University of Silesia

Faculty of Philology

Justyna Jajszczok

The Parasite and Parasitism in Victorian Science and Literature

Dissertation written under the supervision of

Dr hab. Małgorzata Nitka

Sosnowiec 2017

Uniwersytet Śląski

Wydział Filologiczny

Justyna Jajszczok

Pasożyt i pasożytnictwo w wiktoriańskiej nauce i literaturze

Praca doktorska napisana pod kierunkiem

Dr hab. Małgorzaty Nitki

Sosnowiec 2017

CONTENTS

INTRODUCTION

The aim of this dissertation is to study the phenomena of the parasite and parasitism in Victorian science and literature in order to demonstrate the interconnectedness between these two disciplines in terms of their employment of analogous themes, rhetorical devices, concepts and narratives. The parasite here serves as a particular example of the larger trend of cross-inspiration between scientific and literary works. This interconnectedness is presented through ecological interactions and the evolution-derived concept of convergence, both of which are used specifically to signal the equivalent status of literary and scientific narratives in the nineteenth century.

The present work approaches the topic of the parasite and parasitism from four planes:

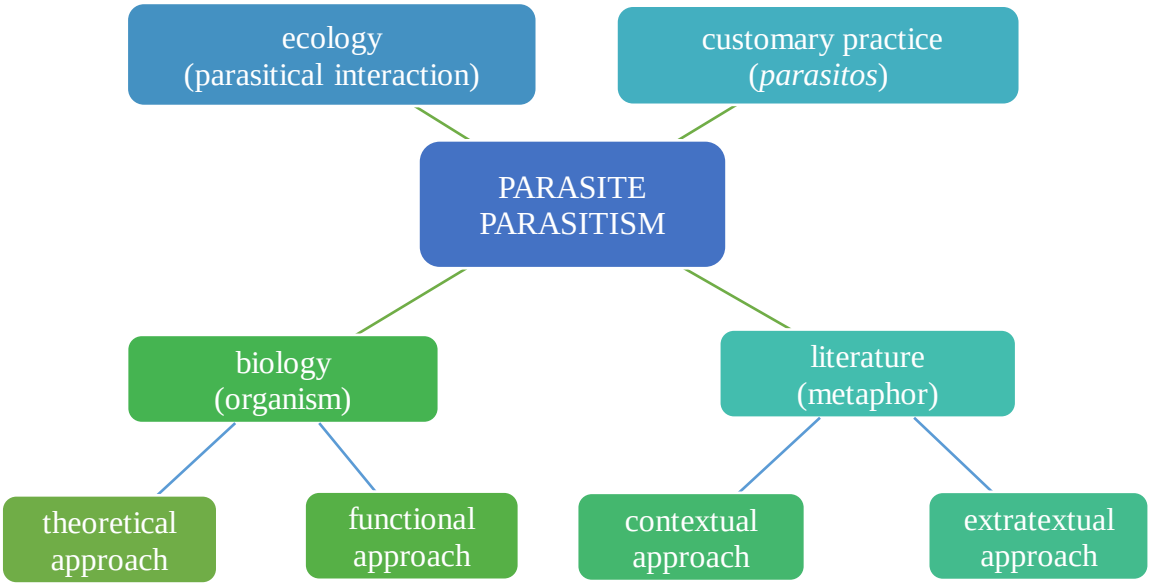

Figure 1 Four Planes of Approaches to the Parasite and Parasitism

The planes presented above show four directions of study included in this work. The plane referred to as customary practice traces the origin of the term parasite to its first and still relevant meaning in which *parasitos* denoted a person "eating at the table of another," i.e. someone taking advantage of other people's broadly understood generosity. *Parasitos* gave

its name to all the other ‘parasites’ and ‘parasitisms’ discussed in this work. The reason why the term ‘customary practice’ is introduced is to distinguish it from the concept of social parasitism which is not explored here. The ecological plane examines parasitism, that is an interaction in which one species benefits while the other is harmed as one of the possible ways in which the relations between scientific and literary texts can be approached. On the biology plane ‘parasite’ is understood either as any organism using other organisms to their benefit (theoretical approach) or as an organism of specific pathology towards their hosts (functional approach); the former approach is closer to the zoological branch of parasitology while the latter – to medicine. Finally, the literature plane is explored on which certain characters of chosen Victorian works of fiction are read as parasites, either because this is how they are portrayed (contextual approach) or because their behaviours can be interpreted as analogous to those exhibited by biological parasites (extratextual approach).

The titular science is being understood here as life science, the branch of natural science which studies living organisms and their relations, and the disciplines used here are predominantly parasitology, biology, and medicine. The literature evoked in the title is mostly regarded here as narrative fiction. In this respect, Chapter I, which analyses a number of instances of science and literature relations, differs from other chapters as it expands the scope of science to include Earth science, especially geology; it also broadens the definition of literature to include Victorian essays and poems.

One of the key concepts employed extensively in this dissertation is that of a story. It is understood here not in the restrictive narratological sense but as any narrative recounting fictional of non-fictional events. This is done to establish a shared platform on which literature and science equivalence or correspondence can be examined. Therefore, this dissertation can be considered a collection of stories of parasites as told by literature and science: Chapter II tells the paradoxical story of their etymological genesis, Chapters III and

IV show the evolution of the narratives of parasites' origins, Chapter V includes stories of their peculiar survival strategies while Chapter VI shows that narratives told by science writers of the twentieth and twenty-first century share similarities with stories found in Victorian fiction.

Every chapter of this dissertation is treated as a single essay, with its own introduction and concluding remarks. Chapter I concludes with the assertion that the most suitable ecological interaction which can be used to describe the science-literature relation in the nineteenth century is mutualism. Chapter II examines the paradoxicality of the concept of the parasite which – contrary to its name – is used mutualistically by science writers to tell their stories. The theme of stories in continued in Chapter III which studies a particular story of parasite origins, which until the nineteenth century were believed to be internal. Chapter IV approaches the story of origin from the external side, and introduces the foremost parasitical narrative of the infection literature subgenre. Chapter V examines a particular example of infection literature, noting the convergence of ideas created by the Victorian fiction writers and later uncovered in natural environment. The final chapter discusses the concept of convergence in relation to contemporary science and literary works of the 1800s.

Two concepts taken from life science govern the present work: the ecology-derived mutualism and convergence, which is borrowed from evolutionary studies. Mutualism assumes a reciprocal interaction between nineteenth-century science and literature, an interaction from which both participants benefit, in terms of having access to new, creative ideas (literature) and innovative ways of describing existing problems (science). Convergence, on the other hand, is understood in evolutionary studies as an arrival at analogous adaptations of different species in different locations; here the concept of convergence is adopted in such a way that it denotes analogous behaviours of characters in literature and organisms in natural environment (specifically, parasitical organisms).

'Convergent concepts' is the name given here to ideas originating in Victorian fiction which do not find their counterparts in their contemporary scientific texts but which can be found in later works of science.

The following sections of the introductory chapter focus on the review of literature and the methodology used in this dissertation. The need to adhere strictly to the concepts derived from life science and attempts at maintaining discipline in employing them is the primary reason why this thesis is not governed by one particular methodological approach. It does use certain methodological tools borrowed from such disciplines as deconstruction, postcolonialism and gender studies to focus on specific problems but overall it cannot be categorised as subscribing to any of them. The more detailed explanation of this choice is given in the methodology section of this chapter. In addition, the review of literature is divided here in two parts: firstly, the readings of the parasite and parasitism in literature and criticism, and then the broader issue of the relations between science in literature is addressed.

Readings of Parasites in Literature

The idea of reading literature's employment and reworking of the theme of the parasite and parasitism is by no means original. Attempts at such an interpretive direction have already been made, especially since the 1980s when literary critics specialising in the science-literature relations inevitably stumbled upon the figure of the parasite in its many guises. The critics whose parasite-related works I use are Kirstie Blair[1] and Laura Otis[2] who encounter

[1] Kirstie Blair, "Contagious Sympathies: George Eliot and Rudolf Virchow," in: *Unmapped Countries: Biological Visions in the Nineteenth-Century Literature and Culture*, ed. Anne-Julia Zwierlein (London: Anthem Press, 2005), 145-154.
[2] Laura Otis, *Membranes. Metaphors of Invasion in Nineteenth-Century Literature, Science, and Politics* (Baltimore and London: The Johns Hopkins University Press, 2000).

'the parasite' through their studies on cells and infections, and Carol A. Senf[3] who includes it in her vampiric inquiries. Jonathan Z. Smith[4] in turn employs religious perspective to analyse the theories of the Other. An extensive collection of essays entitled *Parasites, Worms, and the Human Body in Religion and Culture*[5] examines the notion of parasitism in multiple contexts but mostly in its figurative meaning. Aspects of parasitism in literary deconstructive criticism are explored by J. Hillis Miller,[6] while Michel Serres[7] sees the parasite-host relations as a crucial model in literature, society and technology. The works of the latter two authors are examined in more detail in the next section to explain why their approach to the parasite and parasitism is inapplicable to this study.

In my choice of literary and scientific texts analysed I am mostly indebted to the systematic overview of parasites in nineteenth-century literature done by Anne-Julia Zwierlein in her article "From Parasitology to Parapsychology: Parasites in Nineteenth Century Science and Literature,"[8] in which she presents particular parasite-related features of selected Victorian texts. The following paragraphs summarise and discuss Zwierlein's article in detail in order to outline the scope of its influence on this work as well as the directions in which it deviates from her text.

Zwierlein begins by describing John Ruskin's indignation at science's apparent obsession with distasteful subjects: the unpleasant side of animal life. The disgust he expresses culminates in his total rejection of all that he finds repugnant, parasites

---

[3] Carol A. Senf, *The Vampire in Nineteenth-Century English Literature* (Bowling, Green State University Popular Press, 1988).
[4] Jonathan Z. Smith, "What a Difference a Difference Makes," in: *Relating Religion: Essays in the Study of Religion* (Chicago: University of Chicago Press, 2004), 251-302.
[5] *Parasites, Worms, and the Human Body in Religion and Culture*, eds. Brenda Gardenour and Misha Tadd (New York, Frankfurt, Berlin: Peter Lang, 2012).
[6] J. Hillis Miller, "The Critic as Host," in: *The J. Hillis Miller Reader*, ed. Julian Wolfreys (Stanford: Stanford University Press, 2005), 17-37.
[7] Michel Serres, *Parasite*, trans. Lawrence R. Schehr (Baltimore and London: The Johns Hopkins University Press, 1982).
[8] Anne-Julia Zwierlein, "From Parasitology to Parapsychology: Parasites in Nineteenth Century Science and Literature," in: *Unmapped Countries: Biological Visions in the Nineteenth-Century Literature and Culture*, ed. Anne-Julia Zwierlein (London: Anthem Press, 2005), 155-172.

particularly, which, Zwierlein argues, in effect reveals his desire to push such topics to the margin of scientific discourse and then – if at all possible – eliminate them altogether. She is right to point out that Ruskin in his dismissal of the contemporary scientific discoveries (e.g. of Darwinian evolution) proves his conservatism. Ruskin seems to believe that a proper scientist, when narrativising his subject, is obliged to tell only the good story and carefully omit the horrible ones. In this way Zwierlein sets the premise of her study: "Surprisingly, there are no sustained attempts to link nineteenth century literature with contemporary parasitical studies. […] Taking my cue from Ruskin, the guiding questions will be how parasites in these nineteenth century scientific and literary texts are seen in the light of the 'horrible' and marginal, how far they are accepted as inevitable, and how far a purpose and function within the natural system is ascribed to them."[9] Her main focus is on the particular moments in which the horrible, side-lined parasite moves (or is pushed) from its margins to the spotlight, and the causes of such changes; the answers she offers are: either because the parasites are revealed in their ubiquity and thus inevitability, or because it is discovered that they perform some vital function or serve some important purpose in nature.

Having established her premise, Zwierlein moves on to present a brief history of parasitology in the nineteenth century, using various scientific texts of the period in chronological order. As she notes, parasites in Darwin's works (especially *On the Origin of Species by Means of Natural Selection* published in 1859) are seen as examples of perfect evolutionary adaptations whose place in the natural system is firmly established, just like that of any other organism. The same conclusions on parasites as having "their rightful place in the natural system"[10] are present, she observes, in Otto Gruendler's dissertation (1850) written in Latin. She then evokes the German lecture by Maximilian Perty (1869) in which two points are of interest to her: his anthropomorphisations of the parasites and the attention

[9] Zwierlein, "From Parasitology to Parapsychology," 157.
[10] Zwierlein, "From Parasitology to Parapsychology," 160.

he pays to their extreme, 'proletarian' reproductive capacities. It is worth noting here that she chooses such scientific texts which already show a certain process of metaphorisation of the parasite. The representative of British parasitology that is next mentioned by Zwierlein is T. Spencer Cobbold and his treatise *Parasites* (1879). She points out his eagerness in fighting such prejudices as expressed by Ruskin and in employing military rhetoric of destruction when describing his helminthological subject. Zwierlein does not make here any mention of a crucial fact that at the time of the publication of *Parasites* he was one of very few specialists in the country and his view stems from the position of a medical adviser and not a detached observer and researcher. While discussing Cobbold, Zwierlein just touches upon the probably most important subject in the history of parasitology: the origin of parasites. Here she concentrates solely on the question "whether parasites are intruders or indigenous to the host organism"[11] present in works of Cobbold and T. H. Huxley (1887). In this way, she approaches this subject from a very late point, disregarding the centuries of rival theories trying to answer this question. The present work addresses this issue by broadening the scope of the overview of historical and contemporary theories and beliefs relating to the stories of parasitical origins.

After establishing the historical framework of nineteenth-century parasitology, Zwierlein proceeds to enumerate a number of examples of the contemporary texts in some ways related to 'parasites' or 'parasitism': Robert Browning's poetry in which she notes the issue of the centrality of the marginal; Thomas Hardy's *Tess D'Urbervilles* which she reads as focused on the most detailed; she also evokes H. G. Wells's parasites in *The Time Machine* and the parasitical vampires of *The War of the Worlds,* as well as Rudolf Virchow's essay on bacteria and an entry from the *Encyclopaedia Britannica* on 'Parasitism in Medicine.'

[11] Zwierlein, "From Parasitology to Parapsychology," 161.

While these texts are only listed as in any way relating to the topic, four other literary works are discussed in more detail by Zwierlein: Charles Dickens's *Bleak House*, George Eliot's *Middlemarch*, Bram Stoker's *Dracula* and Arthur Conan Doyle's short story "The Parasite." In *Bleak House* Zwierlein finds parasites as simultaneously ubiquitous (analogous to miasmatic contamination) and being situated outside the system, of which they are disturbers, and whose presence leads to a general disease of the whole social organism, an interpretation she bases on the idea borrowed from Rudolf Virchow. Dickensian parasites, Zwierlein asserts, are easy to identify because they exhibit retrogressive and degenerative characteristics; mostly the predisposition to limit their energetic expenditure. In her analysis of *Middlemarch*, she observes that in Eliot's novel parasites – just like in Darwin's works – are considered regular elements of the system and their presence is so natural that it is sometimes difficult to identify them. Zwierlein traces Eliot's inspirations to Herbert Spencer's idea of a social organism (realised in *Middlemarch* in the form of a web of connections) and G. H. Lewes's analogies between animal and human world. In Zwierlein's reading, Eliot employs biological, parasitical metaphors to tackle moral questions of egoism, free will, determinism and sense of responsibility, as exemplified by the development of Dorothea's character. The moment Zwierlein turns to Stoker and Conan Doyle marks also the point of divergence from parasitology to parapsychology, in which the figure of the parasite is transformed into a symbol of anxieties and threats. In Stoker's 1897 *Dracula* (just like in Dickens's and Eliot's novels) the parasite is equalled with vampire, and is read as a metaphor for a panoply of urban horrors which the upper- and middle-classes associated with the slums: poverty, lack of hygiene, and mostly, the fear of being contaminated by them. Two issues are explored here: one of them is the proneness of the female victim to the vampiric attack, and the other is the terrifying capacity of the vampires to reproduce in vast numbers, which also points to their degeneration. Finally, Zwierlein explores Doyle's "The

Parasite" which she believes could have been a direct inspiration to Stoker. In this story, the parasite stands for a psychological anxiety as well as sexual repression which is first internalised by the main character and then externalised in the form of the West-Indian mesmerist Miss Penclosa (which Zwierlein, erroneously, consistently calls Penelosa), the eponymous parasite. Here the parasite is treated as an inevitable part of the system as well as of the psyche who/which, is always already within.

Zwierlein's conclusion is as follows:

> […] the discourse about the parasite is an instance where science and literature can be seen to diverge more and more as they approach the *fin de siècle*. While nineteenth century parasitology, as we saw above in the writings of Cobbold, had been labouring successfully to demonstrate that parasites are neither divine punishments nor parts of our own organism revealing a 'deficiency' in ourselves, literary texts increasingly used the figure of parasitism to depict not only exploitative mechanisms in society, but also the 'darker' aspects of human psyche. While science increasingly dissociated the victim's predisposition from the fact of his or her infection, in literature the language of parasitology […] offered a way, before the advent of Freud, of describing psychological self-division, and the struggle between conscious and subconscious impulses.[12]

In her overview of parasitology in the nineteenth century, Zwierlein does not go beyond Cobbold's work from the late 1870s; in this way, she does not include the later texts which proved crucial for a new direction of development in this field: such as works by Patrick Manson, Luigi Sambon, and Arthur Looss, among others. These belong to the wider discourse of tropical medicine and imperial advancements, and disprove her concluding claim that literature and parasitology diverged in the final years of the nineteenth century.

The present work picks up Zwierlein's challenge and attempts to advance a few more steps in the task of bridging literature with parasitical studies in the nineteenth century. The focus, however, is different. While Zwierlein concentrates on the parasites' shifts from the margins of discourse to its centre, and the changes in their relevance accompanying these

[12] Zwierlein, "From Parasitology to Parapsychology," 172.

shifts, this thesis pays attention to these qualities of parasitological texts which allow for reading them as literary narratives, and then the particular themes found both in parasitical and literary narratives of the nineteenth century. Because she tries to fit as many examples as possible in the limited medium of a chapter in a collection of essays, Zwierlein is inevitably reductive, often merely ticking off, or signalling an issue without its further development. A number of issues she mentions in passing will gain more prominence in the present work such as the theories of parasitical origins, especially the spontaneous generation theory, the rise of bacteriology (which was the direct consequence of the emergence of tropical medicine), the animal-human analogies used by Lewes and Eliot, and the questions of fault and responsibility of the host/victim. The departure point of my dissertation is very similar to Zwierlein's, as to a certain extent there is an unavoidable overlap in the selection of the literary texts analysed, that is Charles Dickens's *Bleak House* and George Eliot's *Middlemarch*, as well as works by Charles Darwin, T. Spencer Cobbold and G. H. Lewes.

However, what fundamentally differs my work from Zwierlein's is the effort to remain strictly within the scientific discourse, and not to digress into the definitions and readings of the parasite and parasitism derived from cultural studies without the clear indication of such an employment and the reasons behind it. The moment Zwierlein asserts that parasitology diverged from literature at the end of the nineteenth century is also the moment she deviates from science and turns her attention to parapsychology, as exemplified by Doyle's "The Parasite," which is related to the topic only nominally. Therefore, although works by Conan Doyle will be included in the later chapters of this work (most predominantly *The Sign of the Four* from 1890), "The Parasite" will not, for precisely this reason. In the present dissertation, I also pay attention to the works of the late nineteenth-century parasitologists (i.e. Rudolf Leuckart, Arthur Looss, Patrick Manson, and Luigi Sambon) Zwierlein does not mention or include in her bibliography, perhaps because they contradict her assumption.

Moreover, this dissertation carefully omits all references to vampires as, in my opinion, the conflation of parasites and vampires appears rather superficial and, although justifiable by some biological examples, would direct the argument away from the strictly scientific context this work is intended to adhere to.

As mentioned before, the wish to remain within scientific discourse is also the reason why this work does not employ one governing methodological approach. The following section explains the reasons behind this choice and assumes a form of a case study of two examples of literary criticism which use the concept of the parasite in their methods. Here I explore J. Hillis Miller's take on the 'parasite' in more detail, especially his transition from the Greek *parasitos* to literary criticism, and Michel Serres's understanding of the phenomenon of the parasite and parasitism in the scientific context. The overall aim of this section is to demonstrate how the figure of parasite and the phenomenon of parasitism have so far been employed by literary critics, and what advantages and – more importantly – disadvantages their strategies were accompanied by.

The Critic as Parasite. Methodology and Review of Literature

J. Hillis Miller's 1976 essay "The Critic as Host" was originally meant as a reply to critics who compared his interpretative methodology – deconstruction – to parasitism. Miller acknowledges it in the introductory paragraph of the essay which I quote here in full:

> At one point in 'Rationality and Imagination in Cultural History' M. H. Abrams cites Wayne Booth's assertion that the 'deconstructionist' reading of a given work 'is plainly and simply parasitical' on 'the obvious or univocal reading.' The latter is Abrams' phrase, the former Booth's. My citation of a citation is an example of a kind of chain which it will be part of my intention here to interrogate. What happens when a critical essay extracts a 'passage' and 'cites' it? Is this different from a citation, echo, or allusion within a poem? Is a citation an alien parasite within the body of its host, the main text, or is it the other way around, the interpretative text the parasite which surrounds and strangles the citation which is its host? The host feeds the parasite and makes its life possible, but at the same time is killed by it, as criticism is often said to

> kill literature. Or can host and parasite live happily together, in the domicile of the same text, feeding each other or sharing the food?[13]

Miller begins his defence by circumnavigating the accusation he wants to address. Instead, he turns to the more general question whether any criticism at all is not inherently parasitical. This is of vital interest to the present work as well since "cited passages" constitute its great part – as they would in any other thesis on literature. Is this strategy of analysis – i.e. incorporating passages of literary texts and analysing them outside of their original context – on which my dissertation on the parasite and parasitism in Victorian science and literature is based, in essence parasitical? And what does Miller understand by "parasitical"? In his tracing of the history of the parasite, Miller points to "two main modern meanings in English, the biological and the social."[14] This would suggest that he approaches the term from these two perspectives while addressing the issue of parasitical criticism as opposed to the apparently non-parasitical "citation, echo, or allusion." Yet, this is not entirely true: in fact, Miller uses the third meaning, the metaphorical meaning in which to be a parasite means to exploit someone for one's own advantage. When he tackles the question of citations within works of criticism, he does not refer to persons taking advantage of other people's generosity, nor to biological organisms using their hosts' resources but not contributing to their survival. From both these definitions, Miller takes what he needs: the idea of taking advantage, of not contributing anything useful in return, of the relation between the one being exploited and the one exploiting, and discards those elements he deems unnecessary.

The following fragment, in which he explains his understanding of the host-parasite relation, demonstrates this "pick-and-choose approach" and showcases Miller's ease in transitioning from one meaning of the term "parasite" to another:

---

[13] Miller, "The Critic as Host," 17.
[14] Miller, "The Critic as Host," 19.

> A curious system of thought, or of language, or of social organization (in fact all three at once) is implicit in the word parasite. There is no parasite without a host. The host and the somewhat sinister or subversive parasite are fellow guests beside the food, sharing it. On the other hand, the host is himself the food, his substance consumed without recompense, as when one says, 'He is eating me out of house and home'. The host may then become host in another sense, not etymologically connected. The word 'host' is of course the name for the consecrated bread or wafer of the Eucharist, from Middle English *oste*, from Latin *hostia*, sacrifice, victim.[15]

In the first part of the paragraph, Miller obviously refers to the social meaning of parasite: a person who eats someone else's food; the food is being meant here as the actual foodstuff on the table, of which the host also partakes. But in the very next sentence Miller writes that "the host is himself the food." Are we to understand that the meaning of parasite at this point switches from the social to the biological? It would seem so, yet Miller appears to use the metaphorical meaning, citing the idiomatic expression of eating someone out of house and home. However, the meaning behind this idiom is not connected with the actual consumption of the host; it simply means to "eat a lot of someone else's food."[16] So, in order to retain the suggestion that host is food, Miller draws our attention to the *other* host, that is the bread consecrated in the Eucharist. From there he goes to the etymological connection between host and guest.

This turn towards etymology should signal the departure from the biological meaning of parasite but he returns to it in the perhaps most problematic fragment of his essay:

> One of the most frightening versions of the parasite as invading host is the virus. In this case, the parasite is an alien who has not simply the ability to invade a domestic enclosure, consume the food of the family, and kill the host, but the strange capacity, in doing all that, to turn the host into multitudinous proliferating replication of itself. The virus is at the uneasy border between life and death. It challenges that opposition, since, for example, it does not 'eat,' but only reproduces. It is as much a crystal or a component in a crystal as it is an organism. The genetic pattern of the virus is so coded that it can enter a host cell and violently reprogram all the genetic material in that cell, turning the cell into a little factory for manufacturing copies of itself, so destroying it.

---

[15] Miller, "The Critic as Host," 19.

[16] "Eat someone out of house and home," in: *Oxford Dictionaries*, https://en.oxforddictionaries.com/definition/eat_someone_out_of_house_and_home (12.09.2016).

> Is this an allegory, and if so, of what? The use by modern geneticists of an 'analogy' (but what is the ontological status of this analogy?) between genetic reproduction and the social interchanges carried by language or other sign systems may justify a transfer back in other direction.[17]

Miller's line of reasoning is difficult to follow. At first, he talks of the most frightening version of parasite, a virus, a concept undoubtedly borrowed from natural sciences. But Miller's virus is personified, not just through being given a relative pronoun 'who', but through being ascribed actions biological viruses are not capable of performing: invading domestic enclosures or consuming the food of the family. Then these are to be understood as metaphors: the former as an infection, breaking through the protective immune system of the host, the latter as using the host's resources. When he writes about the virus being an uneasy border between life and death, he simultaneously creates an uneasy border within the body of the paragraph: between the metaphorical and the biological parasite, or even between what he understands to be a parasite and how it is understood by science. For afterwards he turns towards an unsourced reference to its genetic composition: resembling a crystal as much as an organism, and with one objective, to reproduce. Miller does not address the discrepancy between his virus "consuming the food of the family" and the scientific viruses not being able to eat. Moreover, from the purely biological point of view, Miller's science is questionable. Viruses not only do not eat; they are not actually organisms in the strict sense; *Dictionary of Epidemiology* defines a virus as "[a] microscopic infectious agent composed of a piece of genetic material (RNA or DNA) surrounded by a protein coat. To replicate, a virus must infect a living cell: viruses can reproduce only by entering a host cell and using the translational system of the cell to initiate the synthesis of viral proteins and to undergo replication."[18] To be considered organisms, viruses would have to be "individual

[17] Miller, "The Critic as Host," 20.
[18] "Virus," in: *A Dictionary of Epidemiology*, 6th Edition, ed. Miquel Porta (Oxford, New York: Oxford University Press, 2014).

living system[s] […] capable of reproduction, growth, and maintenance."[19] Thus, not even being biological organisms, viruses are nonetheless parasites, relying on their hosts entirely.

Miller appears surprised that the epidemiological or genetic source of the definition of viruses he has referenced employs language analogous to that used to describe social interchanges and finds it justification enough to reverse the transfer of vocabulary to his own ends. A similar observation regarding the shared terminology of parasitology and descriptions of social behaviours is made by Michel Serres in *The Parasite* (1980). He explains how "[t]he basic vocabulary of [parasitology] comes from such ancient and common customs and habits that the earliest monuments of our culture tell them, and we still see them, at least in part: hospitality, conviviality, table manners, hostelry, general relations with strangers. Thus, the vocabulary is imported to this pure science and bears several traces of anthropomorphisms."[20] There are two points of interest in his observation; firstly, he is quite right about parasitology employing vocabulary of ancient habits: 'hosts' do 'entertain' or 'harbour' their 'unwelcome guests.' Nonetheless, parasitology does not employ such terms as 'conviviality' or 'table manners' to describe the behaviour of its object of study, although it is more than likely that authors of parasitological narratives would employ such vocabulary as metaphors to explain or present certain parasitical actions. Secondly, he asserts that through the import of vocabulary associated with social parasitism, the "pure science" of parasitology becomes tainted with anthropomorphisms. This would suggest that anthropomorphisation of science is something unusual and that parasitology is somehow exceptional in its use of analogies with the human world. The concept of "pure science" suggests that scientific texts are necessarily devoid of any rhetorical "impurities," an assertion which Chapter I of the present work demonstrates to be false. Moreover, the

[19] "Organism," in: *Oxford Reference*, http://www.oxfordreference.com/view/10.1093/acref/9780199204625.001.0001/acref-9780199204625-e-3120?rskey=jpKdR2&result=3582 (19.09.2016).
[20] Serres, *The Parasite*, 6.

distinguishing of parasitology as special because its vocabulary comes from ancient customs and habits does not seem proper either. After all, it is a common practice in natural sciences to refer to their objects of study, and their behaviours by using available custom-derived vocabulary: peacocks are engaged in spectacular courtship rituals; dolphins are herding and corralling smaller fish, and worker bees serve and protect their queen. Anthropomorphisation and other literary devices present in scientific narratives are not only extremely frequent; they are the integral indispensable part of these narratives.

While I consider Miller's science questionable, I find Serres's use of parasitology tantamount to abuse. A case in point: he claims that "[f]or the science called parasitology, a rat, a carrion-eater like the hyena, a man, be he peasant or high official, are not parasites at all. They are, quite simply, predators. The relation with a host presupposes a permanent or semipermanent contact with him; such is the case for the louse, the tapeworm, the *pasturella pestis*. Not only living *on* but also living *in* – by him, with him, and in him. And thus a parasite cannot be large. Parasitism pertains only to invertebrates, coming to an end with mollusks, insects, and arthropods. There are no parasitic mammals."[21] Even excluding such concepts as brood parasitism or kleptoparasitism, which could be argued to belong rather to ecology than to the "pure" science of parasitology, Serres's limited view of biological parasites seems astounding. This has already been noted by Anders M. Gullestad who points out an obvious example of mammalian parasitism which for some reason escapes Serres's attention: pregnancy.[22] Every person, Serres included, for the first nine months of his or her life to all intents and purposes was a parasite – in biological, not social sense. The human embryo which plants itself inside the mother must first fight her immune response so it is

[21] Serres, *The Parasite*, 6. Original emphasis.
[22] Anders M. Gullestad, "Literature and the Parasite," *Deleuze Studies*, Vol. 5, No. 3 (2011), 306. Available at: http://www.academia.edu/2236429/Literature_and_the_Parasite (19.09.2016).

not rejected as a foreign body that it is.[23] I would argue that the moment of birth is also the moment of the switch of the meaning of the parasite when referred to a person. Foetuses meet the definition of biological endoparasites but once they arrive in the world, their incessant demand of attention and resources and lack of any reciprocation puts them among social parasites.

Because the term 'parasite' used in literature predates by centuries its use in science, both Miller and Serres seem to feel justified in claiming the term and adopting it to their purposes. Yet their adoption, while furthering their own ideas and benefiting from the reversal of rhetoric transfer, leaves science disadvantaged in the process. The interaction in which one of the participants benefits while the other is harmed is recognised in ecology as parasitism/predation. Ironically, when Miller fights the accusation that as a practitioner of deconstruction he is parasitising on "obvious, univocal reading" of a given text of literature, he seems to parasitise on science instead. Both these texts can be accused of introducing undesired anthropomorphisations into the world of science and loading it with concepts for which it has no place. To say that 'parasite' has a negative connotation is to adopt its metaphorical meanings. Botany, zoology or parasitology – perhaps with the exclusion of medicine – do not deal with issues of 'good' and 'evil,' or 'positive' and 'negative.' To natural sciences nature is a vast object of study in which no element is more or less important than the other and all are given (or are supposed to be) impartial treatment. Value judgement is the domain of humanities.

[23] Gullestad, "Literature and the Parasite," 306. He quotes Luis P. Villareal's 1997 article "On Viruses, Sex, and Motherhood" in which the author states that "mammalian embryos resemble parasites that must supress their mother's immune recognition systems to survive." Valerie Curtis notes how the phenomenon of morning sickness can be explained as a secondary immune response of pregnant women. As their immunity is to some extent lessened to allow the implantation and development of the embryo containing foreign genetic material, they are exposed to attacks of other opportunistic parasites: viruses, bacteria, fungi, etc., especially via the gastrointestinal tract. Vomiting in the first trimester may be associated with instinctive rejection of suspicious, i.e. potentially parasite-infected, foods. Valerie Curtis, *Don't Look, Don't Touch*. *The Science Behind Revulsion* (Oxford: Oxford University Press, 2013), 46.

All of this is not to assert that I find both Miller's and Serres's take on parasites and parasitism completely devoid of merit. I agree with Miller's rejection of the idea that there is a possibility of "the obvious and univocal reading" of a given literary work, or that there is one "correct" interpretation. Miller is an important critical influence on this work and his essays on Dickens and Eliot are indispensable in addressing some of the issues these texts raise. Moreover, while, just like Gullestad, I take issue with Serres's conclusion that he offers "the best definition" of parasite – something Gullestad tongue in cheek calls "a truly idiosyncratic approach to the topic in question,"[24] – his view of parasites as "thermal exciters,"[25] which means that they make "the equilibrium of the energetic distribution fluctuate"[26] is also in accord with science. In fact, the view of parasites as disturbers of balance is explored in detail in Chapter III. However, the route these two critics take to reach their conclusions is problematic: in order to support their theses, they exploit scientific concepts. Which is not to say that this is something reprehensible or wrong; in fact, the present work could be accused of the same practice: appropriating elements of biological discourse to its own advantage while disregarding these elements which do not fit the thesis.

A similar problem is present in other critical texts employing the parasite in its biological meaning. In Misha Tadd's article "The Power of Parasites and Worms," the boundaries between the two terms are easily collapsible: sometimes 'parasites' are used interchangeably with 'worms,' at other times 'worms' denote the actual crawling creatures (in this case, their definition is expanded significantly to include "bugs, vermin, snakes, dragons"[27]) while a 'parasite' is seen as "a category of 'relationship.'"[28] From the strictly scientific point of view, such an approach generates problems; if within the established

[24] Gullestad, "Literature and the Parasite," 308.
[25] Serres, *The Parasite*, 190.
[26] Serres, *The Parasite*, 191.
[27] Misha Tadd, "The Power of Parasites and Worms," in: *Parasites, Worms, and the Human Body in Religion and Culture*, eds. Brenda Gardenour and Misha Tadd (New York, Frankfurt, Berlin: Peter Lang, 2012), xi.
[28] Tadd, "The Power of Parasites and Worms," x.

context (usually up to the date of the state of research at the moment of publication) such terms or categories do not have fixed meanings, they cannot form the solid foundation against which new research can be verified. In cultural studies, on the other hand, the lack of such pivots is not problematic, as terminology and categories can be adapted to the momentary need.

What hopefully differs this work from Miller's, Serres's or Tadd's, in my opinion, is the wish to maintain unequivocal definitions while regarding the particular meanings of 'the parasite,' especially the biological ones. It is to a large extent a protective measure and a disclaimer: as a non-specialist in any of the biology-related fields, I take special care to support my employment of scientific concepts with reliable sources and try to utilise them to my best knowledge and abilities with the awareness that, in one way or another, I must be guilty of oversimplification or misuse. Thus, I pay particular attention to my using but not abusing of science, especially when I employ 'parasite' in its metaphorical sense.

This is the reason why throughout this work, whose objective is to analyse Victorian science and literature, I very often include scientific sources from the twentieth or the twenty-first century. On the one hand, these sources serve as instruments of verification of scientific theories presented in Victorian parasitological and literary narratives, and of the assessment which of them proved valuable and which rightly faded away. On the other hand, some of the concepts introduced in the nineteenth century and proven to be inaccurate or simply wrong at that time are still employed today; I show the parallels between Victorian and contemporary science in terms of their abuse within the social or political context, and their repeated failures to influence and educate the general opinion. Consequently, throughout this dissertation I employ natural sciences as the source of the interpretive methods applied to both literary and scientific texts I examine, from ecological interactions

to evolutionary convergence and Parasite Avoidance Theory, all of which are derived from contemporary science.

Just like in terms of content this thesis is indebted to Anne-Julia Zwierlein, in terms of methodological approach it relies heavily on the works of Gillian Beer and George Levine. Both of them are scholars of relations between Victorian science and literature who see the traffic between these two disciplines as two-way. Gillian Beer's *Darwin's Plots* (1983) is an analysis of Darwin's writing and its influence on other writers, especially George Eliot. Beer interprets his style as narrative and notes its debt to literature, showing to what extent the language of science is open to interpretation because of its use of metaphors and other rhetorical devices. This view can be seen as relating to that presented by Gowan Dawson who maintains that "[r]elying on the same rhetorical structures and tropes found in all other forms of discursive activity, scientific texts are, in any case, just as amenable to critical analysis as any work of imaginative literature, and their authorially-mandated meanings […] equally likely to be resisted or subverted in the actual reading processes of different audiences."[29] This, however, is at odds with Beer's view of the interpretation of scientific narratives, as she states explicitly in the introduction to her study: "This book does not imply that Darwin's work is 'fiction'."[30] Expressing the same point, George Levine analogically notes that "[i]f there is two-way traffic between science and literature – and of course I believe that there is – there must be two distinctive channels. Science is not literature."[31]

He expands this view in the essay entitled "Why science isn't literature: the importance of differences." Pertinent to my dissertation, and related to my criticism of Miller, Serres and Tadd, is the introduction to the essay in which Levine states his accusation against

---

[29] Gowan Dawson, "Literature and Science under the Microscope," *Journal of Victorian Culture*, Vol. 11, No. 2 (2006), 304.
[30] Gillian Beer, *Darwin's Plots: Evolutionary Narrative in Darwin, George Eliot and Nineteenth-Century Fiction*, 3rd Edition (Cambridge: Cambridge University Press, 2009), xxv.
[31] George Levine, "Science and Victorian Literature: A Personal Retrospective," *Journal of Victorian Culture*, Vol. 12, No. 1 (2007), 95.

certain directions of literary criticism thus: "The developments in modern literary theory that have produced a radical questioning of the possibility of objectivity, and have turned all written language into discourse, and have insisted on the fictionality of all writing, have also, as a consequence, broken down the borders between fiction and nonfiction."[32] The way in which my dissertation approaches the question of interactions and convergence of science and literature may suggest that I subscribe to the radical questioning mentioned by Levine. That is not the case. My intention is not to break down the borders between fiction and nonfiction and I disagree with the claim that all writing is fictional. My reading of the correspondence between Victorian literature and science does not assume that there are no differences between them. Precisely because there is a fundamental difference between these two disciplines, I introduce the notion of a story to relate ideas found in both of them. The definition of the story used here: "any narrative or tale recounting a series of events"[33] is inherently ambiguous and context-independent. In this understanding, the story, regardless of its fictional or nonfictional nature, is extracted from its source context and examined independently, as a representation of a certain idea, such as degeneration, infection and hostile takeover.

Other methodological approaches used in this dissertation are chapter-specific. While Chapter I explicitly employs the idea of the "two-way" traffic between science and literature realised in the concept of mutualism, the remaining chapters do so implicitly. In its approach to science and literature, Chapter II relies on the ecocritical idea of "the relationship between literary texts and ecological ideas,"[34] but reinterprets it to describe not how the ecological ideas are realised in literary texts but how these texts can be related to science by means of

[32] George Levine, "Why Science Isn't Literature: The Importance of Differences," in: *Realism, Ethics and Secularism: Essays on Victorian Literature and Science* (Cambridge: Cambridge University Press, 2008), 166.
[33] Chris Baldick, *The Concise Oxford Dictionary of Literary Terms* (Oxford: Oxford University Press, 2001), 244.
[34] John Parham, "Dickens in the City: Science, Technology, Ecology in the Novels of Charles Dickens," *19: Interdisciplinary Studies in the Long Nineteenth Century*, No. 10 (2010), www.19.bbk.ac.uk, p 2.

concepts derived from ecology. In its treatment of the many examples of theories of parasite origin, Chapter III employs strategies used in cultural studies: showing how both predominant and marginal cultural discourse influences the perception of reality.[35] In Chapter IV, which concentrates on infection literature, inevitably a postcolonial approach is used to discuss inherent prejudice regarding non-European diseases and their pathogens. Continuing the discussion of infection literature, Chapter V incorporates notions taken from gender studies to address the multi-layered ambiguity of the subversive pathogenic invader. Finally, Chapter VI, through its introduction of Parasite Avoidance Theory, approaches both science and literature from the anthropological perspective, especially in its treatment of the notions of disgust. Thus, it may be stated that this dissertation is based on the methodological principle of adaptation.

[35] Anna Burzyńska, Michał Paweł Markowski, *Teorie literatury XX wieku* (Kraków: Wydawnictwo Znak, 2007), 540.

CHAPTER I INTERACTIONS BETWEEN LITERATURE AND SCIENCE IN THE NINETEENTH CENTURY

Introduction

The aim of this introductory chapter is to examine the relations of science and literature in the nineteenth century, and to propose a strategy of interpretation of these relations. To this end, two methods are utilised here: one derived from cultural studies and one from life science. Culturally, this chapter is indebted to the works of Gillian Beer and George Levine, critics whose approach to fiction and non-fiction texts I wish to emulate. In both Beer's and Levine's studies, the traffic between literature and science is regarded as "two-way,"[1] and this assumption allows for the examination of the extent and scope of the correspondence of scientific and literary texts. Since both Victorian science and literature, as Levine maintains, are products of "one culture," they share a number of similarities, the most crucial of which is the common medium of language. Thus, the two-way communication between them is not just expected; it is inevitable.

This science-literature communication is read here through ecology, the branch of biology which studies interactions between various species, and their environments. Ecology describes how different organisms affect each other and their surroundings, and these descriptions in essence narrativise the phenomena occurring in nature. The interactions ecology analyses – mutualism, commensalism, neutralism, predation/parasitism, and competition – tell stories of how some species gain or lose from contacts with other species.

This reading proposes to use a biology-derived strategy of describing relations and apply it to a different purpose. Such a borrowing seems advantageous as ecology accounts

[1] George Levine, "Science and Victorian Literature: A Personal Retrospective," *Journal of Victorian Culture*, Vol. 12, No. 1 (2007), 95. Gillian Beer, *Darwin's Plots: Evolutionary Narrative in Darwin, George Eliot and Nineteenth-Century Fiction*, 3rd Edition (Cambridge: Cambridge University Press, 2009), 5.

for a variety of interactions which could be used to describe the transforming relation between science and literature in the nineteenth century. Thus, the aim of the chapter is to study a number of literary and scientific texts of the period and attempt at deciding which of the ecological interactions is best suited to denote the science-literature relation. The following sections explore this relation firstly as an example of neutralism, then as commensalism, and finally as mutualism and parasitism/predation.

Because these literary and scientific works serve here as examples of a specifically employed interpretative strategy, they are not analysed in detail; their function is to illustrate the way in which the identification of some ecology-derived interactions may be modified to fit a particular example of science-literature relation better. A more detailed analysis of the example of mutualistic interaction is presented in the final section of the chapter, which contains a case study of the relation between George Eliot's *Middlemarch* (1871-2) and G. H. Lewes's scientific texts: the article "Only a Pond!" (1859), his *Seaside Studies* (1858) and *Studies in Animal Life* (1862). Here, themes and concepts that are communicated between the works of these two authors are examined, and the question of limitations of science-literature correspondence is addressed.

The Ecology of Literature and Science Relations

In an article discussing various linguistic problems a translator of scientific texts may encounter, J. A. Large makes a very interesting remark: "The pragmatic aim of the scientific translator is facilitated by the absence of literary devices in most scientific texts; the scientist strives to communicate clearly and unambiguously to an audience which is expecting to be informed rather than amused or entertained, and literary flourishes would be as out of place

here as mathematical quotations in romantic fiction."[2] Though only a passing comment, it is quite an impressive one in regard to the number of controversial claims it contains. While the author equivocally maintains that it is not true of all scientific texts, the premise is apparent: science and literature are to be treated as two completely separate entities that employ different linguistic means to different ends. As Large suggests, because the aim of a scientific text is to inform – and perhaps also to educate – its audience, it must be presented without any "literary devices"; the aim of literature, on the other hand, is to "entertain" and "amuse." This clean-cut division is rather simplistic: not only does it reduce the value of literature to mere entertainment but it also neglects the possibility of some overlap between science and literature in relation to shared imagery and lexis.

In ecological terms, a situation in which two organisms of different species interact but do not affect each other in any way, is called "neutralism."[3] But in ecology, just like in the humanities, this particular interaction is difficult not only to assert but even to prove. As Eric R. Pianka writes in *Evolutionary Ecology*, "[t]rue neutralism is likely to be very rare or even nonexistent in nature because there are probably indirect interactions between all the populations in any given ecosystem, although their significance may be minimal."[4] Analogically, true neutralism of this type in various disciplines would be extremely difficult to argue. Even if believed to be completely immune to cross-influence, just like in the case of their biological counterparts, these fields might in fact affect each other in a number of ways so subtle that their interactions would be difficult to observe and perhaps thus considered unimportant or irrelevant. When Large juxtaposes "literary flourishes" in a

---

[2] J. A. Large, "Science and the Foreign-Language Barrier," in: *Working with Language. A Multidisciplinary Consideration of Language Use in Work Contexts*, ed. Hywel Coleman (Berlin: Mouton de Gruyter, 1989), 179.

[3] *The Oxford Dictionary of Ecology* defines neutralism as "[a] situation in which two species populations coexist, with neither population being affected by association with the other." "Neutralism," in: *The Oxford Dictionary of Ecology*, 4th Edition, ed. Michael Allaby (Oxford: Oxford University Press, 2010).

[4] Eric R. Pianka, *Evolutionary Ecology*, 7th Edition, eBook (2011), 229.

scientific text with "mathematical quotations in romantic fiction," he sees them as equivalent incongruities in their respective contexts. Even though, as Large suggests, a complex equation may indeed seem unusual within a romantic narrative (albeit not completely "out of place," especially considering postmodern literary strategies), it would be very problematic to find a scientific paper absolutely devoid of any literary devices. If different species are part of one environment, so are literature and science part of Levine's "one culture": they have not developed in complete isolation and it seems more than possible that they may have influenced each other.

The question remains as to the type and extent of their communication. In this respect the ecological discourse comes in handy, as there are other interactions which might prove more valuable in the examination of the relation of science and literature than the controversial neutralism. Ecology identifies five more interspecific interactions: mutualism ("An interaction between two species in which both species benefit"[5]), commensalism ("The interaction between species populations in which one species, the commensal, benefits from another, sometimes called the host, but this other is not affected"[6]), amensalism ("An association between two species that is detrimental to one of the species but has no effect on the other"[7]), competition ("The interaction that occurs between two or more organisms, populations, or species that share some environmental resource when this is in short supply"[8]), and predation/parasitism[9] The reason why predation and parasitism are conflated into one is that from the ecological perspective the outcome of these interactions is the same: while one species benefits (the predator or the parasite) the other is harmed (the prey or the

[5] "Mutualism," in: *A Dictionary of Biology*, 7th Edition, eds. Elizabeth Martin, Robert S. Hine (Oxford: Oxford University Press, 2015).
[6] "Commensalism," in: *A Dictionary of Biology*.
[7] "Amensalism," in: *A Dictionary of Biology*.
[8] "Competition," in: *A Dictionary of Biology*.
[9] Judith L. Bronstein, "Mutualisms," in: *Evolutionary Ecology. Concepts and Case Studies*, eds. Charles W. Fox, Derek A. Roff, Daphne J. Fairbairn (Oxford: Oxford University Press, 2001), 318-319.

host). As these cover the entire spectrum of interrelations from mutual benefit to mutual harm, they may prove useful in determining the relation of science and literature in the Victorian period.

As this chapter progresses, various examples of science-literature relations in the nineteenth century will be analysed in order to assert the most suitable term to denote their mutual influence. Since this terminology is borrowed from contemporary ecology, it may suggest that literature and science are read here as equivalents of different species, competing or cooperating within the same environment, like oxpeckers eating ticks off the backs of hippopotamuses.[10] While at face value quite interesting, such a reductive analogy would be very difficult to argue convincingly. This, however, is not the point of the employment of ecological concepts. Ecology is a discipline which studies various species and their interactions in an environment, and at its core lie the notions of interconnectedness and mutual influence. As such, it has established a number of tools and methods to research and examine its subject. Throughout this chapter I use the discipline of ecology as a provider of research tools which I then employ to read the science-literature relations in a particular way. In a work whose goal is to study the scientific notion of parasitism in literature, such methodology seems most fitting.

[10] This type of interaction would be classified as mutualism, as apparently both species benefit from the interaction. However, studies show that such classification might not be entirely accurate. Oxpeckers do eat ticks feeding on the skin of large mammals but their preferred food is blood and thus, given the choice of parasitic insects or wounds in the skin of their hosts (or "clients"), they will choose to feed on the wounds. In his article on the subject of the mutualism of red-billed oxpeckers, Paul Weeks notes how problematic such a classification of this ecological interaction is: "it is possible that oxpeckers are, for instance, parasitic on hippopotami (where they seem to feed exclusively on wounds: Attwell, 1966; Olivier and Laurie, 1974), commensal on impala, and mutualistic on rhinoceroses." Paul Weeks, "Red-Billed Oxpeckers: Vampires or Tickbirds?" *Behavioral Ecology*, Vol. 11, No. 2 (2000), 158-159. Available at: http://beheco.oxfordjournals.org/content/11/2/154 (11.09.2016).

Literature and Science

The relation between science and literature in the nineteenth century is perhaps best visible when literary texts are inspected for their scientific inspirations. A common practice of interpretation among critics attempting a survey of literature and science of the period, this however usually leads to a somewhat slanted reading of the communication between them, one that usually assumes the precedence of science while disregarding the possibility that literature may affect science as well. In her article on narrative ambiguity in nineteenth-century scientific literature, Charlotte Sleigh complains that "overviews of science and literature are […] scarce" and most of those written use the "obvious model" which is "to trace how themes of science have been echoed in the literature of their day."[11] What she finds problematic in this approach is the general inclination to "see the interaction of science and literature as one-way."[12] That kind of relation suggests commensalism in which literary texts tend to be regarded as mere receptacles for the ideas derived from natural sciences while the latter are not only prioritised in terms of importance but are also seen as being unaffected by the interaction. Literature of the Victorian period seems a common object of this kind of examination, more often than not being interpreted as a mirror in which the great scientific advancements of the nineteenth century, from Charles Lyell's uniformitarianism[13] to Charles Darwin's evolutionary concepts to Herbert Spencer's survival of the fittest, are reflected.

Two disciplines of natural sciences in particular had an immense impact on the culture of the nineteenth century: geology and biology; and the force of this impact is a frequent

[11] Charlotte Sleigh, "'This Questionable Little Book': Narrative Ambiguity in Nineteenth Century Literature of Science," in: *Unmapped Countries. Biological Visions in Nineteenth-Century Literature and Culture*, ed. Anne-Julia Zwierlein (London: Anthem Press, 2005), 15.
[12] Sleigh, "'This Questionable Little Book'," 15.
[13] Although Lyell did not coin this term – William Whewell did in 1832 – he is generally known for popularising it. "Uniformitarianism," in: *Encyclopaedia Britannica*, https://www.britannica.com/science/uniformitarianism (14.09.2016).

subject of Victorian literature and also of its critical studies. The borrowing and employment of scientific concepts by literature was especially widespread after the publication of Charles Darwin's *On the Origin of Species* in 1859, when many writers' interest in evolution, geology and other fields of natural science was manifested in their texts.[14] Darwin's ideas of variation under domestication, variability, struggle for existence and natural selection not only did to some extent disturb many of Victorian beliefs but also introduced a new set of creative ideas to be extensively explored in fiction. At the same time, however, it cannot be said that the theory of evolution appeared new and original, and that it turned the Victorian perception of the world upside down overnight. The educated part of society had already been introduced to these notions through Robert Chamber's *Vestiges of Creation* (first published anonymously in 1844) or Jean-Baptiste Lamarck's early evolutionary concepts from the late eighteenth and early nineteenth century. In fact, as Janet Browne maintains, theories of Charles Darwin and Alfred Russel Wallace "meshed fluently with Victorian notions of competition and progress across the realms of society, technology, politics and culture."[15]

The fluency of this meshing is explored in meticulous detail in Alvar Ellegård's *Darwin and the General Reader* which studies the responses of the public to Darwin's conceptions through the analysis of the British press. In his study, he breaks the responses into "a scale of positions," from absolute rejection to absolute acceptance, and includes educational, politico-ideological and religious factors which influenced these positions. As he notes, the immediate controversy Darwin's theory stirred can be summarised as the conflict between science and religion or between naturalism and supernaturalism,[16] but he

[14] Janet Browne, "Constructing Darwinism in Literary Culture," in: *Unmapped Countries. Biological Visions in Nineteenth-Century Literature and Culture*, ed. Anne-Julia Zwierlein (London: Anthem Press, 2005), 55.
[15] Browne, "Constructing Darwinism in Literary Culture," 56.
[16] Alvar Ellegård, *Darwin and the General Reader: The Reception of Darwin's Theory of Evolution in the British Periodical Press, 1859-1872* (Chicago and London: The University of Chicago Press, 1990), 32.

also observes that the religious response to Darwin was more nuanced than expected. While it is true that High and Low Church of England were decidedly against the implications presented in *On the Origin*, Broad Church and Unitarians were, as Ellegård puts it, "much less anti-Darwinian."[17] Predictably, the bone of contention was the concept of natural selection, the crux of Darwin's theory which questioned the existence of an intentional direction of evolutionary developments.

Relevant to the present discussion, Ellegård also makes an interesting observation regarding Chambers's *Vestiges*. Apparently, Victorian scientists considered it nothing more than an amateurish book full of "slips on many points in detail,"[18] but they felt compelled to refute many of the issues it presented because it was a very popular book[19] that "made such a stir among non-scientific readers."[20] In consequence, readers acquainted with Chambers's ideas and their subsequent criticisms might have been sceptically predisposed towards Darwin's work, assuming it to be nothing more than a reworking of the fallacious theories from *Vestiges*, and another literary rather than scientific text. This might be the additional reason why *On the Origin of Species* was not met with general acclaim: not necessarily because of its controversial contents but because of its language and the style in which it was written. George Eliot, for instance, seemed rather unimpressed upon her first reading of Darwin's publication; in her journal, she noted that "[i]t seems not to be well written: though full of interesting matter, it is not impressive, from want of luminous and orderly presentation."[21] Gillian Beer refers to Eliot's response as "a curiously inadequate reaction to a book whose theories were to leave man wandering in a thronged, strifeful world of nature

[17] Ellegård, *Darwin and the General Reader*, 36-38.
[18] Ellegård, *Darwin and the General Reader*, 11.
[19] 24,000 copies sold by 1860, Ellegård, *Darwin and the General Reader*, 11.
[20] Ellegård, *Darwin and the General Reader*, 11.
[21] George Eliot, "Journal," quoted in: Gillian Beer, *Darwin's Plots: Evolutionary Narrative in Darwin, George Eliot and Nineteenth-Century Fiction*, 3rd Edition (Cambridge: Cambridge University Press, 2009), 146.

which offered him no peculiarly endowed place."[22] However, her reaction might not have been adequate at the time but having had over a decade to peruse Darwin's text, Eliot presented her own well written and impressive evolution-inspired work, both luminous and orderly presented. Her initial dislike of *On the Origin* is indicative of another issue; perhaps just like the majority of the Victorian reading public, Eliot approached it with a mindset of a reader of a piece of literature, not a scientific text, and judged it accordingly. Thus, the contents of *On the Origin*, to Eliot, lost some of its impact because of imperfect delivery.

The influence of Darwin's theory on the culture of the nineteenth century is unquestionably widespread and profound. It seems impossible to overstate the extent to which evolutionary concepts actually shaped the collective mind of the Victorian society, especially the middle classes, that is those who in reality were the main producers and consumers of culture. Apart from questioning Christian fundaments of the world, Darwin can also be seen as having ruined nature for Victorians. Under his instructions, it changed from a well-known pastoral Arcadia into an unknown environment which, as Sean Purchase puts it, became "capricious, amoral, potentially cruel and ruthless, but worst of all, indifferent to who or what it let survive."[23] To many, the chaotic, godless struggle for survival (or "struggle for existence" as it was originally called by Darwin) proved difficult to accept – and these efforts were also recorded by the literature of the period.

Just like the public, so were the authors documenting their struggles with processing the Darwinian theory divided into its supporters and opponents. While science writers T. H. Huxley and G. H. Lewes fervently advocated Darwinian concepts, others, such as Richard Owen, passionately criticised them. A similar division can be identified among literary writers: novelists such as George Eliot and H. G. Wells are generally considered pro-Darwinian, while Alfred, Lord Tennyson can be seen as rather sceptical towards the

[22] Gillian Beer, *Darwin's Plots*, 146.
[23] Sean Purchase, *Key Concepts in Victorian Literature* (Basingstoke: Palgrave MacMillan, 2006), 124.

implications suggested in *On the Origin*.[24] Some of these literary and cultural responses to Darwin's concepts are presented in the following section of the chapter. They have been chosen specifically to illustrate two issues. First of all, they show how literature interpreted and imagined the world under the new rule of natural selection. Secondly, the examples provided here record the evolution of the influence of natural selection on the notions of progress and degeneration, the latter of which is inseparably related to the phenomenon of biological parasitism.

Science in Literature

Typically considered a commentary on Darwin's godless, violent nature, Alfred, Lord Tennyson's *In Memoriam A. H. H.* (1849) predates *On the Origin* by ten years. If Tennyson's scientific inspirations were to be identified, these would most likely be works of Charles Lyell and Robert Chambers "under whose command/Is Earth and Earth's, and in their hand/Is Nature like an open book."[25] Tennyson's famous "Nature, red in tooth and claw" line seems distinctly Darwinian in its implications, but it may be considered a part of what John Holmes refers to as "a general trend of secularisation and religious questioning."[26] The year of the publication of *On the Origin* was not the critical moment when the doubts regarding Christian faith confronted with scientific discoveries suddenly entered collective consciousness; these had been circulating among the educated part of the society for decades. Such doubts are echoed in the following stanza:

> Are God and Nature then at strife,
> That Nature lends such evil dreams?
> So careful of the type she seems,

[24] John Holmes, "Darwinism in Literature," *University of Reading Weblogs*, 2015, blogs.reading.ac.uk/english-at-reading/files/2014/02/Darwinism-in-Literature1.pdf (09.01.2017), 1-2.
[25] Alfred, Lord Tennyson, *In Memoriam A. H. H,* Eleventh Edition (London: Edward Moxon & Co., 1862), 210.
[26] Holmes, "Darwinism in Literature," 1.

So careless of the single life[27];

These lines may be interpreted as the artistic expression of what John Cartwright calls "the immense suffering that lies at the heart of natural processes."[28] Yet these verses also point to the incomprehensible indifference of the natural world, and the fundamental conflict between Nature and God – an observation which in a way foreshadows the later implications of the Darwinian struggle for existence.

According to the theory of natural selection, species struggling for existence are most likely to survive if they adapt best to their environment (a strategy that Herbert Spencer later called "the survival of the fittest"[29]). Survival of the fittest and natural selection were controversial not just because of their implied lack of teleology. More importantly, they undermined the Victorian faith in progress-directed development[30] because adaptations can lead to both progressive developments and degeneration. An example of adaptive degeneration which entered public consciousness even before *On the Origin*'s publication was "the life story of barnacles."[31] Barnacles begin their lives as free-living creatures, but once they find their spot, they get rooted in it, and remain there for the rest of their lives, forfeiting their freedom of movement. Darwin himself made barnacles the subject of his studies published in 1852 and 1854.[32] These seem a direct inspiration to Charles Dickens,

---

[27] Tennyson, *In Memoriam A. H. H.*, 78.
[28] John Cartwright, "Those Dreadful Hammers: Geology and Evolution in Nineteenth Century Literature," in: *Literature and Science. Social Impact and Interaction*, eds. John H. Cartwright and Brian Baker (Santa Barbara: ABC-CLIO, 2005), 179.
[29] Herbert Spencer, *The Principles of Biology* (Edinburgh and London: Williams and Norgate, 1864), 444.
[30] Angelique Richardson, "'The Difference Between Human Beings': Biology in the Victorian Novel," in: *A Concise Companion to the Victorian Novel*, ed. Francis O'Gorman (Oxford: Blackwell Publishing, 2005), 212.
[31] Richardson, "'The Difference Between Human Beings'," 212.
[32] Charles Darwin, *Living Cirripedia, A Monograph on the Sub-Class Cirripedia, with Figures of All the Species. The Lepadidæ; or, Pedunculated Cirripedes* (London: The Ray Society, 1852) and *Living Cirripedia, The Balanidæ, (or Sessile Cirripedes); the Verrucidæ* (London: The Ray Society, 1854). Both available at: http://darwin-online.org.uk/EditorialIntroductions/Freeman_LivingCirripedia.html (11.09.2016).

who incorporated a whole family of Barnacles in *Little Dorrit* (1855-57).[33] The administrators of the Circumlocution Office fulfil their nominative determinism to the letter:

> To have got the whole Barnacle family together would have been impossible for two reasons. Firstly, because no building could have held all the members and connections of that illustrious house. Secondly, because wherever there was a square yard of ground in British occupation under the sun or moon, with a public post upon it, sticking to that post was a Barnacle. No intrepid navigator could plant a flag-staff upon any spot of earth, and take possession of it in the British name, but to that spot of earth, so soon as the discovery was known, the Circumlocution Office sent out a Barnacle and a despatch-box. Thus the Barnacles were all over the world, in every direction – despatch-boxing the compass.[34]

Dickens's Barnacles, just like Darwin's Cirripedia, are ubiquitous and tenacious in their adherence; once attached to a post, they become its part and parcel. Combining the various meanings of the expression "post," Dickens draws from natural sciences to characterise his collective characters through the qualities of the biological creatures they epitomise, thus incorporating scientific discourse into his novel.

The idea of progress-unrelated adaptations conditioned by natural selection was also employed by H. G. Wells in his *The Time Machine* (1895), in which the human race diverges from the common root and develops into two branches: the Eloi and the Morlocks. Brian Baker notes how this novel portrays the biology-originating social fears of the late nineteenth century: "the Eloi have lives of 'material enjoyment,' but they are a degenerated species, locked into a parasitic relationship with the Morlocks."[35] The relationship between these two subspecies evokes ecological interactions in criticism; while to Baker it is parasitic, Joshua

---

[33] This connection is analysed by Jonathan Smith in "Darwin's Barnacles, Dickens's *Little Dorrit*, and the Social Uses of Victorian Seaside Studies," *Lit: Literature Interpretation Theory*, Vol. 10, Issue 4 (1999), 327-347.

[34] Charles Dickens, *Little Dorrit* (London: Bradbury and Evans, 1857), 297.

[35] Brian Baker, "Darwin's Gothic: Science and Literature in the Late Nineteenth Century," in: *Literature and Science. Social Impact and Interaction*, eds. John H. Cartwright and Brian Baker (Santa Barbara: ABC-CLIO, 2005), 206.

Stein considers it "symbiotic."[36] Yet when we consider the observations of the protagonist of the novella, the Time Traveller, neither of these terms seems appropriate:

> The Upper-world people might once have been the favoured aristocracy, and the Morlocks their mechanical servants: but that had long since passed away. The two species that had resulted from the evolution of man were sliding down towards, or had already arrived at, an altogether new relationship. The Eloi, like the Carolingian kings, had decayed to a mere beautiful futility. They still possessed the earth on sufferance: since the Morlocks, subterranean for innumerable generations, had come at last to find the daylit surface intolerable. And the Morlocks made their garments, I inferred, and maintained them in their habitual needs, perhaps through the survival of an old habit of service. […] Ages ago, thousands of generations ago, man had thrust his brother man out of the ease and the sunshine. And now that brother was coming back changed! Already the Eloi had begun to learn one old lesson anew. They were becoming reacquainted with Fear. And suddenly there came into my head the memory of the meat I had seen in the Under-world.[37]

The symbiosis suggested by Stein is impossible to argue once the facts are laid bare; the Morlocks may very well dress and house the Eloi but what they get in return is the furthest from the Eloi's advantage: their flesh for consumption. In its common meaning, "symbiotic" would be synonymous with "mutualistic," i.e. mutually beneficial, which is not be the case of the Eloi-Morlocks relation. Their interaction seems most likely to be predatory, in which one of the groups benefits while the other is irretrievably harmed (i.e. killed).

As the example of barnacles shows, in the nineteenth-century scientific and cultural discourse biological parasites tended to be connected with the problem of degeneration. This connection was propagated by E. Ray Lankester's 1880 work *Degeneration: A Study in Darwinism* in which the example of parasites is used to picture a possibility of an evolutionary regression: from advanced, free-living creatures, to very simple ones, reduced to feeding and reproduction. Baker notes that "[d]egenerationist theorists often drew upon

[36] Joshua Stein, "The Legacy of H. G. Wells's *The Time Machine*: Destabilization and Observation," in: *H. G. Wells's Perennial* Time Machine, eds. George Slusser, Patrick Parrinder, and Danièle Chatelain (Athens and London: The University of Georgia Press, 2001), 151.
[37] H. G. Wells, *The Time Machine: An Invention* (New York: Henry Holt and Company, 1922), 136-137.

parasitology for their examples,"[38] as they proved a distressful yet fascinating phenomenon, to writers and general public alike. Thus, parasites in various forms found their way into Victorian consciousness. An interesting example of such use of parasites can be found in *Punch's Almanack*.

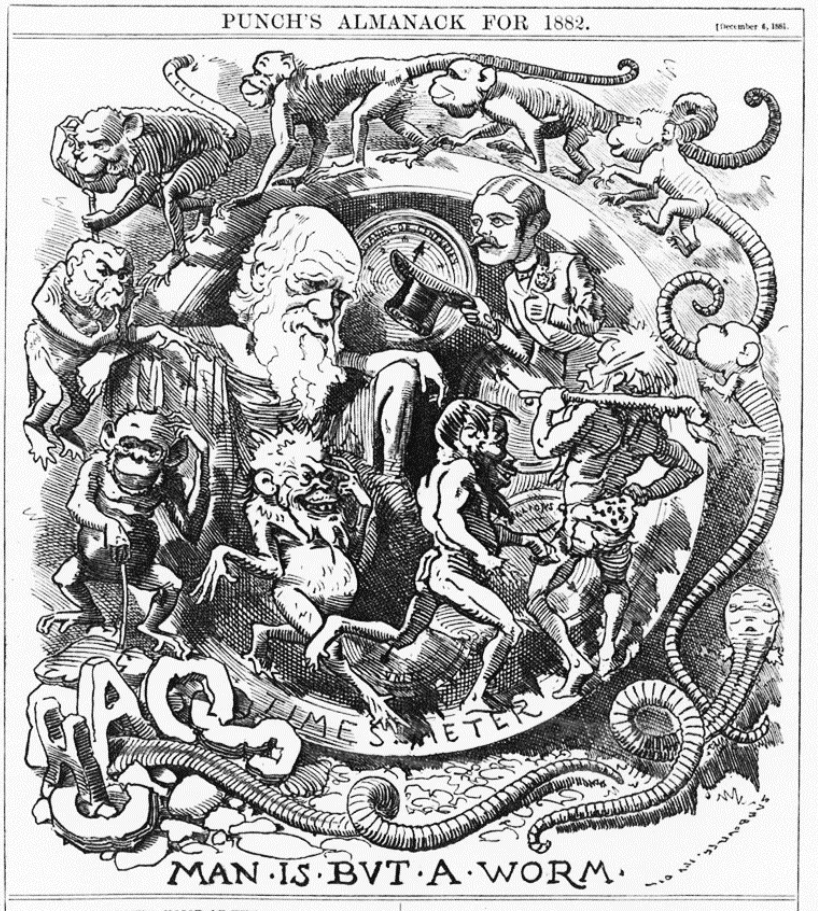

Figure 2 Linley Sambourne, "Man Is but a Worm," Punch's Almanack for 1882.

Entitled "Man is but a Worm," Linley Sambourne's illustration employs the representation of worms in an attempt to ridicule and undermine Darwin's theory through crude simplification. It presents a scientifically incorrect but socially compelling vision in which worms are generated from chaos and then go through various progressive modifications to

[38] Baker, "Darwin's Gothic...," 206. One of such writers was Max Nordau. In his *Degeneration*, he describes "the ideal man of decadentism" as "[a] parasite of the lowest grade of atavism, a sort of human sacculus." In the footnote he explains what sacculus is, echoing Lankester's words: "a cirripedia which lives in the condition of a parasite in the intestinal canal of certain crustacea. It represents the deepest retrograde transformation of a living being primarily of a higher organization." Max Nordau, *Degeneration. Translated from the Second Edition of the German Work*, trans. anonymous (London: William Heinemann, 1895), 329.

arrive at the most advanced, the fittest creature at the other end of the chaos – Darwin himself. Different evolutionary stages indicated on the "times-meter" show the shortcut from worms to monkeys (whose tails are to be the remnants of their previous verminous bodies), to apes, to cavemen, to contemporary people. This example shows how a specific scientific concept is not just used but abused to serve particular ideological ends, which may even point to the possibility that rather than commensal, the interaction between science and culture may as well be predatory/parasitic.

Since the abovementioned examples have been chosen to reflect the "obvious model" of interpretation, i.e. inspecting literature for scientific inspiration, at face value these examples support the interpretation of the science-literature interaction as commensal, yet certain issues point to a different classification. While literature, taking inspiration from science, benefits creatively, the assertion that the scientific participant in the interaction retains its neither advantageous nor disadvantageous position is questionable. The scientific notions are not transplanted from their source material to fiction without being first modified and customised by the writers, and these alterations may stem from their own interpretations of science as they understand it. Such modifications therefore always carry the risk of oversimplification or misrepresentation on the part of the novelists, and then of confusion and misunderstanding on the part of their readers. On the other hand, a transition of this kind may as well prove beneficial to science which, as a result of the interaction, becomes enveloped in new meanings and thus introduced into new contexts. In this manner, the scientific theories are offered a new research paths through which various results of their application can be tested and verified. Thus, I argue that commensalism is not the most suitable term to denote the relations between science and literature in the nineteenth century. As another ecology-originating interaction would be more suitable to describe their cross-

influencing, the aim of the following section is to select one of two remaining possibilities, that is that is either predation/parasitism or mutualism.

Literature in Science

The examples used above illustrated in what way literature can benefit from its relation to science. The following examples inspect the reversal of this relation, i.e. how science can benefit from literature. In this section, four ways in which literature is used by science are analysed: as an aid in explanation (as shown by Robert Chambers); as a means of assimilation and anesthetisation (in Charles Lyell's writing); to show analogies within the same discipline (which is done by Alfred Russel Wallace and Charles Darwin), and lastly, to point to cross-discipline analogies which may inspire comical reactions (as exemplified by E. Ray Lankester's and G. H. Lewes's works). Each of these strategies serves a different purpose: from presenting complex and complicated notions in such a way they would be more accessible to the general reader, to making the scientific texts more interesting and appealing, and finally, to revealing the relevance of the world of natural sciences to the readers' everyday life.

In the aforementioned quote regarding the task of a scientific translator, J. A. Large suggests that the employment of "literary devices" may somehow confuse readers or introduce some undesired ambiguity into the body of the scientific text. This seems not to be the case, as rhetorical and stylistic figures appear in works of science frequently, and serve much more important purpose than just ornamental; in fact, it is their presence that ensures clarification and elucidation. Literary devices such as metaphors or similes are employed extensively and specifically to familiarise readers with new concepts by evoking the well-known ones. A perfect illustration of a literary device at work in a scientific context

may be found in the first paragraph of Robert Chambers's *Vestiges of Creation* (1844) in which he attempts to account for the vastness of the universe:

> The sun, planets, and satellites, with the less intelligible orbs termed comets, are comprehensively called the solar system, and if we take as the uttermost bounds of this system the orbit of Uranus […], we shall find that it occupies a portion of space not less than three thousand six hundred millions of miles in extent. The mind fails to form an exact notion of a portion of space so immense; but some faint idea of it may be obtained from the fact, that, if the swiftest race-horse ever known had begun to traverse it, at full speed, at the time of the birth of Moses, he would only as yet have accomplished half his journey.[39]

The first part of the description is purely scientific: we are informed of the elements of the solar system and of its size in thousands of hundreds of million miles – which proves a challenge to visualise even to a twenty-first century mind. Therefore, Chambers resorts to the means of something known to help his readers imagine the apparently unimaginable. He uses the example of a familiar notion of a race-horse and a time reference of the birth of Moses to make a simpler, more accessible version of the otherwise inconceivable vastness of the universe. These references are very imprecise as neither the speed of the race-horse nor the birth date of the biblical Moses can be precisely established. This is not relevant, however. Instead, they are supposed to allow for a different kind of visualisation for a mind to which "three thousand six hundred millions of miles" means nothing. This extended simile is by no means "out of place," quite the opposite, it makes the paragraph more lucid.

Chambers's quotation allows us to gather at least two points. Firstly, he demonstrates that mere information is simply not enough; he wants his audience to comprehend these scientific concepts and the way to do that is to represent them through recognisable images. Secondly, he suggests that literature would be the preferred way in which science should be explained. Having previously written *History of English Language and Literature* (1836),

[39] Robert Chambers, *Vestiges of the Natural History of Creation* (London: John Churchill, 1844), http://www.gutenberg.org/dirs/etext04/vstc10h.htm (02.08.2014).

Chambers extensively drew on his literary experience when describing nature, which may explain why *Vestiges of Creation*, as Klaus Stierstrofer notes, "is replete with literary metaphors and references."[40] Because Chambers retained what Stierstrofer calls his "'literary' strategies of conceptualization and presentation,"[41] he ultimately produced a "book form which his contemporaries found most accessible and readable, the novel"[42] whose protagonist, as it were, is the world. This observation is validated by some passages in Chambers's work. For instance, he refers to various geological layers as "the leaves of the *Stone Book*"[43] or "pages of the geological record"[44] which together compose "the wondrous chapter of the earth's history."[45] Introducing new concepts, Chambers, through his use of an accessible genre of narrative nonfiction, leads his readers by the hand, instead of forcing them to wade on their own through scientific jargon. As he wrote in the conclusion, *Vestiges* was "composed in solitude […] for the sole purpose (or as nearly so as may be) of improving the knowledge of mankind, and through that medium their happiness."[46] To Chambers, the road to happiness leads through knowledge and he sees it as his duty to make this journey as easy and pleasant as possible.

Perhaps it could be argued that the example of Chambers, being a man of literature and of science alike, is rather unusual and does not prove that science and literature influenced each other so frequently. *Vestiges*, however, even though it is quite extreme in adopting literature to its means, is no exception. Many scientific works of the nineteenth century were written by erudite scholars who possessed extensive knowledge reaching outside the scope of their own disciplines. Charles Lyell, for example, the author of the

---

[40] Klaus Stierstrofer, "Vestiges of English Literature: Robert Chambers," in: *Unmapped Countries. Biological Visions in Nineteenth-Century Literature and Culture*, ed. Anne-Julia Zwierlein (London: Anthem Press, 2005), 33.
[41] Stierstrofer, "Vestiges of English Literature: Robert Chambers," 27.
[42] Stierstrofer, "Vestiges of English Literature: Robert Chambers," 35.
[43] Chambers, *Vestiges.*
[44] Chambers, *Vestiges.*
[45] Chambers, *Vestiges.*
[46] Chambers, *Vestiges.*

Principles of Geology (1830-33) believed that a good geologist "should, if possible, be at once profoundly acquainted with ethics, politics, jurisprudence, the military art, theology; in a word, with all branches of knowledge, whereby any insight into human affairs, or into the moral and intellectual nature of man, can be obtained."[47] He also added that "[i]t would be no less desirable that a geologist should be well versed in chemistry, natural philosophy, mineralogy, zoology, comparative anatomy, botany; in short, in every science relating to organic and inorganic nature."[48] Lyell, perhaps considering himself a very good geologist, proves this on numerous occasions on the pages of his geological work, making frequent references to philosophy, politics, theology and literature.

However, rather than to aid understanding, Lyell makes use of literary imagery as well as of literary texts in order to make his geological descriptions more captivating. Which is quite effective as the following description of the Sicilian ravine Valle del Bove shows:

> Let the reader picture to himself a large amphitheatre, five miles in diameter, and surrounded on three sides by precipices from two thousand to three thousand feet in height. […] The character of the scene would accord far better with Milton's picture of the infernal world; and if we imagine ourselves to behold in motion, in the darkness of the night, one of those fiery currents, which have so often traversed the great valley, we may well recall
>
> —'yon dreary plain, forlorn and wild,
> The seat of desolation, void of light
> Save what the glimmering of these livid flames
> Cast pale and dreadful.
>
> The face of the precipices already mentioned is broken in the most picturesque manner by the vertical walls of lava which traverse them.[49]

Lyell begins in the same manner as Robert Chambers does, by coming forward with data concerning the size of the valley. However, the sight he encounters is appealing to the

[47] Charles Lyell, *Principles of Geology or, The Modern Changes of the Earth and its Inhabitants Considered as Illustrative of Geology*, vol. 1 (New York: Appleton and Company, 1854), 2-3.
[48] Lyell, *Principles of Geology*, vol. 1, 2-3.
[49] Lyell, *Principles of Geology*, vol. 3, 88-9.

aesthetic sense to such an extent that numbers alone cannot express it; therefore, Lyell turns to *Paradise Lost* for more suitable means of expression. And he is right in doing so: Milton's verses skilfully, almost organically conjure up infernal imagery of the valley traversed by currents of fiery lava. However, when Lyell tries to use his own powers of description, he comes up with "picturesque," a term nowhere near as evocative as Milton's lines. Once again, we encounter a situation in which a scientific text employs a familiar literary reference to facilitate its reception, this time, however, appealing to readers' aesthetic sense rather than their understanding. Both Chambers and Lyell read their subject as a *Stone Book*, but while Chambers finds in himself the confidence to aestheticise it on his own, Lyell chooses to turn to the master of verse.

Lyell as well as Chambers are considered to various extent important sources of inspiration for Charles Darwin whose *On the Origin of Species* (1859) to many is the nineteenth century epitome of science affecting literature (or culture in general). In Janet Browne's words, "Charles Darwin's work and the wider transformations associated with evolutionary ideas are specially noted for having had a marked impact on creative literature of all kinds at that time."[50] Equally important is the fact that literature had a significant impact on the creation of *On the Origin* as well. As Gillian Beer notes, "Darwin's ideas profoundly unsettled the received relationships between fiction, metaphor, and the material world. That power of his was nurtured by his omnivorous reading"[51] which, she maintains, strongly influenced his writing.[52] Nevertheless, the most famous literary device present in *On the Origin of Species*, the tree metaphor, in which Darwin compares evolving species to

[50] Janet Browne, "Constructing Darwinism in Literary Culture," 55.
[51] Gillian Beer, *Darwin's Plots*, 27. She cites entries from Darwin's notebooks in which he recorded all the literary works he had read between 10th June and 14th November 1840, which included at least five of Shakespeare's plays, a few of Jane Austen's novels and many poets.
[52] Gillian Beer, *Darwin's Plots*, 28-32.

branches and twigs, does not appear to be inspired by entries from his reading list. Below is Darwin's employment of this device:

> The affinities of all the beings of the same class have sometimes been represented by a great tree. I believe this simile largely speaks the truth. The green and budding twigs may represent existing species; and those produced during former years may represent the long succession of extinct species. At each period of growth all the growing twigs have tried to branch out on all sides, and to overtop and kill the surrounding twigs and branches, in the same manner as species and groups of species have at all times overmastered other species in the great battle for life. The limbs divided into great branches, and these into lesser and lesser branches, were themselves once, when the tree was young, budding twigs; and this connexion of the former and present buds by ramifying branches may well represent the classification of all extinct and living species in groups subordinate to groups. […] As buds give rise by growth to fresh buds, and these, if vigorous, branch out and overtop on all sides many a feebler branch, so by generation I believe it has been with the great Tree of Life, which fills with its dead and broken branches the crust of the earth, and covers the surface with its ever-branching and beautiful ramifications.[53]

At first it may be surprising that such an apparently violent action as the struggle for existence is here represented as a prolonged substitution of one branch by another but this simile makes perfect sense because it accounts for the slowness of the evolutionary processes. However, Darwin cannot be credited as the sole creator of this particular metaphor. When he writes that "[t]he affinities of all the beings of the same class have sometimes been represented by a great tree," he has a very specific source in mind. Darwin was not the first to use the tree analogy to talk about the development of new species; in 1855, four years before the publication of *On the Origin*, Alfred Russel Wallace introduced this analogy in his article published in *The Annals and Magazine of Natural History*. Here is Wallace's version of the tree metaphor:

> We are also made aware of the difficulty of arriving at a true classification, even in a small and perfect group; – in the actual state of nature it is almost impossible, the species being so numerous and the modifications of form and structure so varied, arising probably from the immense number of species which have served as antitypes for the existing species, and thus produced a complicated branching of the lines of

[53] Charles Darwin, *On the Origin of Species by Means of Natural Selection or The Preservation of Favoured Races in the Struggle for Life*, ed. William Bynum (London: Penguin Books, 2009), 123-124.

> affinity, as intricate as the twigs of a gnarled oak or the vascular system of the human body. Again, if we consider that we have only fragments of this vast system, the stem and main branches being represented by extinct species of which we have no knowledge, while a vast mass of limbs and boughs and minute twigs and scattered leaves is what we have to place in order, and determine the true position each originally occupied with regard to the others, the whole difficulty of the true Natural System of classification becomes apparent to us.[54]

The analogies between Darwin's and Wallace's metaphors are explicit. It seems, however, that Wallace uses his literary language more consciously and with a better awareness of the possible consequences. At first, when enumerating the points which he sees as proofs of his theory of the emergence of new species, he refers to them as "branches"[55] of the subject. He then develops the idea of branching to explain the difficulties connected with natural classification. He talks first about the branching of lines of affinity which could be shown either through the continued tree analogy or by the reference to the human vascular system. The choice he makes – remaining with the dendrological metaphor – apart from assuring the consistency of his argument, also showcases his ability to avoid rhetorical traps. After all, the vascular system *does* resemble a tree: with arteries as supporting boughs, and veins branching off into smaller and more fragile capillaries. Yet, he does not develop this metaphor, and this avoids the problem of explaining the presence (or absence) of a heart in the representation of evolutionary process. Consequently, Wallace's description appears clear and straightforward; he himself found the tree metaphor "the best mode of representing the natural arrangement of species and their successive creation"[56] and succeeded in retaining its unambiguity.

The image of the tree presented in turn in *On the Origin* passage may evoke many associations, from genealogy to horticulture. The biblical reference, however, seems the

---

[54] Alfred Russel Wallace, "On the Law Which Has Regulated the Introduction of New Species," *The Annals and Magazine of Natural History, Including Zoology, Botany, and Geology*, Vol. 16 (1855), 187.
[55] Wallace, "On the Law," 186.
[56] Wallace, "On the Law," 191.

most evident. "Tree of Life" (absent from Wallace's description) must have been immediately recognised by his readers as an image deriving from the Garden of Eden. What Darwin tried to achieve here, Gillian Beer suggests, was to combine "two contrasted trees – life versus knowledge"[57] which would result in one image that could embrace both these ideas. Darwin, however, did not foresee the aftermath of this method; to put it figuratively, he inadvertently evoked another image – of a Gardener, a deity that his readers identified as God. As Beer explains, "[h]is theory had no place for an initiating or intervening creator. Nor for an initiating or intervening author. Yet terms like 'selection' and 'preservation' raise the question, 'By whom or what selected or preserved?' And in his own writing Darwin was to discover the difficulty of distinguishing between description and invention."[58] What significantly differs Wallace's employment of the tree metaphor from Darwin's is the fact that the former managed not to fall into the pitfall of ambiguous readings the latter did. Wallace's branching tree does not invite undesirable interpretations of a higher being instead of the problematic "Tree of Life," he uses "Natural System.".

Darwin is not to be absolved from this misreading, especially in the instances when he evokes nature: "nature cares nothing for appearances, except in so far as they may be useful to any being. She can act on every internal organ, on every shade of constitutional difference, on the whole machinery of life."[59] By frequently personifying nature, he gave *her* more power than he had intended. In a letter to Alfred Russel Wallace Darwin notes this error: "It is evidently also necessary not to personify 'Nature' too much – though I am very apt to do it myself – since people will not understand that all such phrases are metaphors."[60] As it turned out, Darwin's employment of metaphors, instead of clarifying difficult notions, seems

[57] Gillian Beer, *Darwin's Plots*, 33.
[58] Gillian Beer, *Darwin's Plots*, 48.
[59] Darwin, *On the Origin of Species*, 82-83.
[60] Darwin, quoted in: Robert M. Young, *Darwin's Metaphor: Nature's Place in Victorian Culture* (Cambridge and New York: Cambridge University Press, 1985), 100. Available at: http://human-nature.com/dm/dar.html (22.09.2016).

to have made the reception of his theory more challenging, at least to some readers. It does not, however, prove the point J. A. Large makes that as a scientist, he should have strived "to communicate clearly and unambiguously to an audience which is expecting to be informed."[61] Darwin tried to present his theory as clearly as possible, but did not succeed in presenting it unambiguously. What remains as an open question is whether this ambiguity is to be seen as the inherent flaw of his text or whether it is due to the readers' interpretation.

This problem demonstrates the ease with which the classification of the science-literature interaction can be changed: what in Wallace's case is clearly a mutualistic relation in which both science and literature benefit from their cross-influence, in Darwin's writing it comes closer to a predatory or parasitic interaction in which the employment of literary devices harms science through encouraging undesirable interpretation. Nonetheless, Darwin succeeds in writing a book that changes the readers' perception of their world, regardless of the fact whether they understand the mechanics behind it. Perhaps the best commentary on Darwin's literary success is that made by George Levine in his *Darwin the Writer*. Here, he maintains that "the power of the *Origin* depends finally on its success in creating a way of seeing and feeling that allowed readers to experience the world freshly, to absorb a sense of dazzling multiplicity beyond the complete comprehension of any observer or participant, of sensing, even without fully understanding, the new reality."[62] The misconceptions regarding his theory seem a small price to pay in comparison with such an achievement, tantamount to these enjoyed by the greatest literary masterpieces.

While Wallace and Darwin used the biological metaphors to explain another biological phenomenon, two other nineteenth-century science writers, G. H. Lewes and E. Ray Lankester used images derived from natural sciences to compare and contrast them with the human world. G. H. Lewes's interests, just like Chambers's, were extensive, stretching from

[61] J. A. Large, "Science and the Foreign-Language Barrier," 179.
[62] George Levine, *Darwin the Writer* (Oxford: Oxford University Press, 2011), 77.

philosophy to marine life. He seems to have been particularly enthusiastic about microscopic parasites whose example he used several times in his writing.[63] What he found especially fascinating was the parasitical cascade of microorganisms; in *Sea-Side Studies* (1858) he writes of "the most piquant of all paradoxes" of a parasitic crustacean, a *Lernæa*: "The female, ensconced in the eye, or gills, of a fish, lives a lazy life at the fish's expense, and the male lives upon her as she lives on the fish (not unlike some disreputable males of the human species), and this male is himself infested with parasitic Vorticellæ, so that we find parasites of parasites of parasites!"[64] He makes a similar comment about this crustacean in *Studies in Animal Life* (1862) where he calls the fact that "the female lives in the gills of a fish, sucking its juices, and the ignoble husband lives as a parasite upon her!," a state in which "the degradation is moral as well as physical."[65] It seems that every time he mentions a microscopic parasitical creature, he points to its similarity with humans and their behaviour, a characteristic feature of his writing style. As Mark Wormald notes, "[h]is writing emulates the resourcefulness of protozoa and constructs ingenious if damning comparisons between the appalling violence he observed in a water-drop and the world of his readers."[66] By applying criteria of judgment which are usually at work in the human-scale world, Lewes anthropomorphises his microscopic subjects and makes them a paradoxical object of ridicule: his crustaceans are very man-like, because *they* behave like *animals*. A particularly fine example of this technique of Lewes's is analysed later in this chapter.

[63] In *Studies* he explains thoroughly the life cycle of opalina; in "Only a Pond" (1859) and *Sea-Side Studies* he mentions the parasitic chains of polyps.
[64] George Henry Lewes, *Sea-Side Studies at Ilfracombe, Tenby, The Scilly Isles, and Jersey* (Edinburgh and London: William Blackwood and Sons, 1860), 56.
[65] Lewes, *Studies in Animal Life*, 47.
[66] Mark Wormald, "Microscopy and Semiotic in *Middlemarch*," *Nineteenth-Century Literature*, Vol. 50, No. 4 (March, 1996), University of California Press, 514.

The biological phenomena of parasite and degeneration are also adopted by E. Ray Lankester in his 1890 *Degeneration*. Using the same strategy as Lewes, he points to certain human-animal analogies:

> Any new set of conditions occurring to an animal which render its food and safety very easily attained, seem to lead as a rule to Degeneration; just as an active healthy man sometimes degenerates when he becomes suddenly possessed of a fortune; or as Rome degenerated when possessed of the riches of the ancient world. The habit of parasitism clearly acts upon animal organisation in this way. Let the parasitic life once be secured, and away go legs, jaws, eyes, and ears; the active, highly-gifted crab, insect, or annelid may become a mere sac, absorbing nourishment and laying eggs.[67]

Here too the comparison of a degenerated man and a degenerated animal reveals their striking likeness. Similarly to Dickens's emphasis on the double meaning of "post," so does Lankester utilise the expression "degeneration" in its many senses. The degeneration of a free-living animal into a parasite equals its turning into "a mere sac," immotile, blind, and deaf, concentrating on feeding and reproducing. Lankester suggests that the moral degeneration of people has the same effect: in this way he jokingly explains the fall of Rome or of a rich man. It seems that he enjoys incorporating such facetious comparisons into his descriptions; when he explains the degeneration of the adult barnacle, he notes that "[i]ts organs of touch and of sight atrophy, its legs lose their locomotor function, and are simply used for bringing floating particles to the orifice of the stomach; so that an eminent naturalist has compared one of these animals to a man standing on his head and kicking his food into his mouth."[68] This vivid image again creates a link between animal and human degeneration which results in a ridiculous comparison. Lankester's motive in presenting his subject in such a way is open to speculation but these analogies do not seem to be warnings against the possibly intentional degeneration of human beings. Rather, their incongruity makes them instantly memorable.

---

[67] E. Ray Lankester, *Degeneration. A Chapter in Darwinism* (London: Macmillan & Co., 1880), 33.
[68] Lankester, *Degeneration*, 37.

Both Lewes and Lankester also present a new quality to the science-literature crossover: it results in a controlled comic effect. The absurdity of the crustacean's lazy husband or a barnacle man kicking food in his mouth must result in some kind of amusement on the reader's side. There seem two reasons why such humorous similes might be used: firstly, Lewes and Lankester use them to appeal to their audience and facilitate their comprehension through laughter, just like Chambers does through the employment of familiar images and Lyell through poetry. The second motive appears much more serious: in a world after or during[69] the publication of *On the Origin*, a site of fearful and never-ending struggle for survival, amusing analogies could be seen as protective cushions, cognitively distancing the readers from the threats of the natural world. Although unveiling the disturbing similarity between the small and big scale universes, they perhaps allowed for a less dramatic and more tolerable way of accepting revelations delivered by natural science.

As the examples presented in this section demonstrate, the argument of the one-sidedness of science-literature interactions is very difficult to maintain. In the nineteenth century, literature was using science as a source of inspiration as much as science used literature to its own ends. Authors of fiction employed concepts derived from biological or geological discourse and creatively adopted, interpreted and modified them. At the same time, scientists composed their texts in such ways that they would be as accessible and readable as possible, and this objective was met through the use of literary devices and examples. In both cases the employment of registers and styles of the other discipline was burdened with risks of misunderstanding or misappropriation but such instances do not seem to have had detrimental effects on either. Therefore, in my opinion, the ecological interaction which could be employed to describe this relation, rather than the reciprocally harmful parasitism or the characterised by one-sided dominance predation, would be mutualism. In

[69] Although *Seaside Studies* was published as early as 1858, the evolutionary ideas had already been present in popular circulation. Richardson, "'The Difference Between Human Beings'," 202-203.

the following section, a particular case study of a mutual interaction of science and literature will be analysed to demonstrate the suitability of this choice.

George Eliot's *Middlemarch* and G. H. Lewes's Infusoria

Over a decade after the publication of *On the Origin*, a novel very much inspired by Darwin's theories appeared: in December 1871 the first part of George Eliot's *Middlemarch* was published.[70] In fact, the inspiration was so conspicuous that the initial reviewers of the novel were almost scornful about her insistent employment of scientific expressions.[71] Michael Rectenwald claims that "*Middlemarch*'s scientific jargon jolted its first critics; the novel may be considered a forerunner for incorporating specialized scientific language into fiction and for habituating fiction readers to such language. […] Eliot probably exposed to evolutionary and other materialistic theory some unwary readers who might not have seen it elsewhere."[72] Apart from getting her readers accustomed to scientific vocabulary, Eliot's point may have been to expand the interpretative possibilities of realist fiction. *Middlemarch* abounds in evolution-inspired expressions from variation to universal interconnectedness of life on earth.[73] Perhaps to a modern reader, accustomed to the postmodernism-tainted prose, these references are rather commonplace but in the early 1870s it must have made quite an impression to spot in a realist novel a phrase like "the limits of variation are really much wider than any one would imagine from the sameness of women's coiffure and the favourite love-stories in prose and verse,"[74] which is an obvious reference to Darwin's theory of variation under domestication.

[70] Doreen Roberts, "Introduction" to George Eliot's *Middlemarch* (Ware: Wordsworth Editions, 2000), viii.
[71] Beer, *Darwin's Plots*, 139.
[72] Michael Rectenwald, "The Construction and Deconstruction of Science in Middlemarch," 2008 in: *Victorian Web*, http://www.victorianweb.org/authors/eliot/middlemarch/rectenwald2.html (17.04.2011).
[73] Purchase, *Key Victorian Concepts*, 62.
[74] Eliot, *Middlemarch*, 4.

Because she wrote *Middlemarch* so late in relation to *On the Origin*, Eliot had almost twelve years to peruse through Darwin's book and – probably more importantly – contemplate the reactions it had caused. The inception of *Middlemarch* reflects Eliot's profound studies done beforehand; the numerous scientific references are not ornamental but belong to the very core of the novel which is carefully constructed and multi-layered, demanding from its readers some grasp of facts lying outside the plot. It is a novel set in the early 1830s, at the time when the Reform Bill was passed, but written in the reality of the post-*Origin* 1870s. Geoffrey Hemstedt notes that "an account of the Victorian novel must still be mainly of evolution and variety, of a form repeatedly stretched and reshaped to accommodate new aspects of experience."[75] Thus *Middlemarch* is a curious study of a society unaware that it is being subjected to rules of natural selection and struggle for survival – but at the same time the text demands a reader who is conscious of these facts.

Darwin and the theory of evolution were not the only of Eliot's scientific inspirations; these, as Rectenwald maintains, were numerous.[76] More importantly, however, he considers her a scientist equal to her intellectual authorities and remarks that she is not just a derivative collector of scientific references but a literary (wo)man of science in her own right.[77] In addition, Gillian Beer points to the fact that in terms of their task, a scientist and a novelist are not all that different: "George Eliot emphasises the congruity between all the various processes of the imagination: the novelist's and the scientist's enterprise is fired by the same prescience, the same willingness to explore the significance even of that which can be registered neither by instruments nor by the unaided senses; the same willingness to use and

[75] Geoffrey Hemstedt, "The Novel" in: *The Context of English Literature. The Victorians*, ed. Laurence Lerner (London: Methuen, 1978), 4.
[76] Rectenwald, "The Construction and Deconstruction of Science in Middlemarch."
[77] Rectenwald maintains that "Eliot has her debts – like any other man of science, she stands (sometimes precariously) on the shoulders of others: Bichat (Lydgate's mentor), Lyley, Claude Bernard, T.H. Huxley, John Stuart Mill, Auguste Comte, William Whewell, Herbert Spencer, and of course, G. H. Lewes. She drew from all of them, most especially Herbert and Lewes." Rectenwald, "The Construction and Deconstruction of Science in Middlemarch."

to outgo evidence."[78] In constructing her work and exploring her characters, Eliot uses the same scientific methods her mentors did. Science, or, more precisely, evolution, becomes, in a way, a true subject of the novel. And this subject is approached from a scientific perspective and experimented upon. Rectenwald and Beer, by equalling Eliot's efforts with those of "true" scientists, in effect absolve her of the potential sin of literary appropriation.

The influence of Darwin on Eliot's work is more complex than just the "borrowing" of vocabulary. What Eliot does, is creating a literary environment of Darwinian nature ruled by variation, survival for existence and natural selection and then describing it accordingly. J. Hillis Miller, perhaps with less belief in her competence, calls Eliot's reworking of her scientific inspirations an "admirable development of a quasi-scientific model to describe the subjective life of the individual, the relations of two persons within the social 'medium', and the nature of that medium as a whole."[79] Miller denotes at least three levels or scales within this "model," each of them included in the previous one. "This idea," he continues, "is but one aspect of a larger assumption, that is, the notion that any process in any of the three 'scales' is made up of endlessly subdividable 'minutiae.' Anything that we call a 'unit' or a single fact, in social or mental life, is not single but multiple. A finer lens would always make smaller parts visible. The smaller parts, in turn, are made up of even smaller entities."[80] These levels, apparently, are potentially endlessly dividable; discovering another is just a matter of the application of stronger lenses.

The passage Miller is alluding to is the famous "microscopic" commentary of Mrs. Cadwallader's match-making taken from Chapter 6:

> Even with a microscope directed on a water-drop we find ourselves making interpretations which turn out to be rather coarse; for whereas under a weak lens you may seem to see a creature exhibiting an active voracity into which other smaller

[78] Beer, *Darwin's Plots*, 141.
[79] J. Hillis Miller, "Optic and Semiotic in *Middlemarch*," in: *Middlemarch. Contemporary Critical Essays*, ed. John Peck (New York: St. Martin's Press, 1992), 71.
[80] Miller, "Optic and Semiotic in *Middlemarch*," 71.

> creatures actively play as if they were so many animated tax-pennies, a stronger lens reveals to you certain tiniest hairlets which make vortices for these victims while the swallower waits passively at his receipt of custom. In this way, metaphorically speaking, a strong lens applied to Mrs. Cadwallader's match-making will show a play of minute causes producing what may be called thought and speech vortices to bring her the sort of food she needed.[81]

This time, however, Darwin was not the source of inspiration for this scientific reference – G. H. Lewes was. In fact, it is actually possible to trace the precise fragment of Lewes's writing that had been "borrowed" by Eliot. Mark Wormald, who writes on the subject of microscopy and semiotic in *Middlemarch*, is convinced that Eliot was inspired by Lewes's article "Only a Pond!" published, just like *On the Origin*, in 1859. He claims that *Middlemarch* "was surely written with Lewes's 'Only a Pond!' in mind, if not actually at hand"[82] and cites the concluding paragraphs of the article as his evidence:

> Microscopic as all these creatures are, we notice grades of big and little even here. Not only do they prey on each other with a ferocity unsurpassed by their betters, but they also have their parasities [sic], like their betters. What! parasites living on these atoms? So it is. Nature is sympathetic, and makes the whole world – food. Look at that elegant Vorticella – the bell-shaped animalcule. It lives, you observe, parasitically on the body of that pretty water-flea, and has established a small colony of its kindred on that good 'allotment.' There it sticks, making a vortex in the water with its restless cilia, and drawing into its mouth any available food;
>
> 'Where the flea sucks, there suck I,'
>
> is its motto; where the rambling, restless animal transports itself, there will this tenacious parasite be transported also; and so it sees the world. But observe it closely, when it has ceased to shrink up at contact with some foreign body, or 'in alarm' at some vibration; it is now extended to its full length, and you perceive that in its turn this parasite has parasitic plants established on it. We have all laughed at Thackeray's poor Irishman having always some poorer Irishman living on him, as he lives on society; and here we see the very system carried on by the tiny denizens of that tiny ocean.[83]

---

[81] Eliot, *Middlemarch*, 48.
[82] Wormald, "Microscopy and Semiotic in *Middlemarch*," 517.
[83] George Henry Lewes, "Only a Pond!," *Blackwood Edinburgh Magazine*, 85 (1859), 597.

This particular fragment is the more interesting as it employs additional literary references than just the mention of Thackeray. The fragment "Where the flea sucks, there suck I" was perhaps immediately recognised and enjoyed by Victorian readers. On the one hand, it is a modified version of Ariel's song from William Shakespeare's *The Tempest* which originally reads: "Where the bee sucks, there suck I."[84] On the other, it also evokes John Donne's poem "The Flea" in which the parasitic insect "sucked me first, and now sucks thee."[85]

The analogies between these two quotations seem rather obvious: Lewes's Vorticella which sticks to the water-flea, using its cilia to make vortices in the water and eat whatever comes near is almost an exact reflection of Eliot's "tiniest hairlets which make vortices" "while the swallower waits" for food. Wormald of course may be right; however, if we compare Eliot's passage with a quotation from Lewes's later *Studies in Animal Life* (1862) in which he describes an opalina, a genus of protozoa, we can find an alternative source of inspiration:

> 'Tis a creature of the most absolute abnegations – sans eyes, sans teeth, sans every thing; no, not sans every thing, for, as we look attentively, we see certain currents produced in the liquid, and, on applying a higher magnifying power, we detect how these currents are produced. All over the surface of the Opalina there are delicate hairs in incessant vibration; these are the *cilia*. […] Sometimes the cilia act as instruments of locomotion; sometimes as instruments of respiration, by continually renewing the current of water; sometimes as the means of drawing in food, for which purpose they surround the mouth, and by their incessant action produce a small whirlpool into which the food is sucked.[86]

The "vortex" may have changed into "whirlpool" but what we can find in this fragment, and what is absent from that chosen by Wormald, is the reference to "a higher magnifying

---

[84] William Shakespeare, *The Tempest*, Act V, Scene I, v. 88.
[85] John Donne, "The Flea," in: *The Norton Anthology of English Literature*, Fourth Edition, Vol. I, ed. M. H. Abrams et al. (New York, London: W. W. Norton Company, 1979), 1068.
[86] Lewes, *Studies in Animal Life*, 16.

power," that is Eliot's "stronger lens" – an analogy quite important in reading Eliot's use of microscopy in her novel.

Lewes's contemplation of "parasites of parasites of parasites" is merely a departure point for his observation; and the final destination is a very philosophical reverie: "In mountainous districts, where houses and clusters of houses look so tiny in comparison with the huge limbs of Mother Earth, one is apt to think of man as a parasitic animal living on a grandeur creature – an epizoon nestling in the skin of this planetary organism, which rolls through space like a ciliated ovum rolling through a drop of water."[87] Curiously, as regards this particular fragment, Mark Wormald found another analogy between Eliot's and Lewes's texts. He quotes a passage from George Eliot's Ilfracombe journal in which while she was "looking at the town's houses clinging to the steep hillside, she reflected, 'one cannot help thinking of man as a parasitic animal – an epizoon making his abode on the skin of the planetary organism.'"[88] It is of course not surprising that George Eliot and Lewes – being "emotional and professional partner[s] for […] twenty-five years"[89] – shared their ideas, inspiring each other.

Thus, the significance of "Only a Pond!" to the conception of *Middlemarch* is more profound than just the appropriation of certain phrases. As its title suggests, the subject of Lewes's article is a pond – an ordinary, commonplace pool that can be very easily found virtually anywhere and even more easily overlooked. Lewes thus explains his choice of such an apparently mundane subject: this humble pond in fact "mirrors completely […] the choicest wonder of the physical world."[90] So although the title hints that ponds may be regarded as nothing remarkable, the exact opposite is being meant, and the remainder of the

[87] Lewes, *Sea-Side Studies*, 32-33.
[88] Wormald, "Microscopy and Semiotic in *Middlemarch*," 514, n. 22.
[89] Kathryn Hughes, "George Eliot's Life," in: *George Eliot in Context*, ed. Margaret Harris (Cambridge: Cambridge University Press, 2015), 6.
[90] Lewes, "Only a Pond!," 581.

article points to this fact repeatedly. It may be commonplace and ordinary, Lewes writes, yet "[s]o rich is almost every stagnant pond, that you have only to dip the jar in, trusting to chance, and on raising it to the light you will see a little world in miniature […]: there is study for months in that glass jar."[91] As if applying the microscope not just to his study, but also to his writing, Lewes begins to reduce his subject from the vast universe of the pond to its minute part – a glass jar which itself turns to be a miniature world. The contents of the jar are in turn minimised to their miniscule fragment – a drop of water, which, again, emerges as yet another universe thanks to the employment of the microscope. He explains that "[t]he drop of water is a microcosm – the world in miniature. Manifold are the creatures swimming, crawling, feeding, and fighting in it."[92] The living creatures within the drop of water may be minute but, at least to Lewes's eye, they appear comparable to their full-scale counterparts of the macroscopic world.

The analogy of the two worlds, the minute one and the human-scale one, is crucial to the argument of the science-literature mutualism. It did not originate with Lewes, however. Angelique Richardson traces the idea of the analogies between humans and microscopic creatures to Schopenhauer via Thomas Hardy who wrote the following sentence in his 1891 notebook: "Man – like infusoria in a drop of water under microscope."[93] There seems no stronger evidence of the mutualism of the science-literature relation than this: a phrase which entered public circulation in 1851 with the publication of Arthur Schopenhauer's *Studies in Pessimism* (in German, the English translation was published in 1891) found its way into G. H. Lewes's works, which in turn inspired George Eliot and – finally – appealed to Thomas Hardy through Schopenhauer again. "The drop of water under microscope" analogy

[91] Lewes, "Only a Pond!," 584.
[92] Lewes, "Only a Pond!," 585.
[93] Richardson, "'The Difference Between Human Beings'," 203. Original underscoring.

effortlessly switched contexts and disciplines, as if it had its own volition to travel and arrive at the great well of inspiration from which anyone could draw *ad libitum*.

Eliot's inspiration with Lewes's works seems quite obvious but in her case, their similarities are only the departure point to another path reaching a different conclusion. Eliot's description of Mrs Cadwallader's match-making contains a very scientific notion of "an endless possibility of revision"[94]: the application of a stronger lens allows the observer to discover new universes. The interpretation it offers, however, differs from the one proposed by the author of "Only a Pond!". While to Lewes, a universe is a universe, Eliot suggests that perhaps these newly discovered worlds are governed by different rules than the previously known ones, and that without possessing sufficient data combined with appropriate equipment we may find ourselves making merely "coarse" assumptions. Apart from invoking the science of microscopy in a very explicit manner, this passage also suggests a very interesting technique of reading the whole narrative. As its subtitle states, *Middlemarch* is a "study" (Angelique Richardson even calls it "an experiment"[95]) and in order to avoid the risk of "coarse interpretations," in imitation of Eliot's 'scientific' approach, the reader is invited to employ the scientific method when reading the text – application of stronger and weaker interpretative lenses is advisable. On the other hand, as Miller notes, "*Middlemarch* is full of such shifts in perspective from close up to far away and back to close up again […]"[96] so this switching of lenses is in fact enforced through the composition of the narrative.

Eliot's use of science is more than mere inspiration. On the contrary, in Robert Speaight's words, she "found in Middlemarch the microcosm of a wider world. Here she could study the workings of society, as she had imagined them in a number of lives not

[94] Rectenwald, "The Construction and Deconstruction of Science in Middlemarch."
[95] Richardson, "The Difference Between Human Beings'," 203.
[96] Miller, "Optic and Semiotic in *Middlemarch*," 68.

outwardly remarkable but compelled by many conflicting currents in their daily flow."[97] The provincial society of Middlemarch is intentionally presented as if it were a cluster of cells that are subjected to the never-ending shifts and changes, caught in currents, whose bounds are not firm but which fluctuate incessantly, like creatures visible under the microscope. This in turn reflects Lewes's comments on nature:

> Nature is economic as well as prodigal of space. She fills the illimitable heavens with planetary and starry grandeurs, and the tiny atoms moving over the crust of earth she makes the homes of the infinitely little. Far as the mightiest telescope can reach, it detects worlds in clusters, like pebbles on the shore of infinitude; deep as the microscope can penetrate, it detects life within life, generation within generation, as if the very universe itself were not vast enough for the energies of life![98]

This organismic impression is even reinforced when we observe the reaction of the Middlemarch collective organism towards the newcomer, Mr. Lydgate. As the narrator puts it, "Middlemarch […] counted on swallowing Lydgate and assimilating him very comfortably,"[99] which evidently evokes Lewes's description of osmotic consumption of the opalina.

The world of Middlemarch could be thus treated as a water-drop, a tiny yet all-embracing universe in itself, in which creatures of all kinds are, to repeat Lewes's observation, "swimming, crawling, feeding, and fighting."[100] Narration is devised in such a way as to imitate the working of a compound microscope: the given sets of characters are first observed through a weaker lens and so the internal relations within the group are established as merely cursory – and, as the narrator suggests, often misinterpreted. However, when studied more thoroughly under a stronger lens, new, previously overlooked or

---

[97] Robert Speaight, *George Eliot* (London: Arthur Baker, 1956), 105.
[98] Lewes, *Studies in Animal Life*, 27.
[99] Eliot, *Middlemarch*, 128.
[100] Lewes, "Only a Pond!" 585.

impossible to spot relations are revealed and, in some cases, the true nature of some characters exposed.

However, the stronger the lens we apply to the apparent analogies between *Middlemarch* and Lewes's works, the feebler they appear. Reducing Eliot's novel to the literary reworking of scientific ideas, although superficially justifiable, is coarsely simplistic. The subject of "Only a Pond!" is, generally speaking, water and its contents – in ponds, jars and drops. Water imagery is also extensively employed by George Eliot in *Middlemarch*. Yet there is a fundamental difference between Lewes's "almost every stagnant pond" and Eliot's "current into which all thought and feeling were apt sooner or later to flow." The word "stagnant" is crucial here: in order to examine the contents of, say, a river or even a pond, one needs to take a sample, which is in fact an immobilised fragment of the very mobile whole. Such action allows thorough examination but at the cost of losing insight into the workings of motion: currents, vortices and ripples.

Middlemarch is generally considered a study of a specific community within specific bounds. R. H. Hutton, a literary reviewer and Eliot's contemporary, calls it a "wonderful photograph of provincial life."[101] Such a metaphor implies a frozen frame, again – an immobile section of a larger, mobile whole. In this respect the camera lens has the same property as the microscope lens: even a water-drop, instead of being a boundless universe, is limited by its own shape – not to mention the fact, that it is imprisoned between two pieces of glass that allow it to be observed through microscopic lenses. Miller suggests using the notion of "sample" instead: "In *Middlemarch* a fragment is examined as a 'sample' of the larger whole of which it is a part, though the whole impinges on the part as the 'medium' within which it lives, as national politics affect Middlemarch when there is a general

[101] R. H. Hutton, review of "Middlemarch: a Study of Provincial Life," *The British Quarterly Review*, Vol. 57. 1873, in: *Critics on George Eliot. Readings in Literary Criticism*, ed. William Baker (London: George Allen & Unwin, 1973), 30.

election, or as the coming of the railroad upsets rural traditions."[102] *Middlemarch*, although clearly inspired by science, is after all not a scientific text and it is not obliged to comply with strict scientific rules, just as scientific methodology does not necessarily have to apply to it. Middlemarch (as a place) may be specifically located in space and time but that does not mean that *Middlemarch* (as the title) is limited by these concepts. Instead, the novel benefits fully from the mutualistic interaction with science in the sense that is, it employs as much of the science as possible to its own advantage but disregards these notions in which it has no interest.

Conclusion

The Victorian period witnessed not so much an emergence of the science-literature mutualism – which cannot be claimed to be particular to the nineteenth century – as the uncovering of the scale and strength of these interactions. Due largely to the popularisation of scientific discourse with the publication of works by Darwin and his contemporaries, the perhaps surprising balance of the science-literature cross-borrowings saw the light of day. In this context, the term 'interaction' seems preferable over 'relation' because at its core lies the concept of communication, of a dialogue of two equals exchanging views and ideas and employing them to their own and mutual advantage.

As stated in the introduction, the aim of this chapter was to investigate various examples of nineteenth-century works of literature and science in relation to a number of ecology-derived interactions, and make the choice of the most suitable interaction, which is identified here as mutualism. Although this chapter concludes the examination of ecological interactions of Victorian science and literature, it lays the foundation for the subsequent chapters in which other approaches to the notions of parasites and parasitism are studied,

[102] Miller, "Optic and Semiotic in *Middlemarch*," 66.

both in scientific and fictional texts. Nonetheless, they still rely on the idea of the mutualistic interaction of natural sciences and works of fiction. This is especially visible in the next chapter, in which the term “parasite” is investigated through its changes of meanings and contexts.

CHAPTER II THE PARADOXICALITY OF PARASITES

Introduction

The purpose of the present chapter is twofold. Firstly, it describes the ecological relation of parasitism, in order to present its surprisingly vast scope and thus argue the first of many paradoxes associated with it. While parasitism is one of the interactions recognised by ecology, when it is treated as a subject in ecological narratives, its relation to literature seems to fulfil these requirements of the mutual interaction between science and literature which were discussed in the previous chapter. As it is demonstrated here, ecology is particularly prone to the narrativisation of its subject, and the various types of parasitical relations recognised by ecological science can be read, but – more crucially – seem to be *written* in such a way that they become reminiscent of fables, both in terms of imagery and delivery mode, as the parasites in them are presented as anthropomorphised villains. The second purpose of the chapter is to trace the history of the term "parasite," which also proves paradoxical in many respects, to reinforce the argument of the fundamental connection of literature and science, which is supported by several modifications of meanings and contexts (from literary, to biological, to social, to literary) the notion has been subjected to throughout the centuries. As has the previous chapter, this too features literary case studies, in which "parasite" understood in its original Greek sense will be analysed, and these include Charles Dickens's *Bleak House* and George Eliot's *Middlemarch*. The overall aim is to demonstrate emphatically many facets of paradoxicality related to the term parasite.

The previous chapter sought answers to the question how the relation between science and literature can be described if perceived from the perspective of ecological interactions. Ultimately, it has been established that this relation is reminiscent of biological mutualism, that is an interaction in which both organisms (or groups of organisms) benefit from contact

with each other. While mutualism does not necessarily signify the perfect balance of exchange in this relation, it emphasises the fact that the ratio must be fair enough for both participants to appear better off after the exchange rather than if the interaction did not happen at all. Should the balance be tilted in favour of one of the interactors, a completely different interaction would take place: either commensalism, in which one organism benefits while the other is unaffected, or predation/parasitism,[1] in which one of the organisms benefits from the relation, while causing serious harm to the other.

In the nineteenth century, a prominent shift in the perception of parasites took place. The second half of the 1800s is the time when the systematic science of parasitology emerged and thus introduced the notions of organismic parasitism to the general public, preparing the ground for the later shift in meaning of parasites and parasitism from strictly biological to that employed by social sciences. The presentation of these concepts was done through the medium of scientific accounts which employed stories, anecdotes and literary devices (mostly metaphors and similes); many science writers narrativised their objects of study, a practice present in scientific writing to this day. Thus, this chapter offers explanation of the reason why in the present work scientific narratives are treated as correspondent to literature: both ultimately tell stories – understood here in the broadest sense, that is as accounts of some fictional or non-fictional events, – and the particular story this work examines, is the story of parasites.

[1] Predation and parasitism share a number of qualities but are not the same. According to May Berenbaum, predation occurs when "one species kills and consumes several individuals of the other species during its lifetime, [while in] parasitism […] one species merely saps the 'reserves' and rarely kills its host." May Berenbaum, "Plant-Herbivore Interactions," in: *Evolutionary Ecology. Concepts and Case Studies*, eds. Charles W. Fox, Derek A. Roff and Daphne J. Fairbairn (Oxford, New York: Oxford University Press, 2001), 303.

Biological Parasitism

The parasite is a very paradoxical biological organism. On the one hand, it is ubiquitous in terms of numbers and distribution. On the other, making a definitive decision which organism is and which is not a parasite is extremely difficult and more often than not such a decision is arbitrary, varying from one taxonomist to another. A definition of a parasite is therefore usually vague and imprecise. According to the Oxford Dictionary a parasite is "an organism which lives in or on another organism (its host) and benefits by deriving nutrients at the other's expense."[2] Microbiologist Dickson D. Despommier defines a parasite as "any organism that derives its shelter and general nutrition from another, larger organism."[3] To parasitologist Rosemary Drisdelle a parasite is an organism which "lives on, or in, another species, getting everything it needs from its host."[4] These definitions are so ambiguous that they could include protozoa harboured by mosquitoes, fleas living on hedgehogs, dogs living in people's households and human beings inhabiting the Earth. Nowhere in these definitions is there a clear demarcation line between what is and what is not a parasite, just like there is no such line to distinguish their hosts. By these definitions, most organisms can be seen as parasites. In fact, this assumption may appear much closer to the truth than expected. As the authors of *Parasitism. The Diversity and Ecology of Animal Parasites* point out, "[e]stimates of the overall biodiversity of parasites vary depending on how inclusive we define 'parasite,' but approximately 30-50% of described animal species are parasitic at some stage during their life cycle […]. Given that virtually all metazoan species are infected with at least one species of parasite (most species contain many more), that all viruses and many prokaryotes and fungi are parasitic, and that we underestimate the biodiversity of groups such as

[2] "Parasite," in: *Oxford Dictionaries*, http://www.oxforddictionaries.com/definition/english/parasite (05.06.2015).
[3] Dickson D. Despommier, *People, Parasites, and Plowshares. Learning from Our Body's Most Terrifying Invaders* (New York: Columbia University Press, 2013), 196.
[4] Rosemary Drisdelle, *Parasites. Tales of Humanity's Most Unwelcome Guests* (Berkeley and Los Angeles: University of California Press, 2010), 1.

nematodes and mites […], these rough estimates are undoubtedly low. Clearly, knowledge of parasite biodiversity equates to knowledge of key branches of the Tree of Life."[5] What may be quite surprising in this respect is that these apparently innovative observations echo those which have been in the scientific circulation since the mid-nineteenth century. Rudolf Leuckart in his *Parasites of Man*, first published in Germany in 1863 (second edition in 1879), expressed a very similar and, as it turns out, a very modern view:

> The term "Parasite" in its widest sense, includes all those creatures which inhabit a living organism, and obtain nourishment from its body. […] This definition includes not only vegetable and animal parasites (phytoparasites and zooparasites), but also parasites on plants and on animals. The larva that inhabits the wood of a tree or the pulp of a fruit is to be regarded as a parasite in no less degree than the thread-worm of the human intestine; and the beetle that defoliates our forests is quite as much a parasite as the louse upon the feathers of the swallow. Parasitic life, then, as thus understood, is an exceedingly widespread phenomenon.[6]

It is not difficult, therefore, to arrive at the conclusion that, according to the most inclusive definition, *virtually every organism* is parasitic to some extent. This seems to go hand in hand with the Darwinian idea of competitive, cruel nature, ruled by struggle for existence in which each organism (humans included) is forced to feed on another in order to survive. While visually such an image proves truly awe-inspiring, practically it creates a lot of problems, the definition of parasites being just one of them.

Parasites therefore are defined not by what they are but by what they do. And, again paradoxically, they do a lot, not really doing much. Apart from a few exceptions which will be explored later, they are not predatory hunters, but rather inert organisms opportunistically taking advantage of their hosts whenever they can. Depending on how they exploit their hosts, parasites can be divided into a few subgroups. If they feed on their hosts, they are

---

[5] Timothy M. Goater, Cameron P. Goater, Gerald W. Esch, *Parasitism. The Diversity and Ecology of Animal Parasites*, Second Edition (Cambridge, New York: Cambridge University Press, 2014), 2.
[6] Rudolf Leuckart, *Parasites of Man, And the Diseases Which Proceed from Them*, trans. William E. Hoyle (Edinburgh: Young J. Pentland, 1886), 1.

called ectoparasites (e.g. lice); if they feed inside their host, they are referred to as endoparasites. Multicellular endoparasites are perhaps *the parasites* that come to mind immediately when this term is evoked: tapeworms, roundworms, flukes etc. known under the collective name of helminths. Until the nineteenth century, as Jonathan Smith notes, it was believed that worms were the only zoological form of parasites "whether expressed through the Greek, *helminth*, or the Latin, *vermis*."[7] These erroneous notions appear understandable when the complicated life cycle of parasitic worms is taken into consideration: they tend to require two or more hosts (intermediate and final, or definitive) to complete their life cycle, and in their larval stages they do not resemble their adult forms. Microbial endoparasites are called pathogens (these include, among other, bacteria and viruses); and they "often rely on a third organism, known as the carrier, or vector, to transmit them to the host";[8] malaria-causing *Plasmodium* protozoa are an example of parasites which demand a mosquito vector to carry them to the human host. Rudolf Leuckart further divided the parasites into 'constant' and 'occasional' (known also as 'obligate' and 'facultative,' respectively) which reinforced the impossibility of providing an unambiguous definition of what is and what is not a parasite.[9]

To make matters even more confusing, there also exist forms of parasitism in which the parasite has no, or very little, contact with the host. One of these is the so called brood parasitism which occurs in a number of species, such as birds (e.g. cuckoos). As Frank J. Messina and Charles W. Fox explain, "[c]onspecific brood parasitism occurs when a female lays at least one of her eggs in the nest of another female."[10] This is a very peculiar example

---

[7] Jonathan Z. Smith, "What a Difference a Difference Makes," in: *Relating Religion: Essays in the Study of Religion* (Chicago: University of Chicago Press, 2004), 254.
[8] "Parasitism," in: *Encyclopaedia Britannica*, http://www.britannica.com/EBchecked/topic/443191/parasitism (19.09.2016).
[9] Leuckart, *Parasites of Man*, 3. Later, he also employs the terms "temporary" and "stationary," 4-5.
[10] Frank J. Messina, Charles W. Fox, "Offspring Size and Number," in: *Evolutionary Ecology. Concepts and Case Studies*, eds. Charles W. Fox, Derek A. Roff and Daphne J. Fairbairn (Oxford, New York: Oxford University Press, 2001), 119.

of indirect parasitism in which the parasite exploits its host by putting larger strain on the host's resources. In this competitive relation, the parasite itself is beneficial not because it gets immediate gratification but because it is freed of the responsibility of nurturing its offspring and allowed to continue its life undisturbed, while the host is forced to maintain the nest, provide for the larger family, very commonly at the expense of the original brood, and reduce its own needs. In terms of evolutionary struggle for existence, the host loses in the long term.

As the above paragraph illustrates, the characteristics of brood parasitism seem to invite metaphorical phrasing, even in scientific texts. Consider the following description of this phenomenon observed in European Cuckoos:

> Some species of birds thrive not by carefully rearing their own young, but by pawning that task off on adults of other species. The European Cuckoo, whose distinctive call is immortalized in the sound of the "cuckoo clock," is the bird in which this habit has been most thoroughly studied. Female European Cuckoos lay their eggs only in the nests of other species of birds. A cuckoo egg usually closely mimics the eggs of the host (one of whose eggs is often removed by the cuckoo). The host may recognize the intruding egg and abandon the nest, or it may incubate and hatch the cuckoo egg. Shortly after hatching, the young European Cuckoo, using a scoop-like depression on its back, instinctively shoves over the edge of the nest any solid object that it contacts. With the disappearance of their eggs and rightful young, the foster parents are free to devote all of their care to the young cuckoo. Frequently this is an awesome task, since the cuckoo chick often grows much larger than the host adults long before it can care for itself. One of the tragicomic scenes in nature is a pair of small foster parents working like Sisyphus to keep up with the voracious appetite of an outsized young cuckoo.[11]

It seems quite striking how very story-like this description is. The scene is set in short but imaginative phrases: the "pawning" of the task of parenthood, the instinctive parricide[12]

[11] Paul R. Ehrlich, David S. Dobkin, and Darryl Wheye, "Brood Parasitism," *Birds of Stanford,* 1988, http://web.stanford.edu/group/stanfordbirds/text/essays/Brood_Parasitism.html (09.06.2015).

[12] J. Hillis Miller points to the phonetic similarity of the words 'parricide' and 'parasite' which he noticed in William Makepeace Thackeray's *The History of Henry Esmond* (1852); a quote from the novel introduces his essay on critical reading of literary texts:
'*Je meurs où je m'attache*', Mr Holt said with a polite grin. 'The ivy says so in the picture, and clings to the oak like a fond parasite as it is'.
'Parricide, sir!' cries Mrs Tusher.

committed by the foundling, the devoted and exhausted foster parents. Importantly, this is not done to facilitate understanding; in essence, the concept of brood parasitism is not difficult to grasp. This is of course the depiction of an ecological interaction observed in the animal kingdom but the way in which it is worded may inspire indignation for which there is no place in science. The post-Darwinian nature ruled by natural selection does not recognise the idea of fairness and justice, which does not necessarily hinder the need to emphasise how very unfair it is for the bird host to be burdened with the parasite's egg. In this respect, brood parasitism may have the potential to be treated not strictly as a fact of nature but as a fable with a clearly defined villain. From here it takes only one step to read an instance of a cuckoo's parasitism as an Aesop's fable and thus see the human equivalents hidden behind the masks of birds.

The above description from the 1980s utilises the same strategy that was used by G. H. Lewes in his writing: showing the analogies between the animal and the human world, usually to comic effect. The images of the tragicomic parents and their oversized cuckoo foster child are analogous to Lewes's description of Vorticella's "ignoble husband [that] lives as a parasite upon [his *Lernæa* wife]";[13] both employ language relating directly to the everyday life. It shows that in the 1860s as well as a hundred years later the preferred way of presenting phenomena from the animal kingdom is through fable-like anthropomorphisations.

Another example of indirect parasitism is the so called kleptoparasitism which, as the name indicates, is parasitism by theft. As Erin Appleby and Ryan Streur define it, kleptoparasitism is "[a] foraging strategy in which an animal obtains food items by stealing

J. Hillis Miller, "The Critic as Host," in: *The J. Hillis Miller Reader*, eds. Joseph Hillis Miller, Julian Wolfreys (Stanford: Stanford University Press, 2005), 17.

[13] Lewes, *Studies in Animal Life*, 47.

them from other animals which have procured them at a cost to [themselves]."[14] Appleby and Streur focus on the example of seabirds stealing food from other species (including people) but in this relatively rare ecological interaction people can also assume the role of parasites; such an occurrence has also been documented. While conducting their field studies in the Cameroonian national park, three Dutch scientists reported an incident in which a group of humans chased two lions away from a carcass of western hartebeest, and stole it. [15] Although the actual event had not been observed and could only be deduced from the evidence at the scene, further studies revealed that such incidents were by no means isolated. As a result, the researchers concluded that "this 'human-kleptoparasitism' seems to take place regularly in a large part of Africa […]," [16] and thus influences the survival rate of both humans and lions. In this perverse role-reversal in which the lion is supposed to fear people, another aspect of parasitism is uncovered: its inherent ambiguity. In the tale of brood parasitism, the division into heroes and antiheroes is clear and simple. Kleptoparasitism, especially its human version, belongs to the grey area: lions are robbed of their food which is definitely unfair, but at the same time humans quite often are considered food by lions which cannot be referred to as fair either. In this respect humans kleptoparasitising lions can be seen as some act of universal justice or perhaps revenge, an attempt at achieving some balance in the distribution of unfairness. Once again, however, such typically anthropocentric projections onto the world of wild nature prove treacherous: this apparently justified payback has grave consequences. Lions, being at the top of the food chain, typically must compete with their 'equals' (i.e. other predators) for food resources, which in itself is

[14] Erin Appleby and Ryan Streur, "Kleptoparasitism," *Biology 342*, Course Syllabus, Fall 2012, http://academic.reed.edu/biology/courses/BIO342/2012_syllabus/2012_WEBSITES/Erin_A_and_Ryan_S%2011-20final/index.html (09.06.2015).
[15] Marjolein Schoe, Hans H. De Iongh and Barbara M. Croes, "Humans Displacing Lions and Stealing Their Food in Bénoué National Park, North Cameroon," *African Journal of Ecology*, Vol. 47, No. 3 (2009), 445-446. Available at: http://onlinelibrary.wiley.com/doi/10.1111/j.1365-2028.2008.00975.x/full (09.06.2016).
[16] Schoe, De Iongh and Croes, "Humans displacing lions...," 446.

straining enough. Kleptoparasitism (human or animal) adds to this strain and in effect reduces the lions' chances of survival in the long run.[17] And because in nature everything is interconnected, fewer lions means less meat for humans to steal. Justice is served but ultimately both sides lose.

As the above examples demonstrate, ecological parasitism is quite paradoxical in that it employs literature to tell the story of injustice and exploitation, but this employment cannot be categorised as parasitic interaction of literature and science. Instead, it represents the mutualistic interaction. The descriptions of parasitism present a scientific phenomenon through a narrative, not on the level of the advanced employment of similes and analogies but on the very basic level of scientific description and explanation. Stories of various forms of parasitism seem to write themselves; apparently without a conscious effort from the storyteller, as if the subjects could not be described without being narrativised. This is especially visible in the two examples of the descriptions of indirect parasitism but is by no means limited to them. In the previous chapter instances of literary techniques used in scientific texts were discussed; and it has been concluded that some of these strategies served the purpose of facilitating understanding and accessibility of complex problems, while others created analogies between the animal kingdom and the human world to emphasise their interconnectedness. This chapter continues this argument by broadening its premise.

As these illustrations of ecological parasitism show, the narrativisation of a particular scientific phenomenon seems not a strategy employed by scientists with a didactic purpose in mind, but the inherent quality of the scientific description itself. The ease with which the analogies between the human and the animal world are presented in these parasitical narratives is possible because ultimately these are the same stories – whether they belong to the realm of science or fiction – with interchangeable heroes (and antiheroes) and parallel

[17] Schoe, De Iongh and Croes, "Humans displacing lions...," 446.

events. My argument here would be as follows: it is not possible to pinpoint the exact moment in which the story enters a scientific text, whether it is at the stage of observation, description or the final narrative because it is already present at the moment of formulating the coherent account of events. In other words, a story is inherent in the scientific text because the act of putting into words facts and events observed in nature demands the use of language which is already metaphorical. What is possible, however, is locating in these scientific texts markers such as analogies, similes and other literary devices which might be considered superfluous to the basic story but which show the moment of the overt introduction of the literary narrative into the scientific narrative on the part of the writer. At this stage, when parasites are presented through anthropomorphising language, these scientific narratives begin to resemble fables whose general purpose is to teach through morals and negative examples (i.e. what not to do) and whose division of characters into protagonists and villains is clear-cut and simplistic.

From *Parasitos* to Parasite and Back

Just as ecological parasitism is strongly related to literature through its use of narrativisation, so is the term 'parasite'. According to *The Oxford Dictionary of Word Origins* it was first used in the middle of the sixteenth century (i.e. between 1530 and 1569): "The word parasite came via Latin from Greek *parasitos* '(person) eating at another's table', from *para-* 'alongside' and *sitos* 'food', and originally came into the language as a term for a hanger-on or sponger."[18] As *The Merriam-Webster New Book of Word Histories* adds, "[b]y extension, it gained the meaning 'one who gains the hospitality or patronage of another through flattery'."[19] In the *Alpha Dictionary* one can find a more detailed explanation of how the

[18] "Parasite," in: *Oxford Dictionary of Word Origins*, Second Edition, ed. Julia Cresswell (Oxford: Oxford University Press, 2010).
[19] "Parasite," in: *The Merriam-Webster New Book of Word Histories* (Springfield, MA: Merriam-Webster, 1991).

term's meaning expanded: "around 400 [BCE], Greek comedy began featuring rude, sniveling dinner guests who were hard to get rid of. At this point the word began to take on the sense of 'freeloader,' a dinner guest who wears out his welcome. The Romans borrowed the word, like so many things Greek, as their word *parasitus*. Roman comedies often featured them [too]."[20] Robert Maltby adds that "[t]he parasite, or flatterer, has a long tradition in Graeco-Roman comedy, going back ultimately to Epicharmus. All parasites, both Greek and Roman, share in varying degrees certain comic characteristics – impudence, wit and, especially in the Roman variety, a keen interest in food. In Greek New Comedy their role often overlaps with that of the professional flatterer or *kolax*."[21] In the sixteenth century the Latin *parasitus* (through French) became the English *parasite* and "continued to denote a person who lives off or gains favor with another through flattery and obsequiousness, and all of its use derogatory."[22] Its first use in the biological sense dates as early as 1646[23] and since the eighteenth century it has been employed by botanists,[24] but it was only in the second half of the nineteenth century that the term gained popularity and was widely used to denote certain animals. However, it has retained some of its customary meaning and even today 'parasite' stands also for 'hanger-on' or 'cadger.'[25]

---

[20] "Parasite," in: *Alpha Dictionary*, ed. Robert E. Beard et al., http://www.alphadictionary.com/goodword/word/parasite (23.06.2009).

[21] Robert Maltby, "The Language of Plautus's Parasites," *The Open University*, 1999, http://www2.open.ac.uk/ClassicalStudies/GreekPlays/ Conf99/Maltby.htm#L1 (17.08.2009).

[22] "Parasite," in: *The Merriam-Webster New Book of Word Histories* (Springfield, MA: Merriam-Webster, 1991).

[23] "Parasite," in: *Online Etymology Dictionary*, ed. Douglas Harper, http://www.etymonline.com/index.php?term=parasite (20.07.2009). Andreas Hassl notes that this transition for cultural to medical meaning of the 17th century was based on erroneous reception of the term. Andreas Hassl, "Der klassische Parasit: Vom würdigen Gesellschafter der Götter zum servilen Hofnarren," *Wiener Klinische Wochenschrift*, Vol. 117 (2005), Supplement 4, 2-5.

[24] "Parasite," in: *Oxford Dictionary of Word Origins*, Second Edition, ed. Julia Cresswell (Oxford: Oxford University Press, 2010). Dickens for instance uses the term in its botanical sense in *Bleak House* when he refers to the inscription of "Peffer" in Cook's Court: "smoke, which is the London ivy, had so wreathed itself round Peffer's name, and clung to his dwelling-place, that the affectionate parasite quite overpowered the parent tree." Charles Dickens, *Bleak House* (Ware: Wordsworth Editions, 2001), 111. J. Hillis Miller, while interpreting Percy Bysshe Shelley's *The Triumph of Life*, notes that "Parasites for Shelley are always parasite *flowers*." That is because in Shelley's time, i.e. the early nineteenth century, parasites were used exclusively in botanical context. Miller, "The Critic as Host," 28.

[25] *The Oxford Paperback Thesaurus* gives such synonyms for 'parasite': hanger on, cadger, leech, passenger, bloodsucker, sponger, scrounger, freeloader, mooch, and bludger. "Parasite," in: *The Oxford Paperback*

As Anne-Julia Zwierlein rightly points out, "[t]he exchange between science and literature could not be closer […]. While on the one hand an ancient literary topos gives a name to a newly emerging subfield of biological inquiries, on the other hand the literary stock figure of the sponger-parasite, fuelled by contemporary research, attains very concrete biological overtones in nineteenth century literature."[26] Zwierlein's remark hinges on the widespread belief that the original *parasitos* was the sponger of Greek and Roman comedies. Robert Maltby, however, traced this term even further into the past to reveal that "*Parasitos* was originally a religious term, referring to a temple acolyte (particularly in shrines of Heracles) who would have received free food and meals in return for services."[27] Thus in its original sense, *parasitos* was a name of a religious person earning a living through this barter method of exchange of work for food. In this way Maltby's explanation somewhat reverses the argument that *parasitos* was established as an inherently negatively-connoted word. It seems, therefore, that at first this term was neutral and only picked up the pejorative meaning either when it began to appear in everyday language, or when it was adopted by comedy. J. Hillis Miller argues that this term "was originally something positive, a fellow guest, someone sharing the food with you, there with you beside the grain,"[28] and that it was only after it started to denote a professional dinner guest that it acquired negative meaning. Nonetheless, the paradoxical core of the word's history remains intact: it used to be a neutral-to-positive religious term that was taken up by literature to denote an unpleasant and comical character; next 'parasite' was borrowed by science to describe a certain biological

Thesaurus, Third Edition, eds. Maurice Waite, Lucy Hollingworth, and Duncan Marshall (Oxford: Oxford University Press, 2006).

[26] Anne-Julia Zwierlein, "From Parasitology to Parapsychology: Parasites in Nineteenth Century Science and Literature," in: *Unmapped Countries: Biological Visions in the Nineteenth-Century Literature and Culture*, ed. Anne-Julia Zwierlein (London: Anthem Press, 2005), 158.

[27] Maltby, "The Language of Plautus's Parasites."

[28] Miller, "The Critic as Host," 19.

phenomenon – firstly botanical and later zoological, – only to be re-adopted by literature and social sciences as an ideologically-charged term of abuse.

The paradoxicality of 'parasite' is not exhausted with its shifting context. J. Hillis Miller, in his essay "The Critic as Host," points to the paradoxicality that lies in its very name: *parasitos*, alongside food. But to Miller 'para-' is much more than 'alongside':

> "Para" is an "uncanny" double antithetical prefix signifying at once proximity and distance, similarity and difference, interiority and exteriority, something at once inside a domestic economy and outside it, something simultaneously this side of the boundary line, threshold, or margin, and at the same time beyond it, equivalent in status and at the same time secondary or subsidiary, submissive, as of guest to host, slave to master. A thing in 'para' is, moreover, not only simultaneously on both sides of the boundary line between inside and outside. It is also the boundary itself, the screen which is at once a permeable membrane connecting inside and outside, confusing them with one another, allowing the outside in, marking the inside out, dividing them but also forming an ambiguous transition between one and the other.[29]

Following Miller's lead, it could be argued that 'parasite' is 'paradoxical' because they share the same uncanny prefix, which gives them mutually exclusive meanings. In parasite's 'para' Miller finds a multitude of meanings, many of which are presented in binary oppositions; considered at once they are antithetical but if examined one by one they seem to cohere. But he also finds this contradiction in the word treated as a whole; he points to the fact that a parasite is not an entity in itself but a name given to one of the participants in the parasitical relation: "There is no parasite without a host."[30] Even this relation he considers paradoxical; tracing the histories of words 'host' and 'guest,' and discovering their common root, Miller arrives at the conclusion that "[t]he uncanny antithetical relation exists not only between pairs of words in this system, host and parasite, host and guest, but within each word in itself"[31] resulting in some kind of complicated anti-definition of a parasitic relation in which each of the words is simultaneously its own synonym and antonym. As I have already stated

[29] Miller, "The Critic as Host," 18.
[30] Miller, "The Critic as Host," 19.
[31] Miller, "The Critic as Host," 19-20.

in the Introduction, Miller's line of reasoning is difficult to follow. In his ambiguity-laden treatment of the 'parasite,' he drifts from one context to another, sometimes evoking botany, sometimes linguistics, at other times sociology, further suspending the possibility of a definition, even a provisional one for the sake of his argument. This maintains the uncertainty of meaning which parallels that faced by ecology, where the demarcation line between what is and what is not a parasite is frustratingly blurred. As many other 'uncanny' expressions, 'parasite' proves difficult to be immobilised in a fixed definition; it always seems to defy it and pose challenges to those willing to secure its meaning, from the most basic understanding of its etymological roots to the vast scope of the relations it describes.

Parasitoi in *Middlemarch* and *Bleak House*. Families and Paradoxes

While the previous sections of the chapter explored the issue of paradoxicality of ecological and lexical parasites and parasitism, the following one focuses on instances of paradoxical parasites in literary examples. Here, the meaning of a *parasitos* (pl. *parasitoi*) as derived from Greek comedies will be used to analyse these characters from *Bleak House* and *Middlemarch* that literally eat at tables of other. These include characters who are not necessarily referred to as parasitical or parasite-like explicitly, but who through their behaviour and relations with their hosts earn the names of true *parasitoi*, that is abusers or exploiters of hospitality. Two of the three examples shown below, that is Mr Featherstone's relatives from *Middlemarch* and Harold Skimpole from *Bleak House* have already been interpreted as parasites in Anne-Julia Zwierlein's article on parasites, but not as examples evoking the comedic meaning of the term.

A cluster of characters who exhibit traces of *parasitoi* appear in George Eliot's *Middlemarch* in which she uses particular markers to allow the reader to identify parasitical characters; in this case these are greed and passivity. If we were to look for the mentioned in the previous chapter Vorticellæ of Middlemarch, the closest to Lewes's parasites waiting

passively for food being sucked by means of cilia-induced vortices would be the characters referred to in the novel as the "sitters-up,"[32] i.e. Mr Featherstone's hopeful relatives, his prospective legatees. The narrator affectionately refers to them as "Christian Carnivora,"[33] Fred Vincy, himself a hopeful legatee *in spe*, calls them without a grain of affection "vultures,"[34] while the invaluable Mrs Cadwallader sees them as "collections of strange animals."[35] Although referred to as predatory creatures, on closer inspection it becomes apparent that they do not really exhibit any traits usually associated with carnivores; the Featherstones and the Waules seem rather sluggish yet unwearied creatures. If there is anything aggressive about them, especially Brother Solomon and Mrs Waule, the lady "who had been Jane Featherstone for five-and-twenty years,"[36] is their passive-aggressive persistence in reminding old Mr Featherstone of his duties to his kin: "Solomon and Jane; also, some nephews, nieces, and cousins [were] arguing with still greater subtilty as to what might be done by a man able to 'will away' his property and give himself large treats of oddity, felt in a handsome sort of way that there was a family interest to be attended to, and thought of Stone Court as a place which it would be nothing but right for them to visit."[37] Impressively, the old man's dislike towards his relatives, which "seemed to get stronger as he got less able to amuse himself by saying biting things to them"[38] only reinforces their resolution. It is interesting to note that in his "biting" comments Mr Featherstone reverses the metaphorical relation of himself and his family; they are considered carnivorous, yet it is he who does the biting.

---

[32] George Eliot, *Middlemarch* (Ware: Wordsworth Editions, 2000), 254.
[33] Eliot, *Middlemarch*, 272. Anna-Julie Zwierlein notes that such language in the novel comments on the nature of humans as animals on the one hand, and inspires "images of human vampirism and parasitism" on the other. Zwierlein, "From Parasitology to Parapsychology," 167.
[34] Eliot, *Middlemarch*, 86.
[35] Eliot, *Middlemarch*, 267.
[36] Eliot, *Middlemarch*, 86.
[37] Eliot, *Middlemarch*, 252.
[38] Eliot, *Middlemarch*, 254.

The scale and toll of the invasive presence of the sitters-up is experienced by Mary Garth who, being employed as housekeeper to Mr Featherstone, is given a unique perspective into the power relations in the household. When her uncle becomes bedridden, the family turn properly oppressive with their need to explicitly attend to "family interest" but implicitly to assure their own; and Mary is unwittingly caught in the middle of this affair:

> Thus Stone Court continually saw one or other blood-relation alighting or departing, and Mary Garth had the unpleasant task of carrying their messages to Mr Featherstone, who would see none of them, and sent her down with the still more unpleasant task of telling them so. As manager of the household she felt bound to ask them in good provincial fashion to stay and eat […]. But some of the visitors alighted and did not depart after the handsome treating to veal and ham.[39]

As the crucial mediator between the host and his family of *parasitoi*, Mary takes on the role of the provider of food following good neighbourly customs. But the Waules and the rest of the family do not follow the same custom, and not only do they outstay their (begrudging) welcome but in effect attempt to eat Mr Featherstone out of house and home, a characteristic parasitical behaviour according to Miller.[40] This is particularly true of Brother Jonah, who occupies a seat in the kitchen-corner, and keeps a constant watch on Mary, in the stationary attempt to protect family interest, together with the rest of the family considering her a threat to their inheritance. Her physical proximity to the riches of old Featherstone and her combined status of the manager of the house and family mediator put her at the centre of the invasion of blood-relations, but also at the top of the list of prospective legatees and because of that the family feels the need to try to isolate her from or limit her access to Mr Featherstone.

Mary also rightly suspects the vanity of their hopes which she regards (but in her mind only) as "the petty passions, the imbecile desires, the straining after worthless

[39] Eliot, *Middlemarch*, 252.
[40] Miller, "The Critic as Host," 19.

uncertainties."[41] She turns out to be right as these strange animals' incessant speech vortices and passive-aggressive sitting-up come to no avail when the old man makes a Mr Joshua Rigg the sole beneficiary of his will. Additionally, the way in which this situation is resolved, leaves the reader wondering if an absolute lack of any sitting-up would not have been more helpful in getting some part of the legacy. After all, Mr Featherstone does demonstrate a surprising consistency in this respect. He is an unwelcoming host to the group of *parasitoi* waiting to consume the fruits of his labour and his will is the expression of a clear objection to being treated in such a way. Not only did he disinherit the "Christian Carnivora" but also Fred Vincy who had not *actually* borrowed money on account of his prospective inheritance, as old Featherstone implied, but the great possibility of him being the beneficiary of his estate was a fact generally known and accepted in Middlemarch and this alone could have indirectly annoyed Mr Featherstone enough to induce his pre-emptive action. Although it might be seen as disinheritance out of spite, Mr Featherstone in a perverted way does appear a moral victor in these circumstances, as apart from leaving the vast majority of his wealth to Joshua Rigg, he also makes a stipulation concerning "the erection and endowment of almshouses for old men, to be called Featherstone's Alms-Houses, and to be built on a piece of land near Middlemarch already bought for the purpose by the testator, he wishing – so the document declared – to please God Almighty."[42] It seems that at the moment of devising the will, Mr Featherstone must have been more concerned with those in actual need but, more importantly, with those who did not abuse his hospitality originating in good custom – which paradoxically proves more Christian than any of the behaviours exhibited by the "Christian Carnivora."

Mr Featherstone proves a very uncooperative host who does not appreciate eating at his table even after his death. Sir Leicester from Charles Dickens's *Bleak House*, on the other

[41] Eliot, *Middlemarch*, 260.
[42] Eliot, *Middlemarch*, 277.

hand, presents himself as a gracious host to not necessarily welcome guests at his residence. As Dickens sarcastically suggests, because Sir Leicester is wealthy, he has many poor relatives. This implies that an affluent host attracts all kinds of people who claim even the smallest affinity with him for their own gain. Dickens calls Sir Leicester "a glorious spider, [who] stretches his threads of relationship"[43] which would suggest some predatory instincts on the side of the aristocrat: attracting greedy flies for his own gratification. It is not the case, however, because "while he is stately in the cousinship of the Everybodys, he is a kind and generous man, according to his dignified way, in the cousinship of the Nobodys; and at the present time, […], he stays out the visit of several such cousins at Chesney Wold with the constancy of a martyr."[44] Sir Leicester is a such a spider whose thread is an unspoken invitation to which a number of his family (from Boodle to Zoodle) respond, and invade his web, rather quickly outstaying their faint welcome. As a consequence, he must suffer their immeasurable company all over Chesney Wold: "cousins yawn on ottomans. Cousins at the piano, cousins at the soda-water tray, cousins rising from the card-table, cousins gathered round the fire."[45] He allows it because he believes that he is obliged to familial loyalty, and the support for his large circle of relatives is part of his social position. He seems to put the presence of his numerous guests into the same category of inconvenience as his regular bouts of gout: inevitable and associated with his name.

What significantly differs Eliot's Christian Carnivora from Dickens's Dedlock extended family is their social class and the privileges but also limitations connected with it. Mr Featherstone is a self-made man who earned his fortune, and Brother Solomon and Sister Jane are seen the greedier as they have come to riches of their own, and thus their existence is not threatened by their brother's ultimate disinheritance. The Dedlock cousins (or, in fact,

[43] Charles Dickens, *Bleak House* (Ware: Wordsworth Editions, 2000), 335.
[44] Dickens, *Bleak House*, 335.
[45] Dickens, *Bleak House*, 336.

Sir Leicester himself) are not in the same position as their opportunities of earning a living are scarce:

> there are cousins who are so poor, that one might almost dare to think it would have been the happier for them never to have been plated links upon the Dedlock chain of gold, but to have been made of common iron at first, and done base service.
>
> Service, however (with a few limited reservations; genteel but not profitable), they may not do, being of the Dedlock dignity. So they visit their richer cousins, and get into debt when they can, and live but shabbily when they can't, and find – the women no husbands, and the men no wives – and ride in borrowed carriages, and sit at feasts that are never of their own making, and so go through high life.[46]

The issue of greed, so present in descriptions of Mr Featherstone's relatives, here gives way to sympathy if not pity. The Dedlock poor cousins do not really have any choice in the matter of familial parasitism; having very limited options of supporting themselves, they are restricted to forever assuming the role of unwelcome guests eating at the table of their richer kin. Of these guests, the first is Volumnia Dedlock,

> a young lady (of sixty) who is doubly highly related, having the honour to be a poor relation, by the mother's side, to another great family. Miss Volumnia, displaying in early life a pretty talent for cutting ornaments out of coloured paper, and also for singing to the guitar in the Spanish tongue, and propounding French conundrums in country houses, passed the twenty years of her existence between twenty and forty in a sufficiently agreeable manner. Lapsing then out of date and being considered to bore mankind by her vocal performances in the Spanish language, she retired to Bath, where she lives slenderly on an annual present from Sir Leicester and whence she makes occasional resurrections in the country houses of her cousins. […] But she is a little dreaded elsewhere in consequence of an indiscreet profusion in the article of rouge and persistency in an obsolete pearl necklace like a rosary of little bird's-eggs.[47]

Throughout this description, the antiquity of Volumnia is emphasised: she is an elderly lady but she prefers to appear to the world as a young person, which she probably tries to achieve by the ill use of make-up; her outdated jewellery is accompanied by her outdated "skills" – the only activity approximating work she can do – which overall paints a picture of a vain,

[46] Dickens, *Bleak House*, 335.
[47] Dickens, *Bleak House*, 335.

delusional, old-fashioned bore, half-ridiculous and half-piteous. It also points to either her unwillingness, or inability to adapt to new circumstances, which may explain why J. Hillis Miller calls her "the ancient aristocratic parasite of Sir Leicester Deadlock" who has "cheated death […], but only by choosing a death-in-life which is repulsive in its grotesque imitation of youth and vitality."[48] Very much like Eliot's Christian Carnivora, Volumnia's presence causes discomfort to her host; Sir Leicester looks at her grotesqueness "with magnificent displeasure."[49] Yet he stands her rouge and pearls with dignity for Volumnia is a true, ancient Dedlock,[50] as debilitated and backward as her distinguished host; and family obligations matter to him as much as trying to force the time to stop moving forward.

The Paradox of the Child *Parasitos*

Eliot's Christian Carnivora and Dickens's Dedlocks share the most crucial characteristic of *parasitoi*: they are the guests who arrive uninvited and outstay their non-existent welcome. Yet, paradoxically, they lack the other component of a true *parasitos*: their only redeeming quality, that is their entertainment value. Volumnia's skills in that department are insufficient, to put it kindly. The rest of the Dedlocks, just like Brother Solomon and Sister Jane, do not even attempt at entertaining their respective hosts. This cannot be said of another character of *Bleak House* who could also be considered a *parasitos*: Harold Skimpole, a child parasite. He, on the other hand, although presented as quite delightful in appearance and conversation, inspires more aversion than enjoyment. His apparently innocent disregard for everyday concerns such as time and money together with his tendency to let other people

[48] J. Hillis Miller, *Charles Dickens: The World in His Novels* (Cambridge, Mass.: Harvard University Press, 1958), 184.
[49] Dickens, *Bleak House*, 336.
[50] As the narrator puts it: "Volumnia is a little dim, but she is of the true descent; and there are many who appreciate her sprightly conversation, her French conundrums so old as to have become in the cycles of time almost new again, the honour of taking the fair Dedlock in to dinner, or even the privilege of her hand in the dance. On these national occasions dancing may be a patriotic service, and Volumnia is constantly seen hopping about for the good of an ungrateful and unpensioning country." Dickens, *Bleak House*, 483.

take care of these matters for him, render this assumption only natural to make. Posing himself as a mere child, who knows nothing of the adult world, allows him to rise above the mundane and excuse himself from the mind-numbing social obligations and responsibilities. Instead, he 'employs' himself as an amateur entertainer: a painter, a musician, a skilful conversationalist who eagerly fulfils the role of a *parasitos*, quite literally eating at the table of Mr Jarndyce. What differs Volumnia from Skimpole in this respect is that, unlike the former, the latter enjoys his host's favour. However, while the Dedlocks' presence in the house of their host is uncomfortable but generally harmless, the same cannot be said about Skimpole who will stop at nothing to preserve himself, and himself only. His childishness combined with his blatant hanging-on makes him one of the most disagreeable villains of *Bleak House*.

In precisely this vein he is regarded by literary critics: S. D. Sharma remarks, that "[t]he portrait of Skimpole in this novel singularly sticks to our memory like a leech"[51] and Robin Mayhead notes that though "superficially so delightful, [Skimpole] is one of the sinister characters of the novel. He […] is a parasite; a parasite upon the innocent generosity of Mr Jarndyce, a parasite who achieves his success by captivating those who meet him, with an apparently ingenuous candour."[52] On a similar note, Paul Mankowski also uses – and largely expands – this metaphor when he calls Skimpole "a grotesque parasite: a colossal tick, a leech, a tapeworm with a taste for Mozart, who, it turns out, is childlike in his pursuit of pleasure, but shrewd and willful in his studied neglect of responsibility."[53] All of those parasitical references employed by these critics evoke the contemporary meaning of 'parasite,' i.e. an exploiting scrounger, to emphasise their very strong (almost hysterical in

[51] S. D. Sharma, *Victorian Fiction: Some New Approaches* (New Delhi: Sarup and Sons, 2002), 73.
[52] Robin Mayhead, *Understanding Literature* (Cambridge: Cambridge University Press, 1969), 103-4.
[53] Paul V. Mankowski, "The Skimpole Syndrome: Childhood Unlimited," *First Things*, May 1993, http://www.firstthings.com/article/2008/08/004-the-skimpole-syndrome-childhood-unlimited-49 (03.06.2009).

Mankowski's case) negative reaction towards this character. *Bleak House* abounds in villains of many sorts and yet it is Skimpole who seems to stand out as particularly evil. The following paragraphs will try to offer a possible answer to this apparently universal antagonism.

Though in the novel he never is explicitly referred to as a parasite, Mr Skimpole nonetheless more often than as a man or as a person, is associated with creatures: Mr Jarndyce calls him "the finest creature upon earth – a child,"[54] to Esther he is "a little bright creature"[55] and to himself "a creature who is perfectly simple in worldly matters."[56] If these creatures are to invoke animals, these would be such that are generally considered idle or just useless, for example butterflies or drones. He claims himself that all he asks is "to be free. The butterflies are free. Mankind will surely not deny to Harold Skimpole what it concedes to the butterflies!"[57] Skimpole is a kind of butterfly: a pretty but purposeless creature whose function remains only decorative. Yet, unlike his harmless biological counterpart, he for some reason retains the customs of a caterpillar: the blatant disregard for anything and anyone who does not have direct influence on fulfilling his cravings.

Later, Skimpole expresses his admiration for the way of life of drones, recounted here by Esther:

> He didn't at all see why the busy bee should be proposed as a model to him; he supposed the Bee liked to make honey, or he wouldn't do it – nobody asked him. It was not necessary for the bee to make such a merit of his tastes. […] He must say he thought a Drone the embodiment of a pleasanter and wiser idea. The Drone said, unaffectedly, "You will excuse me; I really cannot attend to the shop! I find myself in a world in which there is so much to see, and so short a time to see it in, that I must take the liberty of looking about me, and begging to be provided for by somebody who doesn't want to look about him." This appeared to Mr Skimpole to be the Drone philosophy, and he thought it a very good philosophy – always supposing the Drone to be willing to be on good terms with the Bee: which, so far as he knew, the easy

[54] Dickens, *Bleak House*, 60.
[55] Dickens, *Bleak House*, 61.
[56] Dickens, *Bleak House*, 371.
[57] Dickens, *Bleak House*, 67.

> fellow always was, if the consequential creature would only let him, and not be so conceited about his honey![58]

Obviously, when delivering his praise of drones and their way of life, Skimpole has himself in mind. It even explains why he never expresses gratitude towards his sponsors: apparently, he finds them too conceited about their honey. The analogy is simple: Skimpole is a drone who is on good terms with Jarndyce, the busy bee, who provides for him. Then, since his well-being is someone else's responsibility, he can focus on the study of the world without having to occupy himself with such a mundane activity as breadwinning. The parallels with the aforementioned brood parasitism seem quite visible here; but Skimpole advances his parasitism even further; instead of using Jarndyce to provide for his daughters, he places himself in the host's nest. What is also rather striking in this quote is Skimpole's apparent belief in the free will in the natural world: nobody asked the bee to make honey, therefore he must do it of his own accord. Apart from the fact that this view is simply erroneous, it also suggests the level of cynicism on his side. Since nobody asked him to be responsible and ethical, and since to him such a conduct would appear unpleasant, he does not need to comply to social norms. In Harold Skimpole's world this logic not only works but also benefits him: nobody asked Mr Jarndyce to be Skimpole's host, and yet he is; he must like it, then.

While it becomes abundantly clear to the reader, and other characters, what kind of person Skimpole really is, Mr Jarndyce allows himself to be fooled by this "child." When asked by Ada about the reason behind him being so childish, he proposes a theory that Skimpole "is all sentiment, and – and susceptibility, and – and sensibility – and – and imagination. And these qualities are not regulated in him, somehow. I suppose the people who admired him for them in his youth, attached too much importance to them, and too little

[58] Dickens, *Bleak House*, 81-82.

to any training that would have balanced and adjusted them; and so he became what he is."[59] Jarndyce blames external factors for Skimpole's inability to adapt to the requirements of adult life, as if holding the whole society responsible for arresting his proper development. In fact, if Jarndyce wants to blame someone in particular for creating such a creature, he should start with himself. It is after all due to his humouring of Skimpole's behaviour that his childishness is sustained – because it obviously proves advantageous. As Nabokov writes, Jarndyce's naivety comes from his own definition of a child: "a child *was* from the point of view of Dickens the finest creature upon earth. But now comes an interesting point: the definition 'a child' cannot be really applied to the man Skimpole. Skimpole deceives the world, as he deceives Mr Jarndyce into thinking that he, Skimpole, is as innocent, as naive, as carefree as a child. Actually, he is nothing of the sort."[60] The lengths to which Jarndyce goes to justify his child-friend are astounding and make his generosity appear more like naivety on the verge of foolishness: it seems that Jarndyce almost asks for Skimpole to exploit him.

When confronted with actual children, Skimpole's fake childishness appears almost vulgar; the more so as they seem to induce him to reveal his true nature of a cruel exploiter. As Mildred Newcomb remarks, "Harold Skimpole is a professional [who] lives a free and easy life quite above the restrictions and limitations that hamper most people. Examination of Skimpole, therefore […], will show us the characteristics and consequences of the childhood exploiter in his most efficient and slickly polished form."[61] If he were just a harmless character concentrated on the beauty of the world and relying on his generous friends, he would be easily tolerated. However, when he occasionally employs himself in

[59] Dickens, *Bleak House*, 504.
[60] Vladimir Nabokov, *Lectures on Literature*, ed. Fredson Bowers (San Diego, New York: A Harvest Book Harcourt, 1982), 83.
[61] Mildred Newcomb, *The Imagined World of Charles Dickens* (Columbus: Ohio State University Press, 1989), 130.

actions and these prove destructive beyond doubt, then his "childishness" immediately evokes resentment, if not hatred. The moment he sends sick Jo away, he reveals his true nature. His action seems the result of calculated self-serving: once there appears the threat that he, the fake child, may be likened to an actual hurting child, Skimpole realises that he would inevitably be compared unfavourably, and his own interest would be at risk. Thus, he gets rid of competition as fast as possible; in his mind, Mr Jardyce's table is too small to accommodate more children when in fact all the seats are taken by one *parasitos*.

Skimpole is a great example of a perverted Dickensian child: not only does he assume the child's qualities with which he evokes negative instead of positive feelings but he also serves as a point of reference against which all the other characters that ever meet him are contrasted in favour (perhaps with the noble exception of the lawyer Mr Vholes). His appearance is perfectly agreeable:

> He was a little bright creature, with a rather large head; but a delicate face, and a sweet voice, and there was a perfect charm in him. All he said was so free from effort and spontaneous, and was said with such a captivating gaiety, that it was fascinating to hear him talk. Being of a more slender figure than Mr Jarndyce, and having a richer complexion, with browner hair, he looked younger. Indeed, he had more the appearance, in all respects, of a damaged young man, than a well-preserved elderly one.[62]

Though his looks would encourage readers to take him as a "preserved child," that does not really seem to be the case. Miller suggests the reason why he might be, as Zwierlein puts it, "exempt from the human life-cycle."[63] This, he remarks, is due to the fact that "Skimpole changes through time not by the normal growth and maturing of a human being, but by a scarcely perceptible decay."[64] This decay is not visible because it is internalised, and only occasionally manifested in his behaviour. Just like Volumnia Dedlock, he seems to have

[62] Dickens, *Bleak House*, 61.
[63] Zwierlein, "From Parasitology to Parapsychology," 165.
[64] Miller, *Charles Dickens*, 183.

cheated death and become ageless; but just like her, his presence evokes magnificent, if unspecified, displeasure.

If there is anything we are certain about Skimpole is the fact that his childishness is not so much congenital as acquired at some point in his past. We learn that Skimpole once used to have a job (in medical profession), started a family and probably tried to conform to the mundane everyday life. But this life of an ordinary man came to a sudden halt when he decided to put on the child's costume, so to speak. Why he would make such a decision and voluntarily reject all the knowledge he had gained throughout his life in exchange for child-like innocent ignorance is never explained. He could have done it out of expediency and laziness. On the other hand, his motives may have been different: suppose he adopted his conduct not for the reasons of convenience but because of his fear or loathing of the adult life he had tasted for a moment and strongly disliked, of the inescapable responsibilities and dangers associated with it. In this respect, his need for hiding behind a mask of a child could be read not as a cunning plan of a harmful sponger but as some kind of survival technique, his peculiar means of coping with reality.

Furthermore, one could also propose a more perverse way of reading his parasite-like behaviour. It seems that Skimpole adopted the childish conduct specifically to aid his capability as a hanger-on; he gives the appearance of a pleasant man, a skilled conversationalist whose apparent innocence of the world is an inexhaustible source of bemusement expressed by his host. However, the reverse may in fact be the case; perhaps it was what induced Skimpole's parasitic lifestyle. As it has been explained before, children and parasites share a number of similarities: they grow within human bodies and use their resources to their own advantage and even after having been born, they remain sole takers who demand constant supply of food and attention and who offer nothing in return – perhaps apart from being adorable. For this is precisely how children are (and are meant to be)

perceived: they are loveable, they make older people happy with their meaningless babbling, they have problems with reasoning and their strange logic usually puzzles the adults; they sometimes even exhibit unacceptable behaviour but are forgiven – simply because they are *still* children who need to learn the proper ways. It almost seems as if they are forced to do all these things in order to survive, as if this adorableness was the integral part of the evolutionary strategy of human survival. Children must appeal to adults in such a way that their carers – primarily the parents but not exclusively – would willingly and quite often at cost of self-sacrifice feed and take care of them.

The same behaviour is adopted by Skimpole but he cannot evoke such pleasant associations. The reason behind his failure in this respect lies precisely in his artificiality. Actual children are adorable not because of some calculated motive or the conscious adoption of this survival strategy but because it really is within their nature. Skimpole, on the other hand, is forced to repeatedly assure everyone else of his childishness and thus he evokes some suspicion. Most people tend to disdain Skimpole because, although he acts like a child, he *is not* like a child – his vulnerability is not such a part of himself that he can do nothing about it, but a cynical tactic adopted to harm and exploit. Whenever he takes off his mask, he exposes his boundless egocentrism.

The final layer of paradoxicality attached to *parasitos* lies in its relation to the host. The comedy-derived parasites are characters, with human motivations and desires; they operate within the rules of the metaphor. As the above literary examples show, the fundamental difference between biological parasites and *parasitos* is that in the latter relation the hosts have the ability to decide whether they accept the company of the uninvited guests or not. To risk an analogy in the style of J. Hillis Miller: biological parasites do not knock before entering the household; instead, they break in, and make themselves at home, systematically ruining the place. Because *parasitos* belongs to the realm of literature, his or

her conduct is easy to explain by means of literary interpretation, and then judged according to the same moral criteria that are applied to people. *Parasitoi* in the above examples could be seen as relatable to other examples of freeloading characters present in literature: such as, for instance, Aesop's Grasshopper singing throughout the summer and expecting the ants to provide for him in the winter,[65] which is supposed to be judged as a reprehensible lounger. However, the problems begin when biological parasites are approached in the same way. The narrativisation of their behaviour seems a very common and dangerous practice because it blurs the borders between the metaphor and real life to such an extent that it makes it impossible to tell if something is parasitical because that lies in its nature, or because that is how it is portrayed in the narrative. Unlike *parasitos*, biological parasites 'invite themselves in' not because they are bad-mannered, greedy or have other ulterior motives, but because this is their biological imperative, over which they have no control. *Parasitos* can always decide if he or she wants to be a sponger or not; a biological parasite has no such choice.

Conclusion

Unconventionally, the final remarks of this chapter will begin with a digression whose aim, hopefully, will soon appear transparent.

In the conclusion to her book on seahorses,[66] Helen Scales provides an interesting reason why she feels it is vital to make every effort to protect them in their natural environment. This appeal is necessary because seahorses, she explains, are not one of the so-called "keystone" organisms whose disappearance would have enormous and unpredictable impact on the environment; on the contrary, to all intents and purposes, they do not matter to nature. But, as she argues, seahorses matter to humans. She demonstrates their purpose

[65] Aesop, "The Ant and the Grasshopper," in: *The Fables of Aesop* by Joseph Jacobs (London: Macmillan & Co., 1894), http://www.vam.ac.uk/content/articles/a/aesops-fables-the-ant-and-the-grasshopper/ (14.06.2015).
[66] Helen Scales, *Poseidon's Steed. The Story of Seahorses, from Myth to Reality* (New York: Gotham Books, 2010).

through the employment of a quote from David Attenborough: "The overwhelming reason is man's imaginative health."[67] Seahorses must exist because human beings need them to be able to create stories: myths and fairy tales. At the core of her argument lies the conviction that explaining the existence of such creatures – reminiscent of chess knights, with monkey tails and chameleon eyes – would be impossible without resorting to some creative effort. Stating the simple fact that they are just an effect of thousands of years of natural selection at work somehow does not suffice. Scales, then, raises seahorses from their status of natural organisms to the level of mythological creatures, on a par with other hybrids such as griffins or basilisks (or, indeed, hippocampi). Thus, seahorses matter because they are treated as an exercise in human creativity.

So, I argue, are parasites. The examples this chapter provides: of biological parasitical abundance, of the unique survival strategies of ecological klepto- and brood parasites, and of literary characters whose behaviour gave the name to the natural phenomenon, all point to the paradoxicality inscribed within their nature. The need to narrativise their existence is equally strong: from their name, to the explanations of their origin and the reasons behind their peculiar behaviour, parasites demand and create stories. Being, just like seahorses, creatures too strange to be believable, they must be filtered through the narrative techniques which allow for at least partial understanding. In essence, parasites must undergo the process of being raised above their biology to the mythical level which man finds familiar and thus more acceptable. But, as the examples in the previous chapter proved sufficiently, this familiarisation comes at a cost. Just like Darwin's personified nature, so do parasites fall prey to the same risk as any other phenomenon of nature transformed into literary text: of such interpretations which might work on the literary level but which would deviate from the natural facts. In the case of parasites, such a situation is very likely to happen. In both

[67] David Attenborough, quoted in: Scales, *Poseidon's Steed*, 192.

fictional and non-fictional stories created around the subject of parasites, they are presented as selfish, unscrupulous and disgusting villains: the patricidal cuckoo, the greedy kleptoparasites, the voracious sitters-up, the corrupt fake child. However, their relation with literature can work to the parasites' disadvantage as well as advantage. The way in which these stories are told makes parasites appear as if they are misunderstood tragic antiheroes who cannot help being born this way. In such a form, even if devoid of redeeming features,[68] they could inspire enough curiosity to allow for their "plight" to be given a sympathetic forum. This is precisely the technique used by contemporary parasitologists who attempt to bring the objects of their studies to the attention of non-specialist general audience.[69] Combining the nasty with the impressive, they create and recount stories, include narrativised case studies and occasionally resort to myths and legends to make their subject more accessible and compelling The claim of mutualistic interaction between science and literature is thus exemplified by the parasite-themed narratives.

In the previous centuries, most predominantly the 1800s, however, the conscious attempts to describe parasites in more favourable light were sparse,[70] and the generally preferred strategy was to present them to the world solely as the product of man's imaginative "disease." Parasites were enveloped in stories of horror and disgust whose focus differed, depending on the particular theme the scientific or literary narrators tended to approach. The subsequent chapters will follow a pattern in which a particular theme of these

---

[68] In fact, the more recent discoveries in parasitology actually prove positive aspects of harbouring parasites. One of them is their ability to boost up their hosts' immune system, in effect protecting them from other infections or even autoimmune diseases. These surprising qualities of parasites are the subject of Dickson D. Despommier's *People, Parasites, and Plowshares. Learning from Our Body's Most Terrifying Invaders* (New York: Columbia University Press, 2013).

[69] See for example Carl Zimmer, *Parasite Rex. Inside the Bizarre World of Nature's Most Dangerous Creatures* (2001), the already mentioned Rosemary Drisdelle, *Parasites. Tales of Humanity's Most Unwelcome Guests* (2010) and Dickson D. Despommier, *People, Parasites, and Plowshares. Learning from Our Body's Most Terrifying Invaders* (2013), or Valerie Curtis, *Don't Look, Don't Touch. The Science Behind Revulsion* (2013).

[70] Zwierlein's mentions Darwin's admiration at their great adaptive capabilities, and Cobbold's acknowledgement of their bad reputation, which he tried not to improve but – semi-successfully – rid of the ridiculous superstitions and prejudices. Zwierlein, "From Prasitology to Parapsychology," 158-59 and 161, respectively.

parasite narratives is traced and analysed in both zoological (or sometimes medical) and literary contexts.

CHAPTER III STORIES OF ORIGIN: FROM WITHIN

Introduction

The purpose of the previous chapter, apart from arguing the inherent paradoxicality of parasites, was to show how science uses narratives in explanation of ecological or biological phenomena of parasitism (brood parasitism, kleptoparasitism etc.) It also attempted to find the answer to the question 'what is the parasite?' in biology, ecology, etymology and literature. All of these sources prove abundant, and the answers they provide vary. The parasite takes on many meanings, defies definitions, classification and categorisation. Even within the strictly scientific context, the answer to the question of the nature of a parasitic organism may vary immensely, depending on the scope of a chosen definition. Such vague, imprecise answers seem frustratingly insufficient. However, because in scientific – especially medical – context the practical consequences of the definition of the parasite are of greater urgency than the theoretical ones, contemporary biomedicine has developed two distinct approaches in which it addresses this problem. For the purpose of the present work I refer to them as theoretical and functional approach. The section on biological parasites in the previous chapter illustrated the difficulties and inconsistencies accompanying the theoretical approach which employs the broadest definition of the parasite. The functional approach, on the other hand, can be characterised by the ability to adapt to a particular practical purpose. While theoretically every organism might be classified as a parasite, functionally, there is a fundamental difference between the medical view on, say, malarial protozoa and on tapeworms.

As the second part of the previous chapter has shown, the term 'parasite,' does not belong to the realm of natural sciences exclusively; it originated in denoting a common

custom, and has been historically employed by other disciplines and fields to aid their own ends. Thus, the transplant of this notion from natural sciences to humanities, especially literary and cultural studies, is not only already established by the conventional practice but, more importantly for the present work, useful for the exposition of its meaning, which in turn may appear beneficial to the theoretical approach of natural sciences. This shift, however, is not only cross-disciplinal; it also transports the notion of parasite from the literal to the figurative. Biomedicine and ecology, whether in their theoretical or functional approach, study the actual organisms. When the term 'parasite' is employed in the context of cultural or literary studies, its metaphorical rather than literal meaning is considered. In its approach towards 'parasite,' this chapter positions itself somewhere between the literal and the figurative, as well as between the functional and the theoretical. Generally, when the scientific texts are analysed, their focus is on the literal notion of parasites; the metaphorical approach accompanies the examination of the literary examples.

While the organising question of the previous chapter was 'what?,' the present and the next one are governed by the question 'why?'. The problems parasites generate are analysed both in terms of the understanding of their complex life cycle, as well as in terms of the stylistic difficulties the description of parasites encounters. The conclusion to which this section points is that of the impossibility of an isolated, unbiased parasitological depiction. The parasite as an object of scientific narration shows how ideology permeates scientific discourse, allowing for such (apparently) non-scientific notions as blame, fault, guilt and judgement. Addressing the question of attitudes towards parasites from the historical perspective, this and the next chapters focus on two approaches, according to which the parasite is seen as either an integral, essential but not harmful part of an organism it inhabits (the complementary perspective), or an

unnecessary and uninvited guest, an invader, whose presence is detrimental to the host (the oppositional perspective). While the question of the parasite as an intruder will be explored in Chapter IV, in the present one parasites are viewed as elemental components of their hosts, or – speaking more broadly – of the system they inhabit. The general premise of both these chapters is to present the parasites' stories of origin which, although on the surface may seem very dissimilar, share a common thread in the form of recurring notions of personal responsibility and punishment for certain behaviours.

The final part of this chapter includes two metaphorical examples of parasites seen as integral parts of the system in which they exist. Due to the distinct ways in which these literary works are inspected for parasitical themes, each of them is read here through a different approach: contextual in the case of *Bleak House* and extratextual in the case of *Middlemarch*. Charles Dickens's novel is interpreted as the literary reworking of the scientific theories of its time, as it shows how parasites can be seen as symptoms, manifestations of a greater underlying problem the host suffers from. George Eliot's work, on the other hand, while to a certain extent subscribing to the traditional view of parasites as a form of deserved retribution for actions viewed as transgressive, is read here as offering an alternative explanation of these manifestations: that is, their external origin

The Trouble with Parasites

The history of human beings is inseparably connected with the history of parasites. The earliest accounts of parasites infesting people, according to F. E. G. Cox, "come from a period of Egyptian medicine from 3000 to 400 BC."[1] But, as G. C. Cook notes, a number of larger parasites (specifically intestinal worms) "must have been visualised in ancient

[1] F. E. G. Cox, "History of Human Parasitology," *Clinical Microbiology Reviews*, Vol. 15, No. 4 (2002), 596.

times […] – in fact, since *Homo sapiens* first became aware of his immediate environment."[2] Nonetheless, visualisation and awareness in themselves were not enough to establish the mental connection between these creatures and the various ailments and diseases humanity suffered because of their doings. While it is rather easy to understand that a mosquito bite is responsible for the itching and swelling of the skin, the realisation that the very same mosquito bite might be responsible for debilitating chills and fever some days later seems a lot more difficult to grasp. In fact, just a suggestion of one being the result of the other even on the cusp of the twentieth century was considered incredibly "silly"; at least, this is precisely how some newspapers commented on such a hypothesis presented by the United States Yellow Fever Commission in 1900.[3] In a world without the understanding of such notions as infection, transmission or incubation, a parasite, especially such a conspicuous one as the extremely distressing Guinea worm,[4] is only what it appears to be: a pain-causing animal not very different from stinging wasps or biting snakes. Yet one difference between them was realised from the very beginning: snakes and wasps come from outside, they bite or sting, and then they leave. The question

[2] G. C. Cook, "History of Parasitology," in: *Principles and Practice of Clinical Parasitology*, eds. Stephen H. Gillespie, Richard D. Pearson (Chichester: John Wiley, 2001), 1.

[3] In 1900 the United States Yellow Fever Commission working in Cuba arrived at the (correct) conclusion that the mode of transmission of the disease was a mosquito bite. Irwin Sherman quotes an editorial from *Washington Post* exhibiting the general reaction of the public to this revelation: "Of all the silly and nonsensical rigmarole of yellow fever that has yet found its way into print – and there has been enough of it to build a fleet – the silliest beyond compare is to be found in the arguments of theories generated by the mosquito hypothesis." Irwin W. Sherman, *Twelve Diseases That Changed Our World* (Washington: ASM Press, 2007), 151.

[4] Guinea worm, *Dracunculus medinensis* is believed by some historians of parasitology to be the origin of the Caduceus symbol. The reason behind this assumption is the ancient treatment of the infection which has survived until today. Guinea worm tries to escape human body through lower extremities by forming a burning and itching blister which bursts when submerged in water, thus revealing the head of the parasite. The only possible cure is to take a stick, or twig and wrap the parasite around it, one turn of the stick at the time; the full extraction of the parasite may take weeks as the process is slow and agonising. Dickson D. Despommier, *People, Parasites and Plowshares: Learning from Our Body's Most Terrifying Invaders* (New York: Columbia University Press, 2013), 147-154. Rosemary Drisdelle, *Parasites: Tales of Humanity's Most Unwelcome Guests* (Berkeley, Los Angeles, London: University of California Press, 2010), 107.

where parasites, especially endoparasites, come from for hundreds of years remained a mystery.

The section of W. D. Foster's *History of Parasitology* devoted to the history of tapeworms opens with the following assertion: "A number of questions must have occurred to anyone reflecting on the natural history of tapeworms: what was the nature of the thing? was it indeed an animal? whence did it come? how was it constructed? how did it feed, breathe, grow and reproduce? A clear understanding of these points required the cumulative studies of many investigators over many centuries."[5] Today all of these questions have definitive answers – as 'tapeworm' is granted the precise definition and explanation the elusive 'parasite' is not – but it is an achievement, as Foster points out, which took hundreds of years. To illustrate the difficulty parasites posed to early scientists, I use here the example of one of the most common internal parasites, the pork tapeworm, *Taenia solium*, whose life cycle is relatively simple.

The pork parasite has two hosts: the intermediate one, the pig, and the final, the human. To become infected with *T. solium* a person usually eats raw or undercooked pork in which the tapeworm cysticerci are encysted. After the cysticerci are ingested, they travel to the small intestine and mature into adult worms. The characteristic feature of the pork tapeworm is the scolex with hooklets and suckers by which the parasite secures itself in the intestine. Like other tapeworms, *T. solium* consists of many segments, has no digestive tract and is a hermaphrodite; if undisturbed, it can grow in the intestine up to 10 metres in length. Once fully mature, the tapeworm begins to shed: its last segment, packed with eggs, breaks and escapes the host's body *on its own* or is passed with faeces. To complete the cycle, the eggs must be ingested by a pig, which may get infected if, for

[5] W. D. Foster, *A History of Parasitology* (Edinburgh and London: E. &S. Livingstone, 1965), 29.

example, its feed is contaminated by human waste. In the pig's digestive tract, the eggs hatch and migrate to muscle tissue where they develop into cysts.[6]

Pork tapeworm, in unfavourable (to both the host and the parasite) conditions can use humans as its intermediate hosts. If, instead of the intended cysticerci, the parasite's eggs are ingested, they travel around the host's body and can arrive in any kind of tissue. There they encyst, leading to the disease known as cysticercosis. The arguably most problematic kind of this disease is when *T. solium* encysts in the brain tissue.[7] Even today, the diagnosis of neurocysticercosis (the brain-encysted tapeworm) is challenging, mostly because its symptoms may mimic those of brain tumour or other neurological disorders.[8] In fact, generally speaking, the diagnosis of taeniasis (intestinal worm infestation) is still difficult because without the actual proof in the form of an evacuated segment, the disease may resemble any other gastro-intestinal affliction. Also, with the gradual eradication of various parasitoses in the West, their relative rarity paradoxically leads to delayed diagnoses, as the more common potential causes are first taken into consideration before the parasitic disease.[9]

As the above description of the life cycle of *T. solium* shows, it is very difficult to talk about parasites without implicitly suggesting a certain level of responsibility on the side of the human hosts. The two main causes of the infestation suggested above are certain dietary choices (i.e. the consumption of raw or undercooked pork) and the lack of adherence to certain rules of sanitation (as in infecting pigs' feed with human waste). On

---

[6] Based on Dickson D. Despommier, *People, Parasites and Plowshares*, 113-134.
[7] Despommier, *People, Parasites and Plowshares*, 131-132.
[8] Drisdelle, *Parasites*, 193-195.
[9] Despommier, *People, Parasites and Plowshares*, 95. This problem may be illustrated by the pilot episode of the popular TV series of the 2000s *House M.D.* in which a Jewish teacher, admitted to the hospital with a sudden speech loss due to neurological causes, is treated for brain tumour and cerebral vasculitis first, before being finally diagnosed with neurocysticercosis. Taken that the premise of the series is the genius doctor diagnosing the most unusual cases, it shows the shift in perception of parasitical diseases: from the everyday to the unique. The synopsis of the episode is available at: https://en.wikipedia.org/wiki/Pilot_%28House%29#Plot (29.02.2016).

the surface level, they seem simple and easily mendable. However, the more we analyse them, the more complex they appear. Abstaining from the consumption of raw or undercooked pork seems perfectly reasonable in the practice of parasite prevention, yet the popularity of dishes which consist of raw pork seems to defy it. The reason why a slice of *prosciutto* would not necessarily worry an average European today is because we have established a complex chain of control, a succeeding line of sieves through which only the parasite-free meat is allowed: before it is sold to customers, pork is inspected for the presence of parasites by specialised authorities. Yet this practice is a very modern invention – for which we are indebted to the nineteenth century parasitologists – and enforced in industrialised, wealthy countries. In the less developed areas the prerequisite 'do not eat raw or undercooked pork' is only a meaningless warning because of limited access to such luxuries as electricity or running water. This is vital because the infection with *T. solium* does not necessarily occur when an insufficiently heated piece of meat is ingested. There are other instances in which the infection may occur: for example, it may happen when the same knives, or cutting boards are used first to prepare pork and then other foods[10]; it can also happen if the cutlery and dishes are rinsed in stagnant water (especially where running water is unavailable). Moreover, in places such as smallholder farms of Southeast Asia, Africa or Central America, where human waste is used as soil fertiliser or even as pig feed, the risk of infection is extremely high but at the same time virtually unavoidable.[11] Therefore, these causes must be approached with caution; they

[10] This is a description from T. Spencer Cobbold's account of his visit to India: "Barrack cooks, unless constantly looked after, are utterly careless as to the washing of chopping blocks, tables, dishes, &c. The dish or pot cover on which the meat is placed when raw is often used without washing for serving the piece up for dinner, and I have myself picked up a *Cysticercus* from the table on which a cook was preparing food. The dangers too of the parasite being conveyed by the cook's unwashed hands to the plates in which meals are served, and the common practice of using the same knife for cutting up meat, and afterwards, without washing it, for other culinary purposes, must not be overlooked." T. Spencer Cobbold, *Parasites; A Treatise on the Entozoa of Man and Animals* (London: J. & A. Churchill, 1879), 79.
[11] Drisdelle, *Parasites*, 205-206.

are not as simple as they appear, and their complexity points to the fact that Western standards of judgement are not universally applicable.

The description of the *T. solium* life cycle also shows the troubles the naturalists and medical practitioners had to face before the discoveries of the nineteenth century. When the earlier scientists attempted to answer the vital questions of parasitology: "what was the nature of the thing? was it indeed an animal? whence did it come? how was it constructed? how did it feed, breathe, grow and reproduce?,"[12] they also had to address the issue of the relation of the parasite to its host. The question 'why do hosts entertain parasites?' became one of the most important and most controversial parasitological issues, one which in its modified form is present to this day. The historical attempts to address the 'why?' question indirectly exposed the stereotypes and mental shortcuts made by people who asked them. In the following sections of the chapter, different approaches to the 'why' question are discussed; these are shown on contemporary and historical, and well as Western and non-Western examples to point to analogies present in the treatment of parasites.

Within and Without

In her 2012 article on the power of worms and parasites, which opens a volume devoted to this theme, Misha Tadd notes how these two notions of 'worm' and 'parasite' are useful to cultural studies in discussions regarding such issues as the other, or the sources of disgust. Particularly interesting with regard to the present chapter are Tadd's notes on the responses historically and culturally elicited by parasites: the oppositional and the complementary. She defines them thus: "The oppositional view presents worms and parasites as radically opposed to the self: the worm is corrupting and evil, an image of

[12] Foster, A History of Parasitology, 29.

chaos and destruction, and something to revile, expel and destroy. In contrast, the latter perspective portrays worms as complementary to humans, and parasites as complementary to their hosts. They are valuable, transformative creatures necessary for survival or the perpetuation of the cycle of life and death."[13] These two perspectives on parasites/worms, although not necessarily mutually exclusive, present two distinct views not just on the existence of parasites, but also on their origin. In the oppositional approach, the parasite is an external intruder, invading from without, an alien part of the body whose presence is unwelcome; within the complementary outlook, it is seen as an integral part of the host's body, sometimes even originating within. What is crucial here is the moment of overlap between these two approaches; it happens when the attempts at answering the 'why?' question are made. Parasites or worms only accompany imbalance; they are either its causes or symptoms.

Tadd notes further that Western biomedicine is almost exclusively[14] relying on the oppositional view, while other, non-Western medical perspectives tend to approach parasites from the complementary position, at least to some extent. She turns to the traditional Chinese medicine for examples, as it appreciated some worms as external invaders while seeing other as the "manifestations of bodily imbalance, or semi-demonic harbingers of death."[15] For instance, according to the Chinese physician Wang Kentang (1549-1613), worms are generated from and belong to warmth and moisture, and therefore eating warming and damping food ("excess meat, alcohol, fish, and soft shell

[13] Misha Tadd, "The Power of Parasites and Worms," in: *Parasites, Worms, and the Human Body in Religion and Culture*, eds. Brenda Gardenour and Misha Tadd (New York, Frankfurt, Berlin: Peter Lang, 2012), xv.

[14] Tadd does mention the research of David Elliot and Joel Weinstock who investigate the so-called hygiene hypothesis which states that harbouring intestinal parasites might be in direct relation to the lack of occurrence of auto-immune diseases. The assumption is that due to excessively hygienic lifestyle, the auto-immune diseases are much more common in the West. However, there have been more parasitological studies within the complementary approach recently in which the positive aspects of the human-parasite relation are researched. The most important ones are presented in Despommier's *People, Parasites and Plowshares*.

[15] Tadd, "The Power of Parasites and Worms," xx.

turtle"[16]) leads to their emergence. The body thus becomes imbalanced: that is to say, it is too warm and too damp, and in consequence manifests symptoms of excessive warmth and moisture (which, Tadd points out, are correlative with the symptoms of worm infection[17]). Worms here are presented as a part of the greater panoply of symptoms of imbalance, but the imbalance is shown as being caused by the patients themselves through excessive and imbalanced (too moist and too warm) diet.

The belief that parasites are an integral element of human or animal bodies has survived in a vestigial form in other non-Western cultures. A very particular example of a complementary approach to parasites is presented in the 2012 ethnographic study "Some Considerations Regarding the Origin and Functions of Parasites among Two *Mbya* Communities in Misiones, Argentina."[18] In it, the authors present the views on parasites of indigenous South American communities which are a peculiar mixture of ancient beliefs and modern hygienic propaganda. The *Mbya Guarani* of the Argentinean Northeastern Rainforest believe that – apart from those intruding and detrimental to the body – "[t]here are also worms that are born with and within a person, and live in the human body as their macrocosmic environment; these worms are seen as a natural part of a person's body and not as invaders or pathogens."[19] The *Mbya* divide parasites into the natural and the harmful ones; while the former are not preventable because they originate within human beings, the latter are understood to be the consequence of transgressing certain dietary taboos: drinking "raw" water and consuming "heavy foods" (i.e. highly processed foods such as sweets). As the ethnographers remark, "there exist certain food

[16] Tadd, "The Power of Parasites and Worms," xx.
[17] Tadd, "The Power of Parasites and Worms," xx-xxi.
[18] Marta Crivos, María Rosa Martínez, Carolina Remorini, and AnahíSy, "Some Considerations Regarding the Origin and Functions of Parasites among Two *Mbya* Communities in Misiones, Argentina," in: *Parasites, Worms, and the Human Body in Religion and Culture*, eds. Brenda Gardenour and Misha Tadd (New York, Frankfurt, Berlin: Peter Lang, 2012), 95-121.
[19] Crivos, et al., "Some Considerations...," 96.

taboos, established by '*the ancients*' (the *Mbya* ancestors), that regulate the consumption of some kinds of food considered to be harmful; the disregard of these taboos produces parasites that can damage health and cause death."[20] This, however, does not mean that these parasites are introduced from the outside: "The pathogenic action of the [parasite] is stimulated […] by breaking of taboos [and] also by the consumption of the industrially processed sweets."[21] Parasites, thus, are believed to emerge from within, somehow activated by the forbidden foods. This view also relates to the Chinese example in such a way that the imbalance through which the internal parasites manifest themselves is also believed to be caused by the hosts' food choices: while in the Chinese tradition the foods to be avoided are warming and damping, here they are referred to as heavy. In both cases, the adjectives used to describe these foods are evocative of symptoms of their consumption (e.g. feeling warm and damp after drinking alcohol, feeling heavy after eating sugar-rich foods).

The *Mbya* do believe that there are injurious parasites which enter the body from the outside but the researchers speculate that such a view is the consequence of the foreign, Western influence: "Accounts provided by the *Mbya* show a correlation between this shift in *Mbyan* perceptions of the causes of parasites and the information coming from health programs and from the activities of the sanitary agents, who are trained in the scientific method, and who assert that the causes of intestinal parasitoses are contaminated soil, water, and food – all of which are external to the human body and [at] odds with the traditional *tachó* [parasites] of *Mbyan* culture."[22] It is interesting to note that the Western influence, while introducing the connection between the oppositional idea of parasites and their external origins, retained and reinforced the *Mbya* notions of

[20] Crivos, et al., "Some Considerations...," 112.
[21] Crivos, et al., "Some Considerations...," 112.
[22] Crivos, et al., "Some Considerations...," 113-114.

personal responsibility for the dietary taboo transgressions. The Western preoccupation with the 'why?' question seems always to accompany the issue of responsibility and punishment; it seems that the reason behind this association is that contemporary biomedicine focuses on the individual and his/her responsibility (or lack thereof) for prevention of parasitical infections. However, this is an approach which was present in the West long before the modern health programmes and sanitation reforms were instituted. What Tadd identifies as oppositional approach is relatively new: its origin could be traced to the nineteenth-century; before that, the Western approach to parasites could be seen as much more complementary.

From Within: Bodily Imbalance and Its Causes

The idea that parasites were originating within the bodies of their hosts seems to have been spread worldwide. Until the nineteenth century this approach was employed by Western physicians and men of science who tried to address the issues of life origins in general. Without the knowledge and technology available today, the hypothesis which seemed to account for the otherwise inexplicable natural phenomena, such as a parasitic larva encysted in the brain, was the concept of spontaneous generation. According to this theory, putrefying organic or inorganic[23] matter, in specific circumstances, was capable of producing living life forms. The list of organisms which were believed to emerge spontaneously was extensive; W. D. Foster, after Aristotle, enumerates "butterflies from dew, moths from wood and old clothes, mites from wax, bees from the carcasses of bulls, beetles from dead asses and snakes from the putrefying spinal cords of man"[24]; while

[23] This stipulation is important because spontaneous generation tends to be confused with a similar process called abiogenesis. Abiogenesis, as its name suggests, is the generation of living organism from inorganic (i.e. not biological) material. Spontaneous generation is more general and does not discriminate from organic or inorganic matter.
[24] Foster, *A History of Parasitology*, 5.

Steven Lehrer adds to this the eighteenth-century examples given by Antonie van Leeuwenhoek and Georges-Louis Leclerc, Comte de Buffon: maggots which were believed to originate from rotting meat, crocodiles – from the muddy banks of the river Nile, and mice "from sacking, flour, dust, and other ingredients to be found lying about the floor of a baker's shop."[25] In short, the animals were supposed to be produced by the surroundings in which they would normally be found. Thus, the theory, though laughable today, makes an interestingly modern connection between the environment and the organisms living in it: in the world governed by spontaneous generation, the ecosystem is a self-sufficient, self-generating cosmos in which putrefaction creates new life so nothing goes to waste. In this respect, it is an elegant example of an environmentally sustainable system.

Although the theory began to be challenged even as early as the seventeenth century,[26] a hundred years later it appeared to have been experimentally proven: at the beginning of the eighteenth century John Needham conducted an experiment in which he boiled beef broth and closed it in a corked glass container. Boiling, he assumed, must kill all living organisms, so his sample should remain "lifeless" as no external animalcules could get into the broth through the cork. However, after some time he realised that the broth had putrefied, and so he believed to have verified the theory of spontaneous generation.[27] His experiment was challenged by Lazzaro Spallanzani in the 1760s, who conducted his own tests using air-tight bottles, and much longer boiling time than Needham did, and he successfully disproved the theory.[28] Unfortunately, as Lehrer notes, "his remarkable conclusions regarding spontaneous generation failed even to dent the

[25] Steven Lehrer, *Explorers of the Body: Dramatic Breakthroughs in Medicine from Ancient Times to Modern Science*, Second Edition (New York, Lincoln, Shanghai: iUniverse, 2006), 128.
[26] Foster, *A History of Parasitology*, 5.
[27] Lehrer, *Explorers of the Body*, 128.
[28] Lehrer, *Explorers of the Body*, 128-9.

surface of this firmly entrenched popular theory"[29] which was still considered valid in the nineteenth century.

Spontaneous generation was particularly helpful when it came to the explanation of the origin of intestinal parasites. As they were observed exclusively in their natural environment, i.e. the digestive tract of humans and other animals, it was believed they too must originate from their surroundings.[30] The supporters of this version of spontaneous generation ("the internalists,"[31] as John Farley calls them) assumed that in order for parasites to appear, the internal organs of the host must either contain rotting matter or putrefy themselves. The eighteenth-century French naturalist Georges-Louis Leclerc, Comte de Buffon maintained that if the body of the host (human or animal) suffered from a number of digestive malfunctions which prevented the total absorption of food matter, the excess began to decay and produce surplus particles. As he noted: "These excess molecules, unable to penetrate the interior mould of the animal [host], reunite with several particles of brute matter in the food and form organized bodies […]. This is the origin of tapeworms, ascarides, flukes and all other worms which are born in the liver, stomach and intestines."[32] Comte de Buffon does not speculate on the cause of the internal putrefaction, expressing instead the general view that the generation of intestinal worms is limited to the malfunctioning organisms. The French historian of medicine and contemporary of Buffon, Daniel LeClerc did in fact point to a likely cause of the unabsorbed molecules; in his view, the external excess led to internal excess. He believed that the generation happened "after inordinate eating and drinking such things from which

[29] Lehrer, *Explorers of the Body*, 129.
[30] Cook, "History of Parasitology," 1.
[31] John Farley, "The Spontaneous Generation Controversy (1700-1860): The Origin of Parasitic Worms," *Journal of the History of Biology*, Vol. 5, No. 1 (1972), 100-106.
[32] Georges-Louis Leclerc, Comte de Buffon, *Oeuvres de Buffon*, quoted in: John Farley "The Spontaneous Generation Controversy," 105.

[…] putrid humour comes that contains and nourishes the eggs of worms."[33] These two conditions for the appearance of parasites parallel those found in the non-Western beliefs mentioned earlier: the state of the bodily disturbance and the conviction of people's fault in bringing it on themselves through transgressive behaviour. These transgressions, as has been shown, are centred either on consumption of forbidden food (e.g. the taboo sweets in the *Mbya* community) or on overconsumption in general (e.g. the excessive meat-eating in the Chinese tradition); they are closely connected with parasitical infection as their symptoms mimic each other.[34]

Another internalist who made the triple connection between the emergence of intestinal worms, digestive ailments and the behaviour of man was the Italian naturalist Antonio Vallisneri in 1713. Although he was a proponent of the spontaneous generation theory, he believed that the first impulse for the generation of life forms was of divine origin. Even the first man on earth, Vallisneri believed, was born with helminths already within. However, since in the Garden of Eden first people could not have suffered from their internal guests, the presence of the parasites was explained by Vallisneri as aiding digestion:

> It will not […] be so injurious to the first parent to say, that his body might have been an [sic] hospital of various and wonderful kinds of insects, which while he was innocent, ought not to contribute to his destruction, but make him more compleat, and yield him honour notwithstanding Adam could support and feed those insects which had a mind to live together quietly and friendly, as we may say; and if any thing superfluous remained, that they might eat, but they could abstain from food, and would not transgress their bounds, or eat holes through sides of the guts, which was their habitation, but they would rather, by gently licking the parts, and by healing them, do their host a kindly office.[35]

---

[33] Daniel LeClerc, *A Natural and Medicinal History of Worms*, trans. J. Browne, (London: n.d., 1721), 360.
[34] Tadd, "The Power of Parasites and Worms," xxi-xxii.
[35] Antonio Vallisneri, *Nuove osservazioni, ed esperienze intorno all'ovaja scoperta né vermi tondi dell'uomo, e de' vitelli* (Padua, 1713), reprinted by LeClerc, in: *A Natural and Medicinal History of Worms*, 352-3. Original spelling.

It was only after the Fall that the intestinal worms turned against their host and contributed to the suffering to which man was condemned for his transgression. Just like LeClerc, Vallisneri explicitly states that man is to be blamed for the change in the parasites' behaviour. He emphasises Adam's ingratitude ("for disobeying God, who had loaded him with so many blessings"[36]), in effect portraying the transformation of the intestinal worms as a deserved, justified punishment.

Spallanzani's experiment was repeated in 1859 by Louis Pasteur with flasks of broth: one of which was air-tight, one open-ended, and one long-necked. Pasteur demonstrated that introduction of air into the contents of the flasks was essential to generate new organisms. Thus, he not only proved that spontaneous generation was scientifically unfeasible; more importantly, he was able to confirm that microorganisms were capable of reproducing themselves.[37] Lehrer quotes his triumphant speech delivered in 1864 at the Sorbonne: "Life is a germ and a germ is Life. Never will the doctrine of spontaneous generation recover from the mortal blow of this simple experiment."[38] Although some scientists were still sceptical, history showed that Pasteur was right. This is also the moment when germs were introduced to scientific debate which marks the shift of the approach towards pathogens from complementary to oppositional.

The spontaneous generation theory was explained through a certain kind of imbalance for which man is responsible through his excesses and transgressions, be it either the disruption of the digestive tract, or the state of spiritual imbalance, as opposed to the harmonious balance of the Garden of Eden. Modern biomedicine acknowledges the idea of imbalance as the source of generalised disease as well. In *The Origin of Human Disease* Thomas McKeown lists three circumstances in which serious diseases may occur

[36] Vallisneri, *Nuove osservazioni* …, 353.
[37] "Spontaneous generation," in: *Encyclopaedia Britannica*, 2011, https://www.britannica.com/science/spontaneous-generation (3.01.2017).
[38] Louis Pasteur, quoted in: Lehrer, *Explorers*, 134.

within a given ecosystem. One of such circumstances – apart from the initial exposure to new infective agents, or when the survival of the infective agent is directly connected with its ability to cause disease – is "[w]here the relationship between host and parasite is seriously disturbed. This is usually attributed to ecological imbalance or stress; but these terms do not specify the nature of the disturbance and it is more precise to say that the common, although perhaps not the only causes, are crowding and lack of food."[39] This explanation shows a significant similarity to the theory which postulates that some parasites are integral part of the host, as demonstrated by the examples from Chinese medicine or the *Mbya* beliefs. Thus, McKeown shows how these general assumptions are reconcilable with modern science. If the origin of disease hinges on the disturbance in the parasite-host relationship, it means that the presence of the parasites alone is not enough to cause disease.

What does differ McKeown's contemporary explanation of imbalance from the historical or non-Western ones is his approach to the assumed cause. Here, the responsibility for tipping the balance is not explained unambiguously; on the contrary, the suggested causes (the crowding and lack of food) – which, as McKeown explains later, could be seen as interconnected[40] – are an obvious manifestation of one of the basic rules of evolutionary ecology: the struggle for survival. These causes can be studied internally and externally; that is to say, from the host's and parasite's perspectives. Within the ecosystem, the host must compete for food and shelter with other hosts (other people but also other animals); within the host – an ecosystem on a smaller scale – the parasites must compete for food with the host *and* other parasites, with which they also compete for shelter. The question of reasons other than biological imperative is not present in this context. This emphatic lack of the 'why?' is due to the fact that McKeown limits his use

[39] Thomas McKeown, *The Origins of Human Disease* (Oxford: Basil Blackwell, 1991), 4-5.
[40] McKeown, *The Origins of Human Disease*, 5.

of ambiguous language to the absolute minimum to illustrate or explain the natural need for maintaining the balance. It shows the change in emphasis contemporary science experienced, especially in its departure from controversial concepts such as blame, guilt and fault. This process is still ongoing but its effects are visible in scientific texts of the late twentieth and early twenty-first century. In fact, throughout his study, McKeown is extremely cautious in this respect, and his conclusions are usually accompanied by stipulations and conditions. It is particularly visible in his description of diseases of poverty: "Poverty, like illiteracy and excessive numbers, is not, of course, a direct cause of disease; rather it is the main reason for the existence of many conditions that lead to disease."[41] His descriptions of diseases and conditions that may lead to infections do not offer any straightforward points from which the notions of guilt or responsibility can be inferred. In order to arrive at such a conclusion, an additional narrative would have to be included in these remarks; as they stand, they are as neutral as is possible in the circumstances. This also relates to the point I made earlier: note that McKeown does not recount any (fictional or non-fictional) events that could create a story; his style in fact precludes such a possibility, demonstrating that conscious effort is required not to create scientific narratives but to abstain from doing so.

McKeown's work shows the shift in the perspective on disease cause, whose beginnings could be traced to the second half of the nineteenth century, but which became generally accepted a century later. The most important factor of this transformation is, in the very general terms, the development of science which liberated it from the ideologically-charged 'why?' and other similar questions. However, before this change occurred, these questions were adopted by literature, which offered its own answers, sometimes corroborating the scientific assumptions, while at other times challenging

[41] McKeown, *The Origins of Human Disease*, 138.

them. The following literary examples utilise the strategy that is being employed by the internalist proponents of the spontaneous generation theory and the complementary approach: using the biomedical data as the frame, they spin stories to which issues of responsibility and fault are integral. The premise of these stories is the same: the systems which they describe, or their representatives, are in the state of imbalance, and they search for its causes. Here is where we can find the parasites, either as the manifestations of imbalance, or the disturbers of balance. The remaining part of the present chapter traces the motifs of imbalance and disruption realised in two Victorian novels, together with the parasite genesis stories they tell.

The Story of Imbalance in *Bleak House*

As has been repeatedly stated above, the common thread of the stories of origin presented in the first part of this chapter is the responsibility of man for the bodily imbalance which generates parasites. In this view, parasites are seen as symptoms of this imbalance, not its causes. Therefore, the treatment concentrating on the elimination of parasites alone must necessarily prove ineffective. In order to restore the balance, the underlying problem needs to be identified and attended to; only then the symptoms will be alleviated and the recovery possible. If read from this perspective, Charles Dickens's *Bleak House* seems the literary representation of the state of biomedical knowledge of the middle of the nineteenth century.[42] Here, too, the great social ills are presented through their symptoms, and the issues of responsibility and blame connect various elements of the plot.

[42] There is no hard evidence that Dickens possessed more than common knowledge of parasitology or heard of the hypotheses of parasites' origin, but he was definitely familiar with some of them. In fact, as John Carey explains, Dickens found parasites interesting since childhood years. He writes that "[a]s a boy Dickens used to visit a shop in Long Acre which displayed, in tall jars, preparations which had the appearance of 'unhealthy macaroni', but proved on closer inspection to be tapeworms 'extracted from the internal mechanism of certain ladies and gentlemen' who were delicately referred to, on the receptacles, by initial letters." John Carey, *The Violent Effigy: A Study of Dickens' Imagination* (London, Boston: Faber and Faber, 1979), 82.

While George Eliot's *Middlemarch* can be read as a story of a community suspended in a figurative drop of water observed through a set of lenses varying in strength, *Bleak House* operates on a grander scale. Enumerating the themes of the novel, Louis Crompton notes their connection to a state of imbalance: "Decaying slums with their filthy tenants, a sedately proud but hopelessly outmoded aristocracy, lawyers and clients lost in a fog of legal obfuscation, a confused and silly parliament engaged in a perpetual game of musical chairs; the magnitude of these symptoms of social distress is impressive, and equalled only by the completeness of the failure of those in power to deal with them."[43] As Crompton suggests, through his employment of medical terminology, Dickens depicts a sickly social organism whose various systems are suffering from a number of disorders. What Crompton does not refer to, however, is Dickens's very effective narrative strategy in which he presents the ailments of a particular system through its representatives: and so we learn in the course of the novel that the legal system, just like Mr Vholes[44] – Richard Carstone's solicitor – is constipated; the political system, just like Sir Leicester, is gouty and paralytic; and the class system shows signs of utter dilapidation in its nether regions through the collective character of Tom-all-Alone's inhabitants. To say that the social body presented in the novel is in a state of imbalance is a serious understatement. In fact, its condition is so poor that some of its tissues become necrotic, which is shown in the graphic descriptions of the in-city cemetery.

As numerous critics[45] point out, one of the key motifs of the plot of the novel is the interconnectedness of its society. In one of the more famous quotations from *Bleak House*

---

[43] Louis Crompton, "Satire and Symbolism in *Bleak House*," *Nineteenth-Century Fiction*, Vol. 12, No. 4 (1958), 284.

[44] Crompton makes an interesting remark regarding the name of the lawyer and the associations it may inspire: "A 'vole' is a field mouse, and Vholes's name consequently evokes the image of a parasite that destroys crops." Not only does he read the solicitor's name as having explicit parasitical connotations, but he also employs the broad definition of the term 'parasite' so that in his interpretation it takes on the meaning of 'vermin.' Crompton, "Satire and Symbolism in *Bleak House*," 300.

[45] Some examples include: J. Hillis Miller, *Charles Dickens: The World in His Novels* (Cambridge, Mass.: Harvard University Press, 1958), 191-192, Geoffrey Hemstedt, "The Novel," in: *The Context of English*

the narrator asks: "What connection can there be, between the place in Lincolnshire, the house in town, the Mercury in powder, and the whereabout of Jo the outlaw with the broom […]? What connection can there have been between many people in the innumerable histories of this world, who, from opposite sides of great gulfs, have, nevertheless, been very curiously brought together!"[46] The answers vary, depending on the particular focus of the narration; generally, the connecting links consist of phenomena beyond the control of an individual: death, the elements (especially the fog, both meteorological and legal), the law. All of these are shown as ultimately democratic, since sparing nobody, regardless of their kindness, position or social status.

One of these links which particularly emphasises the interconnectedness of the *Bleak House* society is disease. Specifically, this is presented in the storyline in which Jo, the crossing sweep, gets infected with a virulent disease – probably smallpox, but it is never stated explicitly – which he then transmits to Esther Summerson and her maid Charley. In more general terms, the disease works as a connective factor, breaking class barriers with ease, and bringing together people who would otherwise have remained separated. What is however vital to the present chapter is the fact that in *Bleak House* disease is the epitome of imbalance, bodily as well as social. The imbalance of the legal or commercial systems may breed symbolic parasites such as Mr. Vholes, Mr. Tulkinghorn, and Mr. Smallweed,[47] but the inhabitants of the poor area of Tom-all-Alone's are presented as manifestations of imbalance (understood here as one of the prerequisites of disease cause in which an organism is overwhelmed by pathogenic agents) in the very biological sense; as they are seemingly generated from their

Literature. The Victorians, ed. Laurence Lerner (London: Methuen, 1978), 3-24, Caroline Levine, "Narrative Networks: *Bleak House* and the Affordances of Form," in: *NOVEL: A Forum on Fiction* Vol. 42, No. 3 (2009), 517-523; and recently Sarah C. Alexander, *Victorian Literature and the Physics of the Imponderable* (London and New York: Routledge, 2015), 19-50.

[46] Charles Dickens, *Bleak House* (Ware: Wordsworth Editions, 2001), 189.

[47] Crompton, "Satire and Symbolism in *Bleak House*," 288.

surroundings. Below is Dickens's description of the slum street and its inhabitants represented by the vagrant Jo:

> Jo lives – that is to say, Jo has not yet died – in a ruinous place, known to the like of him by the name of Tom-all-Alone's. It is a black, dilapidated street, avoided by all decent people; where the crazy houses were seized upon, when their decay was far advanced, by some bold vagrants, who, after establishing their own possession, took to letting them out in lodgings. Now, these tumbling tenements contain, by night, a swarm of misery. As, on the ruined human wretch, vermin parasites appear, so these ruined shelters have bred a crowd of foul existence that crawls in and out of gaps in walls and boards; and coils itself to sleep, in maggot numbers, where the rain drips in; and comes and goes, fetching and carrying fever and sowing […] evil in its every footprint […] – though born expressly to do it.[48]

As it is immediately recognised, the employment of such expressions as "swarm," "vermin parasites," "maggot numbers" point to the perception of the dwellers of these abodes as insect-like, lowly creatures who/which inspire disgust and fear in "all decent people," and decency here is defined negatively, i.e. what is decent describes everything that Tom-all-Aloners are not. To say of Jo and the like of him that they are vermin is to say that their presence is not just as insignificant as an insect's – after all, Jo *does* live only as long as he is allowed to by the creator who placed him in the heart of the plot, and dies as soon as he has served his purpose of a specific Dickensian plot device[49] – but, more emphatically, their presence is highly undesired, objectionable and unwelcome. The depiction of the slum and its dwellers evokes extremely unpleasant associations, such as of a piece of rotting meat teeming with maggots. An instinctive reaction to such an image would be to recoil in disgust, turn away, and move to a safe place – safe from the smell, the contamination, the horror.

---

[48] Dickens, *Bleak House*, 189.

[49] Richard Gravil maintains that Jo is "the central character" because "he connects almost all of the main characters, and reveals them in their true lights" possessing the narrative function of a litmus paper. Richard Gravil, *Reading Dickens's* Bleak House (Penrith: HEB, Humanities EBooks, 2012), ebook, 39.

Behind the first layer of the consciously employed biological metaphor, however, there is the morbid fascination characteristic of a passionate naturalist or scientist pondering the genesis of these barely human creatures. Their emergence is explained by means of analogy: just like parasites appear on a human wretch, so do these foul creations appear in the dilapidated housing, which would have otherwise remained uninhabited. Like fleas or lice, they are the opportunists who take advantage of the diseased condition of their environment. Of course, the very phrase "take advantage" is by no means neutral or impartial; it assumes the perspective of the host to whom the emergence of parasites is only disadvantageous. The parasites themselves, on the other hand, do not have a choice but to fulfil the biological imperative. This view would suggest that Dickens's description points to the oppositional view of parasites, their external origin. What is crucial here is that Tom-all-Aloners are not described as inhabitants who at some point came to live in these decaying lodgings. Instead, the narrator, again using the perspective of the host, puts it straightforwardly: "these ruined shelters have bred a crowd of foul existence." The "tumbling tenements" are not just housing, they are the generative matrix in which and from which the innumerable Tom-all-Alone's inhabitants of *Bleak House* are brought about. Janice Allan notes that "the inhabitants are represented as scarcely human and are reduced to agents of contagion,"[50] who have the potential, the opportunity and the motivation to spread forth and infect. However, even if seen as infective agents, their pathogenic capacity is nonetheless still originating within the system of social interconnectedness, which binds them to the complementary approach. The exaggeration and vividness of this description serves two purposes: not only is it an accusatory social diagnosis, encapsulating in the phrase "the swarm of misery" the issue of the extent and scale of poverty and negligence; it also emphasises the advanced state of this misery of

[50] Janice M. Allan, *Charles Dickens's* Bleak House*: A Sourcebook* (London and New York: Routledge, 2004), 126.

the lower regions of society, to the point of necrosis of social tissues. In this sense, the foul existence and the environment which generates it must be shown as beyond the stage of just festering wound; the decay is so advanced that it breeds parasites.

The additional problem to which the description of the Tom-all-Alone's street points, which also bears significance on the issue of lack of balance, is the "maggot numbers." The expressions "swarm" and "crowd" associated with the inhabitants of the slum, apart from comparing them to swarming insects, also illustrate the scale of the social problem. As Dickens shows, due to an extreme instance of imbalance, the higher classes of society are at a very serious risk of not just being outnumbered, which would not be a new situation, but overridden and transformed by the foulest, lowliest class. The people of this area can spread infection and contamination to the higher social echelons – as exemplified by Jo's virulent capabilities, – they have the ability to turn the "decent people" into those similar to Tom-all-Aloners. Nonetheless, Dickens betrays a certain degree of thematic foresight; these ideas of infection transformative on the social scale, such which grows exponentially and beyond control, are later reworked by the *fin-de-siècle* literature. For example, in a similar vein, Bram Stoker in *Dracula* paints a terrifying picture of London that is at risk of being ridden by people-turned-vampires, infecting new victims, in effect creating countless legions of un-dead if not stopped in time. Yet, unlike Dickens, Stoker explicitly locates the cause of the infection outside of the imperial borders.

Here Dickens uses the question of responsibility to connect it with the concept of immunity: immunity from disease – which, as he shows, is granted to no one, regardless of their social rank or personal qualities – but also immunity from social ills. These two are combined when the society is forced to face the Tom-all-Alone's infective power. The infection in *Bleak House* is shown as having two properties: firstly, because it possesses

these transformative features, nobody can assume to be immune against it; secondly, and perhaps the more frightfully, it is unstoppable and uncontrollable. He cleverly interweaves these two functions to express his admonition in a very simple but effective way. The more disgusting the description of the slums, the more terrifying the implication that due to ignored social responsibility, such might soon be the description of the "decent people," exactly those who choose not to go anywhere near Jo's abode in order to prevent any risk of contamination.

The second time the term 'parasite' is used with relation to Jo is when his disease is very advanced and Dr Woodcourt seeks a place for him to stay:

> He is not one of Mrs Pardiggle's Tockahoopo Indians; he is not one of Mrs Jellyby's lambs, being wholly unconnected with Borrioboola-Gha; he is not softened by distance and unfamiliarity; he is not a genuine foreign-grown savage; he is the ordinary home-made article. Dirty, ugly, disagreeable to all the senses, in body a common creature of the common streets, only in soul a heathen. Homely filth begrimes him, homely parasites devour him, homely sores are in him, homely rags are on him; native ignorance, the growth of English soil and climate, sinks his immortal nature lower than the beasts that perish.[51]

Jo again is presented as one of the "the human wretch[es on which] vermin parasites appear," but this time the emphasis is on his homeliness, home-made-ness, nativeness. Being the child of Tom-all-Alone's, he is explicitly referred to as home-grown from English soil, generated from within the system, from the very tissues of the system, unconnected with the exotic foreigners but interconnected with everyone at home. The parasitic generation is shown here on two levels: the biological parasites emerge in or on Jo's body, apparently bred from his homely filth and rags, while he himself is generated from the social decay, from native grime and misery, and impure atmosphere – all the contributing factors to the emergence of organisms in the process of spontaneous

[51] Dickens, *Bleak House*, 544.

generation. The condition of imbalance is emphasised by his bodily disturbance on the one hand, and the human failings in preventing the situation which led to this disturbance on the other. Moreover, he is a "common creature of the common streets," in which "common" may be understood as everyday, lowly and ordinary but also familiar – and thus facilitating sympathy. Through Jo, Dickens channels some of his reformatory aims; as he demonstrates, Jo is at home in London, but he is also at home on the streets; he is both, paradoxically, homely and homeless. His homeliness makes his plight relatable to the *Bleak House* readers, for Jo's function is to represent a case in point of the much greater and more serious problem of social poverty (he is a "wretch," one from "the swarm of misery"), while his homelessness reveals the failings of the authorities' responsibility.

On the grand social scale, Dickens's view of the likes of Jo as parasites demonstrating the state of social imbalance, is in tone with the biological knowledge of his time. As he suggests, the majority of the responsibility for the situation is put on the shoulders of the advantaged classes who either choose to do nothing to remedy it, perhaps out of indifference or ignorance, or whose charity is misplaced, as in the case of Mrs. Jellyby. Adopting strategies pointed at restoring the social balance, that is those which could treat and manage social ills, Dickens suggests, would control the problem of metaphorical parasites generated within the lowest regions of society. Which is to say that restoring and maintaining the social equilibrium would not free the society from these figurative parasites permanently. Once such a state is achieved, however, it would keep them in check, both in terms of social control as well as in the control of their numbers, so they would not be able to tip the balance again. But the other issue at stake here, which shifts the responsibility from the social to the personal level, is the education of the lowest

classes, so that they can do something to help themselves, most predominantly, through adopting a clean way of life.

In this respect, the issue becomes problematic because Dickens blends the general or state responsibility for the imbalance with personal responsibility. On the one hand, he ridicules the efforts of "telescopic philanthropy,"[52] clearly suggesting that the attempts at amending the situation at home take precedence and are more important than Mrs. Jellyby's Borrioboola-Gha project or Mrs Pardiggle's Tockahoopo Indians. On the other hand, Dickens, being himself an avid supporter of Edwin Chadwick's 1842 sanitary reforms,[53] incorporates elements of hygienic propaganda into *Bleak House* descriptions of the poor, suggesting that a certain part of the responsibility lies not only with the state but the poor themselves. A case in point: one of the core elements of the reform was the faith in the beneficial qualities of fresh air. It was believed that the chief factor behind the emergence of disease was, as Chadwick put it in his famous report, "atmospheric impurities"[54] which could be alleviated by "drainage, proper cleansing, [and] better ventilation."[55] Therefore, the emphasis on cleanliness and fresh air, especially when their apparent affordability and ease of implementation were taken into consideration, made proper ventilation a personal duty of everyone, regardless of their financial situation. Consider the following quote from James Pickford's 1858 textbook *Hygiene*: "*As a general disinfectant and deodoriser, the cheapest, the simplest, the most powerful, and most effectual, is PURE FRESH AIR.* […] No epidemic, pestilential or otherwise, can linger amidst aerial currents of greater or less vehemence; but in calm and stagnant atmosphere

[52] Dickens, *Bleak House*, 31-41.
[53] Hemstedt, "The Novel," 7.
[54] Edwin Chadwick, "Report on the Sanitary Conditions of the Labouring Population of Great Britain," *Victorian Web*, http://www.victorianweb.org/history/chadwick2.html (06.06.2010).
[55] Chadwick, "Report on the Sanitary Conditions."

disease and pestilence stalk forth and count their victims by the thousand."[56] If fresh air is a free, readily available and an effective preventive measure, there is no reason, both Pickford and Dickens imply, why anybody should not adopt it. If one chooses not to, then one must be prepared to take the blame for the infection that will inevitably come. This approach, however, bears a strong resemblance to the contemporary Western approach towards Asian and African parasitoses mentioned at the beginning of this chapter. Inscribed in both of them is the conviction that one's own standards and circumstances are universal and thus the strategies which work "at home" are also applicable anywhere else. Fresh air in the nineteenth-century polluted cities was not "readily available," especially in the parts inhabited by the poor; in fact, sometimes it was not available at all, contrary to Pickford's assertion.

There is one final point I wish to draw attention to which shows the perhaps surprising relation between the nineteenth century hygienic propaganda and twenty-first century science. In the above quote, Pickford also notes the importance of the movement of air. His words betray the conviction that an epidemic disease could be simply blown away by a strong aerial current. Although this kind of assumption may appear naive and perhaps overly optimistic, it is scientifically viable. In their article "Natural Ventilation for the Prevention of Airborne Contagion"[57] published in 2007, the authors conclude that natural ventilation in hospitals, as opposed to mechanical air-conditioning, is more efficient in limiting the spread of tuberculosis and other air-borne infections. What is particularly interesting in the present context, is the similarity of their conclusions to the

---

[56] James H. Pickford, *Hygiene, or, Health as Depending upon the Conditions of the Atmosphere, Foods and Drinks, Motion and Rest, Sleep and Wakefulness, Secretions, Excretions, and Retentions, Mental Emotions, Clothing, Bathing, &c.* (London: John Churchill, 1858), 200-1; original emphasis.

[57] A. Roderick Escombe, Clarissa C. Oeser, Robert H. Gilman, Marcos Navincopa, Eduardo Ticona, William Pan, Carlos Martínez, Jesus Chacaltana, Richard Rodríguez, David A. J Moore, Jon S. Friedland, Carlton A. Evans, "Natural Ventilation for the Prevention of Airborne Contagion," in *PLoS Medicine*, No. 4 Vol. 2 (2007), http://journals.plos.org/plosmedicine/article?id=10.1371/journal.pmed.0040068 (03.10.2015).

Victorian concepts, not just in the results of their research but the actual phrasing: "In contrast to mechanical ventilation, natural ventilation offers high rates of air exchange for little or no cost, and is relatively free of maintenance."[58] It is fascinating to note that almost a hundred and fifty years apart, and with all the benefits offered by modern technology, both texts stress the importance of maintaining natural ventilation as the cheapest and most effective means of contagion prevention. On the one hand, this in many respects allows for more confidence in our attitude towards the theories of the nineteenth-century scientists and medical practitioners, as at least some of those turn out to be verified by present-day research. On the other hand, however, it also suggests that the notion of someone's responsibility for the spread of infection – even if in the vestigial form only – is still present in the contemporary medical discourse. The 2007 study compares the air quality in naturally ventilated and air-conditioned hospitals and concludes that natural ventilation helps prevent airborne contagion. This implies that it would be beneficial to hospitals to refrain from installing mechanical air conditioning systems because in the case of an airborne contagion the authorities would be liable for not preventing it to the best of their knowledge and ability.

Literary Parasites: Contextual and Extratextual Approach

In the above analysis of some aspects of Dickens's *Bleak House*, the question of parasites is addressed from two perspectives: biological (theoretical) and metaphorical. Through its biology-inspired description of human parasites, the novel allows for the simultaneous application of these two perspectives. At first sight Dickens's parasites of Tom-all-Alone's are figurative because they refer to people of the lowest social rank. On the other hand, they are presented in an almost scientific way, as the spontaneously generated

[58] Escombe et al. "Natural Ventilation for the Prevention of Airborne Contagion."

manifestations of social imbalance. Although they belong to the world of literature and assume the figurative sense, they are generated within the novel in a way analogous to that the actual parasitic organisms were believed to be generated at the time. Therefore, I would classify Dickens's parasites as belonging to a subtype of metaphorical approach which I have decided to call contextual. Contextual parasites are to be understood as environmental, emerging from and relating to their literary circumstances, figurative versions of the biological parasitical organisms. The contextual approach assumes the direction of interpretation from inside of the text outwards, in the sense emphasising, or in some cases discovering, the parasites that are already there, woven into the tissue of the text itself.

The other approach towards the question of literary parasites I have used is the extratextual approach. An extratextual interpretation does not examine the text in search for the parasites which are already there, but introduces them to the text through a particular reading of it. Contrary to the contextual, the extratextual approach directs the interpretation from the outside towards the text, assuming external perspective. This approach is employed here to analyse the issue of parasites and imbalance in George Eliot's *Middlemarch*, a novel fundamentally different from Dickens's in its treatment of this topic. When inspected for figurative examples of *parasitos*, *Bleak House* and *Middlemarch* both include comparable cases of characters that could be interpreted as such: Dickens's Dedlocks and Skimpole and Eliot's sitters-up. This is not the case when it comes to the biology-derived parasites. In *Bleak House* the contextual parasites, as we have seen, are the integral part of the tissue of the text, but there are no comparable metaphorical parasites in Eliot's novel. This fact may question the overall validity of the inclusion of *Middlemarch* in the present discussion; my justification of this choice is as follows: it is true that Eliot's novel departs from the social diagnosis found in Dickens's

text, in which human parasites are regarded as symptoms of social misery – as such issues form only the backdrop of Eliot's novel – in favour of the thorough examination of human relations and the various consequences of the actions of the characters. It serves, however, as a perfect meeting ground of the two mutually exclusive theories of both scientific and metaphorical parasites' origin: it presents characters which I read as parasites as interwoven into the community in which they thrive, and whose equilibrium they are able to disturb, at the same time pointing to their external origin. While in Dickens's text Tom-all-Alone's inhabitants are read as parasites which are the integral part of the social system, Eliot shows them for what they are, that is strangers who only assume such place in the society. This observation is vital not only because it lays foundations for the next chapter of the present work in which the issue of parasites as organisms originating outside of the host is analysed, but also because it betrays an unprecedented scientific foresight. Eliot does not refer to parasites specifically and straightforwardly but the observations and conclusions she makes regarding her characters are analogous to those contemporary parasitologists make regarding their subject of research, such as the parasites' external origin or the advanced strategies they employ to convince the host that they are the integral part of his/her body.

While *Bleak House* repeatedly and forcefully delivers the message of economic inequality, in *Middlemarch* the cause of imbalance has much less explicit manifestations. If, following the metaphor already mentioned, we consider the Middlemarch society a water-drop full of strange animals whose fates are delivered to us through a set of lenses, we can assume that the parasitical characters there would be the ones who accompany the moments of upsetting of the precious balance: the disturbances in the water drop which would send forth ripples of consequences. However, the way in which these characters and events are presented is hardly ever straightforward and unambiguous, which is

precisely the reason why the extratextual approach is more fitting in the analysis of the novel. Therefore, in the following section of the chapter Eliot's novel is read through a particular interpretive lens: some characters are interpreted as parasites not because they are presented as such in the narrative, but because such a reading explores similarities between the nature of these characters and the features of biological parasites as investigated by Victorian and modern science.

The Story of Disturbance in *Middlemarch*

A number of characters and events in *Middlemarch* may be seen as having potential to ruin the precious balance of the society presented in the novel. Yet even those characters who appear to possess disruptive power, are not necessarily the ones responsible for tipping the equilibrium. Again, the metaphor of weaker and stronger lenses comes in handy: what seems perfectly innocent at first sight, reveals its corrupt nature at closer inspection; what seems insignificant when seen by the naked eye, proves grand and threatening under microscope. In the universe of *Middlemarch*, jumping to conclusions and taking things at face value is not an advisable course of action, for the characters and the readers alike. Sometimes, Eliot seems to suggest, it is better to reserve judgement and wait for the truth to reveal itself. The resolution of the narrative rewards patience.

When it comes to characters and events that have the power to disturb the balance within the Middlemarch community, both Mr Featherstone and Mr Casaubon could be seen as such. In fact, it would seem reasonable to consider their two respective wills precisely those kinds of acts which would have a great disruptive power. They both appear to be of grave consequences, reaching well beyond the influences the testators exercised in their lives. At first sight, or through a low focus lens, the revelations of Mr Featherstone's and Mr Casaubon's last wishes seem to upset the *status quo* dramatically.

The former will disappointed the Christian Carnivora of the Featherstone family but bore the most significant impact on Fred Vincy and, in consequence, on the Garths: it reinforced Fred's debt to Caleb, drove a wedge between him and Mary – haunted by dissonant remorse for having done the right thing, – and cast a shadow over Fred's professional career prospects: "Twenty-four hours ago he had thought that instead of needing to know what he should do, he should by this time know that he needed to do nothing […]. And all this was to have come without study or other inconvenience, purely by the favour of providence in the shape of an old gentleman's caprice. But now, at the end of the twenty-four hours, all those firm expectations were upset."[59] In Fred's view, it was Mr Featherstone who, through his caprice, disturbed the perfect plan young Vincy had prepared for himself; and so, we are led to believe as well that the old gentleman held the ties on Fred's life which, when released, shook not only his future, but that of Middlemarch too. After all, only a person possessing the power of providence could reduce a young man from imagined riches to material rags within mere twenty-four hours.

The same kind of power is apparently granted to another testator and his will, Mr Casaubon. While Mr Featherstone did not deliver on his unspoken promise, Mr Casaubon appended his promise with a surprising codicil according to which the future widow was to lose her inheritance if she married his cousin. Both of the testators were motivated by spite; but while Mr Featherstone's unpleasantness had been revealed through his "snappish humours,"[60] and was generally heard of in Middlemarch, Mr Casaubon's malice came as a shock that sent waves through the community. The word of Mr Casaubon's testamentary dispositions spread through the most efficient of channels: gossip. As the narrator notes, relating to this particular gossip source material: "News is often dispersed as thoughtlessly and effectively as that pollen which the bees carry off

[59] George Eliot, *Middlemarch* (Ware: Wordsworth Editions, 2000), 281-82.
[60] Eliot, *Middlemarch*, 110.

(having no idea how powdery they are) when they are buzzing in search of their particular nectar."[61] The employment of the bee metaphor naturally leads to the assumption that, once the pollen of information about the codicil disseminated, Middlemarch was impossibly abuzz with excitement. But it also shows that on the deeper level the impact of the buzz caused by the codicil was not very strong. Its impact was profound on the personal plane: it was Dorothea's, not Middlemarch world that "was in a state of convulsive change."[62] It caused indignation, no doubt, but the gossip was responsible for no more than vibrations too weak to cause any serious disturbance.

In fact, both Mr Featherstone's and Mr Casaubon's powers of upsetting the social balance by means of their wills are illusive, perceived only on the surface level. A closer inspection, under a stronger lens, reveals that both testators' wishes actually served to retain the *status quo*, not upset it. Before Mr Featherstone's last wishes saw the light of day, Fred was "a plucked idle young gentleman,"[63] and he remained so after the revelation. However, thanks to the subsequent transformations of his and the Garths' fates, he after all did become the manager of the Featherstone estate, as had been expected. Similarly, Mr Casaubon's will, apart from revealing his own spitefulness, did not hinder anything; in fact, it reinstated Dorothea to her pre-Mrs Casaubon's marital and financial status, in effect reducing the marriage and her widowhood to a brief aberration in the course of her life. The examination of these apparently transformative events and their consequences reveals their actual irrelevance and the impotence of their disruptive threats.

---

[61] Eliot, *Middlemarch,* 492.
[62] Eliot, *Middlemarch*, 405. Philip Fisher notes how much the term "world" is "a construction of interpretations." He points to the ambiguity of such terms: "When Casaubon adds the codicil to his will, he cast a shadow over Dorothea's 'name' and he transforms her 'world.'" Philip Fisher, *Making Up Society: The Novels of George Eliot* (Pittsburg: University of Pittsburg Press, 1981), 179.
[63] Eliot, *Middlemarch,* 116.

Other events may perhaps be seen as having more disruptive potential, such as the Reform Act of 1832 which paints the political backdrop of the novel, or Mr Brooke's unsuccessful elections. However, these cases do not seem to possess enough range to influence the lives of the majority of *Middlemarch* characters to a noticeable degree. F. George Steiner notes that the novel "is composed of four plots unequal in emphasis"[64] and these are: the story of Dorothea's attempts at finding purpose in life, the career and marriage of Tertius Lydgate, the courtship between Fred Vincy and Mary Garth, and the fall of Bulstrode.[65] The wills which I have chosen as examples of potentially unsettling events are related directly to two of these plots (although it could be argued that all of these plots are in some way affected by the consequences of Casaubon's and Featherstone's last wishes) and touch lives of more characters than just the testators and the legatees.

The other characters (or a group of characters) related to at least three of the plots specified by Steiner, and also quite obvious with regard to their perception as disturbers of balance, are the outsiders. By their definition, they are alien or foreign introductions, therefore they must necessarily unsettle the *status quo* of the community to some extent – yet to what extent is the question here. Initially, two characters could be characterised by this term, but it later transpires that there are in fact four outsiders in *Middlemarch*, and the less obvious ones are exactly those who not only possess the potential to upset but are actually doing it. Two obvious outsiders presented straightforwardly in the plot are Tertius Lydgate and Will Ladislaw. Both prove capable of causing some stir in the community but both – in the case of Lydgate, sooner, and in Will's case, later – are absorbed by it before they can actually generate any serious disturbance; provided that it

[64] F. George Steiner, "A Preface to *Middlemarch*," *Nineteenth-Century Fiction*, Vol. 9, No. 4 (Mar., 1955), 263.
[65] Steiner, "A Preface to *Middlemarch*," 263-267.

might have been their intention in the first place. When the narrator notes that "Middlemarch […] counted on swallowing Lydgate and assimilating him very comfortably,"[66] the same sentence could be used to describe the fate of Ladislaw as well. It must be noted that Will's presence is more disagreeable that Lydgate's, at least to some. Mr Casaubon and Sir James are particularly opposed to it, but their resistance is balanced by Mr Brooke's enthusiasm.

There is however a third outsider of whose status as such we learn much later: the local banker, Mr Bulstrode. Having come to the town some years previously, Bulstrode seems to have grown into its tissues. But this growth turns out to be pathological. Mary Wilson Carpenter in her article on cholera in *Middlemarch*[67] notes that Bulstrode possesses characteristic properties of an infective pathogen. This, Carpenter maintains, is due to his cosmopolitanism which he exemplifies "in the worst sense of the word: that is, rootless and utterly lacking in the capacity for sympathy. […] Not only is he a stranger in Middlemarch, but no one knows where he comes from."[68] The ignorance of his origins that accompanies Bulstrode is to some extent analogous with the bewilderment that must have been experienced by early parasitologists who would not fathom where an intestinal parasite could have come from. Nonetheless, the darkness regarding his provenance is not enough to denote Mr Bulstrode as a parasite of *Middlemarch*. In order to do so convincingly, and according to the already established scientific criteria, he would have to be successfully argued to be a manifestation of some kind of imbalance. Thus, the arguments supporting the parasitical nature of Mr Bulstrode are presented below.

Even before his exposure, he does not appear a proper, honest person. What the Garths say about Mr Bulstrode has premonitory qualities but also points to the pieces of

---

[66] Eliot, *Middlemarch*, 128.
[67] Mary Wilson Carpenter, "Medical Cosmopolitanism: *Middlemarch*, Cholera, and the Pathologies of English Masculinity," in: *Victorian Literature and Culture*, No. 38 (2010), 511-528.
[68] Carpenter, "Medical Cosmopolitanism," 519.

biological knowledge characteristic of the nineteenth century: "the soul of man, when it gets fairly rotten, will bear you all sorts of poisonous toad-stools, and no eye can see whence came the seed thereof."[69] The road to Bulstrode's origins leads through a detour; through the fourth and most upsetting outsider, Mr Raffles, who could in fact be seen as this sort of figurative "toad-stool," a stranger of unknown origins. Although read here from the extratextual perspective, Mr Raffles is described in the novel in relation to actual biological parasites, just like Dickens's Jo. At first, it happens when he visits his estranged stepson and asks for money to develop his tobacco business; at that moment he says: "The tobacco trade is growing. I should cut my own nose off in not doing the best I could at it. I should stick to it like a flea to a fleece for my own sake. I should always be on the spot."[70] When Rigg Featherstone refuses to support Raffles in any way, and for a very good reason, Raffles dismisses his accusations and claims he nonetheless continues to like his stepson and "jokingly" adds that "[t]here's nothing I like better than plaguing you."[71] The very first scene in which the reader gets acquainted with Raffles sets the tone by which he is to be characterised for the rest of the novel: an irritating and potentially dangerous vermin. As is revealed later in the plot, he does possess features of the plague: he comes uninvited, brings with him distress and misery, and is very difficult to get rid of. Perhaps this is why he inspires vermin connotations: fleas are well-known vectors of plague. The association with an insect parasite is shown in the novel the second time when Raffles approaches Will Ladislaw who, perhaps due to Raffles's peculiar appearance, immediately suspects him to be "one of those political parasitic insects of the bloated kind."[72] Yet Mr Raffles is not politically motivated. It seems that the main reason he was

[69] Eliot, *Middlemarch*, 339.
[70] Eliot, *Middlemarch*, 342.
[71] Eliot, *Middlemarch*, 343
[72] Eliot, *Middlemarch*, 501.

introduced into the storyline was to serve as a revealing agent through whom the true nature of Bulstrode is exposed.

Some critics note that the relation between Raffles and Bulstrode resembles the parasitical interaction. This is stated explicitly by Leland Monk who remarks that "Raffles is indeed a parasite, and Bulstrode is his grudging host."[73] I would argue that Bulstrode is more than a host – especially since Monk implies Raffles's abuse of hospitality here rather than his biological parasitism. I believe that Bulstrode too could be read as parasite within the context of the bodily balance. In this sense, he is one of the parasites referred to before which could be seen as the integral part of the organisms they inhabit. However, because their host-parasite equilibrium is not disturbed, and neither of them experiences any evolutionary stress factors, such as competing for food, they can live together peacefully. It might not be the pre-Fall harmonious bliss Vallisneri had in mind, but in this state the balance is not tipped either way. However, when the stress factor appears – and in this case this would be the emergence of a new parasite, Raffles – the disturbance causes bodily imbalance which must result in the exposure of the original parasite.

The competition between these two outsiders can be explained by an analogy taken from twenty-first century parasitology. In any given environment, different species compete with each other for resources in the perpetual struggle for existence, and parasites are no exception to this rule. Modern medicine has recorded case studies in which persons harbouring more than one species of parasites experienced the effects of their competition.[74] According to the hygiene hypothesis, human immune systems are

---

[73] Leland Monk, *Standard Deviations: Chance and the Modern British Novel* (Stanford: Stanford University Press, 1993), 63.

[74] Dickson Despommier recounts an interesting – albeit quite repulsive – case which serves as an analogy of the Bulstrode-Raffles competitive parasitical relation. The story goes as follows: a six-year old Guatemalan girl was admitted to a New York hospital with HIV/AIDS, tuberculosis and malaria. Before her treatment started, she suffered a bout of malarial fever; the rise of her body temperature revealed one more disease: ascariasis, caused by a giant roundworm *Ascaris lumbricoides*. The discovery was quite spectacular as the worm, irritated by the high temperature, evacuated the girl's body through her nose. "Imagine a smooth, pink-tinted worm about the size of a pencil [...] just crawled out of your left nostril!"

wired in such a way that they tolerate certain parasites as long as they are within control: in manageable numbers and not too virulent. If this is the case, some intestinal parasites may be present in the bodies of their hosts not just without their knowledge but also without any adverse effect to their health, a situation quite similar to the Chinese and *Mbya* beliefs. If, however, the hosts experience a secondary infection or have their immune systems compromised in any other way, this parasite-host balance is lost and the intruders' presence becomes harmful. In such a situation, the human body becomes the battleground between two or more species of parasites and whichever wins the battle is nevertheless capable of seriously injuring the host.

If we apply an extratextual reading of this analogy to *Middlemarch*, we can find an almost exact recreation of the above situation. Here, in the organism of the town two parasites compete for survival: Bulstrode, the stationary, ingrown into its surrounding intestinal parasite is being irritated and then exposed by the much more motile, virulent and destructive parasite akin to the malaria-causing *Plasmodium* type, Raffles. The analogy even makes sense when we consider the life cycle of both these parasites. For the host to get infected with any kind of intestinal worm, he or she must first ingest its infective agents: cysticerci in the case of tapeworms or larvae in the case of roundworms such as *Ascaris*. When the infective larva of *Ascaris* is ingested, it travels with blood to lungs and then trachea; to achieve its mature form, it must get to the intestine, so it

---

Though obviously disturbing, this points to an interesting fact: the girl suffered not one, but two parasitical diseases: malaria – caused by the microscopic parasite of the *Plasmodium* genus – and ascariasis. In this case, the girl's body became an actual, not figurative, battlefield on which two different parasites fought for resources and survival. Her *Ascaris* infection had not been manifested before she suffered the symptoms of the much more virulent parasitic malaria, and it might be assumed that had she not contracted *Plasmodium*, her *Ascaris* infection would have gone unnoticed, but also – more crucially – would have been asymptomatic, according to the hygiene hypothesis.
This case also presents the difference between the theoretical and functional approach to parasites adopted by science. Theoretically, the four diseases the girl suffered from: AIDS/HIV, tuberculosis, malaria and ascariasis were all caused by parasites: viruses, bacteria, protozoa and intestinal worms, respectively. Functionally however, medicine distinguishes between them on the basis of different kinds of treatments and different modes of infection, putting worms and *Plasmodium* protozoa in the parasite category, while viruses and bacteria are given categories of their own. Despommier, *People, Parasites and Plowshares*, 93.

migrates up the trachea, only to be swallowed by the host; this is how it eventually enters the digestive tract.[75] Bulstrode, just like Lydgate, was swallowed and assimilated by *Middlemarch* but, unlike the former, Lydgate proved to be a non-pathogenic organism. Malaria, on the other hand, as is well known, is characterised by cyclical appearance and remission of symptoms. This is due to the *Plasmodium* breaking the host's red blood cells, which first causes chills and then fever; this cycle is repeated until either the death of the host, or the effective treatment with antimalarials is introduced.[76] If viewed from this perspective, the numerous returns of Raffles seem much more understandable, as he appears evolutionarily motivated, not just financially. He comes back to disturb Bulstrode, is placated by a monetary version of quinine, and remits, only to reappear a few days later. Carpenter notes that with every such emergence, "the banker is figuratively 'sickened' by the prospect of the public disgrace that Raffles could bring about"[77] but the sickness Raffles brings seems as figurative as actual, and Bulstrode does complain of some ailments to Lydgate.

To Carpenter, Raffles's most important function is expository of Bulstrode's history; his presence in a way prepares the grounds for the narrator to tell the story of his previous life, here condensed by Carpenter: "beginning with his employment as a banker in London and followed by his passage through various aspects of London society, from a Dissenting religious sect to a pawnshop business […] to a 'sleeping partner' in a business that obtains raw materials cheaply."[78] The revelations of his past are spread around Middlemarch through the standard gossip channels but this time the thrill they cause is much stronger, especially when combined with the news of the suggested part Bulstrode might have played in Raffle's death. The story begins as a small ripple on the

[75] Based on Despommier, *People, Parasites and Plowshares*, 97.
[76] Based on Drisdelle, *Parasites*, 22-23.
[77] Carpenter, "Medical Cosmopolitanism," 521.
[78] Carpenter, "Medical Cosmopolitanism," 521.

surface but it develops into a powerful wave that sweeps disgraced Bulstrode out of Middlemarch. The difference in the Middlemarch community's approach to Bulstrode and the previously discussed balance disturbers Mr. Casaubon and Mr. Featherstone, is that in the case of the banker the strength of public opinion can be observed in action. The moment of the revelation allows the community to execute the social pressure on Mr Bulstrode while he still is present in Middlemarch.

In this reading the character of Raffles combines the innovative assumptions about imbalance with the traditional view of parasites (or diseases in general) as punitive measures for transgressive behaviours. There is a certain biblical determination in presenting Raffles as a divine punishment for Bulstrode for the sins he had committed in his previous life. Therefore, the personal aspect of blame and responsibility is retained. In this respect, Eliot takes advantage of the fact that she writes a novel set forty years earlier; the characters in it possess the knowledge of the 1830s but the author has insights into the scientific discoveries (including those concerning the sources of disease) of the 1870s. That is why she can have her characters express the notions of disease origin such as were believed at the time. This is how the narrator describes Mrs Farebrother: "She had brought up her children to wear flannel and not to over-eat themselves, which last habit she considered the chief reason why people needed doctors."[79] There is ageless wisdom in her beliefs which boil down to preventive measures against diseases: keeping warm and, more crucially, abstaining from overindulgence in food which may lead to more serious issues than a simple case of surfeit-caused indigestion. When Fred Vincy comes down with typhoid fever, his father, with military ardour, keeps "sharp fire on the enemy Infection,"[80] in the belief that high temperatures will chase the disease away. But he also clings to the notion – very annoying to Lydgate – that liquors were beneficial as

[79] Eliot, *Middlemarch,* 140-141.
[80] Eliot, *Middlemarch,* 217.

preventive measure: "best inward pickle, preserving you from the effects of bad air."[81] It is precisely due to Eliot's view on the Middlemarch with the benefit of foresight that she can gently mock some ideas (such as those expressed by Mr Vincy), and fully support other (such as those propagated by Lydgate). In the old understanding, Raffles can be seen as the symptom of Mr Bulstrode's diseased, imbalanced soul. In fact, as Eliot very subtly suggests, Raffles is the *cause* of it. Raffles is thus read here as a parasite of the virulent kind: he is presented as the punishment but he is also an outsider, an infective threat that comes from without the system – a concept which is explored in detail in the next chapter.

Conclusion

As the scientific and some of the literary examples provided above show, the notion of responsibility is deeply ingrained in the theories of parasite origins. Whether they are seen as tangible manifestations of social or bodily imbalance, or distress-causing agents of divine retribution, the human fault seems to persistently factor as the main cause of tipping the balance. There is, however, a fundamental difference between the causes of parasitical origin presented in *Bleak House* and *Middlemarch*. Dickens incorporates the state of the art biology into his writing, according to which parasites are to be viewed as manifestations of imbalance; he also distributes the notions of blame and responsibility for imbalance among the state, society and the individuals, shifting slightly its bulk from the general to the personal. Eliot's prose in terms of its interpreted parasitical content is ahead of its time. Mr Raffles, the only character presented as having some vague connection to parasitical organisms, combines two important properties which, in my reading, combine the complementary and the oppositional approaches to parasites: he is

[81] Eliot, *Middlemarch*, 288.

the *cause* of the imbalance, the source of the waves and ripples spreading across the Middlemarch community; but also, and perhaps foremost, he is not just an *outsider*, an alien element whose presence upsets the system, but a potentially *pathogenic* outsider, an infective agent threatening the constitution of his host.

Such an oppositional view of parasites became more popular in the late nineteenth century with the advancements in tropical medicine. The aim of the next chapter is to explore this version of the story of parasitic origin, with particular attention paid to the issues of responsibility and blame, and their retention in the tropical medicine as well as in the literary examples referred to under the general category of 'infection literature.'

CHAPTER IV STORIES OF ORIGIN: FROM WITHOUT

Introduction

The previous chapter concluded with a particular reading of one of the plotlines in *Middlemarch* which suggested an alternative parasite origin story to the one which assumed their emergence from within the host. The novel can be read as suggesting that parasites can appear from without, that they are not the part of the system but undesired enemies, invaders capable of wreaking havoc on the system. While in the context of parasitical genesis the notion of invasion is not innovative, as it was already explored by those proponents of the spontaneous generation theory who supported the idea that "seeds of parasites" originated outside the hosts ("the externalists," as John Farley calls them[1]), it rose to prominence in the last decades of the nineteenth century, when it became a motif of popular literature, and is relevant until this day. The belief in the external source of disease agents was later extensively used (and to a large extent abused) by writers of so-called invasion literature, a genre of the turn of the century in which the motifs of military invasion were employed to serve a specific political purpose. In the present chapter I combine the parasite-related conclusions I have found in *Middlemarch* with the military-inspired invasion narratives. To this end, I introduce the notion of infection literature: a subgenre of invasion literature in which the invading enemy is presented as a harmful, exotic pathogen.

As this chapter continues the topic of stories of parasitical origin, and directs its attention to the opposite side of the previously explored 'within,' its aim is to argue that infection literature, through its time-specific sources of inspiration, can be regarded as the foremost parasitological narrative, combining the notions of external, invading enemies, the controversial question of responsibility of the hosts/victims, as well as employing medicine

[1] John Farley, "The Spontaneous Generation Controversy (1700-1860): The Origin of Parasitic Worms," *Journal of the History of Biology*, Vol. 5, No. 1 (1972), 100-106.

and natural sciences not only in terms of the content of the stories, but also in their construction. In this respect, the present chapter could be read as a text version of a triple Venn diagram in which each of the three circles represents a different source of inspiration: invasion literature, bacteriology, and tropical medicine; while the overlapping intersection of all of the circles represents infection literature. Such a visual metaphor is particularly useful because it also takes into account the intermediate overlaps of the inspiration circles: the overlap between tropical medicine and bacteriology represents the parasite; the overlap between tropical medicine and invasion literature represents the exotic; and finally, the overlap between bacteriology and invasion literature represents virulence. This structure, when translated from the picture to the text form, dictates precedence of one of the circles – which in this instance is invasion literature, – but it is only functional and by no means implies the superiority of one over the other two. In essence, the present chapter – just as the entire body of this dissertation – is intended to be read as a meeting ground of literature and science of the period in which not a single source of inspiration could be regarded as more important, but which emphasises their equal status.

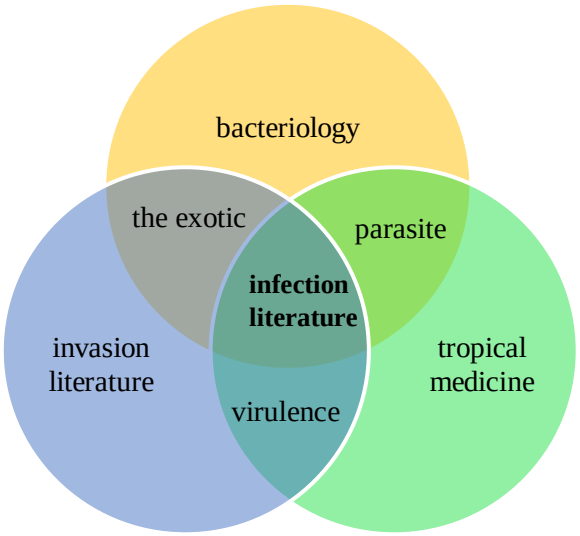

Figure 3 Infection Literature Venn Diagram

Invasion Literature

Invasion literature, now disregarded as artistically inferior and as an expression of political servitude and propaganda, was widely read by the mass public in the late-Victorian, and Edwardian period.[2] A. Michael Matin, the foremost scholar of the subject,[3] defines invasion literature as "a once immensely popular although now little studied Tory-Conservative genre whose chief polemical aim was to stimulate public and Parliamentary support for increased military expenditure by depicting French, Russian, and German attempts on Great Britain and on the territories of the British Empire."[4] As this definition shows, the main focus of the invasion narrative was the portrayal of the British society either as vulnerable to or under a military attack from the numerous political enemies, and as such it was supposed to serve as a cautionary tale, one that would stress the need to be prepared for such a possibility. As the genre proved particularly popular with the reading public, it was also channelling "the crude rhetoric of alarmist propaganda,"[5] shaping the society's view on the probability and assumed scope of such an attack. According to Matin, a typical representative of the British invasion genre tends to contain a number of "staple devices"[6] such as: the native hostility towards foreigners (especially Germans), the immense influx of aliens into the country, and, vitally, the society "in a state of physical and mental decline."[7] Crucially, it is the British indolence and apathy that allow for these invasions to happen; the unpreparedness of the nation and its lack of resistance, combined with the inclination to underestimate the risk of invasion, are

[2] A. Michael Matin's article in which he presents narratives of espionage and invasion is devoted to reading Joseph Conrad's *The Secret Agent* as an example of such genre. One of the points he makes is Conrad's struggle between wanting to write a financially rewarding bestseller, and his contempt for the target readers of such literature whom he perceived as "philistines" and "imbeciles." A. Michael Matin, "'We Aren't German Slaves Here, Thank God': Conrad's Transposed Nationalism and British Literature of Espionage and Invasion," *Journal of Modern Literature*, Vol. 21, No. 2 (1997-98), 264-66.
[3] His seminal work on the subject of invasion is *Securing Britain: Figures of Invasion in Late-Victorian and Edwardian Fiction* (New York: Columbia University Press, 1997).
[4] Matin, "'We Aren't German Slaves Here, Thank God'," 252.
[5] Matin, "'We Aren't German Slaves Here, Thank God'," 265.
[6] Matin, "'We Aren't German Slaves Here, Thank God'," 260.
[7] Matin, "'We Aren't German Slaves Here, Thank God'," 260.

shown as cardinal sins, which in turn allow for these attacks to be interpreted as deserved punishment. However, Matin notes, these onslaughts perform an additional function, perhaps critical in the context of the nationalistic propaganda. The repeated invasions British society experiences in these narratives become the much-needed wake-up call, which "paradoxically 'vaccinate[s]' Britain by stimulating its resistances."[8] Thus, the invasion narratives convey the message that the key to withstand invasion is resistance and preparedness, but at the same time they also stress the need of the attacks to happen, not just to shake the nation into alertness, but also to test its resilience and patriotism. In a reductive way characteristic of popular prose for the masses, the problem it describes – the alien invasion – becomes the key to its solution; a self-perpetuating circle of retribution and retaliation.

Germany, or other political enemy states of the time, was not the only place of origin of the possible invasion. The other one is referred to by Matin as an imperial inversion, in which the nations under the Empire's rule take revenge on their masters through invading Britain and having it undergo a variation of the process of colonisation. The colonisers are shown to be at risk of experiencing their own colonisation, by the hands of those who are supposed to be the colonised ones. Matin argues that "[s]uch an ironic 'lowering' of the denizens of the world's foremost imperial power to the status of those whom they had been accustomed to colonizing is, in fact, one of the sources of greatest rhetorical leverage of invasion fiction; the genre, which coincided entirely with the heyday of European expansionism, thus displays the imperial imagination turned in upon itself."[9] Matin points to two sources of fear that invasion narratives utilised: external and internal. The invasion becomes thus a two-sided issue: on the one hand, its source is peripheral, with the enemy coming from without; on the other, echoing the assumptions of the previous chapter, also

[8] Matin, "'We Aren't German Slaves Here, Thank God'," 260.
[9] Matin, "'We Aren't German Slaves Here, Thank God'," 254.

coming from within. In this later instance, it is the case of the Empire attacking itself, as if it were an organism suffering from an autoimmune disease. But this disease, Matin maintains, attacks in a cunning way: the foes first infiltrate the society, blend in as spies and other unwanted forces, and start the rebellion only once the social tissue is saturated with foreign elements.[10] Therefore, the analogy with the stories of parasites' internal origins works only to a point; while in the former, the native source of parasites is sometimes presented, in invasion narratives, the enemy is always external. Even if the attackers come from within, just like in the case of reverse colonisation, their nativeness is only artificially established through the political process, while their cultural and ethnic background immediately distinguishes them from the "true" natives of Great Britain.

Ailise Bulfin, who continues Matin's research, and offers an extensive typology of the invasion narratives of the late nineteenth- and early twentieth century, notes exactly the same sources of invasion as Matin does: "resentful European 'great power' rivals or […] rebellious colonial subjects,"[11] and categorises them adequately. In her article, she enumerates a number of key elements of invasion fiction, which she precisely sets in time between the years 1870 (Franco-Prussian War) and 1914 (the beginning of WWI). The most prominent of the features of invasion literature she mentions are the following: British vulnerability and inferiority (especially military), the employment of futuristic war technology in a proto-science-fiction manner, the adaptability of the invading enemy to the current political situation, military influence both in terms of themes and commission, "scare-mongering at home and […] playing provocatively before [the] wider international audiences," home jingoism and xenophobia, and the inspiration with the real life imperial incidents (such as Indian Mutiny).[12] As it is clearly visible, her identification of typical components of invasion

[10] Matin, "'We Aren't German Slaves Here, Thank God'," 268.
[11] Ailise Bulfin, "'To Arms!': Invasion Narratives and Late-Victorian Literature," *Literature Compass*, Vol. 12, No. 9 (2015), 483.
[12] Bulfin, "'To Arms!'," 484-487.

narratives does not differ significantly from Matin's. However, what does distinguish Bulfin's work is that she deviates from the strictly military perspective of identifying literary examples of the genre. To Bulfin, the military invasion is just one of many types of attack. She specifies the category of the politically motivated invasion: German invasion (Lieutenant-Colonel George Tomkyns Chesney's *The Battle of Dorking* published in 1871), Russo-French invasion (William Le Queux's *The Great War in England in 1897* published in 1894), Sino-Japanese invasion (M. P. Shiel's *The Yellow Danger* published in 1898), or the ludicrous invasion presented in P. G. Wodehouse's *The Swoop!* (1909) "which featured invading armies not just from Britain's imperial rivals like Germany and Russia, but also from unlikely nations like Switzerland, Monaco, Morocco and Somaliland."[13] She also acknowledges other invasive forces, such as foreign criminals who appear in numerous detective narratives, particularly in several Sherlock Holmes stories. Considering the invasion from the colonial perspective, she expands the genre to accommodate tales of oriental invasion (e.g. Guy Boothby's *Pharos the Egyptian* published in 1899), as well as gothic stories involving supernatural intruders (such as Bram Stoker's *Dracula* published in 1897),[14] or the combination of the two, the oriental/supernatural invasion, such as the strangely specific "Egyptian-themed gothic tales of vengeful, invasive mummies"[15] exemplified by a lesser known Arthur Conan Doyle's story "Lot No. 249" (1892). The distinction she makes between these two perspectives – i.e. military and colonial – is that the narratives of military invasions focus on the future threats, while the narratives of colonial inversed invasion concentrate their efforts on showing the imminent threats which may happen any day, or are already happening. In short, Bulfin broadens the definition of the invasion narrative so that it includes invasions of all kinds, as demonstrated in the

[13] Bulfin, "'To Arms!'," 482.
[14] Bulfin, "'To Arms!'," 489-90.
[15] Bulfin, "'To Arms!'," 490-91.

narratives of oriental invasion (the so-called "yellow peril"[16]), detective and crime fiction, and gothic stories.

The references to vaccination through exposure and autoimmune disease alluded to by Matin, as well as the motif of the possible intruders' exotic provenance and their limited numbers (for instance, Doyle's mummy is a single invader) stressed by Bulfin point to yet another invading force which may again broaden the definition of invasion literature. Combining such motifs as the vulnerability of the nation, colonial threats, and enemies cunningly infiltrating the society, with the invasive factor operating on a much smaller scale, but nonetheless capable of wreaking havoc on the entirety of the nation, I propose the introduction of a subgenre of invasion literature: infection literature.

Following Bulfin's distinction of a single invading factor, infection narrative would focus on the mechanics of invasion, a variation of the infiltration theme mentioned by Matin, in which a single invader, due to his ability to efficiently exterminate his victims or transform them into versions of himself or herself, would be able to spread the invasion in a style of an epidemic. This is possible because his invasive power lies not in numbers but in virulence, and thus an example of infection narrative would put a dangerous individual, rather than numerous enemies, at the centre of the plot. Both invasion and infection narratives can be described as depicting "the overthrow of British society by hostile foreign intruders"[17] but in the latter case the intruder can be seen either as a pathogen or a carrier of a pathogenic infectious agent. The most obvious of these would be the novel by Guy Boothby classified by Bulfin[18] as an example of a tale of oriental invasion. *Pharos the Egyptian* (1899) is straightforwardly an infection narrative in which a vengeful man, who turns out to be the

[16] Bulfin, "'To Arms!'," 489.
[17] Bulfin, "'To Arms!'," 483.
[18] Ailise Bulfin interprets this novel in more detail in her article "The Fiction of Gothic Egypt and British Imperial Paranoia: The Curse of the Suez Canal," *English Literature in Transition*, Vol. 54, No. 4 (2011), 411-443.

ancient magician Ptahmes, lures an Englishman to Egypt and infects him with plague which he then spreads around Europe, decimating its inhabitants. Other works of fiction which I would classify as infection narratives are Richard Marsh's *The Beetle* (1897) and Arthur Conan Doyle's *The Sign of the Four* (1890). In both the premise is very similar: a single yet extremely virulent invader lands in London; motivated by revenge or greed, he or she exposes the weakness and apathy of the society by threatening its existence and the imperial rule.

Because infection narrative is anchored in the definition of invasion literature, it cannot escape the typical elements of the genre. It also employs oriental or supernatural invaders, or incorporates contemporary imperial incidents and thus feeds into general fears of the possibility and consequences of reverse colonisation. Nonetheless, there are qualities which definitely differentiate invasion from infection narratives and warrant the introduction of the infection subgenre. However, before the examination of its distinctive properties can be presented, two vital overviews, or detours, are necessary. As it has been already mentioned, the aim of this chapter is to present evidence in favour of the claim that infection literature is the foremost parasitological genre. The reason, as the following pages will clarify, is that it is inspired by bacteriology and tropical medicine, and these two fields were both considered branches of parasitical studies at the end of the nineteenth and the beginning of the twentieth century. The following two sections, therefore, are devoted to the examination of the connections of these two disciplines with parasitology during that period.

Bacteriology

As the previous sections noted, the emergence and the eventual demise of the invasion literature took place between 1870 and 1914, which, as both Matin and Bulfin state,

"coincided entirely with the heyday of European expansionism."[19] This period also signified a particularly fruitful phase in the development of science. A contemporary historian of medicine Steven Lehrer maintains that the years between 1875 and 1910 can be regarded as "the golden age of microbiology" because during this brief period medicine witnessed an unprecedented progress: the majority of disease-causing germs were identified, and modern virology was established.[20] The identification of microbes as infective agents opened new ways of research and ultimately resulted in creating modern medicines, but at the same time, it generated serious taxonomic problems. The notion of germ was so vague that in essence it included all pathogenic agents: bacteria, viruses, and parasites.[21]

In order to clarify this issue, we need to return for a moment to one of many definitions of 'parasite' from Chapter II. Taken from *Parasitism. The Diversity and Ecology of Animal Parasites*, this particular one shows the scope of 'parasite' in present-day natural science: "approximately 30-50% of described animal species are parasitic at some stage during their life cycle […]. Given that […] all viruses and many prokaryotes [bacteria and other single-celled organisms] and fungi are parasitic […], these rough estimates are undoubtedly low."[22] This chopped quote signals two issues: firstly, it reiterates the point that parasites are ubiquitous in terms of numbers and distribution and the very term 'parasite' is used in contemporary ecology liberally to denote at least half of all known animal species (viruses included). Secondly, and more importantly in the present context, is seems to raise the same problem as that faced by the nineteenth-century microbiologists who struggled with the concept of the germ: that practically all of the infective agents are parasitic. However, there

[19] Matin, "'We Aren't German Slaves Here, Thank God'," 254.
[20] Steven Lehrer, *Explorers of the Body: Dramatic Breakthroughs in Medicine from Ancient Times to Modern Science*, Second Edition (New York, Lincoln, Shanghai: iUniverse, 2006), 275.
[21] Lehrer, *Explorers of the Body*, 275.
[22] Timothy M. Goater, Cameron P. Goater, Gerald W. Esch, *Parasitism. The Diversity and Ecology of Animal Parasites*, Second Edition (Cambridge, New York: Cambridge University Press, 2014), 2.

is a significant difference between the contemporary approach and the one adopted by the scientists of the golden age of microbiology.

In modern science, there is a very strong distinction between what is theoretical and what is functional. Theoretically all infective agents are parasites and – since parasites are defined not by what they are but by what they do – it does not matter very much if under the umbrella term of 'parasite' such distinct species as viruses, bacteria or protozoa are included. Functionally, however, the difference is fundamental. While antibiotics are effective in fighting bacterial infection, they do not work against viruses. Each class of parasites demands different prescriptions and modern therapies are based on the principle of tailored treatment, the "magic bullet" technique firstly postulated by Paul Ehrlich: specific chemotherapy aimed at specific parasites, a kind of medical targeted killing.[23]

During the golden age of microbiology this overlap between bacteriology and parasitology was both theoretical and functional; to such an extent, in fact, that Steven Lehrer refers to it as "a wrong turn"[24] in parasitological research. Because germs were considered to be true parasites, such a belief influenced the practical approach regarding the treatment of epidemic infections. As Lehrer notes, "[t]he powerful influence of the germ theory of disease had convinced most scientists that bacteria caused all epidemic diseases."[25] This proved particularly problematic in the case of such diseases as malaria, which appears bacterium-induced but is actually caused by a protozoan. Malarial *Plasmodium* spp. must be attacked with powerful chemical substances that will not be efficient against bacteria. Due to this fact, it cannot be approached like any other bacterium because parasitic diseases are characterised by non-direct transmission[26] and antibiotic therapies are ineffective in their case.

---

[23] Paul Ehrlich, quoted in: Lehrer, *Explorers of the Body*, 289.
[24] Lehrer, *Explorers of the Body*, 244.
[25] Lehrer, *Explorers of the Body*, 244.
[26] Lehrer, *Explorers of the Body*, 223.

It could be argued that the "wrong turn" started with Robert Koch, who is widely considered the father of bacteriology. He was the one to call the Tubercle bacilli "true parasites" in his 1882 article "The Aetiology of Tuberculosis."[27] The composition of his article would be immediately recognised by contemporary scientists; in explaining his research, he uses the same stages that are now standard academic practice: purpose, methods, results, discussion and conclusions. Introducing his examination, he writes: "The aim of the study had to be directed first toward the demonstration of some kind of parasitic forms, which are *foreign* to the body and which might possibly be interpreted as the cause of the disease."[28] It seems particularly interesting that in his description Koch touches upon what is the core notion of modern parasitology and medicine: that the infectious agent is alien to the host. It shows the effects of the evolution of theories behind the origin of parasites. No longer are they believed to spontaneously generate within the body; on the contrary, they are foreign entities finding their way into the living organism they infect. The line between what is self and what is not is thus very sharp, unlike the vague distinctions between the host and parasite which were presented in Chapter III. This precise distinction, however, turned out to be illusory and thus short lived; further discoveries in the field of parasitology would show the sophistication of strategies and techniques parasites developed in the course of thousands of years of evolution specifically to blur the self vs. non-self division.

Describing each of the methodological steps he undertakes, Koch concludes that "the parasitic nature of tuberculosis is proved"[29] and moves on to answer two vital questions: "where the parasites come from and how they enter the body." [30] After having established that "tubercle bacilli are dependent exclusively upon the animal organism"[31] and inferring

[27] Robert Koch, "The Aetiology of Tuberculosis" (1882), http://www.academia.dk/MedHist/Biblioteket/koch_ Aetiology-of-Tuberculosis_1882.php (19.09.2016).
[28] Koch, "The Aetiology of Tuberculosis," emphasis – mine.
[29] Koch, "The Aetiology of Tuberculosis."
[30] Koch, "The Aetiology of Tuberculosis."
[31] Koch, "The Aetiology of Tuberculosis."

that they are transmitted through air, Koch turns to the practical consequences of his findings, relating to the social aspect of the disease. The most significant result of Koch's work in this respect is the establishment of the tangible pathogen, the sole source of tuberculosis. Such a strong identification of the microscopic agent responsible for the infection went against the prevalent nineteenth-century notions that poor living conditions were responsible for the emergence of the disease, an assumption of which Koch was aware: "Tuberculosis has so far been habitually considered to be a manifestation of social misery, and it has been hoped that an improvement in the latter would reduce the disease. Measures specifically directed against tuberculosis are not known to preventive medicine. But in future the fight against this terrible plague of mankind will deal no longer with an undetermined something, but with a tangible parasite, whose living conditions are for the most part known and can be investigated further."[32] Nonetheless, despite the unequivocal confirmation of the cause of the disease and its method of transmission, Koch's optimistic statements concerning the successful fighting of tuberculosis for years remained in the sphere of wishful thinking. On the one hand, the assumptions relating to the living conditions of those affected were deeply rooted and continued to influence the perception of the disease. On the other hand, Koch's own failure at delivering the cure for tuberculosis (his tuberculin scandalously proved to be ineffective[33]), undermined the belief that medicine could offer some useful treatment.

Koch's reputation was ultimately unscathed and he did receive a Nobel Prize for his work on tuberculosis in 1905 but the conclusions he expressed regarding the origin of

[32] Koch, "The Aetiology of Tuberculosis." In her *Illness as Metaphor* devoted to the comparative study of cancer and tuberculosis, Susan Sontag notes something very similar to Koch's observations: "TB is often imagined as a disease of poverty and deprivation – of thin garments, thin bodies, unheated room, poor hygiene, inadequate food." Susan Sontag, *Illness as Metaphor* (New York: Farrar, Straus and Giroux, 1978), 12.

[33] Koch introduced the tuberculin therapy without testing it sufficiently on human subjects; it was later proven to have contained living bacilli and thus endangered lives of patients who received it. Lehrer, *Explorers of the Body*, 206-209.

disease, although almost immediately accepted by medical professionals, did not appeal to the general public who preferred the traditional scapegoating of the socially unprivileged to blaming some questionable microscopic germ. As a contemporary historian of medicine Irwin W. Sherman explains, "in the past, fear of [tuberculosis], fueled by preexisting prejudices, led to public and institutional reactions including mandatory testing and isolation and tended to stigmatize immigrants and those with different lifestyles."[34] Sherman maintains that this situation will remain such as long as medical authorities continue to disregard the social perception of the disease, and downplay the stereotypes that are not only harmful to those affected, but which effectively prevent successful containment of the epidemic.[35] Sherman's strong emphasis on the connection between the disease and its social perception is crucial in the context of the present work. As the following section of the chapter will demonstrate, the stereotypes regarding the origin of disease were prevalent not just in the field of bacteriology. The next pages are devoted to the premise of tropical medicine which arguably in its early stages was more affected by the perception bias than other fields of research.

Tropical Medicine

The "wrong turn" parasitology experienced between 1875 and 1910 also affected the emerging discipline of tropical medicine. A historian of parasitology, John Farley, repeatedly states that the history of these two fields is closely intertwined because "[t]ropical medicine became the main impetus for the emergence of parasitology as a discipline in Britain."[36] This was due to the fact, as another contemporary parasitologist F. E. G. Cox explains, that "[s]ince most of […] parasitic diseases occur mainly in the tropics, the field of

[34] Irwin W. Sherman, *Twelve Diseases That Changed Our World* (Washington: ASM Press, 2007), 129.
[35] Sherman, *Twelve Diseases*…, 129.
[36] John Farley, "Parasites and the Germ Theory of Disease," in: *Framing Disease: Studies in Cultural History*, eds. Charles E. Rosenberg and Janet Golden (New Brunswick: Rutgers University Press, 1992), 43.

parasitology tended to overlap with that of tropical medicine."[37] Indeed, the two schools of tropical medicine established at the end of the nineteenth century – in Liverpool in 1898 and in London in 1899 – were headed and influenced by two prominent parasitologists of the period, Ronald Ross and Patrick Manson, respectively.[38] The diseases typical in the tropics, from malaria to leprosy, were all considered parasitical, and approached accordingly. Late nineteenth-century parasitology therefore could be argued to have suffered not one but two wrong turns: on the one hand, its scope of inquiry unnecessarily overlapped with that of bacteriology; on the other, it seems to have been invaded by the medical study of exotic diseases because that appeared geographically justified. While theoretically this situation was not particularly problematic, it was very disadvantageous in practice: in both cases of wrong turns, the result was delay in discovering the nature of infective agents of epidemic or tropical diseases, and introduction of effective treatment.

This unfortunate overlap is just one of the similarities the late-nineteenth century bacteriology and tropical medicine shared. The latter, perhaps even to a greater extent than the former, was subjected to a strong ideological bias and in effect incorporated some of the elements of political propaganda of the time. The primary reason for the rising interest in parasitology that Farley mentions is the nineteenth-century expansion of the British Empire. As he explains, the establishment of schools of tropical medicine in England was the immediate result of the imperial growth, and the health issues of the troops stationed in those lands began to constitute a significant problem.[39] The attitude towards tropical diseases and their causes became a political as well as a medical matter, an issue I explored in more detail

[37] F. E. G. Cox, "History of Human Parasitology," *Clinical Microbiology Reviews*, Vol. 15, No. 4 (2002), 595.
[38] John Farley, *Bilharzia*: *A History of Imperial Tropical Medicine* (Cambridge: Cambridge University Press, 2003), 20-29.
[39] Farley, *Bilharzia*, 14-20.

in an article on the subject of imperial stereotypes and prejudices.[40] In the present section only the most important points from this article are presented.

As the diseases in tropical and sub-tropical regions were considered, in Patrick Manson's view, to be of "specific origin,"[41] they were understood to be unrelated to the climate itself. Luigi Sambon, later of the London School of Tropical Medicine, in his 1897 article entitled "Remarks on the Possibility of the Acclimatisation of Europeans in Tropical Regions" argued that the colonisers are being decimated in the tropics not by the impalpable climatic conditions, but by the identifiable "culprits": parasites.[42] The general undertone of Sambon's article is accusatory and cautionary rather than optimistic, for while it exonerates climate, it simultaneously points to another factor apparently responsible for the existence and spread of tropical diseases. In Sambon's view, native people suffer from a number of diseases because of their barbarian and savage, and thus unsanitary and unhealthy, habits. The only way to tackle this problem, he maintains, is to introduce civilisation in the colonised lands and through this process eliminate, or at least manage, health issues of the colonised nations and – by extension – of the imperial troops.

The belief that native people suffer from parasitical tropical diseases because of their barbarity was widespread, and present in many works of late nineteenth-century parasitologists. Rudolf Leuckart, for instance, claimed that "[w]e should expect, *a priori*, that the frequency of helminthiasis would be in inverse ratio to culture and civilisation"[43] and that "all the external characteristics of savage life are […] most important causes of

[40] Justyna Jajszczok, "Parazytologiczne kryptohistorie: tropikalne przesądy i uprzedzenia," in: *Kryptohistorie: Ukryte i utajone narracje w historii*, eds. R. Borysławski, A. Bemben, J. Jajszczok and J. Gajda (Katowice: Wydawnictwo Uniwersytetu Śląskiego, 2014), 115-123.
[41] Patrick Manson, *Tropical Diseases: A Manual of the Diseases of Warm Climates* (New York: William Wood and Company, 1898), xii.
[42] Luigi Sambon, "Remarks on the Possibility of the Acclimatisation of Europeans in Tropical Regions," *The British Medical Journal*, Vol. 1, No. 1880 (1897), 63.
[43] Rudolf Leuckart, *Parasites of Man, And the Diseases Which Proceed from Them*, trans. William E. Hoyle (Edinburgh: Young J. Pentland, 1886), 164.

parasitic diseases." [44] When he writes of the prevalence of parasitic worms in Africa, he suggests that the African people themselves, through their "savage ways," are responsible for this ubiquity. He was not the only one to have held this opinion, which was eventually proven incorrect when other factors pertaining to parasitical infection such as, for instance, exposure to water-based parasites during canal works, were taken into consideration.[45] Even T. Spencer Cobbold, customarily referred to as the father of English parasitology,[46] who devoted his life to eradicating harmful stereotypes regarding parasites and their hosts, could never escape the assumptions that the lack of civilisation must necessarily be accompanied by endoparasitical infestation: "speaking generally, it may be said that the measure of internal parasitism affecting any given class of people bears a strict relation to the degree of barbarism shown by such persons in their choice of food and drink, and in their manner of eating and drinking."[47] Cobbold, too, believed that the best way of ridding humanity of parasitical diseases was to advance their civilisation status. The very same idea was propagated by Patrick Manson; in the introduction to his manual for future parasitologists and medical practitioners, he wrote: "In the following pages I have included certain cosmopolitan diseases, such as leprosy and plague, diseases which […] have been practically ousted from Europe and the temperate parts of America by the spread of civilisation, and the improved hygiene that has followed its train; and are now practically confined to tropical and sub-tropical countries, where they still survive under those backward social and insanitary conditions which are necessary for their successful propagation, and which are more or less an indirect outcome of tropical climate."[48] Manson's assertion seems at odds with Sambon's argument against climate as the source of disease but in fact, it supports it.

---

[44] Leuckart, *Parasites of Man*, 164-5.
[45] Farley, *Bilharzia*, 45-61.
[46] Cook, *History of Parasitology*, 3.
[47] T. Spencer Cobbold, *Parasites; A Treatise on the Entozoa of Man and Animals* (London: J. & A. Churchill, 1879), 27.
[48] Manson, *Tropical Diseases*, xvi.

The specific origin of tropical diseases was confirmed to be parasites; climate only helped them spread and reproduce, indirectly influencing the transmission of pathogens.

Imperial stereotypes were one thing; the other significant element of the propaganda was the epidemiological threat the colonies apparently posed. The exotic discoveries in the field of parasitology lent justification to the obsessive need to civilise the tropical regions. The risk posed by tropical parasites differed dramatically from that known from the domestic ones. Parasites familiar to European parasitologists were seen as passive and immobile, their strategy almost slothful: merely waiting for the right circumstances to infect a host. This is particularly true of helminths such as tapeworms: the larvae of *Taenia saginata* (beef tapeworm) and *Taenia solium* (pork tapeworm) are capable of wintering in soil for a long period of time until opportunity to continue their life cycle presents itself. It may explain, therefore, the inherent need or practice of shifting the blame from the parasite to its host: if being infected depends on giving the parasite the right opportunity, without any volition on its side, the responsibility does seem to rely solely on the person foolish, ignorant or unhygienic enough to allow this to happen. In reality, it must be emphasised, the host, just as much as his or her guests, is a recipient of chance, of bad and good luck, respectively. If parasites themselves do not actively seek their hosts, neither do persons or animals whose bowels harbour them seek their 'guests.'

Unlike the well-known continental parasites, the exotic ones proved a disturbing conundrum for the Western scientific community wrangling with such questions as: 'how do they infect people?,' 'what are their life-cycles?' and most importantly, 'can they cross over and infect us?' The state of grave concern experienced by parasitologists at the end of the nineteenth century was even more understandable since Arthur Looss proposed his skin-contact theory of infection of the tropical schistosoma worms: exposed skin, when in contact with freshwater contaminated by the infective forms of the parasite, would be enough to get

infected. Today we realise Looss's mistake in never having taken into account the intermediate host of the blood fluke – the snail – but at the same time understand the grounds for making it. The life cycle of *Schistosome* spp. is very complex; in addition, in Looss's time it was a source of embittering controversies among German and English parasitologists.[49] The realisation of the risks posed by this form of disease transmission was immediate and, considering the available data, by no means disproportionate: "if the 'skin-contact theory' of Looss were true," writes Farley, "then every puddle in every army camp was a potential source of the disease. An artilleryman, returning home from Egypt, could be responsible for an epidemic of bilharzia in Woolwich Barracks! London could become another Cairo; the mind reeled."[50] This discovery had the potential to grasp the nation's imagination: it would have been very easy to envision a scenario in which a single person coming back from some tropical regions proves to be the source of contamination and infection for the whole country – with the simulation of the epidemic spreading in exponential progression. Moreover, the accompanying potential of the disease to "un-civilise" the capital of the Empire and turn it into one of the colonial towns, as if the bilharzia was an imperial avenger, made this matter even more serious. It is quite ironic, especially if we take into consideration the fact that "[u]ntil the end of the nineteenth century the only medical school with facilities modelled upon European lines, and yet with opportunities for

[49] It is perhaps worth explaining that the bone of contention was the schistosome egg. The discovery of two kinds of those: terminally- and laterally-spined sparkled disagreement as to whether this criterion alone could be enough to divide the parasite into two species. The debate that followed sometimes included more than academic arguments: the German scientists, having behind them a century of glorious parasitological studies, derided the British of the newly-established schools of tropical medicine on the basis of their alleged sloppiness and the general disregard for the rules of scientific method. A particularly fine example of this exchange of arguments was presented by Arthur Looss who wrote to Luigi Sambon thus: "I strongly recommend studies of the sort [i.e. on the helminth life cycle] to all those who indulge in 'formulating ideas' with reference to helminthological questions. Anyone would be laughed at if he tried to write a tale in a language of which he did not know the alphabet" (Looss, quoted in: Farley, *Bilharzia*, 57.). Eventually, the consensus was reached and the Germans had to eat humble pie when the existence of the other species of the blood fluke was confirmed, and it was named *Schistosoma mansoni*, after Patrick Manson, the head of the London School of Tropical Medicine. Farley, *Bilharzia*, 59-71.

[50] Farley, *Bilharzia*, 64.

the study of tropical parasites, was that at the Kasr-el-ain Hospital in Cairo."[51] In effect, thus, with the 1899 establishment of the London School of Tropical Medicine, London in a way *did* become another Cairo.

What seems particularly interesting in this case, is that although Arthur Looss's theory was ultimately proven to be incorrect, his unspecific warning against the threats coming from Egypt in particular and tropical and subtropical regions in general appeared reasonable, as it was supported with empirical evidence.[52] For although many parasites are limited by geographical distribution, a few species – and in worryingly great numbers – are able to travel the world and settle down in new places, changing them irrevocably in their course. Nonetheless, nowadays we know – due to the innumerable advances in the ever-expanding science of parasitology – that the invasion of tropical parasites, although possible to a certain extent, is not as easy as it might have appeared at the end of the nineteenth century.

First and foremost, in terms of the terrifying infective disease, there is the need for the vector or intermediate host whose role is to act as a smuggler's suitcase, hiding the pathogen inside. Luckily for the regions located outside the tropical and subtropical belt, many vectors cannot stay alive in their climate conditions long enough to let the parasites complete their cycles. As Rosemary Drisdelle explains, "*Trypanosoma* spp. need the tsetse fly, *Plasmodium* spp. need the mosquito, and *Schistosoma* spp. need the snail. They can spread to new places, and they do, but only to places where their other hosts can also survive."[53] Tsetse fly range is limited to Africa, but Europe is the homeland of both mosquitoes and snails, so it seems only understandable that there occurred apprehensions connected with the spread of tropical diseases through hosts either already present or easily adaptable to the climate of continental

[51] Foster, *A History of Parasitology*, 188.
[52] Looss got himself accidentally infected with hookworms when he touched the surface of a larvae culture with his finger. Hence he developed the idea that perhaps blood flukes had an analogous mode of infection. Despommier, *People, Parasites, and Plowshares*, 24-5.
[53] Rosemary Drisdelle, *Parasites: Tales of Humanity's Most Unwelcome Guests* (Berkeley, Los Angeles, London: University of California Press, 2010), 25.

Europe. Indeed, as Drisdelle writes, the spread of malaria had actually happened, for it used to be present not only in southern Europe (predominantly Italy) but even "as far north as Siberia";[54] not to mention the rather surprising fact that "*Plasmodium* spp. have made themselves at home in England, the United States, [and] Southern Canada."[55] In this respect, her choice of expression is spot on: the microscopic malaria-causing pathogens, though uninvited and intolerable, have the frightful potential to *make themselves at home* wherever they go – of course provided that their mosquito carriers feel the same.

Imperial tropical medicine focused on germs had one additional impact on the perception of parasites in the late nineteenth century. Because of the customary employment of military rhetoric and rhetoric of invasion, it associated parasites with functions they previously had not seemed to possess, at least not in the descriptions offered. Once the life cycles of some of them were established, it became apparent that a certain number of tropical parasites go through stages of development in which they are free living forms, not only active but also voracious and predatory, aggressively seeking out their intermediate and definite hosts. In this respect, as it has been mentioned above, they are dramatically different from native, continental parasites which had been described for the decades before the 1890s, such as tapeworm immobile embryos clinging to roots of grass and waiting to be picked up by their next host, not having much control over the process. This 'new,' tropical parasite was the more frightening because it betrayed unexpected predatory instincts.

What needs to be stressed at this point, however, is the apparent discrepancy between the above statement and the fragment of the 1860s parasitological treaty by T. Spencer Cobbold analysed in the following section. In it, Cobbold describes the continental intestinal parasites as unable to remain in one place, because "migration is the soul of their

[54] Drisdelle, *Parasites*, 208.
[55] Drisdelle, *Parasites*, 19.

prosperity,"[56] thus emphasising their motility. The difference between continental and tropical parasites in this respect is that the latter are mobile and predatory *before* they enter the host. Cobbold's parasites only become migrant when they reach their final destination. His entire argument is based on the idea that internal parasites are only in their natural environment when they are inside the hosts; and the transitional stages of their life cycles in which they are outside, although essential, are ultimately a necessary obstacle in achieving their life goals.

Infection Literature

Parasitical texts of the second half of the nineteenth century could also in a way be considered invasion literature, especially since some parasitologists betrayed certain predilection for military-inspired metaphors. Rudolf Leuckart, for instance, sometimes referred to parasites as "dangerous guests"[57] but mostly he wrote of them as if they could be organised, focus-oriented troops: "the various groups of the animal kingdom do not all furnish equal contingents to the army of parasites."[58] T. Spencer Cobbold (1879), similarly, envisioned future parasitologists as forming military defense forces against the common enemy. Optimistically (or, perhaps, naively), he expected the outcome to be victorious for humans: "I should like to see a small army of helminthologists rise up and lay siege to the fortresses at present securely held by thousands of death-dealing parasites."[59] Cobbold goes even further when describing his invasive parasites, employing the metaphor which would later be used by invasion literature:

> the best way of studying the entozoa is to regard them as collectively forming a peculiar *fauna*, destined to occupy an equally peculiar territory. That territory is the wide-spread domain of the interior of the bodies of man and animals. Each bearer or

[56] Cobbold, *Parasites*, 2-3.
[57] Leuckart, *Parasites of Man*, 127.
[58] Leuckart, *Parasites of Man*, 3.
[59] Cobbold, *Parasites*, viii.

> "host" may be viewed as a continent, and each part or viscus of his body may be regarded as a district. Each district has its special attractions for particular parasitic forms; yet, at the same time, neither the district nor the continent are suitable as permanent resting-places for the invader. None of the internal parasites "continue in one stay;" all have a tendency to roam; migration is the soul of their prosperity; change of residence the essential of their existence; whilst a blockade in the interior soon terminates in degeneration and death. I repeat it. The entozoa constitute a specialised fauna. What our native country is to ourselves, the bodies of animals are to them. To attack, to invade, to infest, is their legitimate prerogative.[60]

It is fascinating to note how similar Cobbold's description of parasites is to those of state enemies presented in invasion narratives, such as his suggestion that the body of the host can be seen as a continent that is under constant threat from foreign forces. Crucially, these enemy forces are capable of movement and thus actively avoiding detection, an idea which would quite comfortably find its place in one of the political propaganda stories from the end of the nineteenth century.

The image of the body as a territory can also be found in Arthur Conan Doyle's "Lot No. 249" (1892). Its protagonist, Abercrombie Smith, is a medical student who diligently plunges "into a formidable green-covered volume, adorned with great colored maps of that strange internal kingdom of which we are the hapless and helpless monarchs,"[61] evoking Cobbold's geographical metaphor of the human organism. It would be difficult to assert if Doyle was inspired by Cobbold's text written some fifteen years earlier, although it is possible. However, what is also likely is that the metaphor of human body as a territory is generally not very original and, as it was also employed in invasion literature, they could have arrived at it independently. Cobbold's description is also similar to those found in the invasion narratives because he advocates a more general approach towards his subject. Although he stresses the specialisation of both the various "districts" of human body and the particular parasitic "invaders" attracted by them, he nonetheless leans towards the more

---

[60] Cobbold, *Parasites*, 2-3.
[61] Arthur Conan Doyle, "Lot No. 249," *Harper's New Monthly Magazine*, Vol. 85, No. 508 (1892), 529.

general, collective view of parasites as forming peculiar fauna. In terms of practical application, in the nineteenth century, this kind of generalisation was acceptable, in the sense that the approach to and treatment of intestinal infections of the continental (i.e. non-tropical) variety was consistent and unvaried, and reasonably effective regardless of the particular species of parasite. Generalisations of this kind are also a staple element of the invasion literature in which the invading forces are presented as monolithic, persistent hordes whose characterisation is simplistic, and so are their motives. However, because Cobbold's background is scientific rather than military, his notions of invasion seem more suited to consider alongside infection literature.

As Cobbold's example might suggest, the most important factor distinguishing invasion from infection narratives is the source of their inspiration; while invasion narratives are typically informed by military and imperial propaganda, the infection stories draw heavily from medicine of the time. This is the reason why the invasions presented in infection narratives differ significantly from the ones presented in invasion literature when it comes to their mechanics. The military-inspired, colonial invasion stories emphasise numbers of the potential attackers, painting a fearful picture of Britain being flooded and overwhelmed by foreign aggressors. The infection narratives, on the other hand, depart from numbers in favour of the bacteriologically-based idea of virulence, i.e. the infective power of a given pathogen. A virulent invader, such as Bram Stoker's Count Dracula from the 1897 novel is single-handedly capable of bringing the country he attacks to its knees, in a manner only a large army of aggressors would be able to. In Richard Marsh's *The Beetle* (1897), a sole Egyptian invader completely disrupts lives of a number of powerful men with the ease comparable to a deadly epidemic. In Arthur Conan Doyle's *The Sign of the Four* (1890) the Andaman Islander Tonga is presented as an invading pathogen, virulent to such an extent that mere contact with his skin may prove lethal. This is expressed by Jonathan Small who

describes how he "took him in hand, though he was as venomous as a young snake."[62] The virulence of the attacker poses a double threat to the society he or she invades: on the one hand, unlike a numerous army, one virulent individual is much more likely to sneak in imperceptibly; on the other, because he or she works in the same way as epidemic does, there is very little control over the spread of the pathogenic influence. In this respect, the infection narrative presents the most elusive of invaders: one with the power of many, almost invisible, almost uncontrollable. If not for the medical explanation, his or her powers might be seen as supernatural.

The presence of a medical or scientific authority is, after the virulence of the invader, another crucial feature of the infection narrative. If the invasion follows the mechanics of infection, it must be scientifically validated and then overcome by men of science. In the Sherlock Holmes canon, this function is nominally performed by Dr Watson, although the detective himself is presented as a man of science, following the medical methodology in his work. In *Dracula* the diagnosis and treatment of the vampiric ailment is discovered thanks to Professor Van Helsing, while in *The Beetle* a similar function is performed by Sydney Atherton, the scientist who refuses to take in the dubious story of Lessingham until he is presented with a tangible, categorical proof. The employment of characters representing medical and scientific profession, common in the literary context of Victorian realism, also lends credibility to the otherwise incredulous accounts of distressed people who either witness or experience the infective invaders' power. Following Holmes's famous maxim that "when you have excluded the impossible, whatever remains, however improbable, must be the truth,"[63] the scientists of the infection narratives remain firmly within the realm of the possible and scientifically demonstrable, thus ultimately guarding the premise of the genre

[62] Arthur Conan Doyle, *The Sign of the Four* (Ware: Wordsworth Editions, 2004), 201.
[63] Arthur Conan Doyle, "The Adventure of the Beryl Coronet," in: *The Adventures and Memoirs of Sherlock Holmes* (Ware: Wordsworth Editions, 1996), 245.

from the supernatural, even if their enemies turn out to possess powers beyond the scientific explanation, as in the case of *Dracula* and *The Beetle*.

Inspired by both tropical medicine and narratives of invasion, infection literature incorporates exotic, non-native pathogens as the invaders. In addition, these tropical infective agents present in infection literature usually rely on carriers that enable their arrival at their destination, a notion borrowed from parasitology and tropical medicine as well. The villain from *The Beetle* is perfectly capable of travelling unaided, yet still a carrier is used to run the Egyptian's errands, so to speak. Count Dracula employs Jonathan Harker specifically to facilitate his transportation to London. Doyle's Tonga travels together with the escaped convict, Jonathan Small. Pathogens of infection narratives rely on the ignorance, vulnerability or evil intentions of their carriers. It may be argued that Harker was manipulated into bringing Dracula to the capital of the Empire before he had the opportunity to realise who his employer really was. The same argument, however, does not apply to Small. Doyle pays particular attention to the description of his vector's character and personality, which he presents as corrupt, lacking any kind of moral compass and motivated by greed, conceit and arrogance.

The presentation of the carriers as morally deficient is also connected with the more general notion employed by infection literature in particular but by texts of literary and scientific invasion in general: the responsibility of the victim. When discussing various vampiric tales of the nineteenth century, Carol A. Senf notes the recurring motive of the proneness of the victim,[64] according to which some people (and, as she notes, these are most commonly women, being overall depicted as more gullible and of weaker constitution than men) through certain behaviours, either willingly, or due to ignorance, expose themselves to danger of the attack. In this understanding, the notion of the blame discussed in the present

[64] Carol A. Senf, *The Vampire in Nineteenth Century English Literature* (Madison: The University of Wisconsin Press, 1988), 53-54, 81.

and previous chapters resurfaces; again, those infected find themselves in this predicament because of their own action (or lack thereof). Transgressive behaviours, exposure to danger, savage habits and way of life, and unpreparedness are all punished by infection, and the literary examples only reinforce this message. Doyle is particularly attached to this idea: in *The Sign of the Four* the people who die as the consequence of the exposure to Tonga and his carrier are never innocent. Bartholomew Sholto, killed by one of the poisoned darts, is shown as motivated by greed; death also strikes his father, the treacherous Major Sholto. Sherlock Holmes and Doctor Watson, although the poisoned darts swish around them in the finale of the novel, escape unharmed as they do not qualify as punishable for their behaviour. This would make the infection the means of punishment for evil but it cannot be said that one is given precedence over the other; evil and infection go hand in hand, Doyle seems to suggest.

The other reason why the protagonists of Doyle's novel do not find themselves infected is due to another concept borrowed from both invasion literature and bacteriology: the immunity through exposure. Just like Jonathan Small, Holmes and Watson are exposed to a weaker, less virulent version of the infective agent which is Tonga himself, not his poisonous arrows, and thus they are immunised to his epidemiological threat, unlike the Sholtos. The problem of immunity through exposure, together with other features of the infection literature, is analysed in the following section of the chapter devoted to the reading of Doyle's *The Sign of the Four* as a foremost example of infection narrative. Particular attention is paid here to the issues of virulence, both in the sense of the immune response to the pathogenic attack, and the notion of the possibility of being prepared for such an event.

The Sign of the Four[65]

Arthur Conan Doyle seems a particularly interesting author in the context of late-Victorian infection literature as he himself was not only professionally involved in the medical studies of the time but also shared and propagated the pro-imperial enthusiasm of many other British scientists. It is of course subject to supposition but it seems reasonable to suggest that his views might have been influenced by his profession. His medical studies, as Laura Otis writes, lasted from 1876 to 1881, and thus "Doyle learned and practiced medicine during the heyday of bacteriology"[66] which – as we have seen – coincided with the emergence of both invasion literature and tropical medicine. Moreover, he was briefly employed as a ship's surgeon on the African Steam Navigation Company's *Mayumba*, travelling to West Coast, and gained first-hand knowledge of tropical disease there.[67] In fact, even after he abandoned his profession (never having achieved any kind of significant position), "[h]e continued to be well aware of contemporary scientific advances,"[68] as N. Joel Ehrenkranz maintains. It is but little wonder, then, that his literary works betray thinly veiled imperial propaganda and casual racism; after all, that was the then accepted rhetoric standard of medical articles published in academic journals. Doyle's written works – and the Sherlock Holmes canon is a prime example of this – never seem to escape medical discourse: written by a doctor, narrated by a doctor, even famously inspired by Dr John Bell, Doyle's tutor at medical school, whose methods of observation are later adopted by Sherlock Holmes. But in Doyle's

[65] Another version of interpretation of this novel as a narrative of infection is the subject of my article published in *B.A.S. Journal*, in which an alternative source of Holmes's immunity to the one presented here is suggested. In the article, I argue that Holmes vaccinates himself through his consistent intravenous use of precisely measured seven per cent cocaine solution. Justyna Jajszczok, "The Sign of Fall: Sherlock Holmes and Epidemiological Threats," in: *B.A.S Journal*, Vol. 21, 2015, 71-76. Available at: http://www.litere.uvt.ro/publicatii/BAS/pdf/no/ bas_2015.pdf (19.09.2016).

[66] Laura Otis, *Membranes: Metaphors of Invasion in Nineteenth-Century Literature, Science, and Politics* (Baltimore and London: The Johns Hopkins University Press, 2000), 91.

[67] Arthur Conan Doyle, *Memories and Adventures: An Autobiography* (Ware: Wordsworth Editions, 2007), 39-47. In the chapter devoted to the voyage on *Mayumba* Doyle recounts having contracted malaria or some other type of exotic fever, and barely escaping death before recovering.

[68] N. Joel Ehrenkranz, "A. Conan Doyle, Sherlock Holmes, and Murder by Tropical Infection," *Reviews of Infectious Diseases*, Vol. 9, No. 1 (1987), 223.

case the influence of medicine goes deeper than the mere employment of medical authorities within and without the text. The world of Sherlock Holmes, as exemplified by London, is a living organism under constant threats from pathogens and other infectious agents with which only modern medicine can win.

To a number of critics, *The Sign of the Four* seems a flagship story of "reverse colonisation" in which "a foreign invader […] penetrates the Victorian society."[69] In this reading, Sherlock Holmes acts as an imperial protector whose most important duty is to guard the Empire from all kinds of external invasions: from unwelcome immigrants and returning convicts to exotic pathogens and poisonous substances. His task is the more difficult since, as Otis notes, "[t]he very existence and functioning of the empire opened the imperial body to foreign diseases, foreign anger, and foreign revenge because it opened so many new possibilities for 'communication.'"[70] Even being the most competent and effective defender, Holmes cannot put a stop to all kinds of communication and therefore must employ his skills selectively; although he is presented in such a way that the reader is constantly being assured that nothing ever escapes the great detective's attention, there are obvious limitations to Holmes's ability to control every 'opening' in London; what the readers see, are his carefully chosen villains; what they do not see, is the stream of other "loungers and idlers of the Empire"[71] that he lets slide past.

The Sign of the Four is also a story indebted to the tradition of invasion literature. Not only does it present the suggested reverse colonisation, it also features an interesting version of invasion in the form of the Indian Mutiny. Jonathan Small, the main villain of the story, recounts his experience of the rebellion in a manner that evokes other invasion narratives:

---

[69] Lauren Raheja, "Anxieties of Empire in Doyle's Tales of Sherlock Holmes," *Nature, Society & Thought*, Vol. 19, No. 4 (2006), 424. The same theme is also explored by, among others, Joseph McLaughlin, Susan Canon Harris, and Yumna Siddiqi.
[70] Otis, *Membranes*, 104.
[71] Arthur Conan Doyle, *A Study in Scarlet* (Ware: Wordsworth Editions, 2004), 4.

> Suddenly, without a note of warning, the great mutiny broke upon us. One month India lay as still and peaceful, to all appearance, as Surrey or Kent; the next there were two hundred thousand black devils let loose, and the country was a perfect hell. […] From where I stood I could see hundreds of the black fiends, with their red coats still on their backs, dancing and howling round the burning house. Some of them pointed at me, and a couple of bullets sang past my head; so I broke away across the paddy-fields, and found myself late at night safe within the walls at Agra.[72]

It is interesting to note that in Small's narrative, India stands for Imperial England and he positions himself as the rightful inhabitant of the lands on which the mutiny breaks. Perversely, to him the rebels are outsiders who attack or invade his pastoral, Kent-like India, which he seems to treat as his personal piece of Heaven. Thus, they must be compared or equalled to devils: alien, incongruous, let loose and set to destroy his peace and quiet. The thought that perhaps he is one of the army of the invading devils does not seem to cross his mind. The emphasis on the numbers of the invaders suggests inspiration with invasion literature, yet Doyle's persistent employment of hellish imagery transports it to the realms of unreal nightmare, thus cutting the links with the cautionary function of such a narrative. Which is rather paradoxical, taken that invasion narratives focused on imagined invasions, while Small here describes an actual historic event. On the other hand, however, the description of the uprising is ambiguous to a certain extent. While the pro-imperial views appear straightforward in Small's description, Doyle hints subtly at the irony of the murderer's offence at the brutality of the mutineers, thus undermining his narrative and suggesting Small's similarity with the "black devils," rather than with the colonisers.

Moreover, in terms of the colonial metaphor, *The Sign of the Four* seems a rather weak example of reverse colonisation. The two villains of the story – Jonathan Small, a one-legged escaped convict, and his companion Tonga, a cannibal from the Andaman Islands – appear somewhat inadequate in numbers and abilities (although definitely not in motivation) to

[72] Doyle, *The Sign of the Four*, 187-188.

stage an invasion on the British soil. Yet if read as a story which, in Susan Harris's words, "lump[s] drugs, organic toxins, and infectious agents together as foreign-born biocontaminants returning from the colonies to afflict the English,"[73] Doyle's novel offers a much more convincing warning against the pathogenic dangers that lurk within the exotic. Indeed, as Ehrenkranz notes, "[f]or those interested in the epidemiology of tropical infectious diseases, some of Doyle's stories have particular appeal. They contain references to diseases that may reflect Doyle's own experiences in the tropics as well as events of his times. Deadly tropical infections were then, as now, occasionally imported into Great Britain."[74] Moreover, Holmes's strategy in handling the threats posed by Tonga and Small seems in accordance with the nineteenth-century medicine – that is, with Doyle's medical knowledge.[75]

Laura Otis maintains that as a student of medicine, Doyle admired Koch and his work – to such an extent that in 1890 (coincidentally, the year in which *The Sign of the Four* was published), he "visited the Hygiene Institute in Berlin where Koch's 'cure' for tuberculosis was being tested and reported on the 'cure' for the *Review of Reviews*."[76] It is therefore very likely that Doyle had read Koch's "Aetiology of Tuberculosis" and accepted the suggested parasitical origin of the disease – and employed Koch's strategies in his writing. This is why, as Otis states, "Holmes's process of detection […] resembles the task of the bacteriologist, since both trace links between people, one to follow malicious intentions, the other to follow a microbe."[77] Traces to Koch can be found in other Holmes stories, perhaps most

[73] Cannon Harris, "Pathological Possibilities: Contagion and Empire in Doyle's Sherlock Holmes Stories," *Victorian Literature and Culture*, Vol. 31, No. 2 (2003), 449
[74] Ehrenkranz, "A. Conan Doyle, Sherlock Holmes, and Murder by Tropical Infection," 222.
[75] Otis, *Membranes*, 110.
[76] Otis, *Membranes*, 91. Otis uses inverted commas when talking about the cure (i.e. tuberculin) because it proved to be utterly ineffective in treating tuberculosis; it has, however, been used ever since as a reliable diagnostic test. Lehrer, *Explorers of the Body*, 206-209.
[77] Otis, *Membranes*, 105.

prominently in the 1913 "The Adventure of the Dying Detective." In it, Mr. Culverton Smith, a poison specialist, utters the following words:

> 'I only know Mr. Holmes through some business dealings which we have had, but I have every respect for his talents and his character. He is an amateur of crime, as I am of disease. For him the villain, for me the microbe. There are my prisons,' he continued, pointing to a row of bottles and jars which stood upon a side table. 'Among those gelatine cultivations some of the very worst offenders in the world are now doing time.'[78]

Not only is the reference to microbes straightforward; Culverton even uses Koch's contraption as the germ "prisons" in his account; it was Koch's laboratory team who first used agar jelly as a medium for bacterial growth.[79]

The smallness of both Tonga and his carrier also points to concepts derived from bacteriology and tropical medicine. Jonathan's surname is "Small" because he is a small, petty, mean man, deserving of his bad fate. In Tonga's case, this association is much more prominent because it is physical; he actually is small, "a little black man – the smallest I have ever seen,"[80] as Watson describes him. And through his characterisation the analogy with a highly virulent pathogen is established. Tonga is small enough to be 'imported' by Small to London and then to somehow disappear from sight altogether. Tonga's method of spreading his infection also bears some resemblance to strategies used by exotic parasites: as a human version of an air-borne predatory invader, he uses a blowpipe to shoot poisoned darts that penetrate skin and kill the victim almost instantaneously – but not fast enough to spare them agony in the final moments of their lives.

The first crime scene in the novel, Bartholomew Sholto's laboratory at Pondicherry Lodge, introduces us to the murder weapon: stuck to the victim's head is a poisoned dart

---

[78] Arthur Conan Doyle, *His Last Bow. A Reminiscence of Sherlock Holmes* (New York: George H. Doran, 1917), 193.
[79] Lehrer, *Explorers of the Body*, 198.
[80] Doyle, *The Sign of the Four*, 178. Laura Otis focuses especially on this point, creating the relation between the notion of 'small' and bacteriology. Otis, *Membranes*, 93-98.

with "some gummy substance […] dried upon it."[81] Although it is not stated so at this point, we suspect that the substance must be some kind of powerful, extremely concentrated exotic poison. These inconspicuous darts seem to impress Holmes deeply as he refers to them as "hellish things."[82] We realise through Holmes's unusual evocation of hell that the darts are capable of reducing a grown person to a stiff, contorted corpse with a terrifyingly disfiguring *risus sardonicus* within seconds; only few other things deserve this adjective more. The sense of security that London might feel assured about, warns us Doyle, is but illusory; for the Andaman Island cannibal's strength lies in his extreme virulence. His little darts with their highly concentrated poison are like air-borne pathogens that can themselves act as an army of thousands, and are therefore much more dangerous and effective than the geographically removed Indian black devils. And his hellish pathogenic power, at first at least, seems too much to bear, even for Holmes. Infection, therefore, is more effective than invasion and, even more importantly, can be conducted by a very small number of invaders.

In the period between the discovery of the murder and the breakthrough in the investigation, Holmes seems to slowly succumb to some kind of disease. At first Watson associates it with the enforced lack of activity, which the detective must tolerate as his associates seek for clues and data for his mental work. But soon its somatic nature transgresses the limits of his typical impatience. At this stage, however, his symptoms are yet inconclusive and if there is any kind of illness that might be infecting him, it is too soon to say. Agitation and perhaps heightened temperature are indicative of anything from common cold to mental strain. When the inactivity and lack of any new clues to muse over become utterly unbearable, Holmes turns to chemistry to find the solution – in both senses. Watson observes his friend's behaviour with certain concern:

[81] Doyle, *The Sign of the Four*, 142.
[82] Doyle, *The Sign of the Four*, 150.

> He would hardly reply to my questions, and busied himself all evening in an abstruse chemical analysis which involved much heating of retorts and distilling of vapours, ending at last in a smell which fairly drove me out of the apartment. Up to the small hours of the morning I could hear the clinking of his test-tubes which told me that he was still engaged in his malodorous experiment.[83]

Holmes's chemical analysis in this respect is almost alchemical; through "dissolving the hydrocarbon"[84] he tries to dissolve the murder mystery, which, quite surprisingly, appears effective. After the whole night of "heating of retorts and distilling of vapours," Holmes emerges recuperated; his symptoms fade while his energy levels rise. Apparently, the inhalation of these malodorous vapours proved therapeutic. In this respect, we could assume that Doyle had Holmes use chemotherapy to attend to his health problems, in a way indicative of deep knowledge of the mechanics of disease and the sort of therapy which may prove effective in fighting it.

Thus, having regained his mental and physical strength, Holmes returns to his 'old self' and soon leads the plot to its overdue conclusion. In the process, together with Watson, he has one last opportunity to face Tonga and his poisoned darts. This time, however, his reaction towards them is completely different. Before the shot cannibal disappears in the gloomy waters of the Thames, he manages to blow a dart in their direction, which gets stuck in the boat in which they had been pursuing the murderers. As Watson recounts, "just behind where we had been standing, stuck one of those murderous darts which we knew so well. It must have whizzed between us at the instant we fired. Holmes smiled at it and shrugged his shoulders in his easy fashion, but I confess that it turned me sick to think of the horrible death which had passed so close to us that night."[85] Watson's reaction at the sight of the poisoned arrow reflects the one expressed by Holmes during their first encounter with this murder weapon; he even realises that it has the power to "turn him sick". But Holmes's

[83] Doyle, *The Sign of the Four*, 166.
[84] Doyle, *The Sign of the Four*, 174.
[85] Doyle, *The Sign of the Four*, 179.

nonchalance appears strange. After all, he was the one to call them "hellish" and suffer the consequences of too-close a contact with them. His transformation is the more surprising as there does not seem to be any indication of some significant event that might have influenced this change.

One of the possible explanations, in accordance with Doyle's strategy of incorporating medical themes into the tissue of text, is that the second time Holmes comes into contact with the poisoned darts they cannot harm him because he has become immune to them through previous exposure. This idea is in accordance with both the nineteenth century and the modern medical view on human immunity. As Irwin Sherman, a contemporary historian of medicine explains it, "[b]eing immune means that the body is able to react specifically to a foreign material as a result of previous exposure. To be effective, the immune response has to be swift the second time around."[86] He then goes on to list the essential properties of immune system: "First, it must be able to distinguish foreign substances – 'not self' – from 'self.' Second, it must be able to remember a previous encounter; that is, there must be memory. Third, it must be economical; that is, it should be turned on and off as needed. And fourth, it must be specific for the foreign substance."[87] When we trace Holmes's reaction to Tonga's virulent darts, it follows the pattern described by Sherman: there definitely is the memory and the appropriate counter-reaction, not to mention the swift response to Tonga. Thus, Holmes's undiagnosed infection might be read as an awakening of his immune system when confronted with an already known infective agent. In this manner, Doyle showcases a perfect example of the victory of imperial constitution over the exotic danger, a belief which was supported by parasitologists and physicians of the nineteenth century, even when certain events called it into question.

[86] Sherman, *Twelve Diseases*…, 60.
[87] Sherman, *Twelve Diseases*…, 60-61.

Conclusion

In the already quoted here book on the impact of diseases on human history, Irwin W. Sherman describes a number of diseases as various as: porphyria, haemophilia, cholera, smallpox, bubonic plague, syphilis, tuberculosis, malaria, yellow fever, influenza and AIDS. They differ immensely: some of them are genetically transmitted, other are air- or water-borne, other still are contracted by intimate contact between people. There is a multitude of ways in which an agent of disease (bacterium, virus, parasite, or – as in the case of porphyria – one of the chromosomes[88]) can enter the body of the victim; some of these are preventable, some are not. In extreme cases, an effective prevention would be tantamount to absolute isolation. Yet time and time again, in the description of the treatment and social attitude to a given disease, the notions of responsibility and blame emerge: the haemophilia of Tsarevich Alexis of the House of Romanov was a close guarded secret because "such a defect would have been regarded as a sign of divine displeasure since the Tsar was both head of the Church and leader of the Russian people";[89] cholera epidemics happened, it was believed, because God was angry "over the excesses of people";[90] and of course the same reasons are still used to explain HIV infections.[91] Sherman offers his view on this attitude:

> Epidemics or plagues are the result of a complex interplay of biological and social factors, and despite the uniqueness of each disease and a very different social structure from the past, there is a tendency for history to repeat itself. In brief, people do not react kindly to an epidemic disease even if they understand its etiology. Indeed, it is possible to see parallels between medieval reactions to bubonic plague and some of the contemporary fears regarding AIDS. Some of this stems from a crisis of confidence in physicians, the medical establishment, and the government, as well as xenophobia. […] Disease, even if we know its cause, manner of transmission, and possible controls, may act to buttress social divisions and focus the religious, political, and cultural biases of a society.[92]

[88] Sherman, *Twelve Diseases*…, 4.
[89] Sherman, *Twelve Diseases*…, 11.
[90] Sherman, *Twelve Diseases*…, 27.
[91] Sherman, *Twelve Diseases*…, 188-191.
[92] Sherman, *Twelve Diseases*…, 190.

In Sherman's description of epidemics, the phrase "complex" is crucial: the causes of an infection and transmission of a disease are complex because in their explanation a variety of factors must be taken into account. This, as the history of bacteriology and tropical medicine presented above shows, was, and still remains, a seriously challenging task.

The present and the previous chapters, under the shared title "Stories of Origin," although coming from two very different places, turn out to have a common denominator. Within the parasitological framework, literary as well as scientific, the stories of origin seem to be based on the same pattern: a protagonist (and in the case of Doyle's work, a villain, or villains) is being punished for behaviours that are viewed by society as transgressive. In the broader social and political context, however, 'complex' is of no use because it disperses responsibility and blame. The infection narratives presented above prove to a certain degree the impossibility of the complex; these stories demand unambiguous divisions between the enemies and heroes because ultimately their function is to maintain and protect the *status quo*. Sherlock Holmes is an "imperial leukocyte,"[93] as Laura Otis calls him, precisely because his role is to destroy the foreign pathogen in the form of the virulent cannibal without dwelling on the unfairness of the imperial system which had created him in the first place.

It is interesting to note that the transformation of the perception of parasites from originating within to the external invaders was not accompanied by the change in attitude towards their hosts. In fact, the idea that the emergence of parasites is a due punishment for certain behaviours, still remains the acceptable explanation. This view seems the more unfair when we realise what strategies parasites have developed through thousands of years of evolution to succeed in infecting their hosts, and how unavoidable such a situation in many instances is. Therefore, the subject of the next chapter is the analysis of another story of

[93] Otis, *Membranes*, 110.

infection, this time from the perspective of the host, and the examination of the problem of self/non-self division which is crucial for the successful infection.

CHAPTER V STORIES OF TERROR: THE HAPLESS HOST

Introduction

As the previous chapters show, in the second half of the nineteenth century the scientific assumptions regarding the origins of parasites underwent a change, as the theories of their generation from within the bodies of hosts were gradually supplanted by the theories supporting their external emergence. Literature tended to accompany this shift and, at some point, it even began to suggests ideas which science was only able to verify later. Before the scientific community accepted the concept of extrinsic origin of parasites – an idea which would be later adopted by the *fin de siècle* popular fiction – a novel published in the early 1870s included a subplot which seems to have to some extent utilised this notion. George Eliot's *Middlemarch* includes a minor character, Mr Raffles, who is shown as coming from the outside to torment his unwilling host, Mr Bulstrode. Conventionally, Raffles is read as Bulstrode's externalised conscience, whose repeated pangs take a great toll on his constitution. In the novel, Raffles is explicitly associated with blood-sucking animals such as fleas[1] or other "parasitic insects of the bloated kind."[2] In Chapter III of the present work I have interpreted him as an example of a parasite, but of different, smaller, and also more virulent and exotic kind: a parasitic microorganism which has the capability to infect its host with a serious, potentially fatal disease. In my reading, Raffles is something akin to a *Plasmodium* protozoan which causes malaria. This interpretation thus allows for the explanation of the periods of the symptoms remission Bulstrode experiences when his uninvited guest is away, and their return in his presence.

This interpretation is the result of the extratextual approach to the novel in which the idea of the metaphorical parasite is introduced to the text through particular reading, instead

[1] George Eliot, *Middlemarch* (Ware: Wordsworth Editions, 2000), 342.
[2] Eliot, *Middlemarch*, 501.

of being found and identified as a contextual element of the text, as in Dickens's *Bleak House*. On the surface then the two approaches, contextual and extratextual, are analogous to the two scientific assumptions regarding the origins of parasites: in one of them, the parasite is already within (contextual) while in the other, it is coming from the outside (extratextual). This analogy of course disintegrates if explored beyond the first layer. In natural sciences 'the within approach' was ultimately proven to be incorrect and disregarded as such. In terms of the literary interpretation, on the other hand, it may even be preferable to the 'without approach,' not necessarily on the grounds of arbitrary "correctness" but by being arguably less far-fetched than the extratextual one. Because it is interpreted extratextually, the Raffles-*Plasmodium* analogy is subjected to much more stringent criteria of validity than the contextual interpretation. Obviously, no character hinted at being parasitic will be described as exhibiting precisely such qualities that would qualify him or her as a parasitical organism recognised by natural sciences. When employed as a metaphor, the parasite in literary text is allowed semantic ambiguity. The malarial parasite does not move on its own, something Raffles does easily; on the contrary, *Plasmodium* demands a means of transport and an infective device in one: a vector. This, however, is also the problem faced by contextual interpretation: even the explicitly parasitic blood-sucking Dracula is shown as a suave man, not a creature possessing two suckers placed on the head and tail, like a leech to which he is compared. But, as I have explained before, the choice of *Middlemarch* as a novel with a not very prominent but nonetheless significant parasitical element is mostly justified because it could be interpreted as suggesting a path which would go against the parasitological paradigm accepted at the time – and being proven correct by the scientific discoveries that took place years later.

Another novel containing ideas that would be later verified by science, which I classify as an example of infection literature, and which, as will be later presented, exhibits some

unexpected parasitical connotations, is Richard Marsh's *The Beetle,* a gothic novel published in 1897. What differs these two literary hypotheses, however, is the moment of their verification. The suggestion of the external nature of parasites which I have read in Eliot's novel was considered a scientific fact already at the end of the nineteenth century. The concepts that can be found in *The Beetle*, on the other hand, could not have been demonstrated by science so soon; in the case of science, arriving at the correspondent idea took much more time. The parasite-like creature in Marsh's novel possesses truly fantastic qualities: it is able to exert total control over its victims, and use its transformative abilities to change their personality as well as their gender. The way the powers of the villainous parasitic coleopteron are presented in the narrative makes them seem supernatural and as detached from the scientific realm as possible. Yet, through trial and error, modern parasitology can now identify real life parasites which exhibit exactly the same abilities, a development that began in the nineteenth century.

The present chapter is constructed in such a way that it facilitates a dialogue between two studies of parasitical behaviour: one literary and the other scientific, and presents some surprising similarities between them. Although from different decades and disciplines, they nonetheless seem to tell analogous stories. Thus, the ultimate aim of this chapter is to trace these analogies in literary and scientific sources and attempt to demonstrate that – accidental as they may be – their similarity could be explained not by some dubious cross-century retroactive inspiration, but by a concept of convergence derived from evolutionary science.

The Beetle

The previous chapter identified Richard Marsh's novel *The Beetle. A Mystery* as an example of infection literature. Published the same year as its now much more famous literary rival, Bram Stoker's *Dracula* (1897), *The Beetle* tells a superficially very similar story of an exotic

other who attempts to invade London. Both texts are divided into books told by different character-narrators and both include monsters who have the ability to take control over their victims, and to transform themselves into various animals. The differences between them seem to outweigh the similarities, however: *Dracula* is frightening and humourless, and the titular antagonist a powerful, yet strangely attractive male vampire. The exact nature of the villain from Marsh's novel is unclear. The few critics who have studied *The Beetle* tend to agree on the nomenclative description of the antagonist proposed by Roger Luckhurst: "liminal man-woman-goddess-beetle-Thing."[3] Neither a man nor a woman, neither a human nor an insect, neither a human nor a god(dess), the villain is the embodiment of the ultimate otherness. This impossibility of classification, of pinpointing the exact nature of the Thing, is the source of both frustration and horror experienced by other characters of the novel: they fear the unknown and the unknowable. Which is not to say that *The Beetle* follows the conventions of a gothic narrative to the letter. More often than not, the aura of terror is being undermined by the introduction of the absurd and the ridiculous. Comic relief is channelled especially through Sidney Atherton, the character who supposedly embodies the scientific spirit and who could be seen as the counterpart of *Dracula*'s Dr Van Helsing or Dr Steward if not for his active rejection and mockery of the supernatural. Taking this into consideration, in a number of ways, *The Beetle* is much closer to another piece of literature published in 1897: Oscar Wilde's short story *The Ghost of Canterville* in which the main source of the comic is the incongruity between the conventional behaviour expected of characters in a ghost story and their actual practical approach towards the supernatural.

The Beetle could be read as a gothic story employing the motifs of revenge and the unwelcome return of the past mistakes. A disagreeable foreigner of undefined name, origin, and gender arrives in London for the sole purpose of hunting down the quickly rising young

[3] Roger Luckhurst, "Trance-Gothic, 1882-97," in: *Victorian Gothic*, eds. Ruth Robbins and Julian Wolfreys (Basingstoke: Palgrave Macmillan, 2000), 148-167, specifically 160.

statesman Paul Lessingham. The mysterious other identified by a number of racially prejudiced terms from "the unbaptised Mohammedan"[4] to "the Arab bloke"[5] is gradually unwrapped (in one instance – literally) from some of the secrets. In Book One narrated by Robert Holt, the villain is described as a powerful and vindictive mesmerist obsessed with the statesman Paul Lessingham. In Book Two, told from the perspective of Lessingham's rival – and a scientist, – Sydney Atherton, we learn that "the Arab bloke" is no bloke at all, but a woman who – even more shockingly – is capable of transforming into a scarab beetle. Lessingham's fiancée Marjorie Lindon, as the narrator of Book Three, reveals the hideous consequences of being subjected to the powers of the evil Egyptian: first as a witness of the progressive deterioration of Robert Holt's state, and later as a victim herself. Most of the information is revealed in the final book narrated by a detective-like figure of the confidential agent Augustus Champnell. Here – through Lessingham's own account – we learn of the politician's unfortunate adventure in Egypt as a young man and of his very close encounter with the beautiful temptress, the Woman of the Songs, who turned out to be a cult worshipper, whose fellow votaries, apart from transforming into sacred scarabs, also specialised in torture and human sacrifice offered to the goddess Isis. Nonetheless, as the human incarnation of the beetle is so mysterious and presented through mutually exclusive accounts, nothing can be ascertained about it. It is Champnell who begins the custom of referring to the antagonist as simply "the Beetle,"[6] a practice adopted also by literary critics.[7] As for the pronouns employed to refer to the Beetle, "they" and "them" seem to be the most

[4] Richard Marsh, *The Beetle: A Mystery* (London: Penguin, 2008), 82.
[5] Marsh, *The Beetle*, 271.
[6] Marsh, *The Beetle*, 342.
[7] Julian Wolfreys, *Writing London Volume 3: Inventions of the City* (Basingstoke: Palgrave Macmillan, 2007), esp. Chapter 1 "The Hieroglyphic Other: *The Beetle*, London and the Anxieties of Late Imperial England," 8-36; Victoria Margree, "'Both in Men's Clothing': Gender, Sovereignty and Insecurity in Richard Marsh's *The Beetle*," *Critical Survey*, Vol. 19. No. 2 (2007), 63-81; Ailise Bulfin, "The Fiction of Gothic Egypt and British Imperial Paranoia: The Curse of the Suez Canal," *English Literature in Transition, 1880-1920*, Vol. 54, No. 4 (2011), 411-443; W. C. Harris and Dawn Vernooy, "'Orgies of Nameless Horrors': Gender, Orientalism, and the Queering of Violence in Richard Marsh's *The Beetle*," *Papers on Language and Literature*, Vol. 48, No. 4 (2012), 339-381.

common choice. However, as it is heavily implied in the novel, the Woman of the Songs and the oriental invader may very well be one and the same – at least it is what Lessingham believes: "for all I know it [the Beetle] may be the Woman of the Songs herself."[8] Holt too struggles with identifying the Egyptian's gender: "The was something about the manner […] which was so essentially feminine that once more I wondered if I could possibly be mistaken in the creature's sex."[9] Finally, Atherton also explicitly identifies the Beetle (both as a person and as an insect) as female, or at least exhibiting female sexual characteristics when he witnesses her transformation: "One startling fact nudity revealed, – that I had been egregiously mistaken on the question of sex. My visitor was not a man, but a woman, and judging from the brief glimpse which I had of her body, by no means old or ill-shaped either."[10] For these reasons, and against the practice employed by literary critics, I have decided to use "she" and "her" when referring to the Beetle.

The theme of infection, in this case read through the extratextual approach already employed with *Middlemarch*, is realised in the storyline of the aggressive alien pathogen whose presence in London on the one hand, reveals exotic experiences of the highest circles in the House of Commons, and on the other, presents a tangible threat to the nation's constitution. As Julian Wolfreys observes: "It is not too much of a stretch perhaps to read the pervasive, insistent and often seemingly invisible movements of the Beetle throughout the night streets of London as the allegorical or symbolic inscription of the potentially unstoppable threat of a disease within the very heart of empire."[11] However, the way in which this pathogen operates is distinct from the strategy adopted by the infectious agent presented in *The Sign of the Four*. Doyle's Tonga is aggressive in his virulence and his infectious violence is chaotic and aimless, which in the end leads to his defeat. The villain

[8] Marsh, *The Beetle*, 257.
[9] Marsh, *The Beetle*, 27.
[10] Marsh, *The Beetle*, 135.
[11] Wolfreys, *Writing London*, 14.

of *The Beetle*, on the other hand, works more slowly, with much more precision, and in effect, her strategy proves not only more efficient but also more frightening. Her virulence – defined here as "[t]he harshness with which the parasite treats its host"[12] – is great and relentless, and makes her appear unstoppable and uncontainable. It is only the good fortune of a train crash that manages to halt her progress through the country. That is because, unlike in the case of Tonga, the previous exposure to her influence does not seem to immunise the victims, as the example of Paul Lessingham proves. Doyle's pathogen is intentionally defeated by Sherlock the Pharmacist of London; the Beetle, too, at face value, seems to fall victim to the advances of Western technology, but her apparent death is an accident for which nobody can take credit.

Furthermore, the events of the final book of the novel make it clear that the pursuit of the Beetle proves irrelevant to her presumed demise but also that ultimately nothing can be established or verified about her, not even her death. In the act of her "death," the Beetle emphatically demonstrates her ability to simultaneously deprive her English pursuers of agency and confidence, in themselves as well as in Western science. The debris she leaves behind in the train wreck proves as perplexing as her identity: scattered pieces of silk and linen which "are actually neither of silk nor linen! but of some material – animal rather than vegetable – with which [experts] are wholly unacquainted"[13] and the stains on the cushions and woodwork of the compartment could as well be parboiled "human blood," "blood of some wild animal – possibly of some creature of the cat species," "merely paint," or "a deposit of some sort of viscid matter, probably the excretion of some variety of lizard,"[14] depending on which expert examines them. This unresolved conclusion takes *The Beetle*'s narrative to an alternative route than those of Doyle's, showing the failure rather than the

[12] Carl Zimmer, *Parasite Rex. Inside the Bizarre World of Nature's Most Dangerous Creatures* (New York, London: Atria, 2014), 152.
[13] Marsh, *The Beetle*, 338
[14] Marsh, *The Beetle*, 339.

success of "the experts." Those prove utterly defeated when confronted with the power of the Beetle; one of them is the confidential agent Champnell who concludes his narrative – and thus the novel – expressing his acknowledgement of this failure: "So far as I am personally concerned, experience has taught me that there are indeed more things in heaven and earth than are dreamed in our philosophy, and I am quite prepared to believe that the so-called Beetle, which others saw, but I never, was – or is, for it cannot be certainly shown that the thing is not still existing – a creature born neither of God nor man."[15] How very different is such a statement from those occasionally uttered by Sherlock Holmes whose faith in science never falters, such as this one which has been already quoted in this dissertation: "How often have I said to you that when you have eliminated the impossible, whatever remains, *however improbable*, must be the truth?"[16] Surely, he would have classified the Apotheosis of the Beetle, as witnessed by Atherton, as belonging to the realm of the impossible and therefore necessarily eliminated it from his considerations. In the context of *The Beetle*, such an approach would not do, but of course, Holmes's expertise is limited to the genre of classic detective fiction. Even being a subversive, liminal representative of the genre, Marsh's novel is nonetheless a gothic novel, which conventionally includes the impossible as its integral element. Thus, the failure of science to solve the mystery of the unknown may be expected as one of the possible resolutions of the plot, and *The Beetle* proves a particularly frustrating example of such.

The power of the Beetle as both a virulent pathogen and an abductor of agency briefly commented on above will be explored in more detail in the following sections of the chapter. In my reading, *The Beetle* consists of two stories of parasitical infection: a conventional one, at least according to the nineteenth-century standards, and a subversive one, challenging and questioning those standards. The next pages will be devoted to a close reading of these two

[15] Marsh, *The Beetle*, 343.
[16] Arthur Conan Doyle, *The Sign of the Four* (Ware: Wordsworth Editions, 2004), 140. Original emphasis.

stories: Paul Lessingham's in Cairo and Robert Holt's in London, and the analysis of their similarities and differences.

The Story of a Little Traveller

As the parasitological propaganda of the late nineteenth century would have it, getting infected with a tropical disease was always to a certain extent the fault of the infected: either because of their barbarity, their actions, which may be seen as transgressive, or simply because of their carelessness. Of young soldiers getting infected with various parasitical diseases Luigi Sambon of the London School of Tropical Medicine wrote that they were "mere boys, their ignorance of what to avoid [was] complete; their carelessness proverbial."[17] Once we learn about his Egyptian past, we realise that Sambon's description suits young Lessingham perfectly.

The statesman narrates his story to Champnell in the final book, forced to make this disclosure when the return of the Beetle proves impossible for him to handle. Thus, naturally he seeks professional help and finds it in the person of Hon. Augustus Champnell. It is vital to note his title; unlike Sherlock Holmes, who styles himself consulting detective – one who is being consulted and who detects but who need not be private, – Lessingham's aide is a confidential agent, and his professional confidentiality and agency is precisely what the statesman haunted by the mistakes of his youth needs. Once he starts the pursuit of the Beetle and her abductee Marjorie Lindon, Champnell proves quite able and – most vitally – steadily level-headed. But his confidentiality has also a more problematic side. In Book Four we learn that he is in fact the composer of the narratives that comprise the body of the story. The narration of Robert Holt is retrieved from Atherton's and Marjorie's accounts and not presented in the first book verbatim; the narration of Marjorie is the only remaining copy of

[17] Luigi Sambon, "Remarks on the Possibility of the Acclimatisation of Europeans in Tropical Regions," *The British Medical Journal*, Vol. 1, No. 1880 (1897), 63-4.

her manuscripts which she wrote as a therapeutic activity during the three years after the events had taken place, when she was effectively a mental patient. Although it is not specified, it is heavily implied that also Atherton's narration is filtered by Champnell. All in all, only the confidential agent's narrative appears first hand, and his editing still hides more than it reveals: we know that the year of the events is censored and the statesman involved is given a false name of Paul Lessingham. What we do not know, however, is the extent to which Champnell's confidentiality reaches. If he decides to omit or alter some (or any) of the details of the story, there is no way of verifying that. Julian Wolfreys notes that in the novel Champnell is in effect an anti-detective: "The purpose of any detective is to answer questions, to provide solution and resolution, and to enact discovery and, where necessary, recovery."[18] Champnell does none of these things, and in some cases, actively prevents them. In effect, the feasibility of any account presented in *The Beetle* is questionable, further fogging the issue of what is or is not possible. The story of Lessingham is perhaps the one most protected because of the status of its narrator and the matters of state it involves.

Perhaps due to this excess of confidentiality Lessingham's story appears so typical and in accord with the conventions of exotic narratives – be they literary or scientific – of the period. In fact, being based on the taboo-transgression-punishment sequence, it could very well be classified as a typical example of a cautionary tale. Lessingham begins his account with a usual introduction: "I lost both my parents when I was quite a lad, and by their death I was left in a position I which I was, […] my own master. I was ever of a rambling turn of mind, and when, at the mature age of eighteen, I left school, I decided that I should learn more from travel than from sojourn at a university. So, since there was no-one to say me nay, instead of going either to Oxford or Cambridge, I went abroad."[19] The very beginning of Lessingham's story suggests the way in which it will proceed: a youth struck by two

[18] Wolfreys, *Writing London*, 28.
[19] Marsh, *The Beetle*, 240.

tragedies – his parents' death and his own premature autonomy – whose ignorance is as grand as his stubbornness, is a disaster waiting to happen. And the waiting is short for just a few months later he lands in Egypt where he suffers from some feverish infection which in cautionary tales such as this tended to affect Europeans in the tropics very frequently: "I was down with fever at Shepheard's Hotel in Cairo. I had caught it by drinking polluted water during an excursion with some Bedouins to Palmyra."[20] As the convention dictates, Lessingham blames himself for catching the fever: not only did he drink contaminated water but he also spent his time among inappropriate company. Little wonder, therefore, that he got infected. Thus incapacitated, the young Englishman becomes vulnerable to the threats of the oriental, threats that he would normally have been if not immune to, then at least able to resist due to the sole strength of his character.

Still convalescing, yet exceedingly bored and craving variety, young Lessingham – not hindered by any reasonable naysayer – decides to venture into the native quarter of Cairo:

> When the fever had left me I went out one night into the town in search of amusement. I went, unaccompanied, into the native quarter, not a wise thing to do, especially at night, but at eighteen one is not always wise, and I was weary of the monotony of the sick-room, and eager for something which had in it a spice of adventure, I found myself in a street which I have reason to believe is no longer existing […].
>
> 'It was a narrow street, and, of course, a dirty one, ill-lit, and, apparently, at the moment of my appearance, deserted. I had gone, perhaps, half-way down its tortuous length, blundering more than once into the kennel, wondering what fantastic whim had brought me into such unsavoury quarters, and what would happen to me if, as seemed extremely possible, I lost my way.[21]

When Lessingham tells this story to Champnell, he is twenty years older and as distanced from his younger self as possible: transformed by his unfortunate Egyptian adventure, he is withdrawn and introspective and devoid of his former daring boldness. He clearly accepts the responsibility for the events he inadvertently brought on himself. Yet even taking into

[20] Marsh, *The Beetle*, 240.
[21] Marsh, *The Beetle*, 240-241.

consideration the excuse of youth and its recklessness, he implicitly expresses the expectation of punishment for having committed a transgression against conventions of proper behaviour. It is not wise, he acknowledges, to venture unaccompanied into a native quarter of an oriental city but he does not specify why, relying on the unspoken understanding between the narrator and his direct and indirect narratees (Champnell and the reader). He employs the 'it goes without saying' convention typical of a cautionary tale which, combined with equally typical racism, was liberally used by other authors of scientific and literary texts pertaining to the real and imaginary threats of the infectious East. So, in his description the native streets are "of course" dirty, ill-lit and unsavoury, contrasted with the – soon to be lost – innocence and wholesomeness of his younger self.

In the grimy Cairene street, Lessingham is suddenly attracted by the sound of music, which comes from "an open window […] screened by latticed blinds."[22] He stands by the window and listens to sweet tunes of someone's singing accompanied by an instrument he first thinks is a guitar but later believes to be a harp:

> How it all comes back, – the dirty street, the evil smells, the imperfect light, the girl's voice filling all at once the air. It was a girl's voice, – full, and round, and sweet; an organ seldom met with, especially in such a place as that. She sang a little *chausonette*, which, just then, half Europe was humming, – it occurred in an opera which they were acting at one of the Boulevard theatres, – 'La P'tite Voyageuse.' The effect, coming so unexpectedly, was startling. I stood and heard her to an end.[23]

Not only is the contrast between the surroundings and the voice stark, it also suggests an affinity between the clear singing of a European song and the pure young Englishman: two innocent epitomes of the West in the midst of Eastern filth. Even the title of the song, "A Little Traveller," emphasises this similarity. Being a little traveller himself, in a foreign country, surrounded by strange language and culture, Lessingham is lulled into a false sense

[22] Marsh, *The Beetle*, 241.
[23] Marsh, *The Beetle*, 241.

of security by a glimpse of the familiar which seems enough to convince him that he need not be overly cautious: "Inspired by I know not what impulse of curiosity, when the song was finished, I moved one of the lattice blinds a little aside, so as to enable me to get a glimpse of the singer. I found myself looking into what seemed to be a sort of cafe, – one of those places which are found all over the Continent, in which women sing in order to attract custom."[24] As the following description demonstrates, this advertising strategy proves effective for Lessingham is noticed lurking behind the window and enthusiastically invited in. He accepts the offer, attempting a half-hearted justification of his actions: "I was a little tired. Rather curious as to whereabouts I was, – the place struck me, even at that first momentary glimpse, as hardly in the ordinary line of that kind of thing. And not unwilling to listen to a repetition of the former song, or to another sung by the same singer."[25] While his exhaustion and fascination with the songstress may be understandable, his confidence in the extraordinariness of the place seems rather suspicious. It does not appear plausible that a youth at the mature age of eighteen would be competent enough to make such a judgement, unless he does it hyperbolically, with the false self-assurance of his age. On the other hand, we cannot rule out the possibility that during his educational travels he visited enough of those kinds of things (and "that kind of thing" has been commonly interpreted by critics as code for brothel[26]) to be able to call himself an expert. If such is the case, his subsequent punishment seems even more appropriate.

At this point in the story, the narratees and the narrator are all in agreement regarding young Lessingham's behaviour. We all realise that, lured by the siren song, he falls straight into an obvious trap. Lessingham is painfully aware of this: "You have heard this tale before? – No doubt. And often. The traps are many, and the fools and the unwary are not a few."[27]

---

[24] Marsh, *The Beetle*, 241.
[25] Marsh, *The Beetle*, 242.
[26] See for instance Harris and Vernooy, "'Orgies of Nameless Horrors'…," 353.
[27] Marsh, *The Beetle*, 244.

The sentence, which is offered by Lessingham as a perfunctory expression of self-blame, functions also as the acknowledgment of the conventional nature of his narrative: we have all heard cautionary tales such as this. Consequently, the expected consequences of his mistake are told by Lessingham with studied painstaking details: being utterly enchanted by the skill and range of the singer, not paying much attention to the liquor he drank to excess, and finding himself in a lethargic trance. He does try to go out but at that point he is too far under the influence, both of the lady and the drink:

> I rose to leave. She caught me by the wrist.
> ' "Do not go," she said; – she spoke English of a sort, and with the queerest accent. "All is well with you. Rest awhile."
> 'You will smile, – I should smile, perhaps, were I the listener instead of you, but it is the simple truth that her touch had on me what I can only describe as a magnetic influence. As her fingers closed upon my wrist, I felt as powerless in her grasp as if she held me with bands of steel. […] I do not think that after she touched my wrist I uttered a word. She did all the talking. And while she talked, she kept her eyes fixed on my face. Those eyes of hers! They were a devil's. I can positively affirm that they had on me a diabolical effect. They robbed me of my consciousness, my power of volition, of my capacity to think – they made me as wax in her hands. My last recollection of that fatal night is of her sitting in front of me, bending over the table, stroking my wrist with her extended fingers, staring at me with her awful eyes. After that, a curtain seems to descend. There comes the period of oblivion.'[28]

This particular fragment is crucial as it demonstrates the change in the cautionary tale sequence: we move from the transgression to the punishment stage. In this respect, I subscribe to the interpretation of *The Beetle* proposed by Victoria Margree, who reads the villain as targeting and "disciplining" precisely these victims who commit acts which may be interpreted as transgressive. Robert Holt is punished for breaking into a house, Marjorie Lindon for defying the conventions of femininity, and Paul Lessingham – because he "infringes the boundaries of racial separation in his sexual interest in the Egyptian woman."[29] What is more, he also allows himself to be the subject rather than the agent of the seduction,

[28] Marsh, *The Beetle*, 243.
[29] Margree, "'Both in Men's Clothing'," 80, n. 10.

in this way undermining the symbolic power bestowed on him by the Western expectations of masculinity. In a novel that is very sensitive to issues of gender, power, and agency, such a transgression must be punished with force disproportionate to the offence.

Interestingly, what triggers the transformation from the transgression to the punishment stage of the story is the touch: until the moment of her grabbing his wrist, the enchantment Lessingham feels, even if he suspects it not to be entirely safe, does not stray very far from his expectations of a spice of adventure. The second the touch barrier is broken, however, the magnetic strength of the woman suddenly becomes sinister and the true extent of her control apparent. Moreover, it shows that in terms of predation, her mesmeric influence is secondary to her tactile power or the effect of the liquor. Only once the physical contact is established, does she begin to exert her hypnotic control, entirely depriving her victim of will and command. The takeover process therefore consists of four stages, all appealing to different senses: the auditory (song) to lure the victim in, the gustatory and olfactory (drink) to intoxicate them, the tactile (touch) to pin them, and the visual (hypnotic eyes) to finalise their subjugation. The function of each stage is to make the victim more susceptible for the subsequent one but it seems that the victim must be in a vulnerable state before the process even begins. When the young Lessingham enters the café, he is by no means an epitome of fitness and health. In his fragile post-fever condition, he is perhaps the more susceptible to the advances of the Woman of the Songs. As the second story of infection will show, this seems to be the case for her victims.

The depiction of the period of oblivion is much less precise that the preceding passages. With some difficulty, Lessingham talks about being powerless, under mesmeric trance, violated by the Woman of the Songs – using peculiarly contemporary language of description associated with accounts told by victims of sexual abuse (“I was wholly incapable of offering even the faintest resistance to her caresses. I lay there like a log. She

did with me as she would, and in dumb agony I endured."[30]) – and witnessing the most horrendous acts committed by the followers of the Egyptian goddess Isis. These "orgies of nameless horrors"[31] included torture and human sacrifice but are never described more explicitly than "every variety of outrage of which even the minds of demons could conceive."[32] There may be a few reasons behind his vagueness. On the one hand, we have to take into account Champnell's heavy editing. Lessingham repeatedly mentions that the sacrificial offerings were made exclusively of Western women – "as white as you or I"[33] – so this censorship may have been justified by the need for decency. More importantly, the circumstances surrounding Lessingham's experience seriously influenced his ability to narrate a coherent and credible story, as he stipulates himself:

> I wish to point out, and emphasise the fact, that I am not prepared to positively affirm what portion of my adventures in that extraordinary and horrible place was actuality and what a product of a feverish imagination. […] The happenings were of such an incredible character, and my condition was such an abnormal one, – I was never really myself from the first moment to the last – that I have hesitated, and still do hesitate, to assert where, precisely, fiction ended and fact began.[34]

As I have argued before, since *The Beetle*, despite some generic irregularities, would still be classified as a gothic novel, the impossible is the integral part of the storyline and thus Lessingham's narration – or the very existence of the supernatural monster – is expected to be accepted as true within the convention of the genre. This is not to say that such assumption precludes other readings. In fact, the narratives of infection presented in the novel, i.e. Lessingham's and that narrated by Robert Holt, are told in such a way that prominent threats of doubt are interwoven into their tissue, undermining their credibility. It would not be difficult to demonstrate that these accounts are nothing more than studies of weak,

[30] Marsh, *The Beetle*, 246.
[31] Marsh, *The Beetle*, 247.
[32] Marsh, *The Beetle*, 248.
[33] Marsh, *The Beetle*, 248.
[34] Marsh, *The Beetle*, 245-6.

incapacitated minds creating fantastic tales as means of processing traumatic experiences. It is perhaps Champnell's own admission of belief in things not "dreamed of in our philosophy" that tilts the scales towards credibility of those accounts.

Having witnessed a particularly gruesome sacrifice in which "a young and lovely Englishwoman"[35] was burned alive, Lessingham recalls being in some way awoken from his enforced mesmeric stupor. Apparently, the "cumulative horrors of such a scene,"[36] woke him from his trance and fired in him the need to fight for his freedom, unbeknown to his captor: "As she drew nearer to me, and nearer, she appeared to be entirely oblivious of the fact that I was anything but the fibreless, emasculated creature which, up to that moment, she had made of me."[37] The moment she stoops over him, Lessingham clutches at her throat and tries to strangle her; as the fight ensues, the woman tries to put him under her spell again: "Her baleful eyes were fixed on mine. I know that she was putting out her utmost force to trick me of my manhood. But I fought with her like one possessed, and I conquered – in a fashion."[38] His efforts to kill the woman are ultimately unsuccessful as she suddenly transforms into a beetle and slips from his fingers. This development is also the final stroke for Lessingham: "a stark raving madman for the nonce, I fled as if all the fiends in hell were at my heels."[39] It is clear that during the struggle Lessingham fights for more than his freedom; he fights to reclaim his lost masculinity, the integral part of his identity that the woman was somehow able to take from him. The fight ends with him asserting his success: "I conquered." He uses such an ideologically charged expression as if to evoke the ideals of manliness and perhaps create some sort of connection between the great men who conquered lands and himself. Yet the fact that he must qualify it with "in a fashion" suggests that this

[35] Marsh, *The Beetle*, 248.
[36] Marsh, *The Beetle*, 248.
[37] Marsh, *The Beetle*, 249.
[38] Marsh, *The Beetle*, 249.
[39] Marsh, *The Beetle*, 250.

connection is tenuous, his victory – at best questionable, and that his manhood may be irreparably affected. Which seems to be the case, as the subsequent events of the novel show. There are in fact two outcomes of the struggle between Lessingham and the Woman of the Songs: the release of the prisoner and the birth of the Beetle. Whether the woman and the creature that haunts Lessingham in London is one and the same being – as I choose to read her – is irrelevant. What is important is that the Beetle is the living proof of Lessingham's deficient masculinity (shown through by his un-manly, hysterical behaviour) and as such threatens the statesman and – by extension – the reputation of the entire political class.

The Story of an Impoverished Clerk

As mentioned above, the second story of infection involves Robert Holt and it differs from Lessingham's on a number of levels. While the politician's tale seems to an extent conventional and predictable, the story of the impoverished clerk Mr Holt is very much an example of the reversal of conventions and expectations connected with an infection narrative. The first book of Marsh's novel opens with the miserable night during which Robert Holt is forced to find shelter in London. The scene is set in such a way that the reader is encouraged to sympathise with the character: he is penniless and hungry but not lazy, he travels the city in search for work and is repeatedly refused. Thus, when at the end of the day he is also turned away from the casual ward, lodgings he had to stoop to ask for, his predicament inspires nothing short of compassion.

Being rejected from the last place he hoped to spend the night in, Holt wanders again:

> Retreating from the inhospitable portal of the casual ward, I had taken the first turning to the left, – and, at the moment, had been glad to take it. In the darkness and the rain, the locality which I was entering appeared unfinished. I seemed to be leaving civilisation behind me. The path was unpaved; the road rough and uneven, as if it had never been properly made. Houses were few and far between. Those which I did

> encounter, seemed, in the imperfect light, amid the general desolation, to be cottages which were crumbling to decay.[40]

It is interesting to note that the ordeal he is about to experience is taking place in London, the very centre of the Empire, and yet in a spot which seems miles away from civilisation. As Victoria Margree remarks, "[i]t is important that the novel opens with the vision of the uncivilised at the heart of 'civilisation' since it establishes that the threat to civilisation comes not solely from the archaic and the foreign but already exists in the centre of modernity itself."[41] While generally true, if read as an example of infection literature, *The Beetle* makes the opposite point: the agent of the unspecified threat is external but also insidious, being able to adapt to unfamiliar circumstances without difficulty. That is made possible by the dangerously poor state of the country. In that respect, it is not the case that the threat is already within but that society as a whole is unaware of the extent of its vulnerability.

Margree reads Holt as a "liminal figure"[42] who "is a border crosser […], a man in the grip of an apparently irresistible 'descent' in both class and gendered terms."[43] She does not note the significant connotation of the term "descent" with the return to the previous evolutionary form. Just like descending from the class ladder, and later from his manhood, Holt also experiences the reversal of the civilising process, acquiring (or re-acquiring) a markedly animal rank. In addition, Holt's definition of civilisation is peculiar is the sense that he defines it by what it is not: something unfinished, uneven, improperly made, untouched by the authoritative city-planning and thus virtually uninhabitable. In this respect, *The Beetle* combines two visions: urban decay breeding something unwholesome as if inspired by Dickensian vision of London from *Bleak House,* and the late nineteenth-century

[40] Marsh, *The Beetle*, 7.
[41] Margree, "'Both in Men's Clothing',", 65.
[42] Margree, "'Both in Men's Clothing'," 65.
[43] Margree, "'Both in Men's Clothing'," 64.

widely held assumptions that lack of civilisation is directly connected with infection. Holt's language betrays signs of both hygienic and imperial propaganda; and his descent into the decaying part of the city is analogous to a decent into darkness and savagery. His subsequent fall into the realm of the illegal only reinforces this impression.

His narrative continues: "I stumbled blindly over the uneven road. Once, like a drunken man, I lurched forward, and fell upon my knees. Such was my backboneless state that for some seconds I remained where I was, half disposed to let things slide, accept the good the gods had sent me, and make a night of it just there."[44] Starved and perhaps already hallucinating, Holt turns into a state in which he is only going to be once he meets the eponymous Beetle: backboneless and accepting of his fate without any question with regard to such issues as morality, righteousness or decency, all of which are luxuries in the time of struggling for survival. When he falls on his knees, this shows both his humbled state and the physical descent towards the primitive. But it is worth noting that at his point what he considers an utterly disreputable action is spending the night outdoors; his descent has barely begun.

Just like in the case of Lessingham, the infective agent sets a trap in the form of a window. While the former is enchanted by the siren song, Holt is just fantasising about the inside of a very dilapidated house whose slightly raised sash promises refuge from the elements: "It was so near to me; so very near. I had but to stretch out my hand to thrust it through the aperture. Once inside, my hand would at least be dry. How it rained out there! […] The damp was liquefying the very marrow of my bones. […] And, inside that open window, it was, it must be, so warm, so dry!"[45] Again, Holt makes a reference to his backboneless state, at this point being broken by the rain. Nonetheless, his moral compass is still so strong that he first considers informing the occupants of the house about the opened

[44] Marsh, *The Beetle*, 8.
[45] Marsh, *The Beetle*, 9.

window and thus risk losing even this chance of shelter: "To have caused the window to be closed – the inviting window, the tempting window, the convenient window! – and then to be no better for it after all, but still to be penniless, hopeless, hungry, out in the cold and the rain – better anything than that. In such a situation, too late, I should say to myself that mine had been the conduct of a fool. And I should say it justly too. To be sure."[46] The internal struggle presented here is between his foolishness at losing such an opportunity and the foolishness at taking it; both choices seem wrong – and soon we learn that both of them would be wrong.

At this point, Holt begins to argue with himself, finding logical and moral arguments for choosing one foolishness over the other: "Well, if the house was empty, in such a plight as mine I might be said to have a moral, if not a legal, right, to its bare shelter. Who, with a heart in his bosom, would deny it me? Hardly the most punctilious landlord."[47] What Holt is also doing here is appealing to the reader's conscience and empathy, but also to his/her understanding of how the civilised world works: a respectable man, in a plight, has all the right in the world to use vacated premises if it is a matter of life and death. It is not an argument of a tramp, it is a reasonable argument of a person who knows his rights and is not afraid to use them. But it also mitigates his further blame for having done so, i.e. breaking into the house in the end.

The consequences for doing so turn out to be the worst possible. When Holt indeed does cross the threshold between the legal and illegal, he also crosses the line between dream and nightmare, and ultimately – between life and death. Once he is inside, he is overwhelmed by a peculiar feeling:

> What it was that was with me I could not tell; I could not even guess. It was as though something in my mental organisation had been stricken by a sudden paralysis. It may seem childish to use such language; but I was overwrought, played out; physically

[46] Marsh, *The Beetle*, 10.
[47] Marsh, *The Beetle*, 11.

> speaking, at my last counter; and, in an instant, without the slightest warning, I was conscious of a very curious sensation, the like of which I had never felt before, and the like of which I pray that I never may feel again, – a sensation of panic fear. I remained rooted to the spot on which I stood, not daring to move, fearing to draw my breath. I felt that the presence with me in the room was something strange, something evil.[48]

The grains of salt with which we are supposed to read his narrative are already present here. A man who has spent the last days wandering around the city, suffering starvation and exhaustion may not be in the best state of mind, which – as he clearly notes himself – has already begun playing tricks on him. After all, this is not a common tramp but an impoverished clerk who shivers with disgust at the thought of breaking the law; we may thus speculate that the panic fear he begins to feel inside is the realisation of his altered state: he is not a respectable citizen any more, but a common criminal. Holt does realise this, and expresses this sentiment a few paragraphs later: "when one has been dragged through the Valley of Humiliation, and plunged, again and again, into the Waters of Bitterness and Privation, a man can be constrained to a course of action of which, in his happier moments, he would have deemed himself incapable."[49] His external circumstances at last influence his hitherto ironclad principled character, and this internal conflict may be projected by his mind as some external evil.

Yet his description of the experience points to the visceral rather than the intellectual. The curious sensation of panic fear is such a reaction which overrides reason and points to the evolutionary gut feeling. As his descent into the primitive continues, he turns towards the organic as the most appropriate source of descriptive terms: what is referred to as "a sudden paralysis" at the beginning of the paragraph becomes being "rooted" in its final part. In a way then, the window becomes a gateway into a monster's lair in which Holt's mettle is irrelevant; here, he is nothing more than prey and his chances of survival depend not on

[48] Marsh, *The Beetle*, 12.
[49] Marsh, *The Beetle*, 14.

his intellectual prowess but his instincts. In this instance, he tries his best not to draw any attention to himself, keeping still and holding his breath. Little does he know that his presence was not only acknowledged but anticipated; this is how the Beetle sets her trap.

Soon enough, in the complete darkness of the room, he begins to sense the presence of some other entity which unfortunately proves not to be imaginary, although at this point the clerk does not know exactly what it is. He slowly learns, together with the reader, in the process narrated in a particularly disturbing and evocative style which deserves a longer quotation:

> Slowly the eyes came on […]. Nothing could have exceeded the horror with which I awaited their approach, – except my incapacity to escape them. Not for an instant did my glance pass from them, – I could not have shut my eyes for all the gold the world contains! – so that as they came closer I had to look right down to what seemed to be almost the level of my feet. And, at last, they reached my feet. They never paused. On a sudden I felt something on my boot, and, with a sense of shrinking, horror, nausea, rendering me momentarily more helpless, I realised that the creature was beginning to ascend my legs, to climb my body. Even then what it was I could not tell, – it mounted me, apparently, with as much ease as if I had been horizontal instead of perpendicular. It was as though it were some gigantic spider, – a spider of the nightmares; a monstrous conception of some dreadful vision. It pressed lightly against my clothing with what might, for all the world, have been spider's legs. There was an amazing host of them, – I felt the pressure of each separate one. They embraced me softly, stickily, as if the creature glued and unglued them, each time it moved.
>
> Higher and higher! It had gained my loins. It was moving towards the pit of my stomach. The helplessness with which I suffered its invasion was not the least part of my agony, – it was that helplessness which we know in dreadful dreams. I understood, quite well, that if I did but give myself a hearty shake, the creature would fall off; but I had not a muscle at my command.
>
> […]
>
> It was heavy, so heavy indeed, that I wondered how, with so slight a pressure, it managed to retain its hold, – that it did so by the aid of some adhesive substance at the end of its legs I was sure, – I could feel it stick. Its weight increased as it ascended, – and it smelt! I had been for some time aware that it emitted an unpleasant, foetid odour; as it neared my face it became so intense as to be unbearable."[50]

The realisation of the presence of the Thing and its invasive vertical crawl over his body makes him want to shrink, to recoil but as he is still immobilised, he can only react internally

[50] Marsh, *The Beetle*, 14-15.

with horror and nausea. These are strengthened by the assault on his senses, which in the dark room are heightened: the feeling of being touched by some mysterious sticky appendages, the revolting sound of them gluing to and ungluing from his clothes, and the repugnant smell permeating the room.[51] And most of all, the sense of being rooted in the ground, the terrifying inability to counteract, the inexplicable passivity which brings Holt to the brink of insanity. The biological nature of this violation is the more terrifying as it reinforces the impression of the attacker as some primordial "creature born neither of God nor man" whose viscidity and organic fluidity foreshadow the indeterminacy of the Beetle in almost every respect.

As the creature's ascent continues, the organic terms become more numerous in Holt's account:

> It was at my chest. […] Its forelegs touched the bare skin about the base of my neck; they stuck to it, – shall I ever forget the feeling? I have it often in my dreams. While it hung on with those in front it seemed to draw its other legs up after it. It crawled up my neck, with hideous slowness, a quarter of an inch at a time, its weight compelling me to brace the muscles of my back. It reached my chin, it touched my lips, – and I stood still and bore it all, while it enveloped my face with its huge, slimy, evil-smelling body, and embraced me with its myriad legs. The horror of it made me mad. I shook myself like one stricken by the shaking ague. I shook the creature off. It squashed upon the floor. Shrieking like some lost spirit, turning, I dashed towards the window. As I went, my foot, catching in some obstacle, I fell headlong to the floor.[52]

Demonstrably, at this point Holt is not yet under the full command of the Beetle. In the most unbearable moment, he is able to break from his stupor and run for his life. He does not realise it at this point yet, but the escape is impossible: the pathogen has entered him and began the takeover process. What Holt becomes from this moment onwards, is the Beetle's mindless tool, a mere shell, not capable of protest or any independent action, who is going

[51] While the creature is very mysterious in many ways, the secret of the odour is revealed in Book Two when Sydney Atherton has the opportunity to closely inspect the insect: he identifies it as a lamellicorn of the *copridae* family, i.e. a dung beetle. Marsh, *The Beetle*, 134.
[52] Marsh, *The Beetle*, 15.

to serve his master until the moment he ceases to be useful. The subsequent acts committed by Holt: running naked around the city and breaking into Paul Lessingham's house, show the extent to which his own hitherto spotless character is reduced and substituted by that of the Beetle.

A number of critics note the extent to which the above description is sexual in its nature and how Holt in essence recounts his experience of rape.[53] He is undoubtedly being invaded, in more ways than one. His body is subjected to an undesired, disgusting touch, and his powerlessness and passivity is consistent with that of an assault victim terrorised into submission. Such an impression is only strengthened by the subsequent events presented in Book One. After Holt's fall, he tries for the last time to escape the room but while his hand is on the window sill, the light is suddenly struck and a mysterious figure reveals itself. Neither a man nor a woman – although Holt identifies the person as a man, – but most certainly a foreigner, they command Holt to remain in place. After a brief interrogation during which we learn of the clerk's misfortunes and the chain of events that lead to him being out of a situation, and witness his meek defence against the accusations of being a thief who habitually enters houses through windows,[54] he is given a command he is not able to refuse:

---

[53] See for example Leslie Allin, "Leaky Bodies: Masculinity, Narrative and Imperial Decay in Richard Marsh's *The Beetle*," *Victorian Network,* Vol. 6, No. 1 (2015), 113-135; and Minna Vuohelainen, "Richard Marsh's *The Beetle* (1897): A Late-Victorian Popular Novel," *Working with English: Medieval and Modern Language, Literature and Drama*, Vol. 2, No. 1 (2006), 89-100.

[54] The interrogation goes as follows:
'What sort of clerk are you?'
'I am out of a situation.'
'You look as if you were out of a situation.' […] 'Are you the sort of clerk who is always out of a situation? You are a thief.'
'I am not a thief.'
'Do clerks come through the window?' […] Why did you come through the window?'
'Because it was open.'
'So! – Do you always come through a window which is open?' Marsh, *The Beetle,* 18.

> ‘Undress!’
>
> […] I obeyed, letting my sodden, shabby clothes fall anyhow upon the floor. A look came on his face, as I stood naked in front of him, which, if it was meant for a smile, was a satyr’s smile, and which filled me with a sensation of shuddering repulsion.
>
> ‘What a white skin you have – how white! What would I not give for a skin as white as that – ah yes!’ He paused, devouring me with his glances; then continued. ‘Go to the cupboard; you will find a cloak; put it on.”[55]

The image presented above is striking: a man compelled to strip and have his naked body scrutinised under the predatory, (apparently) male gaze – and being complimented on the whiteness of his skin. In the room of the dilapidated house in the presence of the creature, Holt is indeed a helpless prey, in every sense of the word.

The Beetle again, this time in a much more evocative way, presents her emasculating power. Just like Lessingham, so is Holt painfully aware of the fact that under the control of the foreigner, his masculinity is dissolving: “For the time I was no longer a man; my manhood was merged in his. I was, in the extremest sense, an example of passive obedience.”[56] This symbolic castration he suffers at the hands of the Beetle is not yet over. Though the nightly invasion by the myriad-legged creature could be read as a nightmarish vision, a projection of his fragile mind, the events of the next day dispel the previous doubts about the sexual nature of Holt’s experiences. While under the full command of the Beetle, in the light of the day, he endures another invasion: “a figure, clad in some queer coloured garment, was standing at my side, looking down at me. It stooped, then knelt. My only covering was unceremoniously thrown off from me, so that I lay there in my nakedness. Fingers prodded me then and there, as if I had been some beast ready for the butcher’s stall. […] Fingers were pressed into my cheeks, they were thrust into my mouth, they touched my staring eyes, shut my eyelids, then opened them again, and – horror of horrors! – the blubber lips were pressed into mine – the soul of something evil entered into me in the guise of a

[55] Marsh, *The Beetle*, 19-20.
[56] Marsh, *The Beetle*, 18.

kiss."[57] While the narrative is undoubtedly a testimony of a victim of sexual violence, within the context of the infection narrative, the violation of the body takes on a different meaning. When something evil enters Holt, he is again being invaded by some exotic, disease-dealing pathogen which will permanently transform him and ultimately lead to his death.

Although twenty years and a continent apart, these two stories of infection are very similar in many respects. In both cases the windows function as barriers which must be crossed for the transformation into prey to be initiated. At first, the window is a barrier between safety and danger, but once crossed, it becomes the symbol of an organic barrier the pathogenic Beetle passes through in order to take over her victims. The quotes presented above also point to the necessity of physical contact in order for the infection to take place. Lessingham only loses command of his senses when the Woman of the Songs grabs his wrist; Holt is taken under the influence once the coleopteron finishes its climb over his body. There is also the case of the particular choice of the victims: both Lessingham and Holt are not men in good health but victims of previous debilitating experiences, either weakened by infection or in the state in extreme exhaustion. To some extent it suggests that the Beetle would not be able to exert her control on people of good constitution.

Lastly, the Beetle is an expert of coercion as well as enticement. It is not apparent at the beginning of the novel, but the events concerning Holt and Lessingham are by no means accidents. Both are lured deliberately so that they can perform a very specific function; both are indispensable to the Beetle: one as her "vector" and the other as her slave. Through the analogous means of a window, the infector can offer variable allure to her victims. In the case of Lessingham, what the window offers is entertainment and adventure – precisely what the youth thinks he needs; but all Holt wants is shelter from the rain. Initially, this is what they get: the young man is entertained by the voice of the beautiful songstress, the clerk finds

[57] Marsh, *The Beetle*, 22.

his refuge. The victims seem to come to the Beetle on their own but it is the Beetle who is very skilfully leading them on an invisible leash. This reopens the question of the relevance of such ideologically charged concepts as responsibility or blame.

In the previous chapters I have devoted a lot of attention to the issue of responsibility, repeatedly reaching the conclusion that within the parasitical narratives offered by literature as well as science of the nineteenth century the victim is usually held accountable for getting infected. While such a reading is encouraged in the case of Lessingham, the story of Robert Holt's infection proves more complicated in this respect. His is not a typical cautionary tale. We do not learn more of his backstory until later but from the scraps Holt leaves in the beginning of the narrative, we can deduce that he is more a victim of circumstances rather than a hardened criminal the like of Jonathan Small. For Holt to ask for a place to stay the night in the tramp's ward is a source of great shame, as he has to admit to himself that this is what to all intents and purposes he has become, if not in his own eyes, then in the eyes of the society. The circumstances in which he finds himself – presented no less than as a matter of life and death – force him to commit a petty crime which seems justifiable in his case. *The Beetle* proves unusual in this respect because it is a literary work in which the relation of the parasite and the host is shown from the host's perspective. Such a perspective in not only unusual; in parasitology, it is irrelevant.[58] This is important because it goes against the previously explored issues of personal responsibility for getting infected with parasites. Seeing the same process from the other perspective leaves a space for ambiguity and encourages the suspension of judgement.

[58] *The Oxford Dictionary of Ecology* defines parasitology as "the study of small organisms (parasites) living on or in other organisms (hosts), *regardless of whether the effect on the hosts is beneficial, neutral, or harmful*. The study uses the term 'parasite' in a wider sense than is usually associated with 'parasitism.'" "Parasitology," in: *The Oxford Dictionary of Ecology*, ed. Michael Allaby, Fourth Edition (Oxford: Oxford University Press, 2010).

The Story of a Woman Who Became a Man

In the course of the novel, the Beetle claims three victims whose names we know; these are, in chronological order: Lessingham, Holt and Marjorie Lindon. As Victoria Margree notes, all of them become victims as a way of punishment for their transgressive actions: Holt for housebreaking, Lessingham because as a young man he disobeys the rules of "racial separation" and Marjorie because she "violates the boundaries of what is proper to femininity."[59] While Holt's and Lessingham's transgressions are identifiable and perhaps can also be argued to deserve punishment, Marjorie's faults are uncertain. First of all, she is a secondary victim in the sense that to the Beetle she is a means of getting to the primary object of revenge, Lessingham. Thus, she may be seen as receiving punishment for the wrong choice of fiancé. Yet there is much more to Marjorie than conventional love interest of the main character. Margree convincingly argues that Marjorie is punished for being a New Woman. As the narrator of Book Three, Marjorie shows herself as a woman as independent as it was possible in the late decades of the nineteenth century, one who goes against the wishes of her Tory father and gets engaged to the young Liberal politician Lessingham. She refuses to be bossed around by any of the men in her social circle and plays an active part in the search for the Beetle. For these transgressions against the conventions of Victorian femininity she is – as Margree maintains – punished.

When Holt is found roaming London streets, a raving lunatic wearing nothing but a torn cape, it is Marjorie who takes him into her family home and tends to him. After he recuperates slightly, he tells her of the monster prowling around the city, and together with Atherton all three of them return to the dilapidated house, apparently empty this time. There, Holt once more falls into mesmeric trance and is sent away somewhere. Supposing that the house is unoccupied, and that the Beetle is controlling the clerk remotely, Atherton – after

[59] Margree, "'Both in Men's Clothing'," 80, n. 10.

much consideration for Marjorie's safety – runs after him. The last words of Book Three are also the last words directly uttered by Marjorie in the novel: "Sydney, in following Mr Holt, had started on a wild goose chase after all. I was alone with the occupant of that mysterious house – the chief actor in Mr Holt's astounding tale. He had been hidden in the heap of rugs all the while."[60] It is perhaps worth reminding that to anyone apart from Lessingham and Atherton, the Beetle is a man, as Marjorie's employment of the masculine pronoun shows. From this moment onwards, her punishment begins and her voice is taken away from her. In the last book, we learn through Champnell's and other people's accounts that in that house Marjorie was subjected to an ordeal similar to that suffered by Holt. She was forced to take off her clothes: "shoes, stockings, body linen, corsets and all – even to hat, gloves, and hairpins"[61] and instead wear Holt's old garments; and her hair was cut "so close to the head in one place that the scalp itself had been cut."[62] Deprived of all her external signs of femininity, in the guise of a young, shabby gentleman, she travels with the Beetle – her/himself dressed in garments interpreted by the outsiders as men's. At some point they are reunited with Holt, and the Beetle attempts to leave the country with them. Thus, the final book presents an interesting case of a false gender equivalence between the pursuers and the escapees: Champnell, Lessingham and Atherton chase after Marjorie, Holt and the Beetle – all of whom are at that point considered men to the external world. That is not the case, however: Marjorie is only dressed as a man, Holt's manhood is taken away by the Beetle whom I choose to read as a woman but whose gender identification is dependent on the interpretation.

A lot of attention is paid to the fact that when possessed by the Beetle, Marjorie wears Holt's old clothes. Both Atherton and Lessingham find the notion of "the daintiest damsel

[60] Marsh, *The Beetle*, 233.
[61] Marsh, *The Beetle*, 272.
[62] Marsh, *The Beetle*, 274.

in the land! [being sent] – into the streets of London rigged out in Holt's old togs!"[63] most offensive. On the one hand, this outrage may be explained by the Victorian rules of conduct and proper attire fitting for a young lady. On the other hand, if due to such a slight change Marjorie can effortlessly pass as a man, it would imply the disturbing and subversive idea that the hitherto ironclad gender barriers are not only permeable but also penetrable. It is only after more disturbing reports of her fate reach the pursuers, that the question of clothes is temporarily disregarded.

As it transpires, during their train journey and subsequent stay at a guest house, the three escapees draw attention to themselves due to "shrieks and yells […] as if someone was being murdered."[64] As the witnesses relate, these sounds come from a "ragged and dirty" Englishman, who continues to make "a sort of wailing noise."[65] After he hears these reports, Lessingham – knowing perfectly well that the Englishman in rags is Marjorie – asks a question that is never answered explicitly: "This mention of the shrieks on the railway, and of the wailing noise in the cab – what must this wretch have done to her? How my darling must have suffered?"[66] This is precisely the unspoken question Champnell considers:

> The notion of a gently-nurtured girl being at the mercy of that fiend incarnate, possessed […] of all the paraphernalia of horror and of dread, was one which caused me tangible shrinkings of the body. […] What unimaginable agony had caused [the shrieks and yells]? What speechless torture? […] The helpless girl who had already endured so much, endured perhaps, that to which the death would have been preferred! […] what might she not, while being borne through the heart of civilised London, have been made to suffer?[67]

While he is quite certain that Marjorie will be returned to Lessingham, he cannot say anything about the possible state she might be in, especially if she would remain "untouched,

[63] Marsh, *The Beetle*, 300.
[64] Marsh, *The Beetle*, 305.
[65] Marsh, *The Beetle*, 306.
[66] Marsh, *The Beetle*, 308.
[67] Marsh, *The Beetle*, 308-309.

unchanged, unstained"[68] as Lessingham tries to assert. Since all the horrors suffered by Marjorie remain nameless, unimaginable, and unutterable, the readers can fill in the gaps for themselves. A number of critics[69] identify her ordeal as rape, which is consistent with the Beetle's previous *modus operandi* but which also misses the fact that Marjorie's usefulness to the villain is different from Holt's and Lessingham's. The bodies of young Englishwomen are being sacrificed by the worshippers of Isis to their goddess, so it would be reasonable to assume that the Beetle might try to preserve the integrity of the sacrificial offering. On the other hand, the fear of being touched, changed and stained that Lessingham expresses may as well be the references to his perception of himself, his reflection of personal trauma. Naturally, Lessingham fears that Marjorie may experience something equivalent to what he did; on the other hand – bearing in mind his own emasculation at the hands of the Beetle – he fears also the kind of person (or creature) Marjorie may turn into. If the Beetle can symbolically castrate men, what can she do to women?

It would seem that the fact that Marjorie is reassigned male identity suggests that she is elevated from her status of a conventional woman. Herein, argues Margree, lies the perfidious nature of her punishment. As she notes:

> if Marjorie in men's clothing is a parody of a man, she is only a poor imitation of a man who is already himself a parody of masculinity. The full meaning of Marjorie's punishment is this: that if she, as representative of the New Woman, desires masculinity, then the novel will give her what she wants, but in doing so will reveal to her that this is the only type of 'man' a woman could hope to be: one that is equivalent to the dissolute, enfeebled and emasculated Holt.[70]

Convincing and compelling as Margree's arguments are, they disregard a crucial aspect of the novel: the Beetle *her*self. First of all, punishment of women who dare to question the

---

[68] Marsh, *The Beetle*, 310.
[69] Margree, "'Both in Men's Clothing'," 76. W. C. Harris and Dawn Vernooy, "'Orgies of Nameless Horrors'," 341, Allin, "Leaky Bodies," 130.
[70] Margree, "'Both in Men's Clothing'," 74.

order of things in imperial Britain is not specifically on the Beetle's agenda. We know that the followers of Isis have their own interests in the bodies of Western women, but these are very far removed from being sympathetic towards the emancipation movement. In fact, if the point of reference were the objectification itself, it would not make a considerable difference to Marjorie whether she was being objectified as "the daintiest damsel in the land" or as a sacrificial offering in the eyes of the Beetle. Secondly, the Beetle is most probably a woman herself, and her agency and violence is not only equal but it in fact much exceeds those exhibited by stereotypical men. She is not being punished for that – she is the one who punishes, and is indiscriminate at that. But she is also the representative of the uncivilised, of the dangerous other who is not considered part of the power dynamic between genders in Victorian Britain. If anything, she is the external threat in a form of infection that needs to be destroyed to maintain the *status quo*. While I agree with Margree's reading of the novel as supporting the inherent threat to civilisation present already within, I seems to me that in this case the within reaches as far as Egypt.

Generally speaking, the presence of the exotic other in London is transformative on many levels. Minna Vuohelainen writes that the antagonist: "exerts an uncanny hypnotic influence on the English characters with whom she comes into contact: lower-middle-class clerks become burglars, retiring young ladies don male costumes in public and are subjected to implied sexual acts on trains and in hotel rooms, eminent politicians are reduced to unmanned sex toys, and well-trained butlers forget their manners. The creature's challenge to social order is contagious, suggesting the possibility of social change on a revolutionary scale."[71] But the most terrifying of these transformations is the Beetle's ability to reassign genders of her victims according to her need. The symbolic castrations of Holt or Lessingham and the apparent effortless reassignment of Marjorie's gender with a mere

[71] Vuohelainen, "Richard Marsh's *The Beetle*…," 96.

change of clothes and hairstyle are the main sources of terror in the novel, as Leslie Allin notes. According to her, the Beetle proves that gender is boiled down to roles acted by different members of society and a simple change of costumes is enough to confuse the identification.[72] The foreigner, unlike the English, sees through this arrangement and is able to direct the actors playing the gender roles as she wants. The point here would be that the gender roles in Victorian Britain are only performative and easily adaptable but it takes a foreign, external agent to trigger such a transformation.

Victoria Margree studies the issue of the performative nature of genders further, noting the subversive similarity between the vagrant clerk and the ambitious statesman. When Holt, under the remote control of the Beetle, breaks into Lessingham's house and is discovered by the owner, this is how he describes his impression of the politician: "If the discovery of my presence startled him, as it could scarcely have failed to do, he allowed no sign of surprise to escape him. Paul Lessingham's impenetrability is proverbial. […] It is generally understood that he owes his success in the political arena in no slight measure to the adroitness which is born of his invulnerable presence of mind."[73] Margree notes that both "impenetrability" and "invulnerability" very accurately "express the version of British masculinity the text is trying to assert,"[74] yet fail to do so in Lessingham's case due "the fear of performativity" as she calls it.[75] Holt finds in Lessingham precisely these qualities that he himself believes to be lacking: as he is both vulnerable and penetrable in the most extreme sense. Yet these are mere projections of Holt who tries to associate himself with the symbol of stereotypical masculinity represented by Lessingham, not realising that in fact in this respect they are very much alike. Margree comments a few times on the fact that Lessingham is frequently referred to as a "statesman" pointing to the significance of his person on the

[72] Allin, "Leaky Bodies," 130.
[73] Marsh, *The Beetle*, 44.
[74] Margree, "'Both in Men's Clothing'," 71.
[75] Margree, "'Both in Men's Clothing'," 71.

national level but most importantly how much the issue of power and masculinity (both being a statesman and simply a man) is "a matter of performance."[76] She limits her interpretation of the "state" to the political meaning, but a venture into the alternative reading seems opportune. Whenever Lessingham is confronted with any form of the Beetle (even with a paper engraving) he turns from a statesman into a man in a state so much so that it reminds bystanders of "feminine hysterics": "On the instant a look came on to his face which, literally, transfigured him. His hat and umbrella fell from his grasp on to the floor. He retreated, gibbering, his hands held out as if to ward something off from him, until he reached the wall on the other side of the room."[77] He is a statesman in the sense that he comprises within his identity a number of states, only one of them consistent with his political persona.

The Beetle abounds in motifs of domination and power but the two I decided to focus on – hostile takeover and gender reassignment – were chosen specifically to relate to the concepts found in parasitological studies. Carl Zimmer, a science writer and author of *Parasite Rex* (originally published in 2000), expresses them simply: "Parasites can castrate their hosts and then take over their minds."[78] The following sections of the chapter present parasitic case studies which prove both Zimmer's assertion and their relation to the ideas found in *The Beetle*.

The Story of a Wasp and a Cockroach

Parasitoid[79] wasps of the Ichneumonidae family are arguably one of the more fascinating subject of parasitological studies. Their life cycle involves depositing eggs in living hosts that serve as shelter and a source of food to the newly hatched larvae. Of their evolutionary

[76] Margree, "'Both in Men's Clothing'," 70.
[77] Marsh, *The Beetle*, 90.
[78] Zimmer, *Parasite Rex*, xxi.
[79] Parasitoidism is a subtype of parasitism "in which one species kills its prey, as does a predator, but, like a parasite, [it] is normally restricted to a single host individual." May Berenbaum, "Plant-Herbivore Interactions," in: *Evolutionary Ecology. Concepts and Case Studies*, eds. Charles W. Fox, Derek A. Roff and Daphne J. Fairbairn (Oxford, New York: Oxford University Press, 2001), 303.

survival strategy Darwin famously said: "I cannot persuade myself that a beneficent & omnipotent God would have designedly created the Ichneumonidæ with the express intention of their feeding within the living bodies of caterpillars."[80] It is perhaps too dramatic to suggest that such a natural phenomenon could undermine one's religious convictions to a significant extent but this remark nonetheless emphasises how disagreeable the survival strategy of these wasps appears, even to scientists.

As I have mentioned before, when parasitology converged with tropical medicine, a new field opened for European scientists to study, and compare new material with the familiar parasites of the temperate regions. I have also noted that tropical parasitologists very soon realised that exotic parasites, even if comparable to their European cousins, exhibited some unique characteristics. The tropical species of parasitic wasp which could be considered analogous to the Ichneumon wasp is *Ampulex compressa*, also known as jewel wasp or emerald cockroach wasp. It is a beautiful insect: characterised by a metallic greenish colour and slender, proportionate body, the jewel wasp seems more as if taken from a fairy tale where it would not look out of place among ladybirds and butterflies. Her (personal pronoun is warranted here as this particular practice involves females exclusively) way of reproducing, however, is much closer to nightmares beyond "disagreeable." Carl Zimmer, the science writer who compiled the history of *Apulex compressa* explains it in detail. When a jewel wasp is ready to lay eggs, she seeks a cockroach host. Due to evolutionary conditioning, a cockroach is not afraid of creatures smaller than itself – and the wasp is about four times smaller than her host – so when a shiny green insect approaches it, the cockroach does not pay much attention to it. She lands on her host and stings it to temporarily paralyse it; this is done especially so that she has more time to sting it again, this time in the head. As Zimmer writes, "[t]he wasp slips her stinger through the roach's exoskeleton and directly

[80] Charles Darwin in a letter to Asa Gray, 22 May 1860, *Darwin Correspondence Project*, University of Cambridge, http://www.darwinproject.ac.uk/letter/DCP-LETT-2814.xml (02.04.2016).

into its brain. She continues to snake her stinger […] until she reaches the particular knot of neurons that produces the signals that prepare a cockroach to start walking. The wasp injects a second venom that quiets those neurons so that the cockroach cannot make itself move."[81] The parasite is now in absolute control of the host which must do anything she commands. She pulls one of the cockroach's antennae to lead it – "like a dog on a leash"[82] – to her burrow. Here she lays the egg next to the cockroach and leaves the host with her child, sealing them in the burrow. Once the larva hatches, it begins to eat the still living but paralysed cockroach. The process lasts about eight days, in which the larva eats the internal organs of the host in particular order, to maximally prolong its life. After the cockroach finally dies, its dead body serves as a cocoon from which a fully formed jewel wasp emerges after about four weeks.

Scientists have been aware of the peculiar nesting strategies of jewel wasps for centuries; it was categorised as early as 1781 and was commonly observed in its natural environment. The first comprehensive study of the insect was presented by Francis Williams in 1941, but in it he lists the fragmentary work of his predecessors, such as Bingham's 1897 and Maxwell-Lefroy's 1909 studies of the arthropods of India.[83] At the beginning of the twentieth century it was clear that *Ampulex* must be using some kind of paralysing venom that she injects into the cockroach's brain. The exact nature of this venom and the operations of the wasp's stinger was only confirmed in the 2000s.[84] As with many other scientific discoveries, it took years to verify and confirm the precise nature of *Ampulex compressa*'s evolutionary adaptations.

---

[81] Zimmer, *Parasite Rex*, 249.
[82] Zimmer, *Parasite Rex*, 249.
[83] Francis X. Williams, "Ampulex Compressa (Fabr.), A Cockroach-Hunting Wasp Introduced from New Caledonia Into Hawai," *Proceedings of the Hawaiian Entomological Society*, Vol. 11, No. 2 (1942), 221-233, 233.
[84] Gal Haspel, Lior Ann Rosenberg, Frederic Libersat, "Direct Injection of Venom by a Predatory Wasp into Cockroach Brain," *Journal of Neurobiology*, No. 56 (2003), 287-292.

Cockroaches are arguably some of the most revolting creatures on earth, and yet their terrible fate at the hands (or stingers) of jewel wasps evokes emotions akin to pity and sympathy. Even such disgusting animals do not deserve to be eaten alive in such a way which lengthens their ordeal to the extreme. The cruelty of nature seems to have reached the previously unimaginable highs (or lows). Emerald cockroach wasp is so horrific that it brings to mind monsters from fantasy novels. In fact, the Thai cousin of *Ampulex compressa* is *actually* named after fantasy monsters: in 2012, as a result of public vote, this species discovered only a year before was given the name *Ampulex dementor*, after the evil, soul-sucking creatures from the *Harry Potter* series.[85] Except of course, there is no place for such notions as "sympathy," "cruelty" and "ordeal" in nature. The emerald cockroach wasp's parasitism is not a conscious choice; it is an evolutionarily conditioned practice developed expressly to increase their chances of survival. They cannot by any means change their way of life. "Sympathy," "cruelty," and "ordeal" are man's projections onto the natural context in which they are unwarranted. Again, just like it was presented in Chapter II, there is a strong tendency to interpret these natural facts as stories with clearly marked protagonist and antagonist.

The practice in which animal behaviours are interpreted as analogous to behaviours exhibited by humans has been described in behavioural literature as "naive anthropomorphism" or "Bambification,"[86] both of which clearly denote some interpretive fallacy. Yet Clive Wynne, when referring to this practice, employs the term "natural":

---

[85] Michael Ohl, Volker Lohrmann, Laura Breitkreuz, Lukas Kirschey, Stefanie Krause, "The Soul-Sucking Wasp by Popular Acclaim – Museum Visitor Participation in Biodiversity Discovery and Taxonomy," PLoS ONE, Vol. 9, No. 4 (2014), http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0095068 (14.01.2016).

[86] Clive D. L. Wynne, "What are Animals? Why Anthropomorphism is Still Not a Scientific Approach to Behavior," *Comparative Cognition and Behaviour Reviews*, Vol. 2 (2007), 125-135, esp. 125-126. Available at: https://www.ualberta.ca/~elegge/Alrg_Docs/Wynne_2007.pdf (2 April 2016). See also Elle Hunt, "Kangaroo in 'grieving' photos may have killed while trying to mate, scientist says," *The Guardian*, 14 January 2016, https://www.theguardian.com/science/2016/jan/14/photos-grieving-kangaroo-viral-but-scientist-says-sexually-aroused (02.04.2016).

"[someone's] natural tendency to see living things as having a human-like mentality,"[87] suggesting that this habit is so deeply rooted within the human psyche that it is impossible to get rid of, or even control without conscious effort. I would argue, however, that anthropomorphism of this kind is not so much "natural" as "naturalised"; that is why I use the expression "habit." Both idiomatic expressions of "the force of habit" and "second nature" imply automatic practices at work beyond the level of individual awareness but also, crucially, the initial introduction of certain behaviour at some point, and its subsequent adoption through repetition. The very term "Bambification" holds the key to the explanation of anthropomorphism. After all, *Bambi* is a sweet tale of a poor little fawn whose mother is killed by a bad hunter and so he must carry on without her, ultimately finding friends and love. Since the beginning of our lives we are told stories of animals behaving like humans, from Aesop's tales to Disney's animated films to nature documentaries, and through repeated exposure, we form an anthropomorphic habit that becomes our second nature, which only appears problematic when we are forced to address issues beyond the anthropocentric. These stories teach us empathy and cooperation but at the same time they leave a residue which proves very difficult to rinse.

This is of course only a hypothesis, and its verification is beyond the scope of the present work. However, the way in which this chapter has been constructed to a certain extent offers a case study of the sources of naive anthropomorphism. The first part is devoted to the analysis of an evil and dangerous villainess who also happens to transform into a beetle. The second part presents practices of animal parasites which "naturally" evoke such descriptive terms as "cruel" and "unfair." The feminine pronoun by which the jewel wasp is identified here and in Zimmer's account only reinforces this tendency. The analogies between the female emerald wasp and the golden green coleopteron from *The Beetle* are thus

[87] Wynne, "What are Animals?," 131.

encouraged and presented as equivalent, correspondent stories within their respective disciplines.

The Story of a Barnacle and a Crab

Carl Zimmer and the clinical parasitologist Rosemary Drisdelle describe two species of barnacle parasites which have similar effects on their crab hosts. Drisdelle's barnacle, *Briarosaccus callosus* parasitises king crabs while the hosts for Zimmer's *Sacculina carcini* are green crabs. Both parasites work in a very similar way: each species begins its life as an independent larva which transforms into a parasite once it meets the host. Before injecting itself into the crab, the barnacle sheds its legs and other structural elements, in essence invading the host as nothing more complicated than a cluster of cells in a shape of a slug. After entering the crab, the invasion process begins; the barnacle moves to the underbelly of the crab and starts to grow, forming roots entwining the body of the host and pressing the crab's shell until it breaks. The external visible part of the parasite which hangs between the host's legs "like a plump sausage"[88] is called externa and it is critically located exactly where healthy female crabs hold their eggs. At this point the parasitic barnacle is in absolute control of the crab, so much so that if it happens to parasitise a male host, it has the ability to turn him into a female; Zimmer calls this "spaying" or "castration," while Drisdelle refers to this process as "feminisation."[89] The transformation of the male host into female is important, because in its final stage of development the barnacle uses the crab's technique of laying eggs to release the new generation of infective offspring. In Drisdelle's words: "When the nauplii [i.e. larvae] are released, the hapless crab performs its final service to the parasite: puppetlike, it moves out of its hiding place and waves its abdomen back and forth,

[88] Rosemary Drisdelle, *Parasites: Tales of Humanity's Most Unwelcome Guests* (Berkeley, Los Angeles, London: University of California Press, 2010), 110.
[89] Zimmer, *Parasite Rex*, 81; Drisdelle, *Parasites*, 110.

distributing nauplii into the surrounding water as it would its own offspring."[90] Similarly, Zimmer's *Sacculina*-infected male green crab "acts as if he has the female's brood pouch, grooming it as the parasite larvae grow and bobbing in the waves to release them."[91] Interestingly, it is the parasitologist rather than the popular science writer who uses metaphor-laden language to create the tragic story of a hapless victim at mercy of his attacker.

Since barnacles were of interest to Victorian scientists with relation to the notion of degeneration, these parasites were a common study subject. In his 1863 *Parasites of Man* Rudolf Leuckart notes (in a footnote) this on the *Sacculina* parasite: "They obtain their food like plants, by a number of branched prolongations, which pass through the body of their host and ramify in its intestine. They are found generally on the ventral surface of the abdomen of crabs."[92] The comparison to plants suggests that at this point Leuckart and other parasitologists did not yet realise the active part the barnacle has in the body mechanics of its host. Yet as soon as 1886 Alfred Giard "gave some account of the extraordinary effects of the parasite on the secondary sexual characters of the host crab," while in 1910 Geoffrey Smith published his studies concerning other Rhizocephalidae.[93] Thus it can be assumed that the transformative power of parasitic barnacles was well known to scientists already in the first decades of the twentieth century.

Just like the jewel wasps, *Briarosaccus* and *Sacculina* could be seen as total parasites. Unlike tapeworms or ticks, they take over their hosts completely, to the point of either paralysing or castrating them to their own advantage. The analogy between the strategies used by these real-life parasites and the Beetle seems straightforward. *The Beetle* thus could

---

[90] Drisdelle, *Parasites*, 110.
[91] Zimmer, *Parasite Rex*, 82.
[92] Rudolf Leuckart, *Parasites of Man, And the Diseases Which Proceed from Them*, trans. William E. Hoyle (Edinburgh: Young J. Pentland, 1886), 18, n. 1.
[93] J. H. Day, "The Life-History of Sacculina," *Journal of Cell Science*, Vol. 2, No. 77 (1935), 549.

be read as a story of an exotic parasite of extraordinary transformative powers and the extent of control she is able to exercise over her hosts. At the same time, however, she is a metaphorical parasite, read through the extratextual perspective; one who has personality, motivation and willpower. When Zimmer's and Drisdelle's accounts focus on their subjects, they can only assume the external perspective; their stories of parasites revolve around their *modus operandi*, their biological imperative, their evolutionary success. *The Beetle*, unlike the parasitological texts, gives us the glimpse into the internal life of both its parasite and her hosts – something unavailable to science.

Conclusion

The castrating and mesmerising females seem equally the substance of literary horrors and scientific studies. One can find a number of surprising analogies between them, and this chapter offers just two examples of these. In this respect, Richard Marsh's *The Beetle* can be seen as following the same route as works of Arthur Conan Doyle and – to a much lesser extent – George Eliot's *Middlemarch*: exploring scientific ideas of their time but also suggesting other paths of scientific exploration. However, there is a significant difference between these three authors: the biographical connections with nineteenth-century science in both Eliot's and Doyle's lives are well known and extensively researched; this is not the case with Richard Marsh. Although he was a prolific writer, having written seventy-six volumes and many short stories in the years between his first publication in 1888 and his death in 1915,[94] as Victoria Margree notes, "there is no surviving diary or memoir, and few personal letters,"[95] so there is also no evidence that he had more than casual knowledge of science generally, not to mention the more specialist disciplines of parasitology, bacteriology

[94] Minna Vuohelainen, "From 'Vulgar' and 'Impossible' to 'Pre-Eminently Readable': Richard Marsh's Critical Fortunes, 1893-1915," *English Studies*, Vol. 95, No. 3 (2014), 278.
[95] Victoria Margree, "Metanarratives of Authorship in *Fin-de-Siècle* Popular Fiction: 'Is That All You Do, Write Stories?'," *English Literature in Transition*, Vol. 59, No. 3 (2016), 369.

or tropical medicine. Yet the concepts included in *The Beetle* – of the exotic, dangerous invader capable of taking over her victims and even re-gender them – are very similar to the actual zoological phenomenon reported by science.

How is it possible then, that a nineteenth-century novel utilises scientifically valid ideas which could be tested and verified by science some years later? I propose an explanation of this correspondence between literary and scientific narratives which is based on evolutionary science. Evolutionary studies recognise a similar phenomenon in which two distinct species, developing in similar conditions but in geographically widely distributed areas, arrive at the same or very similar adaptations in their evolutionary process. Such an analogy is called 'convergence' and its process 'convergent evolution.' Convergence is defined as "[t]he tendency of unrelated animals and plants to evolve superficially similar characteristics under similar environmental conditions."[96] Thus, according to the explanation offered by convergent evolution, the analogous environmental niches occupied in Europe and Asia by smaller mammals, in Australia are occupied by marsupials with similarly evolved adaptive strategies.

The reason why the idea of convergence was introduced to the evolutionary studies was to correct or address a problem started by Charles Darwin. In the concluding sentence in *On the Origin of Species*, he wrote: "There is grandeur in this view of life, with its several powers, having been originally breathed into a few forms or into one; and that, whilst this planets has gone cycling on according to the fixed law of gravity, from so simple a beginning endless forms most beautiful and most wonderful have been, and are being, evolved."[97] While the beauty and wonder of the evolved forms do not seem to be questioned, contemporary scientists take issue with the notion of "endless." George R. McGhee devotes

[96] "Convergence," in: *Oxford Dictionaries*, http://www.oxforddictionaries.com/definition/english/convergence (02.04.2016).
[97] Charles Darwin, *On the Origin of Species by Means of Natural Selection or The Preservation of Favoured Races in the Struggle for Life*, ed. William Bynum (London: Penguin, 2009), 427

a long study entitled *Convergent Evolution: Limited Forms Most Beautiful* to debunk Darwin's claim. The numerous studies he presents offer evidence in favour of the idea of evolutionary constraint, a concept according to which "the number of evolutionary pathways available to life […] is quite restricted."[98] Convergent evolution exists exactly because the possibilities of new adaptations are not endless.

That is not to say Darwin was wrong – he was just overly optimistic in his view. His "endless forms" are the scientific equivalent of the popular saying that human creativity is limitless. Perhaps it is, but not from the neuroscientific point of view. Neuroscience sees creativity not exactly as something without limits but rather as a manifestation of infinite possibilities of combination out of a finite number of elements.[99] For example, combinations of existing colours are indeed limitless, but it is arguably impossible to invent a new one. Nonetheless, evolutionary constraint and convergence are positive rather than negative concepts as they allow for more precise prediction of the future evolutionary directions. Moreover, since even such concepts as convergent evolution of intelligence and abstract thinking can also be demonstrated in nature,[100] it does not seem to be too presumptuous to assume that the ideas first presented by fiction writers of the late nineteenth century may be realised in nature and "uncovered" by scientists some years or decades later.

The concept of convergence has already appeared in other disciplines. In his dictionary of cultural studies, Chris Barker defines convergence as "the coming together or joining of previously discrete items, [which] has taken on a particular set of meanings during the 1990s in the context of changes within the communications industries and their related

---

[98] George R. McGhee Jr., *Convergent Evolution: Limited Forms Most Beautiful* (London and Cambridge, Ms: The MIT Press, 2011), xi-xii.
[99] Dahlia W. Zaidel, "Biological and Neuronal Underpinnings of Creativity in the Arts," in: *Neuroscience of Creativity*, eds. Oshin Vartanian, Adam S. Bristol, and James C. Kaufman (London and Cambridge, Ms: The MIT Press, 2013), 143.
[100] See G. R. McGhee, *Convergent Evolution*, Chapter 6, "Convergent Minds," 209-243.

technologies."[101] In his definition, convergence entails "breaking down of barriers between technologies" and "the consequences of the re-structuring of the communications industries"; nowhere does he refer to the evolutionary meaning of the term, which I attempt to retain in my take on the notion. Thus, the concept of convergent evolution of ideas is here treated in a way analogous to the parasite-like characters Mr Raffles and Mr Bulstrode in *Middlemarch*: as a simple metaphor. Parasitology and literature cannot really be said to be the equivalents of two distinct species which have developed in similar circumstances but in different locations. Therefore, in the present context, the evolution-inspired concept of convergence is understood as an independent arrival at analogous ideas regarding the behaviour and way of life of parasites: initially in literature and later in parasitology. According to the evolutionary constraint rule, such an analogous outcome was not only possible but actually inevitable due to the ultimately limited number of creative possibilities. In other words, there are only so many ways in which parasites can invade their hosts and sooner or later the imaginative ideas presented by Victorian writers had to be found and verified in real life parasites.

A vital explanation is needed at this point in order to avoid a certain logical pitfall. To say that an idea found in a work of fiction converged with an idea adopted by actual parasites, is to erase the distinction between the fictional and the real. I propose no such thing. What I do propose, and have proposed throughout this work, is the analogous approach to both literature and science from the perspective of literary criticism. Throughout the previous chapters, I have argued that science writers, when writing about their real-life subjects, cannot escape the lure of the narrative. In the first chapter I present examples of the employment of literary devices in nineteenth-century scientific texts whose purpose was to aid understanding, bring the subject closer to the non-specialist readers, or to inspire sublime

[101] Chris Barker, *The SAGE Dictionary of Cultural Studies* (London, Thousand Oaks, New Delhi: SAGE Publications, 2004), 34.

emotions through aesthetic descriptions. In Chapters II-IV I show the less desirable effects of writing and reading stories which are supposed to be impartial scientific texts but which – due to their composition – trigger such responses as naive anthropomorphism, "Bambification," and, most problematically, the application of societal moral norms to natural phenomena to which such notions are not applicable.

Thus, the final chapter of the present work is devoted to further studies of the concept of the convergent evolution of parasitical ideas in the nineteenth-century texts of fiction and modern science. While in the present chapter, the literary analysis took precedence over parasitological case studies, in the next one this relation is reversed: a scientific theory of parasitical involvement in the development of disgust is complemented by particular literary examples.

CHAPTER VI A STORY IS A STORY IS A STORY: SCIENCE AND LITERATURE CONVERGENCE

Introduction

The previous chapter concluded with the introduction of the concept of convergent evolution, a phenomenon recognised by science as early as the late nineteenth century.[1] Its emergence was in response to Charles Darwin's idea of a limitless number of possible adaptations organisms could develop in their evolutionary process. In fact, as the theory of convergent evolution states, the number of adaptations is limited, due to genetic as well as environmental factors. It is proven by distinct species developing similar adaptations in similar environments, even if they are geographically distanced.

The relevance of convergent evolution in the context of the present work amounts to the fact that it accounts for a phenomenon which could otherwise be explained as nothing more than coincidence. The majority of the previous chapter is devoted to the comparison of two case studies: a literary one and a scientific one, with the particular attention paid to their similarities. I argue that the reason behind the analogies between the way a fictitious villain acts upon her victims and the behaviours of actual parasitical creatures, was that these two were examples of solutions which seem to have converged to the point of being analogous.

Just like literary texts, so are scientific texts narratives: stories with protagonists, exposition, and plot. Therefore, it is justifiable to approach them in the same way, i.e. as narratives. The fact that some of them are works of fiction and other are not is irrelevant in this respect. *A story is a story is a story*. In this sense, to say that a literary plotline converged

[1] For example, in his article published in *Science* in 1899, Carl H. Eigenmann discussed two species of blind fish which converged "because of the similarity of their environment [i.e. dark caves]." Carl H. Eigenmann, "A Case of Convergence," *Science*, Vol. 9, No. 217 (1899), 280-282.

with an evolutionary adaptation is to say that the concepts found in the literary narrative are analogous to the concepts found in the scientific narrative. Within this premise, the aim of this chapter is to seek examples of convergent ideas found in Victorian fictional stories and the non-fictional story spun by Valerie Curtis in her 2014 study on disgust.

The important issue that needs to be addressed at this point is the choice of Curtis's Parasite Avoidance Theory as an example of literature-science convergence that sees analogies between Victorian fiction and science. The employment of her study in this respect is to corroborate the notions explored by Victorian writers; it can be thus considered as a retro-active verification tool. An example of such a use of twenty-first century science has already been presented in Chapter III in which the view regarding the indispensable qualities of natural ventilation was promoted by eminent Victorians: Charles Dickens, Edwin Chadwick and James Pickford whose ideas were confirmed in 2007 by medical scientists. The same chapter also contains an example of cultural convergence in the form of analogous explanation of the internal parasite origin under the shared complementary approach: the ancient Chinese concept that the parasites are created within hosts from heat and moisture, the mythical parasites arising inside human bodies in accordance with the beliefs of the *Mbya* indigenous people, and the views of the sixteenth-century European scientists who maintained that parasites were generated spontaneously within the intestines of their hosts.

Although, to my knowledge, the concept of convergent evolution has not been used in literary criticism to explain the presence of biological ideas in fiction, contemporary science has employed nineteenth-century literary works to explain some of scientific concepts. For instance, Charles Dickens gave a certain idea to a group of scientists who in 1956 published in *The American Journal of Medicine* a study entitled "Extreme obesity associated with alveolar hypoventilation – A pickwickian syndrome."[2] In my opinion, a much more

[2] C. Sidney Burwell, Eugene D. Robin, Robert D. Whaley, Albert G. Bickelmann, "Extreme Obesity Associated with Alveolar Hypoventilation – A Pickwickian Syndrome," *The American Journal of Medicine*,

interesting, and employed to a much greater extent, is the example of an idea found in Lewis Carroll's *Through the Looking Glass* (1872) which present-day evolutionary ecology recognises as the so-called Red Queen Hypothesis. The following section of the chapter is devoted to the presentation of the case study of the Red Queen in which the use of literature goes beyond the mere borrowing of a name.

The Case Study of the Red Queen

The authority on the issues of the Red Queen hypothesis and the Red Queen dynamics is Curtis Lively, who has published a number of studies, reviews and overviews on this subject. Although he did not come up with the name or the hypothesis – in this case the credit is granted to two scholars who applied the term Red Queen to two distinct evolutionary phenomena: Leigh Van Valen in 1973 with relation to species interaction, and Graham Bell in 1982 while describing genotype fluctuations of hosts and their parasites[3] – Lively has amassed the most comprehensive collection of studies of the Red Queen, having devised and participated in many of them. This is why I will mostly rely on a number of Lively's articles when discussing the concept.

In order to understand the relevance of the Red Queen to biology in general, and to the present work in particular, a short explanation is essential. In biological studies the Red Queen is extremely important as it offers a convincing – although not yet verified – theory of the existence of sex in nature. Since the general adoption of Darwinian idea of natural selection, biologists have been tackling this question: what makes it evolutionarily advantageous to have males in a given population? If we assume that in a given population the ratio of males to females is equal, it means that – excluding unviable (that is, not capable

Vol. 21, No. 5 (1956), 811-818. Available at: http://www.amjmed.com/article/0002-9343%2856%2990094-8/abstract (21.05.2016).

[3] Curtis M. Lively, "Parasite-Host Interactions," in: *Evolutionary Ecology: Concepts and Case Studies*, eds. Charles W. Fox, Derek A. Roff, Daphne J. Fairbairn (Oxford: Oxford University Press, 2001), 292 and 300.

of performing their evolutionary functions) individuals – exactly half of the population is capable of producing offspring. In other words, there is only as much potential for producing offspring as there are females; the more females, the more offspring. In biology, this is known as "the cost of sex." In a population reproducing asexually (e.g. through parthenogenesis), all of the individuals are capable of reproduction and thus there is no cost of sex. At first sight, the latter arrangement seems much more advantageous. However, the majority of animal populations known to science choose the cost of males over the reduplication of the original individual in the form of clones. Two major hypotheses are proposed to explain it; according to the first one, over generations, the asexually reproduced clones suffer from "accumulation of deleterious mutations"[4] which affect their fitness, while sexual reproduction maintains the diversity in the genetic pool which prevents such an accumulation. The other hypothesis is the Red Queen. Michiels et al. define it as such: "The Red Queen hypothesis states that organisms are under selection to recombine their genotypes [i.e. "the genetic constitution of an individual organism"[5]] in the face of co-adopting species, of which parasites are an important subspecies."[6] Following Bell's application of the term, Curtis Lively explains the Red Queen hypothesis as follows:

> If the parasite is sufficiently virulent, evolutionary change in the parasite population will result in ever-increasing selection against common host genotypes, eventually driving them down in frequency. When the frequency of the common host genotype is diminished, some new, previously rare, host genotype becomes the most common one. This then provides a new target for the parasite population, and the newly common host genotype is expected to be attacked in the same way, but by a different parasite genotype."[7]

---

[4] N. K. Michiels, L. W. Beukeboom, N. Pongratz, and J. Zeitlinger, "Parthenogenetic Flatworms Have More Symbionts Than Their Coexisting, Sexual Conspecifics, But Does This Support the Red Queen?," *Journal of Evolutionary Biology*, No. 14 (2001), 110.

[5] "Genotype," in: *Oxford Dictionaries*, http://www.oxforddictionaries.com/definition/english/genotype (30.05.2016).

[6] Michiels et al, "Parthenogenetic Flatworms …," 110.

[7] Curtis M. Lively, "Parasite-Host Interactions," 291.

Asexually cloned individuals by definition possess only one genotype and if a parasite infects one of them, all of them are at risk; the sexually reproduced individuals are more genetically diverse, so they have a higher chance of survival. This "time-lagged, frequency-dependent selection"[8] which is the core of the Red Queen hypothesis, "is commonly referred to as an arms race, but this is a misleading analogy. An arms race involves an escalation in weaponry (from clubs to swords to guns to bazookas…), not a recycling of weapons,"[9] explains Lively.

It is a race – but a different kind of race. In order to come up with a metaphor reflecting this kind of interaction, evolutionary biologists could have as well used a notion such as "treadmill dynamic," in which one species, being chased by another, needs to run as fast as it can to remain where it is. Once it stops, the treadmill will take it straight to the pursuer, which in turn will drive it to extinction. Instead, they decided to use Lewis Carroll's Red Queen. As Lively explains in detail, this choice was by no means accidental; in fact, it was the only choice possible within the context of the evolutionary interaction between parasites and their hosts. The following lengthy quote is from Lively's "A Review of Red Queen Models" which explains the reason behind this choice. Lively begins by summarising the plot, incorporating certain evolutionary elements in his text:

> Alice decides that it would be easier to see the garden if she first climbs the hill, to which there appears to be a very straight path. However, as she follows the path, she finds that it leads her back to the house. When she tries to speed up, she not only returns to the house but also crashes into it. Hence, forward movement takes Alice back to her starting point (Red Queen dynamics) and rapid movement causes abrupt stops (extinction).
>
> […] When Alice spots the Red Queen, she begins moving toward her, but the Red Queen quickly disappears from sight. Alice decides to follow the advice of the rose and go the other way (I should advise you to walk the other way). Immediately she comes face-to-face with the Red Queen. […]
>
> The Red Queen then leads Alice directly to the top of the hill. Along the way, the Red Queen explains that hills can become valleys, which confuses Alice. Already, in this world, straight can become curvy and progress can be made only by going the

[8] Curtis M. Lively, "Parasite-Host Interactions," 291.
[9] Curtis M. Lively, "Parasite-Host Interactions," 292.

> opposite direction; now, according to the Red Queen, hills can become valleys and valleys can become hills. (Adaptive landscapes can move under frequency dependent selection.) At the top of the hill, the Red Queen begins to run, faster and faster. Alice runs after the Red Queen but is further perplexed to find that neither one seems to be moving. When they stop running, they are in exactly the same place. Alice remarks on this, to which the Red Queen responds: "Now, here, you see, it takes all the running you can do to keep in the same place." And so it may be with coevolution. Evolutionary change may be required to stay in the same place. Cessation of change may result in extinction.[10]

What we have above is a very interesting interpretation of the classic literary text from the perspective of evolutionary biology. The behaviours of the character – Alice's failed attempts to get to the garden – are read as manifestations of phenomena recognised by natural science, in which forward movement is cyclical in nature, while rapid changes lead to rapid crashes, i.e. extinction. Livey reads the novel as if it were governed by rules of his discipline: valleys can become hills not because such is the fanciful creation of the world reflected in the looking glass, but because these are "adaptive landscapes" and as such, they are governed by "frequency dependent selection." *Through the Looking Glass* (1871), is indispensable to explain the complexity of the evolutionary concept of the time-lagged, frequency dependent selection, but at the same time, it is being thus interpreted. This is the reason why I think the idea of convergent solutions not only applies in this case but also proves a valid strategy in approaching works of fiction in general. Here the original Victorian text which has no apparent connections to life sciences is re-examined within the context of the newly established theory, and re-interpreted to conform to the scientific criteria it underlay. Lively uses the literary text very much like his standard objects of study, and applies the same interpretive tools, with convincing enough results. What is more, in doing so, he offers, even if unintentionally, an alternative route of interpretation, of Carroll's novel in particular, but also of other works of fiction. Following this lead, in which an idea that originates in a

[10] Curtis M. Lively, "A Review of Red Queen Models for the Persistence of Obligate Sexual Reproduction," *Journal of Heredity*, No. 101 (2010), (Supplement 1), S14.

literary text is discovered by science and thus becomes a useful interpretive instrument, the following section of the chapter will focus on Valerie Curtis's theory of disgust and its (re)application to literature.

The Story is Only Just Beginning. Parasite Avoidance Theory

In 2013 Valerie Curtis, an anthropologist and Director of the Hygiene Centre at the London School of Hygiene and Tropical Medicine, published a book which collects years of studies, observations and conclusions concerning such issues as hygiene, sanitation, parasites and human behaviours related to those, especially disgust. Although not even 130 pages long, *Don't Look, Don't Touch*. *The Science Behind Revulsion*[11] offers some innovative ideas on the sources of disgust seen from the evolutionary perspective. Curtis presents them through the introduction of the so-called PAT, Parasite Avoidance Theory, which she puts forward within different – but, as she argues, interrelated – contexts: biological, behavioural, social, moral. In her work, she argues that biology-originating emotion[12] of disgust was the basis of the culture-derived disgust as a response to a range of human behaviours: from lack of manners to acts of violence and transgression. She pays particular attention to three disgusts: microbe, manners and moral. The majority of her examination of the subject is the search for the answer to the question whether the same emotion is being felt when someone sees a cockroach (microbe disgust), when someone watches another person picking their nose (manners disgust) and when a person learns that their close friend is a serial adulterer (moral disgust).

[11] Valerie Curtis, *Don't Look. Don't Touch. The Science Behind Revulsion* (Oxford: Oxford University Press, 2013).

[12] Disgust is defined in the *Oxford Dictionary* as "[a] feeling of revulsion or strong disapproval aroused by something unpleasant or offensive," authors of studies of disgust conventionally refer to it as "response" or "emotion." See for instance Paul Rozin, Jonathan Haidt and Clark R. McCauley, "Disgust," in: *Handbook of Emotions*, eds. Michael Lewis, Jeannette M. Haviland-Jones and Lisa Feldman Barrett, 3rd Edition (London, New York: Guilford Press, 2008), 757-776. "Disgust," in *Oxford Dictionaries*, https://en.oxforddictionaries.com/definition/disgust (21.09.2016).

Although disgust and revulsion are not the primary points of interest in the present work, Curtis's emphasis on the role parasites played in the development of instinctual disgust which in turn led to the establishment of all other societal norms seems vital in the dissertation devoted to the topic of parasites and parasitism. Moreover, her interpretation of the origins of disgust through PAT is a great example of convergence of ideas: her conclusions mirror those found in the nineteenth century works of literature which have been discussed here. Thus, Valerie Curtis's work, in more ways than one, serves as a bridge connecting various narratives presented throughout this dissertation. The following section of the chapter will be devoted to reading PAT in different contexts and subsequently to comparing them with ideas already present in Victorian novels.

While doing research work in India, Curtis asked a number of teenage girls to write essays on the topic of disgust. From these essays, she extracted all things disgusting, or disgust elicitors, and listed them at the beginning of *Don't Look, Don't Touch*. The list is quite interesting. Semantically, the disgust-related notions travel from the expected bodily fluids and certain animals to such culture specific concepts as "touching someone of lower caste," "kissing in public," and "betrayal."[13] From the sample results of a relatively small and non-diverse research group Curtis is able to infer that while some disgusts seem based in biology and thus appear universal, other are specific to a given culture and therefore – she assumes – must vary throughout cultures. As the departing point, the list serves as a very good example of the extent – perhaps not realised – to which disgust and its consequences permeate our everyday life. "Disgust," Curtis notes, "is a thread that is woven right through our individual and our social lives; indeed, without this thread societies would fall apart."[14] It is only natural then that she asks about the origins and functions of this omnipresent thread.

[13] Curtis, *Don't Look. Don't Touch*, vii.
[14] Curtis, *Don't Look. Don't Touch*, x.

From the very beginning of her study, she rejects disgust theories and explanations offered by sociological and psychological sciences which subscribe to the view that disgust originates in culture: such as the Freudian idea that the upright posture is the source of morality – because, as Winfried Menninghaus succinctly summarises, "[w]alking upright represents a break with the interrelation of smell, excretion, and sexuality that is characteristic of animals, and it transforms even the memory of the formerly libidinous fusion of nose, eye, sex, and anus into an 'internal sensation' that is 'analogous to disgust.'"[15] Curtis also disagrees with Mary Douglas who in her *Purity and Danger* (1966) presents her theory of social order based on the "pure-impure" division,[16] which Curtis notes, "entrenched this view of disgust as product of culture."[17] Moreover, Curtis dismisses the "orthodox" idea that disgust has oral origins; the source of this notion she identifies as Charles Darwin's *The Expression of the Emotions in Man and Animals* (1872).[18] This seems to be the case with the established scholars of disgust: Paul Rozin, Jonathan Haidt and Clark McCauley who in the overview of their studies state that "[t]he proposed origin [of disgust] is the rejection response to bad-tasting foods, even though taste in the mouth ultimately has little to do with the emotion of disgust. However, oral rejection remains an organizing principle of disgust reactions […]."[19] The reason for her blanket rejection of these theories is, on the one hand, because "all of them propose convoluted explanations of disgust, and all give short shrift to biological explanations,"[20] but more importantly, because in her understanding of disgust she assumes not only that it predates culture, but that "its origin must predate humans […], and it must serve to defend all of the portals of the body – the

[15] Winfried Menninghaus, *Disgust: Theory and History of a Strong Sensation*, trans. Howard Eiland and Joel Golb (New York: State University of New York Press, 2003), 185-186. Mennighaus quotes here Sigmund Freud's "Fragments of an Analysis of a Case of Hysteria."
[16] Mennighaus, *Disgust*, 96.
[17] Curtis, *Don't Look. Don't Touch*, 14.
[18] Curtis, *Don't Look. Don't Touch*, 14.
[19] Rozin, Haidt and McCauley, "Disgust," 763-764.
[20] Curtis, *Don't Look. Don't Touch*, 19.

skin, the airways, the genitals – from infection, not just the mouth."[21] She explains her task thus, providing an elegant proof of the relevance of her book to the science-as-narrative problem:

> The story of disgust needs to be retold, this time from the start, and in the right order. Therefore this book starts with disgust's ancient function as a system that bestows on animals the ability to avoid parasites – those ubiquitous body snatchers that hitch lifts and sneak free lunches from their hosts. As the story unfolds we see how invertebrates, vertebrates, mammals, and primates evolved the behavioural capacities needed to deal with threats from parasites and pathogens. Parasite avoidance behaviour is everywhere in the evolutionary tree of life; humans are but one branch, with more in common with out animal cousins than we like to think.[22]

Although obviously read from the scientific perspective, to Curtis the story of disgust is a story nonetheless – although fable would be more precise, considering her emphasis on the educational element of the narrative, – and parasites are again its anthropomorphised villains. Because of that, they are described in a way which is both attention-grabbing and truthful. Carl Zimmer's account of the jewel wasps from the previous chapter proves how accurate the expression "body snatcher" really is. We also know already that parasites do "sneak free lunches," and this phrase immediately opens the figurative meaning of 'parasite' enclosed in its very name and its origin.

It is also worth noting how Curtis asserts her dominance over the narrative of disgust. Not only does it have to be retold anew, and in the right order, but it is she, and none of her disgust-studying predecessors, who is going to do this. Although she claims that the story unfolds (implying that it does so by itself), she is the one doing the unfolding; having in fact folded the narrative to her liking beforehand. What we have here is not *the* story of disgust; it is Curtis's story, told in the *right* order, from the *right* point in time. She does have

[21] Curtis, *Don't Look. Don't Touch*, 14-15.
[22] Curtis, *Don't Look. Don't Touch*, xi.

competence and confidence to tell it, but since it is only *her* story, we are allowed (if not invited) to interpret it to our liking, or even reject altogether.

In Curtis's story, parasite avoidance behaviour, which is the cause of disgust, goes as far back as life itself. Once again, we are being persuaded of the vital importance that parasites play and have played in the life of humans. Just like parasites explain sex in the Red Queen Hypothesis, so they explain disgust in Curtis's Parasite Avoidance Theory. In its scope, Curtis's theory becomes an all-encompassing system within which there is answer – or a possibility of an answer – to anything, despite it being a scientifically viable, falsifiable theory whose tests can be reproduced to provide the same results.[23] For the things that cannot be answered from the perspective of the animal kingdom, an additional storyline is introduced to the narrative of disgust:

> Humans, however, have also developed some special capacities that are beyond other animals. We are probably the only species that can track parasites by using our imaginations – by conjuring pictures of spreading waves of contagion in our minds. We are probably also the only species to be able to imagine ourselves being disgusted in the future. […] Humans are also the only species with manners – sets of behavioural rules that protect one another, the absence of which occasions disgust and the punishment of the offender. Finally, humans have found a novel use for disgust: employing it to punish social parasites – shunning and excluding the thief, the abuser, the cheat from society. Recent experiments suggest that disgust may have played a fundamental role in the evolution of morality. Moral disgust has a strong claim to be essential to the human ability to cooperate on a mass scale, which is the main reason that *Homo sapiens* is such an exceptional and successful kind of animal.[24]

Curtis collapses the barrier between disgust as the evolutionary system warning against biological dangers such as the revulsion towards putrid smells that betoken the risk of infection, exhibited by humans and higher animals alike, and the disgust as the corrective measure of the maintenance of social system. In the first instance, we are the ones

[23] At the end of her study, she includes the so-called London disgust scale, which can be used individually or in a larger group to test the levels of disgust and its specific triggers. Curtis, *Don't Look. Don't Touch*, 185-189.
[24] Curtis, *Don't Look. Don't Touch*, xi-xii.

experiencing disgust, but in the second case, we obey the social manners so that other people would not be disgusted by us. To that she adds moral disgust which – although nominally identical with its evolutionary and manners-related counterpart – is not related to biology in the strict sense but is aimed at people who are given the name of the most disgusting creatures of zoology: parasites. In the above quote, Curtis speaks of social parasites, those who exploit the society, so the expression is used in its figurative sense.

Let us focus on the biological and moral disgusts for a moment. Both are adopted with the express need to counteract biological parasites. When it comes to these creatures, the most efficient, and perhaps reasonable, approach is to avoid them; as is generally accepted, it is always better to prevent than to cure; hence such precautionary behaviours as avoiding close contact with the sick or abstaining from consumption of suspicious food. The same strategy, strangely, can also be applied to social parasites that cause moral disgust. Although they cannot be avoided in the same way because, even if being denoted parasites, they are people, and therefore are part of the social system, still the idea of avoidance is inscribed in their treatment. They are punished and isolated – shunned and excluded – on the same principles. Those two kinds of parasites nonetheless differ fundamentally, in a way that has been alluded to in the present work on numerous occasions. When biological parasites are described – just like Curtis does it here – as body snatchers that invite themselves to free lunches, such images maintain and reinforce the idea that they do it out of their own volition. We tend to forget, perhaps because of the assumed analogy with the social parasites, or such metaphorical parasites as Dickens's Skimpole that biological parasites do not possess free will to act as they like. Their behaviour is evolutionarily conditioned and compulsive. If they did not behave in such a way, they would not be parasites. Social parasites, such as thieves, abusers or cheats, on the other hand, are an entirely different story. Although they suffer

punishment and exclusion, their behaviour must be just beneficial enough to explain their choice of a lifestyle. For this is undoubtedly a choice, not a biological necessity.

Curtis concludes her introduction to PAT with the following words:

> Disgust lurks on the dark side of human nature, rearing its ugly head in bullying; cruelty; class hatred; the exclusion of the sick, the aged, and the disabled; homophobia; racism; war; and genocide. Disgust can all too easily be turned on others and used as a weapon. Disgust teaches us wider lessons too; it tells us something about the nature of emotions – where they come from, what they are for, how they work, and how they shape our behaviour as individuals and in groups. Disgust has an irresistible story to tell about what it means to be human.[25]

A lot of what Curtis writes here about disgust echoes the sentiments presented in Chapters III and IV and the stories of parasitical origin. The issue of personal responsibility for infection, behaviours transgressing social taboos, or even geographical location of human hosts of tropical parasites are reflected in Curtis's tale of disgust. To call someone a parasite within the context of the present work is tantamount to calling somebody disgusting: it tells us a lot more about the caller than the called. Both "the parasite" and "the disgusting" stand for the things that are undesirable inside the system (being the social order or biological organism); things which are believed – rightly or not – to have the power of weakening, overriding, or even disintegrating the system. Both thus could be used interchangeably as the names for the "other".

In her conclusions Curtis is forceful and unequivocal:

> For us [the scientists exploring disgust from the evolutionary perspective] there is a simple and parsimonious solution to the puzzle of disgust: disgust systems evolved to defend animals from attack by parasites; the tiny, usually invisible, predators that attack by stealth and eat their hosts alive. It is a brain system that orchestrates behaviour in the direction of pathogen avoidance – whether the pathogens are in the environment, in other animals, or, especially, in other humans. It prevents the entry of pathogens through multiple portals: the skin, the airways, and the genitals, as well as the mouth. No magical folk beliefs, Freudian repression, or existential denial of death is needed to explain disgust.[26]

---

[25] Curtis, *Don't Look. Don't Touch*, xii.
[26] Curtis, *Don't Look. Don't Touch*, 19.

Of course, the disgust she refers to here is the disgust that has roots in biology, not the disgust of the moral kind. Such a view may immediately trigger objection of reductionism and misnomer. While the microbe disgust seems the most natural reaction, it becomes increasingly more problematic to employ such a basic emotion to such complex issues. Curtis is aware of that, and in the section devoted to moral disgust, entitled "Is Moral Disgust Really Disgust?," she notes clearly: "Though it makes a good story, this is still just a story."[27] It is her hypothesis based on her interpretation of scientific data, which we can accept or reject. In her presentation of the three disgusts, only the microbial version is an independent, self-sustaining, convincing idea; the following two are based on it and each other, in a way that is to mirror the evolution of *Homo sapiens* and their society. There is no manners disgust without the microbe disgust, and consequently, there is no moral disgust without manners disgust. Curtis suggests that the strongest connection between the morally disgusting acts – such as murder, cannibalism or rape – and the microbe disgust amounts to the appearance of known biological disgust elicitors: bodily fluids. But, as she says, it still is only a story, or an interpretation.

Curtis shows here how the aforementioned retelling of the story of disgust will proceed. Firstly, she goes against the predominant paradigm of disgust studies according to which mouth is the most vital orifice through which human disgust is channelled, as maintained by the aforementioned scholars of disgust Rozin, Haidt and McCauley. Secondly, she maintains the impression of parasites as agents of infection, "animals [that] climb on board, worm their way in, and stow away […], feast on a smorgasbord of tissues and bodily fluids."[28] On the one hand, such a hyperbolic (but figurative) description produces an undesirable image of creatures evolved enough to be aware of action on their biological

[27] Curtis, *Don't Look. Don't Touch*, 86.
[28] Curtis, *Don't Look. Don't Touch*, 21.

urges in the most cunning way. On the other, however, it gives a powerful, and in many ways accurate, idea of the potency and power parasites have over their hosts, humans included.

It all leads to a side note which to a certain extent suggests the broader application of the idea of convergence of concepts than expected. Curtis reiterates the truth which is obvious to the world of natural scientists but which perhaps is not appreciated by general public: "Every free-living animal is a seething mass of parasites."[29] Within her definition of the free-living animal, there is of course the top spot reserved for humans. Such an assertion, however, provides a great complication in the definition of human being. Because every single human being is always a host of parasites, they must be considered the integral part of every person, which in itself proves a difficult truth to accept. However, the discomfort may rise significantly once the full realisation of the impact of the results of the scientific studies sinks in. In Chapter II, I use the definition of parasite from the twenty-first century textbook on ecology in which an overwhelming majority of all living forms are regarded as parasites. This means that this definition includes all known species of viruses, and many species of bacteria, fungi, and higher organisms. In the definition, the rough estimate is that 30-50% of described animals are parasitic, either permanently or for a limited time. In itself, this definition does not really seem to have any functional significance for human lives. We are aware that *some* people might harbour tapeworms, or lice, or suffer from malaria, but this awareness in a way limits our understanding of parasites as actual rulers of life on earth (Zimmer's title *Parasite Rex* is spot on in this respect). Here is also where the actual cognitive problem arises: parasites are not just the problem of *some* people, they are a fact of life of *all* people. In terms of quantities, they outnumber us in ungraspable proportions.

Let us for a moment indulge in a small thought experiment. First, we have to make an assumption which is inaccurate but which will illustrate the scale of parasitical power over

[29] Curtis, *Don't Look. Don't Touch*, 22.

humans; the assumption is that bacteria have roughly the same weight as an average cell in human body. Now, let us take a random human being, from whatever background, geographical or social, and weigh them. For the sake of the experiment, let us say that our random human being is a middle-aged man who weighs eighty kilograms precisely. The obvious assumption is that all of these kilos are all the mass that constitutes our subject. But what does this number, eighty, mean exactly? It is the sum of all the weight of the things that make the person: his organs, skin, bones, muscles, blood and other tissues, etc. But there is more to this man than these bodily components: when we weigh his gut, we are also weighing the bacterial flora inside; when we weigh his skin, we are also weighing the microscopic creatures living on it. When we make the person step on the scales, the eighty on the clock does not mean just him, but all the creatures that he carries on and in him as well. Perhaps a significant number of people realise the existence of bacterial and other microscopic organisms in our bodies. Perhaps they are also willing to accept that these microorganisms all put together may be of quite some weight. But how much is quite? A kilogram; two kilograms? More? How would our subject react if we informed him that all the parasites he carries on and in his body weigh as much as forty kilograms? I suspect that he would not believe us. And yet, within our initial bacterium-human cell weight equality assumption, it is a fact.

It used to be believed that, excluding viruses and other parasites, bacteria alone living in/on a human body outnumbered the host's cells 10 to 1. The newest calculations state that in fact the ratio is more or less 1:1.[30] In our thought experiment, bacteria cells have the same weight as an average human cell, which is simply wrong: bacteria are on average, much smaller, and thus they would not reach the forty-kilogram weight. Nonetheless, it still

[30] Tina Hesman Saey, "Body's Bacteria Don't Outnumber Human Cells So Much After All," *Science News*, Vol. 189, No. 3 (2016), 6. Available at: https://www.sciencenews.org/article/body%E2%80%99s-bacteria-don%E2%80%99t-outnumber-human-cells-so-much-after-all (24.05.2016).

illustrates the scale of parasite dominance over humans. About a half of every person is not really the person. The fundamental question of parasitology: what is self and what is not self?[31] becomes even more complicated in this respect. Moreover, the 1:1 ratio gives rise to two more essential questions answers to which are both difficult and carrying a disturbing suggestion. The first of them is whether parasites make us only half the people we are. The other, arguably even more uncomfortable, is whether they actually *make* us who we are.

Perhaps Curtis was too quick to cast aside the explanations of disgust offered by psychoanalysis and cultural studies. They do not fit in terms of the origin of disgust she proposes but they offer explanations of the human nature which could be considered alongside the biological theories. If within the definition of a human being the place for the darker, more basic and animal side is made, then humanities as well as natural sciences can venture theories of disgust originating from it. Curtis presents the state of the art research through which we learn of the constitutional ambiguity of a human being. She would most probably also reject Julia Kristeva's approach to disgust (or "abjection") since she clearly subscribes to the mouth-origin theory: "Food loathing is perhaps the most elementary and most archaic form of abjection,"[32] but when Kristeva notes that [i]t is thus not lack of cleanliness or health that causes abjection but what disturbs identity, system, order. What does not respect borders, positions, rules. The in-between, the ambiguous, the composite,"[33] she is much closer to the explanation of the unknown within, as well as to those of the complementary nature of parasites. The theories of the psyche also accounted for this ambiguity, albeit on the mental, figurative level, very much like the nineteenth-century fiction suggesting concepts which resurfaced over a hundred years later in the stories of

[31] Paul Schmid-Hempel, "Parasites –The New Frontier: Celebrating Darwin 200," *Biology Letters*, Vol. 5, No. 5 (2009), 625.
[32] Julia Kristeva, *Powers of Horror: An Essay on Abjection*, trans. Leon S. Roudiez (New York: Columbia University Press, 1982), 2.
[33] Kristeva, *Powers of Horror*, 4.

parasitology. Modern science goes through the detour of researching and testing, and arrives at concepts that appear analogous to those suggested by literature and culture decades earlier. The "magical folk beliefs, Freudian repression, or existential denial of death" which Curtis deems irrelevant in her scientific line of reasoning may be helpful in accounting for the un-human element of every person, offering insights into the ways humans become humans.

Having described the ways in which various animals avoid parasites – from the descriptions of insects building latrines to birds fumigating their nests with aromatic herbs[34] – Curtis makes the following remark: "Those behaviours are uncannily familiar, and the language used to describe animal disease avoidance is taken from the vocabulary of human behaviour."[35] Those behaviours are uncannily familiar *because* they are described with the use of familiar vocabulary. There is really no need to write that "[t]ermites and some species of ants use their frass […] for manuring their fungus gardens"[36] but this is the accepted custom of writing about animals, inside and outside of scientific context: anthropomorphic descriptions are interesting, attention-grabbing and compelling. This practice is so everyday that it escapes conscious recognition; Curtis is surprised at the appearance of vocabulary of human behaviour in descriptions of animal behaviour, but she should not be: after all, she was the one to show exactly those examples that fit the anthropomorphic style.[37] These rhetorical devices, employed consciously or not, appear throughout *Don't Look. Don't Touch.* When describing animal manifestations of disgust, she refers to the disgust-causing agent as "offensive," laying the path for the later explanation of manners- and morals-based disgust.

---

[34] Curtis, *Don't Look. Don't Touch*, 35-37
[35] Curtis, *Don't Look. Don't Touch*, 39.
[36] Curtis, *Don't Look. Don't Touch*, 35.
[37] On the other hand, drawing from her anthropologic background, she sometimes switches registers to talk about deodorants for teenagers being advertised as "mating aids." In her study, she uses human-related vocabulary to talk about animal behaviour and animal-related vocabulary to talk about humans. Curtis, *Don't Look. Don't Touch*, 46.

To Curtis, every human interaction is an exercise in "trade-off calculations"[38]; every time we meet another person we make an unconscious decision whether the potential benefits of the contact will outweigh the potential costs. Thus, manners are a specifically devised social tool which acts as a safety cushion during the exchange: on the one hand, minimalizing the risk of person-to-person pathogen transmission, on the other showing the value of the exchange. In Curtis's reading of manners, she uses the same practice that is used in literary interpretation: she looks at human behaviours as if they were a story open to various readings. Using cutlery and individual instead of communal plates, not reusing of toilet paper or expecting to be given a fresh, unused paper cup in a coffee shop: all of these instances (and many more) she interprets as PAT-derivative manners. If one values the contact with another person, they might share the same water bottle, for instance. In such a case, the benefits one derives from the friendly relation outweigh the risks of infection. This may change, if for example, one of the persons has visible lesions on their mouth, but according to Curtis, in such circumstances, the infected person will politely abstain from sharing the bottle. Manners are supposed to work in both ways[39] because they are the expression of policing and self-policing of hygiene.[40]

Finally, she lays the foundations for the moral disgust thus: "By being continent with bodily fluids as not to inflict our parasites on others, by investing time in learning the local conventions, and by making an effort to be courteous in small things, humans can demonstrate their ability to control their own greed, their readiness to put the needs of others before their own, and their willingness to invest in their social group."[41] Those members of society who do not follow these rules, do it at a risk of being branded as "social parasites" who have to put up with social "disgust and shame [which] operate to prevent and punish

[38] Curtis, *Don't Look. Don't Touch*, 63.
[39] Curtis, *Don't Look. Don't Touch*, 62-65.
[40] Curtis, *Don't Look. Don't Touch*, 68.
[41] Curtis, *Don't Look. Don't Touch*, 74.

lapses in […] these kinds of manners."[42] She concludes her section on moral disgust with this observation:

> My current hypothesis is that all moral failings (i.e. defections from doing one's bit for society) occasion disgust, but that there are two categories of moral failings that have an extra-disgusting component: those that involve organic disgusts (acts of violence involving bodily fluids like rape, child abuse, murder, genocide, and torture), and those that involve social parasitism (like the Ancient Greeks who begged bread at the temple when they did not need charity, who gave the name to parasites.)[43]

Where does literature find itself in the discussion of manners, morals, microbes, PAT, disgust, shame and societal norms? If literature, as other manifestations of culture, is wired to the collective cultural brain, the great depository of all the information, "providing cultural maps that we use to navigate the dangers of hidden pathogens,"[44] its function is to a certain extent reduced to its informative and educational value. Curtis believes that "[m]oral systems reside, not just in innate pro-social motives and learnt behaviour patterns in our heads, but also outside them – in the heads of our parents and our role models, on stone tablets, in religious books and codes of law, and in novels, films, soap operas, newspapers, and tweets."[45] While this view of literature is greatly reductive, the existence of some educational elements in plots is also true. Moreover, taken that the entire body of the present work is an exercise in some reduction of literature, which is here used as a source of metaphors being interpreted as related to parasites, Curtis's view comfortably lies within this approach to literature.

Curtis spins a story of disgust in three instalments, or chapters. Yet, as she reminds us, "all good stories should have a moral. They should teach us a lesson – help us to learn something that we can take away and use."[46] Disregarding the controversy that a moral is a

---

[42] Curtis, *Don't Look. Don't Touch*, 76.
[43] Curtis, *Don't Look. Don't Touch*, 91.
[44] Curtis, *Don't Look. Don't Touch*, 53. Section "Culture: The Collective Brain," 53-59.
[45] Curtis, *Don't Look. Don't Touch*, 83.
[46] Curtis, *Don't Look. Don't Touch*, 94.

prerequisite for a story (or a fable) to be "good," it is clear that her view of literature is purely functional. Just like the science writers mentioned in Chapter II created fable-like scientific narratives, so does Curtis evoke the characteristic feature of this genre, i.e. its didactic purpose. She explains how understanding of reasons behind the three disgusts may prove beneficial in disease diagnoses, building societies that are more attentive to the disadvantaged and fairer in organisation, and generally in creating "better human beings."[47] She believes that something she calls "moral progress" is possible: "

> This progress has come from expanded economic links, trade, and communication, from storytelling, to TV, literature, and art; all products of the group imagination. Amazingly, for most of our history, humans probably thought of neighbouring tribes as different species. Science and art has now proved this to be wrong. We now know that we are all one. Strangers are no longer seen as less than human, to be disregarded, exploited, or treated as contaminated parasites. They are, instead, people like us.[48]

Science and culture have taught the contemporary, twenty-first century human being that sometimes the evolutionary-conditioned reaction to the other is not necessary, or even injurious not just to the other, but the self as well. This dissertation has traced the way of this progress before the change of the disgust-related paradigm. The previous chapters show the other as a parasite: in animal and human form alike, in science and literature. And since the principle of convergence is still being argued here, Curtis's optimistic belief in the moral progress may be questioned by the final examination of the literature-originating ideas that were later employed by science.

The following sections of this chapter will revisit the novels discussed previously and examine them for some of the ideas presented in Curtis's study. They will be divided according to the four methods of avoidance she mentions, which are true both in the case of animals, and humans: avoiding close contact with their own species, avoiding close contact

[47] Curtis, *Don't Look. Don't Touch*, 95.
[48] Curtis, *Don't Look. Don't Touch*, 117-118.

with other species, avoiding things and places that may be contaminated, and modifying the environment to discourage parasites,[49] with the intention of providing evidence in favour of the concept of convergence of literature and science.

The Story of Strange and Familiar Parasites

As Curtis mentioned above, every exchange between members of society is a trade-off between the positive benefits and negative costs. This is especially true of strangers whose presence may prove disadvantageous to the whole community. Eliot's *Middlemarch*, is a perfect social sample in Curtis's anthropological understanding. It presents a society ruled by official governing bodies but also by gossiping busybodies, and it is their combined effort that keeps the community in order. Here, every member of society is being constantly tested and examined under the lens of conventions and common decency, and if they are found deficient in some respect, the tools of social punishment are employed as a corrective measure. This is especially true of the newcomers who must be carefully vetted before being accepted into the society.

In Chapter II two potential balance-disrupting strangers are considered: Lydgate and Ladislaw. According to Curtis's anthropological study, if a newcomer wants to be accepted by the new surroundings, the most efficient way for them to adopt is to bring some value, in other words, to prove one's worth and usefulness in their new home, and secondly, to adopt local customs and try to blend in. This is precisely what Lydgate does; when the narrator notes that "Middlemarch […] counted on swallowing Lydgate and assimilating him very comfortably"[50] these words express the collective plan of the town's society as well as his own wish. Although he is a stranger whose previous history in unknown, he seems to pose very little risk in the way of infection or contamination, especially when the advantage of

[49] Curtis, *Don't Look. Don't Touch*, 24-38.
[50] George Eliot, *Middlemarch* (Ware: Wordsworth Editions, 2000), 128.

his profession is taken into consideration. His subsequent actions only confirm the wisdom of the community in accepting him, as very soon he becomes one of them, marrying into one of the Middlemarch families, and effectively treating the town patients. The situation of Will Ladislaw, a stranger who arrives in the town at around the same time as Lydgate, is different, however. Will's presence from the outset is met with resistance and later with open rejection. But his manners also differ from those exhibited by Lydgate. Ladislaw is presented as a risk factor: on the one hand, he cannot offer the benefit of a useful profession, on the other, he actively refuses to fit in, causing irritation and discomfort in some social circles. His behaviour is a cause of speculation, especially once his animosity with Mr Casaubon is discovered. His presence in the neighbourhood is granted only because of the authority of Mr Brooke, and although he cannot stop the disapproval of the society, he is powerful just enough so that his decision to support Ladislaw is respected. Eventually, Will, just like Lydgate, is also swallowed and assimilated, although less comfortably.

Middlemarch is a great literary example on which the idea on moral disgust can be studied. Moral disgust, according to Curtis, is the treatment the cheats of the system and its exploiters, those possessed by greed and those without consideration for other members of community, are given by the collective punishing hand. Chapter III examined how one of the characters, Mr Bulstrode, first wormed his way into the community, passing easily through its security gate, and then was exposed and consequently punished for his moral failings. The same corrective yet much subtler function of the community is shown on the example of Fred Vincy and his evolution from a selfish pleasure-seeker to a responsible and worthy member of society. In many respects, Fred Vincy may be perceived as the true hero of *Middlemarch* in terms of his social and personal evolution. At the beginning of the novel, he could indeed be referred to as *the* egoist[51] of *Middlemarch*: concentrated on his pursuit of

[51] Bernard J. Paris devised an extensive list of "typical features of Eliot's egoist" many of which characterise young Vincy: he "sees all things in their relation to self," "tends to assume that the order of things corresponds

instant gratification, disregarding other people's feelings and, though metaphorically, robbing hard-working people of their money: when his means do not suffice, he asks for financial help "the poorest and the kindest"[52] of people, and subsequently proceeds to disappoint them. The moment of realisation that his debt cannot be repaid proves a turning point in his life: he begins to feel shame and remorse, the first step of his way toward becoming a worthy person. His recognition of the true meaning of the debt is facilitated by Mrs Garth:

> she had made Fred feel for the first time something like the tooth of remorse. Curiously enough, his pain in the affair beforehand had consisted almost entirely in the sense that he must seem dishonourable, and sink in the opinion of the Garths: he had not occupied himself with the inconvenience and possible injury that his breach might occasion them, for this exercise of the imagination on other people's needs is not common with hopeful young gentlemen. Indeed we are most of us brought up in the notion that the highest motive for not doing a wrong is something irrespective of the beings who would suffer the wrong. But at this moment he suddenly saw himself as a pitiful rascal who was robbing two women of their savings.[53]

The suggestion of shame is first instilled by Mrs Garth's practical approach towards remedying the financial situation of her family. What she does at this point, is setting the debt in a broader, communal context, making Fred suddenly realise that his reckless actions have more than just personal consequences: apart from changing their opinion of him, the Garths might have to change in other, unforeseen by him, ways to adapt to their suddenly worse economic situation. When Mary later tells him straightforwardly: "I should be ashamed to say that I loved a man who must always be hanging on others, and reckoning on what they would do for him,"[54] she only reinforces the message her mother fed Fred a few

---

to the desires of the mind," he believes that things that he desires must come to him because he desires them and he is worthy of them; he "sometimes has the illusion that other must want to do what he wants them to do." Moreover, at least initially, "[t]he feelings of others are given no importance." And finally, although he fashions himself the master of his fate, he is "truly at the mercy of circumstances," while "his desires more often frustrated than fulfilled." Bernard J. Paris, "George Eliot's Religion of Humanity," in: *George Eliot. A Collection of Critical Essays*, ed. George R. Creeger (Englewood Cliffs: Prentice Hall, 1970), 26-27.

[52] Eliot, *Middlemarch*, 191.

[53] Eliot, *Middlemarch*, 205-206

[54] Eliot, *Middlemarch*, 211.

hours earlier. The shock of realisation in Fred's case is two-natured: not only is his conscience burdened by the unexpected weight but also his constitution suffers from it and he literally falls ill. There can be little question of the psychosomatic character of his illness but it is also a turning point in his life. At the end of his evolution, Fred emerges a changed man: worthy of Mary's hand, hard-working and "unswervingly steady,"[55] fulfilling the assumption that one can overcome one's egoism by hard work and with help of one's betters. The role the society plays in Fred's transformation is explicit. Symptomatically, the people who help Fred find his place in the world are themselves highly moral and hard-working: the Garths and Camden Farebrother, who himself could easily be called the best and kindest man to appear in *Middlemarch*. Had it not been for their combined efforts, Fred would have undoubtedly fallen again.

The Story of Unhuman Parasites

While in *Middlemarch* even the characters that may be interpreted as parasites are still considered kin, in the sense of being equal with the natives of the town, both in terms of their humanity and usefulness for the community, no such courtesy is granted to the London slums inhabitants from *Bleak House* or to the exotic others in *The Sign of the Four* and *The Beetle*. The parasite-like characters in Dickens's novel could be placed on the dividing line between human and non-human, but also between 'us' and 'them.' The poor are shown as barely meeting the definition of people, and the kind of disgust they may inspire through Curtis's perspective would belong to the microbial kind. Dickens, however, emphasises repeatedly the interconnectedness of their existence with the broader picture of social injustice and the state of the society at large. As it was concluded in Chapter III, the inhabitants of Tom-all-Alone's are the more human, the less human-like they are portrayed. The humanity of Mr

[55] Eliot, *Middlemarch*, 684.

Skimpole, on the other hand, the most obvious and disagreeable parasite of *Bleak House*, is never questioned. The disgust he triggers belongs neither to the microbial nor manners type; his conduct is impeccable: he abstains from being offensive and exhibits great social skills. Yet the response he elicits, not just from Mr Bucket and Esther, but from the readers (and the critics), the disgust of the moral kind they feel towards him, is as strong as it is visceral. In his case, it is not at all difficult to imagine that a person can be half-constituted by a horde of microscopic parasites, but he in fact is a person like any other – and this may be the original source of our disgust. Perhaps Mr Skimpole is so distinctly off-putting because he is so human; he gives us the insight into the depths of the human dark side and makes us realise two very disturbing things: that we might as well see ourselves in it, and that we hate what we see there.

In this section, however, I would like to focus on the instances of the exotic other whose humanity is in some way challenged in the narratives of infection. *The Beetle*, apart from containing such a character, is a particularly fertile text when it comes to providing examples of convergent ideas. On the one hand, it shows some decades in advance the cunning techniques parasites use to overwhelm their hosts. On the other, the novel also includes elements associated with evolutionary parasite avoidance behaviours. As it was discussed in Chapter V, the antagonist of the novel, due to the multi-layered ambiguities surrounding her, always escapes straightforward definition and categorisation. It is even impossible to decide whether the Beetle can be placed somewhere within the binary opposition or outside it, being either male and human or female and animal, or all of these simultaneously. One way or another, there remains but one certainty regarding the Beetle: she inspires fear and disgust. In the novel, a lot of attention is paid to the hideousness of the Beetle's appearance. Here is the first description of the Egyptian mesmerist by Robert Holt (who always sees the Beetle as male):

> There was not a hair upon his face or head, but, to make up for it, the skin, which was a saffron yellow, was an amazing mass of wrinkles. The cranium, and, indeed, the whole skull, was so small as to be disagreeably suggestive of something animal. The nose, on the other hand, was abnormally large; so extravagant were its dimensions, and so peculiar its shape, it resembled the beak of some bird of prey. A characteristic of the face – and an uncomfortable one! – was that, practically, it stopped short at the mouth. The mouth, with its blubber lips, came immediately underneath the nose, and chin, to all intents and purposes, there was none. This deformity – for the absence of chin amounted to that – it was which gave to the face the appearance of something not human – that, and the eyes. For so marked a feature of the man were his eyes, that, ere long, it seemed to me that he was nothing but eyes.[56]

Even outside the horror context in which this character is introduced, this description alone contains a number of aversion elicitors. Yellow skin suggests jaundice, not an infective disease in itself, but a common symptom of other disorders of internal organs. Small skull evokes animal connotations in Holt but it is also a sign of the underdevelopment of the brain. The chinlessness is another indicator of developmental abnormality, as are the unnaturally large eyes. At this point in the plot the Beetle is still presumed to be male but to extend the definition of man to include him in it seems too much of a stretch. Holt hesitates to call him human, and we can hardly blame him. On the other hand, the Beetle's features are grotesque to the point of ridiculousness. Nonetheless, even today someone exhibiting little, bald, yellow tennis ball of a head with gigantic eyes, beak-like nose and puffy lips would be approached with utter apprehension if not downright disgust. The instinctive reaction of fear and repulsion Holt experiences from the very beginning proves valid when the full extent of the Beetle's offensiveness is later exposed. In the course of the novel we learn that the Beetle is the infection incarnate: in her looks as well as in her behaviour – and even in her paraphernalia: just an illustration of a beetle left behind by the villain is enough to put Lessingham into one of his hysterical fits of terror.[57]

---

[56] Richard Marsh, *The Beetle* (London: Penguin, 2008), 17.

[57] The relevant scene in the novel goes as follows:
On the shelf, within a foot or so of where I stood, was a sheet of paper – the size and shape of half a sheet of post note. At this he stooped to glance. As he did so, something surprising occurred. On the instant a look came

The Beetle is an extreme case of a villain which/who may be read through the parasite-related aversion theory. But even within the context of infection literature she is not the only grotesque, pathogen dealing antagonist. In fact, physical or nominative deformity related to the unnatural size emerges as a common motif in this genre but of course it is not specific to it; the strategy of identifying the villain through his/her hideous appearance is used in fiction generally, particularly in fables. A very similar technique of suggesting the villain's pathology through his looks is employed by Arthur Conan Doyle in *The Sign of the Four* when he refers to Tonga, the blowpipe cannibal, to whom a part of Chapter IV was devoted. However, within the context of disgust elicitors, a brief second visit seems warranted.

When Sherlock Holmes tries to find any available information on the dealer of the poisoned darts that killed Bartholomew Sholto, he reaches for the first volume of the gazetteer in which he finds the following description:

> The aborigines of the Andaman Islands may perhaps claim the distinction of being the smallest race upon this earth, though some anthropologists prefer the Bushmen of Africa, the Digger Indians of America, and the Terra del Fuegians. The average height is rather below four feet, although many full-grown adults may be found who are very much smaller than this. They are a fierce, morose, and intractable people, though capable of forming most devoted friendships when their confidence has once been gained. […] They are naturally hideous, having large, misshapen heads, small, fierce eyes, and distorted features. Their feet and hands, however, are remarkably small. So intractable and fierce are they that all the efforts of the British official have failed to win them over in any degree. They have always been a terror to shipwrecked crews,

---

on to his face which, literally, transfigured him. His hat and umbrella fell from his grasp on to the floor. He retreated, gibbering, his hands held out as if to ward something off from him, until he reached the wall on the other side of the room. A more amazing spectacle than he presented I never saw.
'Lessingham!' I exclaimed. 'What's wrong with you?'
My first impression was that he was struck by a fit of epilepsy – though anyone less like an epileptic subject it would be hard to find. In my bewilderment I looked round to see what could be the immediate cause. My eye fell upon the sheet of paper, I stared at it with considerable surprise. I had not noticed it there previously, I had not put it there – where had it come from? The curious thing was that, on it, produced apparently by some process of photogravure, was an illustration of a species of beetle with which I felt that I ought to be acquainted, and yet was not. It was of a dull golden green; the colour was so well brought out – even to the extent of seeming to scintillate, and the whole thing was so dexterously done that the creature seemed alive. The semblance of reality was, indeed, so vivid that it needed a second glance to be assured that it was a mere trick of the reproducer. Its presence there was odd – after what we had been talking about it might seem to need explanation; but it was absurd to suppose that that alone could have had such an effect on a man like Lessingham.
Marsh, *The Beetle*, 90.

> braining the survivors with their stone-headed clubs, or shooting them with their poisoned arrows. These massacres are invariably concluded by a cannibal feast.[58]

Today, with our heightened cultural sensitivity, and our knowledge, we hopefully see the above description for the racist, pseudo-scientific nonsense it is. At the time of publication, in 1890, popular literature – in accordance with Curtis's view – was full of such scaremongering and propagandist images. The Andaman Islanders presented above share very little with people of England in terms of looks and behaviour, and that is precisely the point. In order to justify the practices of the imperial forces in tropical lands, the humanity of their inhabitants must not be just questioned but rather emphatically denied. Here the Andaman Islands are shown as a land of the savage, violent, not only uncivilised but also beyond any hope for achieving the acceptable level of civilisation. They are painted as inspiring terror through their barbarity: as casual murderers and cannibals. On this very topic, Valerie Curtis offers an interesting and relevant remark:

> There are plenty of historical accounts, but it is very hard to find any solid evidence of normal, everyday, culturally sanctioned cannibalism. Though the historical literature is full of colourful tales of cannibal tribes of Africa, the Indies, and the Caribbean […], a closer look reveals how unreliable the accounts are. The typical report of cannibalism goes like this: "Our disgusting next-door-neighbours are uncivilized savages, their women like nothing better than roasted baby, or boiled up visitor, and they sleep around too." Or like this: "Tribe X were uncivilized savages who went around eating each other until we [insert name of colonial power] brought them to order and civilization."[59]

The analogies between the unreliable accounts and the fragment from the gazetteer are visible straightaway. The natives of the Andaman Islands are monsters breaking every taboo, all of which at the same time belong to Curtis's microbial and moral disgust reaction triggers involving bodily fluids and contamination. Whether the revelations of the cannibalism or

---

[58] Arthur Conan Doyle, *A Study in Scarlet and The Sign of the Four* (Ware: Wordsworth Editions, 2004), 162-163.
[59] Curtis, *Don't Look. Don't Touch*, 57. Square brackets provided by the author.

tribal violence are factually accurate is irrelevant; what matters is putting the strong cautionary message across, while at the same time reassuring the public that whichever action is taken to address these issues, is justifiable. Explicit superiority claims are unnecessary when the descriptions of the animal-like barbarity speak for themselves. Therefore, Sherlock Holmes has the convinced readers' full consent to employ any means necessary when dealing with the problem of a single Andaman Islander in London.

The employment of dehumanising descriptions is not exclusive to the Andaman Islanders. In fact, in *The Sign of the Four* even if a villainous character who comes to London is English, he is presented as exhibiting some type of contamination, inhuman change, which may elicit the evolutionary response of avoidance. The history of Jonathan Small proves an example of such treatment. He is an Englishman but for the majority of his life he lives abroad: first in India, and then as a convict, in the Andaman Islands, and his geographical destinations are implied to have played a vital role in shaping him as a person. Unlike Dr Watson – or Conan Doyle himself – who also spent some time overseas, Small is not presented as possessing the kind of imperial mettle which would protect his humanity; instead, each of the episodes he experiences in the course of his life, literally or figuratively, hacks off a small piece of him, leaving him damaged and susceptible to foreign influence. The picture he paints of himself is very unflattering, to say the least, and it elicits minimal – if any – sympathy from the reader. "I was always a bit of a rover […]; when I was about eighteen […] I got into a mess over a girl, and could get out of it again by taking the Queen's shilling and joining the 3rd Buffs, which was just starting for India."[60] We can only guess what mess Small had got into, but we know that whatever it was, he took the least honorary way of getting out of it.

[60] Doyle, *The Sign of the Four*, 187.

Thus, when he arrives in India, he is welcomed by a taste of karmic justice: his accidental encounter with a crocodile costs him a leg and in this way he pays for his previous cowardly action. From this moment onwards, he becomes "a useless cripple" in his own eyes, and such sense of limited self-worth he projects onto his reality. When he is finally captured by Holmes over twenty years later, and having survived the terror of Indian Mutiny, trial for murder and imprisonment in the Andamans, he is not just barely a person he was when he left as an eighteen-year-old, he is barely a person at all. "Twenty long years in that fever-ridden swamp, all day at work under the mangrove-tree, all night chained up in the filthy convict-huts, bitten by mosquitoes, racked with ague, bullied by every cursed black-faced policeman who loved to take it out on a white man."[61] Perhaps Small does not realise it at this point, but the implications of his self-assessment are clear: he can no longer be considered as fulfilling the definition of a white man. Exposed to disease and barbarity which corroded both his constitution and his character, he sends forth messages that trigger the unconscious evolutionary response of repulsion and avoidance. When he describes his escape from the island prison, he includes the account of the murder of a convict-guard: "I sat down in the darkness and unstrapped my wooden leg. With three long hops I was on him. He put his carbine to his shoulder, but I stuck him full, and knocked the whole front of his skull in."[62] Small thus figuratively turns into his cannibal companion, and the final stage of this transformation is confirmed by him clubbing the representative of British officials to death, just like the fierce and hideous cannibals of the Andamans.

The Story of Contaminated Objects

Apart from the propaganda-driven dehumanising descriptions, *The Sign of the Four* also features aversion triggers in the form of foreign objects which may be suspected of being

[61] Doyle, *The Sign of the Four*, 186.
[62] Doyle, *The Sign of the Four*, 201.

infective or contaminated. The most obvious examples of these are Tonga's poisoned darts whose diabolical nature was discussed in Chapter IV. There are also other, less conspicuous objects with the same connotations. One of them is Thaddeus Sholto's hookah. Although a bringer of vital information to Miss Morstan, and generally a decent enough man, all things considered, Thaddeus is presented as a rather disagreeable figure. He is obviously a parody of a decadent dandy for whom "there is nothing more unaesthetic than a policeman,"[63] and who calls himself "a patron of arts."[64] At the same time, he is unpleasant to look at:

> […] a small man with a very high head, a bristle of red hair all round the fringe of it, and a bald, shining scalp which shot out from among it like a mountain-peak from fir-trees. He writhed his hands together as he stood, and his features were in a perpetual jerk – now smiling, now scowling, but never for an instant in repose. Nature had given him a pendulous lip, and a too visible line of yellow and irregular teeth, which he strove feebly to conceal by constantly passing his hand over the lower part of his face.[65]

His features are unsettling and his manner disagreeable but this is only the initial impression Watson makes of him. Later on, he concludes that Sholto is "a confirmed hypochondriac"[66] and perhaps also a drug addict; when Watson listens to his mitral valve, he notes nothing wrong apart from "ecstasy of fear, for he shivered from head to foot."[67] Sholto himself asserts: "I am a little nervous, and I find my hookah an invaluable sedative."[68] He spins his exotic tale, punctuating it by regular puffs on his "overgrown pipe,"[69] but his nervousness never leaves him, and he remains fidgety throughout the narrative.

At the end of his story it is revealed that Miss Morstan is a potential heiress to a considerable fortune, a piece of news Watson does not take in very well. In fact, he is so

---

[63] Doyle, *The Sign of the Four*, 127.
[64] Doyle, *The Sign of the Four*, 127.
[65] Doyle, *The Sign of the Four*, 125.
[66] Doyle, *The Sign of the Four*, 132.
[67] Doyle, *The Sign of the Four*, 126.
[68] Doyle, *The Sign of the Four*, 126.
[69] Doyle, *The Sign of the Four*, 130.

distracted by the prospect of her coming into serious riches that he stops paying attention to the conversation with Sholto, much to the latter's inadvertence. As Watson writes:

> I was dreamily conscious that he was pouring forth interminable trains of symptoms, and imploring information as to the composition and action of innumerable quack nostrums, some of which he bore about in a leather case in his pocket. I trust that he may not remember any of the answers which I gave him that night. Holmes declares the he overheard me caution him against the great danger of taking more than two drops of castor-oil, while I recommended strychnine in large doses as a sedative."[70]

Of course, this fragment is supposed to function as an element of comic relief but it also betrays more sinister undertones to Watson's seemingly passing remarks.

At the beginning of the novel Watson explicitly expresses his unfavourable opinion of drugs, when he observes Holmes injecting himself with cocaine.[71] But it is one thing to reproach a friend who – even if he indeed is an addict – is highly functioning and whose habit does not affect his performance nor his reputation. It is something different altogether when this kind of practice is observed in a clearly disturbed individual. Sherlock is a chemist and his use of various psychoactive substances seems measured and disciplined. Thaddeus Sholto, on the other hand, puffs on his hookah with abandon and without any control; Joseph McLaughlin rightly notes that he could be described as "hooked on the hookah."[72] There are other things he is hooked on: as a self-proclaimed valetudinarian, he takes a number of "nostrums," the function and ingredients list of which we are never to learn. When this image of an addicted, weak, self-absorbed and potentially infective due to his prolonged connection with the exotic individual is taken into consideration in its entirety, the wish of painful death Watson accidentally bestows on him seems almost a visceral reaction to this diseased embodiment of imperial threats.

---

[70] Doyle, *The Sign of the Four*, 132.
[71] Doyle, *The Sign of the Four*, 109-110.
[72] Joseph McLaughlin, *Writing the Urban Jungle. Reading Empire in London from Doyle to Eliot* (Charlottesville and London: University Press of Virginia, 2000), 59.

In Doyle's novel, the exotic is usually considered disturbing or invasive, and these views are expressed towards people as well as objects and places. In such a vein McLaughlin reads the character of Thaddeus: "The grotesque Sholto is a product of Britain's imperial mission, not simply a drug user but […] also the beneficiary of tainted, ill-gotten colonial wealth."[73] The wealth and the hookah, because of their foreign origins, are dangerous and potentially infective. Even Mary Morstan, who is only connected with the infective treasure for a moment, still becomes contaminated. When Watson learns of her history, and the means by which she might become wealthy, he realises that the matrimony he was considering would likely be impossible; this is what he gives as a justification:

> there were two thoughts which sealed the words of affection upon my lips. She was weak and helpless, shaken in mind and nerve. It was to take her at a disadvantage to obtrude love upon her at such a time. Worse still, she was rich. If Holmes's researches were successful, she would be an heiress. Was it fair, was it honourable, that a half-pay surgeon should take such an advantage of an intimacy which chance had brought about? Might she not look upon me as a mere vulgar fortune-seeker? I could not bear to risk that such a thought should cross her mind. This Agra treasure intervened like an impassable barrier between us.[74]

At face value, Watson reinforces his image of a humble gentleman, one who would never take an advantage of a vulnerable lady. A lady he subconsciously expressed some interest in, but one who suddenly transformed into an unattainable object. He explains this transformation as stemming from her "shaken mind and nerve" at the revelations of her father's deeds and the riches to which she is entitled. He dreads being considered a vulgar fortune-seeker or imposing his love on her, yet when he speaks of the impassable barrier between them, perhaps there is more to his reservations than the ones he vocalises. He is present during the conversation between Mary Morstan, Holmes and Thaddeus Sholto, and hears the very same account of Captain Morstan and Major Sholto's shared history in the

[73] McLaughlin, *Writing the Urban Jungle*, 59.
[74] Doyle, *The Sign of the Four*, 146.

Indian regiment and their meeting in England which resulted in Morstan's death and the secretive disposal of his body. The Agra treasure only adds to the sudden undesirability of Mary: she is contaminated by her father's imperial past which is realised in material form in the tainted fortune. At this moment, he knows nothing more of the mysterious treasure, and the subsequent discoveries only strengthen his resolve, but he nonetheless rejects Mary as the possible wife candidate.

Only once she is cleaned of her burden of wealth – and, by extension, of the last thing tying her with her father – does the proposal reappear in Watson's intentions towards Miss Morstan. When during the pursuit of Small and Tonga the contents of the chest are believed to be gone, the last link that connects Mary with her contaminator is severed.

> "The treasure is lost," said Miss Morstan, calmly.
>
> As I listened to the words and realised what they meant, a great shadow seemed to pass from my soul. I did not know how this Agra treasure had weighed me down, until now that it was finally removed. It was selfish, no doubt, disloyal, wrong, but I could realise nothing save that the golden barrier was gone from between us.
>
> "Thank God!" I ejaculated from my very heart.
>
> She looked at me with a quick, questioning smile.
>
> "Why do you say that?" she asked.
>
> "Because you are within my reach again," I said, taking her hand.[75]

The relief that the lifting of the golden burden causes, is enormous, and to some extent disproportionate, when one considers the fact that the treasure was never really a true obstacle, even to the honourable Watson. He did not give her much credit, but Mary was always in the position of refusing the fortune, or spending it on charitable causes if its sheer presence was so disagreeable to her future husband. However, in the state of having but not really having it, her possible refusal was also suspended, and thus her contamination became a chronic, untreatable condition. Once she is saved from this suspension, and returned to her pre-treasure state, she is safe to approach and even to touch: she is within reach, both

[75] Doyle, *The Sign of the Four*, 184.

figuratively and literally. It is very interesting to note here how the two disgusts described by Valerie Curtis, that of microbe and that of manners, are intertwined in the presentation of the relationship between Dr Watson and Mary Morstan. The biologically-derived aversion to things that might be contaminated and people who come in contact with them, is covered in the layer of honourability and aversion to being suspected of greed and low instincts. Watson realises the selfishness, disloyalty and wrongness of such approach, yet the barrier, although it seems self-imposed, is impossible to cross because it is guarded by morals on the one side, and evolution on the other.

The Story of Change and Advancement

The last technique used by potential hosts to combat the never-ending parasite attack that Curtis notes is to modify their environment in such a way that it would discourage parasites to come into closer contact. There are many ways in which animals can do this: through effective disposal of waste, division of labour (among eusocial insects), and regular cleaning and sanitation of nests. Humans, the most advanced of all mammals, employ these and other strategies specific to our species. To keep our systems of nests free from animal parasites, we clean them and throw out waste. But humans also want their nests free from figurative parasites: other people whom, for a number of reasons, we tend not to perceive as legitimate members of our communities. In order to keep them out, we must first define them negatively against us, preferably by comparing or equalling them with biological parasites, and then use the same strategies of disposal and avoidance we use on these animals. To do that, we can employ very sophisticated tools of social punishment: from the legal to the customary. A considerate role in this context is played by what Curtis refers to as the collective brain of culture. Cultural practices are vital in putting such messages across and reinforcing them, in the process making them (or making them seem) universal. Fear and distrust (or, in Curtis's

terms, disgust) of strangers, of those who look different than us, and especially of those who look contagious, seems one of such universal messages. Paradoxically, it is both evolutionarily advantageous and disadvantageous: on the one hand, it keeps a group in relative safety against external infections but it also impairs their collective immune system due to limited exposure to pathogenic agents. On the other hand, invitation of strangers into a group is always connected with more genetic diversity, which is beneficial in the long run, but it poses a much greater risk in terms of infection and contamination.

Depending on the dominating conventional paradigm, one of these ends on the spectrum of disgust (overwhelming disgust resulting in total isolation of strangers as opposed to insignificant disgust resulting in invitation of strangers) is prevalent at a given point in time. The nineteenth century witnessed a shift in this paradigm: although the fear of the other remained intact, the definition of the other changed. Charles Dickens's social problem novels reiterated the messages of the importance of social reforms, the ills of social imbalance and injustice, employing certain dehumanising elements to a specific end: educational and also perhaps evoking shame. In *Bleak House*, apart from employing harrowing images of the plight of the urban poor, he also devotes some attention to the representatives of the upper classes, the social parasites in the Marxist sense. While his employment of biological metaphors when referring to underclasses is conscious and forceful, his novel can also be interpreted as containing certain notions which may be seen as convergent solutions. Consider the following quotation in which Sir Leicester has a conversation with the Ironmaster, Mr Rouncewell:

> 'In these busy times, when so many great undertakings are in progress, people like myself have so many workmen in so many places, that we are always on the flight.'
>
> Sir Leicester is content enough that the ironmaster should feel that there is no hurry there; there, in that ancient house, rooted in that quiet park, where the ivy and the moss have had time to mature, and the gnarled and warted elms, and the umbrageous oaks, stand deep in the fern and leaves of a hundred years; and where the sun-dial on the terrace has dumbly recorded for centuries that Time, which was as much the property

> of every Dedlock – while he lasted – as the house and the lands. Sir Leicester sits down in an easy-chair, opposing his repose and that of Chesney Wold to the restless flights of ironmasters.[76]

It is the uneasy conversation between the ancient and the modern, between the person who thinks he owns time, and the person who never has it. Mr Rouncewell uses the keywords of the time (in both semiotic and chronological sense): "busy," "progress," "work," "on the flight." This is vocabulary of the new era of haste and urgency, concepts incomprehensible to the ancient Sir Leicester to whom a sun-dial is a precise enough time measuring device. He, on the other hand, has all the time in the world – or so he believes. The description of Chesney Wold surroundings points to the price he unwittingly pays for his refusal or inability to keep up; the once great premises are demonstrably in decline, with unhealthy looking trees, and covered deep in ferns and leaves like a neglected graveyard. In the Dedlock world there is no hurry and no restlessness, but there is also no life. To him, of course, his antediluvianism is tantamount to preserving traditions threated by upstarts and the flighty new ideas, which surely will not have a permanent effect on his world. If the biological Red Queen Hypothesis be applied here, we realise how wrong his assumptions are. The Ironmaster, who is the representative of the new world, knows that he has to run as fast as possible to remain relevant to the dictate of progress and in his highly competitive environment. The archaic house of Dedlock, by the same principle of the Red Queen, will be driven to extinction.

The above fragment is important in the present context because, on the one hand, it adds to the list of examples of convergent concepts found in Victorian literature, and on the other, it presents the time of change, of the shifting paradigm: "a remarkable example of the confusion into which the present age has fallen; of the obliteration of landmarks, the opening

[76] Charles Dickens, *Bleak House* (Ware: Wordsworth Editions, 2000), 338.

of floodgates, and the uprooting of distinctions."[77] When Sir Leicester utters these words, he means specifically the invitation to the Parliament of the Ironmaster, the son of his housekeeper. However, since disproval of such a change is expressed by a character whose views are ridiculed and exposed as obsolete and irrelevant, we may assume that in this respect Dickens shows his support for the less-isolationist approach to strangers. Inviting them into the ancient Parliament may prove beneficial; an equivalent of fresh DNA introduced into a stale gene pool, or a window finally opened to ventilate a stuffy room.

Conclusion

The goal of this chapter was to study the idea of convergent solutions which were initially used as plot devices in nineteenth-century fiction, and then resurfaced in late twentieth- and twenty-first century texts of natural sciences, based on two scientific theories: the Red Queen Hypothesis and PAT. Both of them are scientific concepts at the core of which lie parasites. The Red Queen, using Lewis Carroll's character, convincingly explains an evolutionary race between parasites and their hosts. Valerie Curtis's parasite avoidance theory of disgust is an interpretation of the phenomenon of disgust from the biological perspective. The question whether this theory is sufficiently argued and convincing enough to be included in the canon of works on disgust remains open. As a method of interpretation of texts of culture, on the other hand, it seems quite productive and inspiring, and it could be employed as a methodological tool aiding the interpretation of behaviours and choices of other characters.

Parasites have come a long way, from the executors of divine punishment, to alien invaders, to the constitutive component of every human being. At first, literature accompanied these shifts in science, usually trailing a little behind. This chapter argues that at some point, it outdistanced science by a few decades, arriving at ideas that science had to

[77] Dickens, *Bleak House*, 337.

wait many years to discover – or, as I argue, uncover. The final conclusions this chapter can offer is that since literature of the nineteenth century abounds in creative ideas and innovative concepts it perhaps contains much more source material for contemporary scientists than just the notions of parasites and parasitism examined in the present work. The idea of convergence suggests that literature can serve as a source of inspiration to science – but only if science accepts literature as its equal in terms of creative input. The Red Queen and *Ampulex dementor* prove that such an exchange might be beneficial to them both: a true case of a mutualistic interaction.

CONCLUSIONS

The aim of this dissertation has been to demonstrate the interconnectedness of the titular Victorian science and literature on the example of the phenomena of the parasite and parasitism. In doing so, instead of following the "obvious model" of study of the relations between science and literature, in which the former conventionally takes precedence over the latter, this thesis employs an alternative model of study: one that assumes the two-way traffic between them, in which neither is considered the more important one. To this end, it introduces the notion of a story, that is a narrative that recounts events – either fictional (as in literary fiction) or non-fictional (as in scientific studies), – which creates a common ground where both literature and science are examined and analysed co-dependently. The realisation of this model is initially presented in the case study of George Eliot's *Middlemarch* and G. H. Lewes's works in Chapter I. The tracing of the ideas that were employed by one of them, borrowed, adapted and transformed by the other, only to be returned to the originator who re-employed them again, is demonstrated here as the first of the many instances in which literary examination is equalled with scientific research. From this moment onwards, this work has sought to find equilibrium in its treatment of both science and literature, striving not to ascribe to one of them more importance than to the other.

Chapter I therefore shows this balance through the employment of the ecological interaction of mutualism, which emphasises the equal status of its both participants. From this approach, the idea that science and literature could be treated as two equivalent narratives was born and tested against the source material in search for science-literature analogies. In this respect, both of them became sources of stories which could be juxtaposed, compared and contrasted but – most importantly – approached from the same interpretive

perspective. This has led directly to the establishment of the two analogous planes of the parasitical subject: biological parasites approached theoretically and functionally, and metaphorical parasites approached contextually and extratextually. Within this framework, Chapter II tells the story of the paradoxicality of biological parasites which cannot be precisely defined even though they comprise about half of all living creatures (or, perhaps, because of this fact), a view already recognised by Victorian parasitologist, Rudolf Leuckart, and the paradoxicality of the term parasite, expressed in the original Greek version *parasitos*, which in itself comprises the meanings of customary, literary and biological parasite. The section of this chapter devoted to biological parasitism uses some scientific descriptions of parasites and their behaviour to demonstrate the interconnectedness of scientific and literary narratives; in these descriptions, which already employ metaphorical language, the parasites are shown as if they were characters of fables. In the second section of the chapter the stories of Christian Carnivora from Eliot's *Middlemarch*, and the Dedlock family and Harold Skimpole from Dickens's *Bleak House* are read as the narratives of *parasitoi*, i.e. those who eat at the table of another.

While Chapter II follows the etymological origins of the term parasite, the next one tells the story of origin of parasites as understood by Western parasitologists in the nineteenth century and before, and by the non-Westerners (i.e. the beliefs of the Chinese and the Argentinean *Mbya*). The history of theory of spontaneous generation is traced from its beginning to the 1860s when it was conclusively debunked by Louis Pasteur. Here, the parasites are believed to originate from within the bodies of their hosts and are treated either as symptoms of internal imbalance or the disturbers of balance themselves. The urban poor from *Bleak House* are thus interpreted as the former, i.e. a being generated from within the tissue of their decaying surroundings, a clear symptom of social imbalance, while two outsiders (Mr Bulstrode and Mr Raffles) of *Middlemarch* are read as the latter, the disturbers

of equilibrium. The Bulstrode-Raffles relation is compared to an analogous relation found in twenty-first-century parasitological studies in order to show the alternative story of parasitical origin: that is from without the host.

Chapter IV, which focuses on the external origin story of parasites, introduces the subgenre of invasion literature, i.e. infection literature, which is based on three sources of inspiration: invasion literature, bacteriology and tropical medicine. From these, infection narrative borrows such notions as parasitical pathogens, vectors, virulence, immunity through exposure, the exotic other and, perhaps most importantly, personal responsibility for getting infected. This theme is then employed to read Conan Doyle's *The Sign of the Four* as an example of infection literature in which the antagonists, Jonathan Small and his companion Tonga are interpreted as a vector and a virulent pathogen, respectively. Another example of infection literature is Richard Marsh's *The Beetle*, which is discussed in Chapter V. The novel demonstrates the infective power of a single Egyptian invader; this is shown in two stories of infection: a typical one which follows the conventions of parasitological texts, and a subversive one, which questions those conventions. The abilities of the eponymous villain are in fact so overwhelming that they evoke behaviours of real-life parasites as described by present-day parasitology. To account for the analogy between the Victorian antagonist and contemporary parasitological discoveries, this chapter introduces the concept of convergence which substitutes science-literature mutualism as the explanation of these similarities. This does not however suggest that convergence contradicts the argument of the mutualism of science and literature relation; on the contrary, it supports it, demonstrating emphatically that the relation is beneficial to both participants but that its presence can only be asserted with the benefit of hindsight, that is when Victorian literature is inspected for creative ideas later found realised in nature.

The final chapter employs the idea of convergence, presenting two case studies which originate in Victorian literature and then resurface in more recent parasitological texts: the Red Queen Hypothesis and its origin in Lewis Carroll's *Through the Looking Glass*, and Valerie Curtis's Parasite Avoidance Theory whose core elements can be traced to concepts present in the Victorian works of fiction: *Bleak House*, *Middlemarch*, *The Sign of the Four* and *The Beetle*. These texts are in turn read as expressions of four parasite-avoidance strategies presented by Curtis: the avoidance of other people, the avoidance of parasites, their host and vectors, the avoidance of infective objects, and the modification of their environment that would discourage parasites.

This work demonstrates the interconnectedness of the narratives in the nineteenth-century science (in works of Darwin, Lewes, Koch, Cobbold and Manson, among others) and literature in terms of employment of analogous themes and literary devices, using parasite and parasitism as a specific example of this interconnectedness. What it offers in a way of innovation is interpreting chosen characters from Victorian literature as parasites not in cultural or social – but in biological sense. To this end this dissertation employs present-day concepts and interpretive strategies derived from natural sciences, i.e. the ecological mutualism and evolutionary convergence. It also introduces the subgenre of infection literature which draws from three sources (invasion literature, bacteriology and tropical medicine), together with two approaches according to which the literary examples can be read as parasitological texts: in the contextual approach some characters are read as parasites because they are interwoven into the tissue of the text as such; in the extratextual approach some characters are read as parasites because they exhibit behaviours analogous with those of biological parasites.

The present study by no means exhausts the topic of parasitism in Victorian science and literature. Just like in the case of the selection of the nineteenth-century works of science,

so is the range of works of fiction quite limited here and does not venture beyond the texts written by of a handful of writers; certainly other contextual and extratextual parasites – with some exceptions – can be found in other works by Eliot, Dickens or Doyle, and in numerous examples of popular prose of the period. Moreover, although it examines parasites and parasitism on four planes, this study completely and deliberately disregards the notion of social parasitism which would undoubtedly offer new paths of the interpretation of works of fiction but which here would introduce undesirable ideological and political elements quite aside the biological focus of this thesis. Since the aim of this work is to argue the reciprocally advantageous relation between science and literature, it focuses on the notions of ecological mutualism in which both participants benefit from the interaction. Therefore, an interesting direction of study would be the employment of the interaction of competition – in which both participants are at a disadvantage – to examine the potential negative consequences of the influence science and literature have over each other.

The concept of convergence opens a vast scope of interpretive possibilities in the future research; here – because of thematic restrictions – it is limited to ideas found in the narratives of life science and Victorian fiction but its potential is much broader. One of the paths of study which I would consider worthy of attention is the examination of twentieth-century spy fiction (from Joseph Conrad to Ian Fleming to John le Carré) for the advanced strategies used by spies and invading biological species (such as parasites) alike. Another might be the broadening of the definition of infection literature so that it could incorporate the present-day challenges of bacteriology and virology together with the ever-relevant issues of personal and collective responsibility for infections. In essence, this thesis presents one of the lesser used approaches to the question how literary and scientific texts could be examined and analysed; here the focal point is the parasite and its complicated relation with the narratives of fiction and non-fiction but the two-way method of reading the science-

literature relation allows for the introduction of other central points, and thus offers a useful strategy of interpreting this relation.

BIBLIOGRAPHY

Aesop. "The Ant and the Grasshopper." In: *The Fables of Aesop* by Joseph Jacobs. London: Macmillan & Co., 1894. Accessed 14 June 2015, http://www.vam.ac.uk/content/articles/ a/aesops-fables-the-ant-and-the-grasshopper/.

Alexander, Sarah C. *Victorian Literature and the Physics of the Imponderable*. London and New York: Routledge, 2015.

Allan, Janice M. *Charles Dickens's* Bleak House*: A Sourcebook*. London and New York: Routledge, 2004.

Allen, Michelle. "From Cesspool to Sewer: Sanitary Reform and the Rhetoric of Resistance, 1848-1880." *Victorian Literature and Culture*. Vol. 30, No. 2 (2002), 383-402.

Allin, Leslie. "Leaky Bodies: Masculinity, Narrative and Imperial Decay in Richard Marsh's *The Beetle*." *Victorian Network*, Vol. 6, No. 1 (2015), 113-135.

Anderson, Warwick. "'Where Every Prospect Pleases and Only Man Is Vile': Laboratory Medicine as Colonial Discourse." *Critical Inquiry*. Vol. 18, No. 3 (1992), 506-529.

Appleby Erin, and Ryan Streur. "Kleptoparasitism." *Biology 342*, Course Syllabus, Fall 2012. Accessed 9 June 2015, http://academic.reed.edu/biology/courses/BIO342/2012_syllabus/2012_WEBSITES/Erin_A_and_Ryan_S%2011-20final/index.html.

Arata, Stephen D. "The Occidental Tourist: 'Dracula' and the Anxiety of Reverse Colonization." *Victorian Studies*. Vol. 33, No. 4 (1990), 621-645.

Baker, Brian. "Darwin's Gothic: Science and Literature in the Late Nineteenth Century." In: *Literature and Science. Social Impact and Interaction*. Edited by John H. Cartwright and Brian Baker. Santa Barbara: ABC-CLIO, 2005, 199-221.

Baldick, Chris. *The Concise Oxford Dictionary of Literary Terms*. Oxford: Oxford University Press, 2001.

Barker, Chris. *The SAGE Dictionary of Cultural Studies*. London, Thousand Oaks, New Delhi: SAGE Publications, 2004.

Beer, Gillian. *Darwin's Plots: Evolutionary Narrative in Darwin, George Eliot and Nineteenth-Century Fiction.* Third Edition. Cambridge: Cambridge University Press, 2009.

Berenbaum, May. "Plant-Herbivore Interactions." In: *Evolutionary Ecology. Concepts and Case Studies*. Edited by Charles W. Fox, Derek A. Roff and Daphne J. Fairbairn. Oxford, New York: Oxford University Press, 2001, 303-314.

Blair, Kirstie. "Contagious Sympathies: George Eliot and Rudolf Virchow." In: *Unmapped Countries: Biological Visions in the Nineteenth-Century Literature and Culture*. Edited by Anne-Julia Zwierlein. London: Anthem Press, 2005, 145-154.

Boothby, Guy. *Pharos the Egyptian*. London: Ward, Lock & Co. 1899.

Bronstein, Judith L. "Mutualisms." In: *Evolutionary Ecology. Concepts and Case Studies*. Edited by Charles W. Fox, Derek A. Roff, Daphne J. Fairbairn. Oxford: Oxford University Press, 2001, 315-330.

Browne, Janet. "Constructing Darwinism in Literary Culture." In: *Unmapped Countries. Biological Visions in Nineteenth-Century Literature and Culture*. Edited by Anne-Julia Zwierlein. London: Anthem Press, 2005, 55-70.

Bulfin, Ailise. "'To Arms!': Invasion Narratives and Late-Victorian Literature." *Literature Compass*, Vol. 12, No. 9 (2015), 482-496.

Bulfin, Ailise. "The Fiction of Gothic Egypt and British Imperial Paranoia: The Curse of the Suez Canal." *English Literature in Transition*. Vol. 54, No. 4 (2011), 411-443.

Burwell, C. Sidney, Eugene D. Robin, Robert D. Whaley, Albert G. Bickelmann. "Extreme Obesity Associated with Alveolar Hypoventilation – A Pickwickian Syndrome." *The American Journal of Medicine*, Vol. 21, No. 5 (1956), 811-818. Accessed 21 May 2016, http://www.amjmed.com/article/0002-9343%2856%2990094-8/abstract.

Burzyńska, Anna, Michał Paweł Markowski. *Teorie literatury XX wieku*. Kraków: Wydawnictwo Znak, 2007.

Carey, John. *The Violent Effigy: A Study of Dickens' Imagination*. London, Boston: Faber and Faber, 1979.

Carpenter, Mary Wilson. "Medical Cosmopolitanism: *Middlemarch*, Cholera, and the Pathologies of English Masculinity." *Victorian Literature and Culture*, No. 38 (2010), 511-528.

Cartwright, John H. and Brian Baker. *Literature and Science. Social Impact and Interaction*. Santa Barbara: ABC-CLIO, 2005.

Cartwright, John H. "Those Dreadful Hammers: Geology and Evolution in Nineteenth Century Literature." In: *Literature and Science. Social Impact and Interaction*. Edited by John H. Cartwright and Brian Baker. Santa Barbara: ABC-CLIO, 2005, 171-198.

Casillo, Robert. "Parasitism and Capital Punishment in Ruskin's 'Flors Clavigera'." *Victorian Studies*. Vo. 29, No. 4 (1986), 537-567.

Chadwick, Edwin. "Report on the Sanitary Conditions of the Labouring Population of Great Britain." *Victorian Web*. Accessed 6 June 2010, http://www.victorianweb.org/history/chadwick2.html.

Chambers, Robert. *Vestiges of the Natural History of Creation*. London: John Churchill, 1844, accessed 2 August, 2014. http://www.gutenberg.org/dirs/etext04/vstc10h.htm.

Cobbold, T. Spencer. *Parasites; A Treatise on the Entozoa of Man and Animals*. London: J. & A. Churchill, 1879.

Cook, G[ordon]. C. “History of Parasitology.” In: *Principles and Practice of Clinical Parasitology*. Edited by Stephen H. Gillespie, Richard D. Pearson. Chichester: John Wiley, 2001, 1-20.

Cook, Gordon C. *Tropical Medicine: An Illustrated History of The Pioneers*. London, New York: Elsevier, 2007.

Cox, F. E. G. “History of Human Parasitology.” *Clinical Microbiology Reviews*, Vol. 15, No. 4 (2002), 595-612.

Crivos, Marta, María Rosa Martínez, Carolina Remorini, and AnahíSy. “Some Considerations Regarding the Origin and Functions of Parasites among Two *Mbya* Communities in Misiones, Argentina.” In: *Parasites, Worms, and the Human Body in Religion and Culture*. Edited by Brenda Gardenour and Misha Tadd. New York, Frankfurt, Berlin: Peter Lang, 2012, 95-121.

Crompton, Louis. “Satire and Symbolism in *Bleak House*.” *Nineteenth-Century Fiction*, Vol. 12, No. 4 (1958), 284-303.

Curtis, Valerie. “Dirt, Disgust and Disease: A Natural History of Hygiene.” *Journal of Epidemiology and Community Health (1979-)*. Vol. 61, No. 8 (2007), 660-664.

Curtis, Valerie. *Don’t Look, Don’t Touch. The Science Behind Revulsion*. Oxford: Oxford University Press, 2013.

Curtis, Valerie. “Why Disgust Matters.” *Philosophical Transactions of The Royal Society. Biological Sciences*. Vol. 366 (2011), 3478-3490.

Day, J. H. “The Life-History of Sacculina.” *Journal of Cell Science*. Vol. 2, No. 77 (1935), 549-583.

Darwin, Charles. *Living Cirripedia, A Monograph on the Sub-Class Cirripedia, with Figures of All the Species. The Lepadidæ; or, Pedunculated Cirripedes*. London: The Ray Society, 1852. Accessed 11 September, 2016,

http://darwin-online.org.uk/EditorialIntroductions/Freeman_LivingCirripedia.html.

Darwin, Charles. *Living Cirripedia, The Balanidæ, (or Sessile Cirripedes); the Verrucidæ*. London: The Ray Society, 1854. Accessed 11 September, 2016, http://darwin-online.org.uk/EditorialIntroductions/Freeman_LivingCirripedia.html.

Darwin, Charles. *On the Origin of Species by Means of Natural Selection or The Preservation of Favoured Races in the Struggle for Life*. Edited by William Bynum. London: Penguin Books, 2009.

de Buffon, Georges-Luis Leclerc. *Oeuvres de Buffon*. Edited by M. F. Cuvier. Paris: Chez F. D. Pillot, 1830.

Dawson, Gowan. "Literature and Science under the Microscope." *Journal of Victorian Culture*. Vol. 11, No. 2 (2006), 301-315.

Despommier, Dickson D. *People, Parasites, and Plowshares. Learning from Our Body's Most Terrifying Invaders*. New York: Columbia University Press, 2013.

Dickens, Charles. *Bleak House*. Ware: Wordsworth Editions, 2000.

Dickens, Charles. *Little Dorrit*. London: Bradbury and Evans, 1857.

Donne, John. "The Flea." In: *The Norton Anthology of English Literature*. Fourth Edition, Vol. I. Edited by M. H. Abrams et al. New York, London: W. W. Norton Company, 1979, 1068-1069.

Doyle, Arthur Conan. "Lot No. 249." *Harper's New Monthly Magazine*. Vol. 85, No. 508 (1892), 525-544.

Doyle, Arthur Conan. "The Adventure of the Beryl Coronet." In: *The Adventures and Memoirs of Sherlock Holmes*. Ware: Wordsworth Editions, 1996, 224-247.

Doyle, Arthur Conan. *A Study in Scarlet and The Sign of the Four*. Ware: Wordsworth Editions, 2004.

Doyle, Arthur Conan. *His Last Bow. A Reminiscence of Sherlock Holmes*. New York: George H. Doran, 1917.

Doyle, Arthur Conan. *Memories and Adventures: An Autobiography*. Ware: Wordsworth Editions, 2007.

Drisdelle, Rosemary. *Parasites. Tales of Humanity's Most Unwelcome Guests*. Berkeley and Los Angeles: University of California Press, 2010.

Ehrenkranz, N. Joel. "A. Conan Doyle, Sherlock Holmes, and Murder by Tropical Infection." *Reviews of Infectious Diseases*. Vol. 9, No. 1 (1987), 222-225.

Ehrlich, Paul R., David S. Dobkin, and Darryl Wheye. "Brood Parasitism." *Birds of Stanford*. (1988). Accessed 9 June 2015, http://web.stanford.edu/group/stanfordbirds/text/essays/Brood_Parasitism.html.

Eigenmann, Carl H. "A Case of Convergence," *Science*, Vol. 9, No. 217 (1899), 280-282.

Eliot, George. *Middlemarch*. Ware: Wordsworth Editions, 2000.

Ellegård, Alvar. *Darwin and the General Reader: The Reception of Darwin's Theory of Evolution in the British Periodical Press, 1859-1872*. Chicago and London: The University of Chicago Press, 1990.

Escombe, A. Roderick et al. "Natural Ventilation for the Prevention of Airborne Contagion." *PLoS Medicine*, No. 4 Vol. 2 (2007). Accessed 3 October 2015, http://journals.plos.org/plosmedicine/article?id=10.1371/journal.pmed.0040068.

Farley, John. *Bilharzia*: *A History of Imperial Tropical Medicine*. Cambridge: Cambridge University Press, 2003.

Farley, John. "Parasites and the Germ Theory of Disease." In: *Framing Disease: Studies in Cultural History*. Edited by Charles E. Rosenberg, and Janet Golden. New Brunswick: Rutgers University Press, 1992, 33-49.

Farley, John. "The Spontaneous Generation Controversy (1700-1860): The Origin of Parasitic Worms." *Journal of the History of Biology*, Vol. 5, No. 1 (1972), 95-125.

Fisher, Philip. *Making Up Society: The Novels of George Eliot*. Pittsburg: University of Pittsburg Press, 1981.

Fielding, Julien R. "Inside/Out: The Body Under Attack in American Popular Culture." In: *Parasites, Worms, and the Human Body in Religion and Culture*. Edited by Brenda Gardenour and Misha Tadd. Berlin, New York: Peter Lang, 2012, 189-214.

Foster, W. D. *A History of Parasitology*. Edinburgh and London: E.&S. Livingstone, 1965.

Fox, Charles W. Derek A. Roff and Daphne J. Fairbairn, eds. *Evolutionary Ecology. Concepts and Case Studies*. Oxford, New York: Oxford University Press, 2001.

Gardenour, Brenda and Misha Tadd, eds. *Parasites, Worms, and the Human Body in Religion and Culture*. New York, Frankfurt, Berlin: Peter Lang, 2012.

Goater, Timothy M., Cameron P. Goater, Gerald W. Esch. *Parasitism. The Diversity and Ecology of Animal Parasites*, Second Edition. Cambridge, New York: Cambridge University Press, 2014.

Gravil, Richard. *Reading Dickens's* Bleak House. Penrith: HEB, Humanities EBooks, 2012. Ebook.

Gullestad, Anders M. "Literature and the Parasite." *Deleuze Studies*. Vol. 5, No. 3 (2011), 301-323. Accessed 19 September 2016, http://www.academia.edu/2236429/Literature_and_the_Parasite.

Harris, Susan Canon. "Pathological Possibilities: Contagion and Empire in Doyle's Sherlock Holmes Stories." *Victorian Literature and Culture*, Vol. 31, No. 2 (2003), 447-466.

Harris, W. C. and Dawn Vernooy. "'Orgies of Nameless Horrors': Gender, Orientalism, and the Queering of Violence in Richard Marsh's *The Beetle*." *Papers on Language and Literature*. Vol. 48, No. 4 (2012), 339-381.

Haspel, Gal, Lior Ann Rosenberg, Frederic Libersat. "Direct Injection of Venom by a Predatory Wasp into Cockroach Brain." *Journal of Neurobiology* No. 56 (2003), 287-292.

Hassl, Andreas. "Der klassische Parasit: Vom würdigen Gesellschafter der Götter zum servilen Hofnarren." *Wiener Klinische Wochenschrift*, Vol. 117 (2005). Supplement 4, 2-5.

Hemstedt, Geoffrey. "The Novel." In: *The Context of English Literature. The Victorians*. Edited by Laurence Lerner. London: Methuen, 1978, 3-24.

Henry, Nancy. "George Eliot and the Colonies." *Victorian Science and Culture*. Vol. 29, No. 2 (2001), 413-433.

Holmes, John. "Darwinism in Literature." *University of Reading Weblogs*, 2015. Accessed 9 January 2017, blogs.reading.ac.uk/english-at-reading/files/2014/02/Darwinism-in-Literature1.pdf.

Hughes, Kathryn. "George Eliot's Life." In: *George Eliot in Context*. Ed. Margaret Harris. Cambridge: Cambridge University Press, 2015, 3-11.

Hunt, Elle. "Kangaroo in 'Grieving' Photos May Have Killed while Trying to Mate, Scientist Says," *The Guardian*. 14 January 2016. Accessed 2 April 2016, https://www.theguardian.com/science/2016/jan/14/photos-grieving-kangaroo-viral-but-scientist-says-sexually-aroused.

Hutton, R. H. Review of "Middlemarch: A Study of Provincial Life." In: *Critics on George Eliot. Readings in Literary Criticism*. Edited by William Baker. London: George Allen & Unwin, 1973, 30.

Jajszczok, Justyna. "Parazytologiczne kryptohistorie: tropikalne przesądy i uprzedzenia." In: *Kryptohistorie: Ukryte i utajone narracje w historii*. Edited by R. Borysławski, A.

Bemben, J. Jajszczok and J. Gajda. Katowice: Wydawnictwo Uniwersytetu Śląskiego, 2014, 115-123.

Jajszczok, Justyna. "The Sign of Fall: Sherlock Holmes and Epidemiological Threats." *B.A.S Journal*. Vol. 21 (2015), 71-76. Accessed 19 September 2016, http://www.litere.uvt.ro/publicatii/BAS/pdf/no/ bas_2015.pdf.

Koch, Robert. "The Aetiology of Tuberculosis" (1882), *Academia*. Accessed 19 September 2016, http://www.academia.dk/MedHist/Biblioteket/koch_Aetiology-of-Tuberculosis _1882.php.

Kristeva, Julia. *Powers of Horror: An Essay on Abjection*. Trans. Leon S. Roudiez. New York: Columbia University Press, 1982.

Lankester, E. Ray. *Degeneration. A Chapter in Darwinism*. London: Macmillan & Co., 1880.

Large, J. A. "Science and the Foreign-Language Barrier." In: *Working with Language. A Multidisciplinary Consideration of Language Use in Work Contexts*. Edited by Hywel Coleman. Berlin: Mouton de Gruyter, 1989, 169-192.

LeClerc, Daniel. *A Natural and Medicinal History of Worms*. Translated by Joseph Brown. London: J. Wilcox, 1721.

Lehrer, Steven. *Explorers of the Body: Dramatic Breakthroughs in Medicine from Ancient Times to Modern Science*, Second Edition. New York, Lincoln, Shanghai: iUniverse, 2006.

Leuckart, Rudolf. *Parasites of Man, And the Diseases Which Proceed From Them*. Translated by William E. Hoyle. Edinburgh: Young J. Pentland, 1886.

Levine, Caroline. "Narrative Networks: *Bleak House* and the Affordances of Form." In: *NOVEL: A Forum on Fiction*. Vol. 42, No. 3 (2009), 517-523.

Levine, George. *Darwin the Writer*. Oxford: Oxford University Press, 2011.

Levine, George. *Realism, Ethics and Secularism: Essays on Victorian Literature and Science*. Cambridge: Cambridge University Press, 2008.

Levine, George. "Science and Victorian Literature: A Personal Retrospective." *Journal of Victorian Culture*. Vol. 12, No. 1 (2007), 86-96.

Lewes, G[eorge]. H[enry]. "Only a Pond!." *Blackwood Edinburgh Magazine*. Vol. 85 (1859), 581-592.

Lewes, G[eorge]. H[enry]. *Sea-Side Studies at Ilfracombe, Tenby, The Scilly Isles, and Jersey*. Edinburgh and London: William Blackwood and Sons, 1860.

Lewes, G[eorge]. H[enry]. *Studies in Animal Life*. New York: Harper & Brothers Publishers, 1860.

Lively, Curtis M. "A Review of Red Queen Models for the Persistence of Obligate Sexual Reproduction." *Journal of Heredity*. No. 101 (2010) (Supplement 1), S13-S20.

Lively, Curtis M. "Parasite-Host Interactions." In: *Evolutionary Ecology: Concepts and Case Studies*. Edited by Charles W. Fox, Derek A. Roff, Daphne J. Fairbairn. Oxford: Oxford University Press, 2001, 290-302.

Livingstone, David N. "Tropical Climate and Moral Hygiene: The Anatomy of a Victorian Debate." *The British Journal for the History of Science*. Vol. 32, No. 1 (1999), 93-110.

Luckhurst, Roger. "Trance-Gothic, 1882-97." In: *Victorian Gothic*. Edited by Ruth Robbins and Julian Wolfreys. Basingstoke: Palgrave Macmillan, 2000, 148-167.

Lyell, Charles. *Principles of Geology or, The Modern Changes of the Earth and its Inhabitants Considered as Illustrative of Geology*. Vol. 1. New York: Appleton and Company, 1854.

Maltby, Robert. "The Language of Plautus's Parasites," *The Open University* (1999). Accessed 17 August 2009, http://www2.open.ac.uk/ClassicalStudies/GreekPlays/Conf99/Maltby.htm.

Mankowski, Paul V. "The Skimpole Syndrome: Childhood Unlimited." *First Things* (1993). Accessed 3 June 2009, http://www.firstthings.com/article/2008/08/004-the-skimpole-syndrome-childhood-unlimited-49.

Manson, Patrick. *Tropical Diseases: A Manual of the Diseases of Warm Climates*. New York: William Wood and Company, 1898.

Margree, Victoria. "'Both in Men's Clothing': Gender, Sovereignty and Insecurity in Richard Marsh's *The Beetle*." *Critical Survey*. Vol. 19. No. 2 (2007), 63-81.

Margree, Victoria. "Metanarratives of Authorship in *Fin-de-Siècle* Popular Fiction: 'Is That All You Do, Write Stories?'." *English Literature in Transition*, Vol. 59, No. 3 (2016), 362-389.

Marsh, Richard. *The Beetle: A Mystery*. London: Penguin, 2008.

Matin, A. Michael. *Securing Britain: Figures of Invasion in Late-Victorian and Edwardian Fiction*. New York: Columbia University Press, 1997.

Matin, A. Michael. "'We Aren't German Slaves Here, Thank God': Conrad's Transposed Nationalism and British Literature of Espionage and Invasion." *Journal of Modern Literature*. Vol. 21, No. 2 (1997-98), 251-280.

Mayhead, Robin. *Understanding Literature*. Cambridge: Cambridge University Press, 1969.

McGhee, George R. Jr. *Convergent Evolution: Limited Forms Most Beautiful*. London and Cambridge, Ms: The MIT Press, 2011.

McKeown, Thomas. *The Origins of Human Disease*. Oxford: Basil Blackwell, 1991.

McLaughlin, Joseph. *Writing the Urban Jungle. Reading Empire in London from Doyle to Eliot*. Charlottesville and London: University Press of Virginia, 2000.

Menninghaus, Winfried. *Disgust: Theory and History of a Strong Sensation*. Translated by Howard Eiland and Joel Golb. New York: State University of New York Press, 2003.

Messina, Frank J., Charles W. Fox. “Offspring Size and Number.” In: *Evolutionary Ecology. Concepts and Case Studies*. Edited by Charles W. Fox, Derek A. Roff and Daphne J. Fairbairn. Oxford, New York: Oxford University Press, 2001, 113-127.

Michiels, N. K., L. W. Beukeboom, N. Pongratz, and J. Zeitlinger. “Parthenogenetic Flatworms Have More Symbionts than Their Coexisting, Sexual Conspecifics, but Does This Support the Red Queen?.” *Journal of Evolutionary Biology*. No. 14 (2001), 110-119.

Miller, J. Hillis. *Charles Dickens: The World in His Novels*. Cambridge, Mass.: Harvard University Press, 1958.

Miller, J. Hillis. “Optic and Semiotic in *Middlemarch*.” In: *Middlemarch. Contemporary Critical Essays*. Edited by John Peck. New York: St. Martin’s Press, 1992, 65-84.

Miller, J. Hillis. “The Critic as Host.” In: *The J. Hillis Miller Reader*. Edited by Joseph Hillis Miller, Julian Wolfreys. Stanford: Stanford University Press, 2005, 17-37.

Monk, Leland. *Standard Deviations: Chance and the Modern British Novel*. Stanford: Stanford University Press, 1993.

Nabokov, Vladimir. *Lectures on Literature*. Edited by Fredson Bowers. San Diego, New York: A Harvest Book Harcourt, 1982.

Newcomb, Mildred. *The Imagined World of Charles Dickens*. Columbus: Ohio State University Press, 1989.

Nordau, Max. *Degeneration. Translated from the Second Edition of the German Work*. Translated anonymously. London: William Heinemann, 1895.

Ohl, Michael, Volker Lohrmann, Laura Breitkreuz, Lukas Kirschey, Stefanie Krause. “The Soul-Sucking Wasp by Popular Acclaim – Museum Visitor Participation in Biodiversity Discovery and Taxonomy.” *PLoS ONE*, Vol. 9, No. 4 (2014). Accessed 14 January 2017,

http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0095068.

Otis, Laura. *Membranes. Metaphors of Invasion in Nineteenth-Century Literature, Science, and Politics*. Baltimore and London: The Johns Hopkins University Press, 2000.

Paris, Bernard J. "George Eliot's Religion of Humanity." In: *George Eliot. A Collection of Critical Essays*. Edited by George R. Creeger. Englewood Cliffs: Prentice Hall, 1970, 11-36.

Parham, John. "Dickens in the City: Science, Technology, Ecology in the Novels of Charles Dickens." *19: Interdisciplinary Studies in the Long Nineteenth Century*. No. 10 (2010), 1-23. Accessed 5 December 2016, www.19.bbk.ac.uk.

Pianka, Eric R. *Evolutionary Ecology*. 7th Edition. 2011. eBook.

Pickford, James H. *Hygiene, or, Health as Depending upon the Conditions of the Atmosphere, Foods and Drinks, Motion and Rest, Sleep and Wakefulness, Secretions, Excretions, and Retentions, Mental Emotions, Clothing, Bathing, &c.* London: John Churchill, 1858.

Purchase, Sean. *Key Concepts in Victorian Literature*. Basingstoke: Palgrave MacMillan, 2006.

Raffensperger, John. "Was the real Sherlock Holmes a Pediatric Surgeon?." *Journal of Pediatric Surgery*. Vol. 45 (2010), 1567-1570.

Raheja, Lauren. "Anxieties of Empire in Doyle's Tales of Sherlock Holmes." *Nature, Society & Thought*. Vol. 19, No. 4 (2006), 417-426.

Ravin, James. "Sir Arthur Conan Doyle: The Author Was An Ophthalmologist." *Survey of Ophthalmology*. Vol. 40, No. 3 (1995), 237-244.

Rectenwald, Michael. "The Construction and Deconstruction of Science in Middlemarch." *Victorian Web*. Accessed 17 April 2011, http://www.victorianweb.org/authors/eliot/middlemarch/rectenwald2.html.

Richardson, Angelique. "'The Difference Between Human Beings': Biology in the Victorian Novel." In: *A Concise Companion to the Victorian Novel*. Edited by Francis O'Gorman. Oxford: Blackwell Publishing, 2005, 202-231.

Roberts, Doreen. "Introduction" to George Eliot's *Middlemarch*. Ware: Wordsworth Editions, 2000, vii-xxi.

Rozin, Paul, Jonathan Haidt and Clark R. McCauley. "Disgust." In: *Handbook of Emotions*. Edited by Michael Lewis, Jeannette M. Haviland-Jones and Lisa Feldman Barrett. Third Edition. London, New York: Guilford Press, 2008, 757-776.

Saey, Tina Hesman. "Body's Bacteria Don't Outnumber Human Cells So Much After All." *Science News*. Vol. 189, No. 3 (2016), 6. Accessed 24 May 2016, https://www.sciencenews.org/article/body%E2%80%99s-bacteria-don%E2%80%99t-outnumber-human-cells-so-much-after-all.

Sambon, Luigi. "Remarks on the Possibility of the Acclimatisation of Europeans in Tropical Regions." *The British Medical Journal*. Vol. 1, No. 1880 (1897), 61-66.

Sambourne, Linley. "Man Is But A Worm." *Punch's Almanack for 1882*. Vol. 82 (1881), n.p.

Scales, Helen. *Poseidon's Steed. The Story of Seahorses, from Myth to Reality*. New York: Gotham Books, 2010.

Schmid-Hempel, Paul. "Parasites – The New Frontier: Celebrating Darwin 200," *Biology Letters* Vol. 5, No. 5 (2009), 625-627.

Schoe, Marjolein, Hans H. De Iongh and Barbara M. Croes. "Humans Displacing Lions and Stealing Their Food in Bénoué National Park, North Cameroon." *African Journal of Ecology*, Vol. 47, No. 3, (2009), 445-447. Accessed 9 June 2016, http://onlinelibrary.wiley.com/doi/10.1111/j.1365-2028.2008.00975.x/full.

Senf, Carol A. *The Vampire in Nineteenth-Century English Literature*. Bowling, Green State University Popular Press, 1988.

Serres, Michel with Bruno Latour. *Conversations on Science, Culture, and Time*. Translated by Roxanne Lapidus. Ann Arbor: The University of Michigan Press, 1998.

Serres, Michel. *The Parasite*. Translated by Lawrence R. Schehr. Baltimore and London: The Johns Hopkins University Press, 1982.

Shakespeare, William. *The Tempest*. Edited by Cedric Watts. Ware: Wordsworth Editions, 2004.

Sharma, S. D. *Victorian Fiction: Some New Approaches*. New Delhi: Sarup and Sons, 2002.

Sherman, Irwin W. *Twelve Diseases That Changed Our World*. Washington: ASM Press, 2007.

Siddiqi, Yumna. *Anxieties of Empire and the Fiction of Intrigue*. New York: Columbia University Press, 2008.

Sleigh, Charlotte. "'This Questionable Little Book': Narrative Ambiguity in Nineteenth Century Literature of Science." In: *Unmapped Countries. Biological Visions in Nineteenth-Century Literature and Culture*. Edited by Anne-Julia Zwierlein. London: Anthem Press, 2005, 15-26.

Smith, Jonathan. "Darwin's Barnacles, Dickens's *Little Dorrit*, and the Social Uses of Victorian Seaside Studies." *Lit: Literature Interpretation Theory*. Vol. 10, No 4 (1999), 327-347.

Smith, Jonathan Z. "What a Difference a Difference Makes." In: *Relating Religion: Essays in the Study of Religion*. Chicago: University of Chicago Press, 2004, 251-302.

Snyder, Laura J. "Sherlock Holmes: Scientific Detective." *Endeavour*. Vol. 28, No. 3 (2004), 104-108.

Sontag, Susan. *Illness as Metaphor*. New York: Farrar, Straus and Giroux, 1978.

Speaight, Robert. *George Eliot*. London: Arthur Baker, 1956.

Spencer, Herbert. *The Principles of Biology*. Edinburgh and London: Williams and Norgate, 1864.

Stein, Joshua. "The Legacy of H. G. Wells's *The Time Machine*: Destabilization and Observation." In: *H. G. Wells's Perennial* Time Machine. Edited by George Slusser, Patrick Parrinder, and Danièle Chatelain. Athens and London: The University of Georgia Press, 2001, 150-159.

Steiner, F. George. "A Preface to *Middlemarch*." *Nineteenth-Century Fiction*. Vol. 9, No. 4 (1955), 262-279.

Stierstrofer, Klaus. "Vestiges of English Literature: Robert Chambers." In: *Unmapped Countries. Biological Visions in Nineteenth-Century Literature and Culture*. Edited by Anne-Julia Zwierlein. London: Anthem Press, 2005, 27-39.

Stoker, Bram. *Dracula*. Ware: Wordsworth Editions, 2000.

Tabrah, Frank L. "Koch's Postulates, Carnivorous Cows, and Tuberculosis Today." *Hawai'i Medical Journal*. Vol. 70 (2011), 144-148.

Tadd, Misha. "The Power of Parasites and Worms." In: *Parasites, Worms, and the Human Body in Religion and Culture*. Edited by Brenda Gardenour and Misha Tadd. New York, Frankfurt, Berlin: Peter Lang, 2012, ix-xxxvi.

Tennyson, Lord Alfred. *In Memoriam A. H. H*. Eleventh Edition. London: Edward Moxon & Co., 1862.

Tucker, Herbert F., ed. *A Companion to Victorian Literature and Culture*. Malden, Oxford: Blackwell Publishers, 2002.

Vallisneri, Antonio. *Nuove osservazioni, ed esperienze intorno all'ovaja scoperta né vermi tondi dell'uomo, e de' vitelli* (1713). Reprinted by Daniel LeClerc in: *A Natural and*

Medicinal History of Worms. Translated by Joseph Browne. London: J. Wilcox, 1721, 332-336 and 350-353.

Vuohelainen, Minna. "From 'Vulgar' and 'Impossible' to 'Pre-Eminently Readable': Richard Marsh's Critical Fortunes, 1893-1915." *English Studies,* Vol. 95, No. 3 (2014), 278-301.

Vuohelainen, Minna. "Richard Marsh's *The Beetle* (1897): A Late-Victorian Popular Novel." *Working with English: Medieval and Modern Language, Literature and Drama*. Vol. 2, No. 1 (2006), 89-100.

Wallace, Alfred Russel. "On the Law Which Has Regulated the Introduction of New Species." *The Annals and Magazine of Natural History, Including Zoology, Botany, and Geology*. Vol. 16 (1855), 184-196.

Watts, Sheldon. "British Development Policies and Malaria in India 1890-c. 1929." *Past & Present*. No. 165 (1999), 141-181.

Weeks, Paul. "Red-Billed Oxpeckers: Vampires or Tickbirds?." *Behavioral Ecology*. Vol. 11, No. 2 (2000), 158-159. Accessed 11 September 2016, http://beheco.oxfordjournals.org/content/11/2/154.

Wells, H. G. *The Time Machine: An Invention*. New York: Henry Holt and Company, 1922.

Williams, Francis X. "Ampulex Compressa (Fabr.), A Cockroach-Hunting Wasp Introduced from New Caledonia Into Hawai." *Proceedings of the Hawaiian Entomological Society*. Vol. 11, No. 2 (1942), 221-233.

Winyard, Ben and Holly Furneaux. "Dickens, Science and the Victorian Imagination." *19: Interdisciplinary Studies in the Long Nineteenth Century*, Vol. 10 (2010), 1-17. Accessed 5 December 2016, www.19.bbk.ac.uk.

Wolfreys, Julian. *Writing London Volume 3: Inventions of the City*. Basingstoke: Palgrave Macmillan, 2007.

Wormald, Mark. "Microscopy and Semiotic in *Middlemarch*." *Nineteenth-Century Literature*, Vol. 50, No. 4 (1996), 501-524.

Wynne, Clive D. L. "What are Animals? Why Anthropomorphism is Still Not a Scientific Approach to Behavior." *Comparative Cognition and Behaviour Reviews*. Vol. 2 (2007), 125-135. Accessed 2 April 2016, https://www.ualberta.ca/~elegge/Alrg_Docs/Wynne_2007.pdf.

Young, Robert M. *Darwin's Metaphor: Nature's Place in Victorian Culture*. Cambridge and New York: Cambridge University Press, 1985. Accessed 22 September 2016, http://human-nature.com/dm/dar.html.

Zaidel, Dahlia W. "Biological and Neuronal Underpinnings of Creativity in the Arts." In: *Neuroscience of Creativity*. Edited by Oshin Vartanian, Adam S. Bristol, and James C. Kaufman. London and Cambridge, Ms: The MIT Press, 2013, 133-148.

Zimmer, Carl. *Parasite Rex. Inside the Bizarre World of Nature's Most Dangerous Creatures*. New York, London: Atria, 2014.

Zwierlein, Anne-Julia. "From Parasitology to Parapsychology: Parasites in Nineteenth Century Science and Literature." In: *Unmapped Countries: Biological Visions in the Nineteenth-Century Literature and Culture*. Edited by Anne-Julia Zwierlein. London: Anthem Press, 2005, 155-172.

Zwierlein, Anne-Julia, ed. *Unmapped Countries: Biological Visions in the Nineteenth-Century Literature and Culture*. London: Anthem Press, 2005.

Dictionaries and Encyclopaedias

Alpha Dictionary. Edited by Robert E. Beard et al. Accessed 23 June 2009, http://www.alphadictionary.com.

A Dictionary of Biology. 7th Edition. Edited by Elizabeth Martin, Robert S. Hine. Oxford: Oxford University Press, 2015.

A Dictionary of Epidemiology. 6th Edition. Edited by Miquel Porta. Oxford, New York: Oxford University Press, 2014.

Encyclopaedia Britannica. Accessed 19 September 2016, http://www.britannica.com.

The Merriam-Webster New Book of Word Histories. Springfield, MA: Merriam-Webster, 1991.

Online Etymology Dictionary. Edited by Douglas Harper. Accessed 20 July 2009, http://www.etymonline.com.

Oxford Dictionaries. Accessed 5 June 2015, http://www.oxforddictionaries.com.

The Oxford Dictionary of Ecology. Fourth Edition. Edited by Michael Allaby. Oxford: Oxford University Press, 2010.

Oxford Dictionary of Word Origins. Second Edition. Edited by Julia Cresswell. Oxford: Oxford University Press, 2010.

The Oxford Paperback Thesaurus. Third Edition. Edited by Maurice Waite, Lucy Hollingworth, and Duncan Marshall. Oxford: Oxford University Press, 2006.

Oxford Reference. Accessed 19 September 2016, http://www.oxfordreference.com.

Databases:

Darwin Correspondence Project. University of Cambridge. Accessed 2 April 2016, http://www.darwinproject.ac.uk/letter/DCP-LETT-2814.xml.

List of Illustrations

SUMMARY IN ENGLISH

The dissertation *The Parasite and Parasitism in Victorian Science and Literature* aims to show how science (understood here predominantly as life science) and literature (understood here mostly as fiction) of the Victorian period influence each other. Their interconnectedness is analysed on the example of the phenomena of the parasite and parasitism on four planes: of biology, ecology, customary practice and literature. The notion of the story is introduced to create a common ground between scientific and literary narratives.

Chapter I presents this correspondence through the employment of various ecological interactions from neutralism to mutualism, using several examples from Victorian literature (Alfred, Lord Tennyson, Charles Dickens, H. G. Wells) and science (Charles Darwin, Alfred Russel Wallace, Charles Lyell, Robert Chambers, E. Ray Lankester). The case study of George Eliot's *Middlemarch* and G. H. Lewes's works demonstrates the science-literature mutualism, where ideas employed by one of them are borrowed, adapted and transformed by the other, then returned to the originator who re-employs them in different contexts.

Continuing the argument of the mutual interaction of science and literature, Chapter II demonstrates the paradoxicality of biological parasites which begins with their convoluted etymological history. The Greek *parasitos*, which contains within itself the customary, biological and ecological meanings of the parasite, is presented both in scientific narratives of parasitical species and in literary examples such as Christian Carnivora from Eliot's *Middlemarch*, and the Dedlock family and Harold Skimpole from Dickens's *Bleak House*.

The purpose of Chapters III and IV is to present two stories of parasitical origin, from within and from without, respectively. Chapter III shows these early beliefs of European scientists (the spontaneous generation theory) and non-Western peoples according to which the parasites originate from within the bodies of their hosts and are therefore considered

either symptoms of internal imbalance or the disturbers of this balance. This theme is then employed to read the urban poor from Dickens's *Bleak House* as being generated from within their putrefying surroundings, and two outsiders of *Middlemarch* – Mr Bulstrode and Mr Raffles – as the disturbers of balance.

The alterative theory of the parasites' origin is presented in Chapter IV which introduces the subgenre of invasion literature, i.e. infection literature. Inspired by both bacteriology and tropical medicine, infection literature tells stories of invasive pathogens able to wreak havoc on the sensitive tissue of the heart of the empire. Here, Arthur Conan Doyle's *The Sign of the Four* is read as an example of infection literature in which the antagonists are interpreted as a vector and a virulent pathogen threating the safety of the nation.

Another example of infection literature is Richard Marsh's *The Beetle*, which is discussed in Chapter V. The novel demonstrates the infective power of a single Egyptian invader; this is shown in two stories of infection: a typical one which follows the conventions of parasitological studies of the period and a subversive one which calls those conventions into question. To account for the similarities between the Victorian villain and the present-day parasitological discoveries, this chapter introduces the concept of convergence (i.e. the independent arrival at similar ideas and solutions) derived from evolutionary science.

The final chapter employs the idea of convergence further, presenting two case studies which come from Victorian literature and then re-emerge in later parasitological studies. The scientific Red Queen Hypothesis is read here as the reworking of the ideas found in Lewis Carroll's *Through the Looking Glass* while the core elements of Valerie Curtis's Parasite Avoidance Theory are traced to concepts present in *Bleak House*, *Middlemarch*, *The Sign of the Four* and *The Beetle*.

SUMMARY IN POLISH

Celem rozprawy *Pasożyt i pasożytnictwo w wiktoriańskiej nauce i literaturze* jest ukazanie, w jaki sposób nauka (rozumiana tu jako nauka biologiczna) i literatura (w rozumieniu prozy) okresu wiktoriańskiego wzajemnie na siebie wpływały. Te powiązania są analizowane na przykładzie pasożyta i pasożytnictwa, które to zjawiska rozpatrywane są na czterech płaszczyznach: biologicznej, ekologicznej, zwyczajowej i literackiej. Zawarte w rozprawie teksty literackie i naukowe traktowane są równorzędnie: jako fikcyjne i niefikcyjne opowieści (*stories*).

Rozdział I ukazuje, jak zależności pomiędzy nauką a literaturą można interpretować za pomocą ekologicznych interakcji, od neutralizmu do mutualizmu, na przykładach dzieł kilku wiktoriańskich pisarzy (Alfred, Lord Tennyson, Karol Dickens, H. G. Wells) oraz naukowców (Karol Darwin, Alfred Russel Wallace, George Lyell, Robert Chambers, E. Ray Lankester). Mutualizm jest tu wykorzystany do analizy analogii pomiędzy powieścią *Miasteczko Middlemarch* George Eliot a pismami G. H. Lewesa, w których pewne pojęcia używane przez jednego z autorów są pożyczane, adaptowane i zmieniane przez drugiego, by później pojawić się na nowo w twórczości pierwszego twórcy.

Opierając się na idei mutualizmu naukowo-literackiego, Rozdział II ukazuje paradoksy związane z pasożytami, zaczynając od skomplikowanej etymologii samego słowa „pasożyt". W pierwotnym greckim znaczeniu termin ten (*parasitos*) łączył w sobie znaczenia, które dziś pojawiają się na płaszczyźnie biologicznej, ekologicznej i zwyczajowej, co zaprezentowane jest w rozdziale na przykładach naukowych opisów różnych gatunków pasożytów oraz literackich postaci Chrześcijańskich Zwierząt Mięsożernych (*Christian Carnivora*) pojawiających się w *Miasteczku Middlemarch*, a także członków rodziny Dedlock i Harolda Skimpole'a z *Samotni* Karola Dickensa.

Celem Rozdziałów III i IV jest zaprezentowanie dwóch historii pochodzenia pasożytów; jako wywodzących się z wnętrza ciała żywiciela oraz jako pochodzących z zewnątrz. W Rozdziale III ukazane są wczesne teorie europejskich naukowców (przede wszystkim teoria samorództwa) oraz popularne wierzenia ludzi spoza kręgów zachodnich, według których pasożyty generowane były wewnątrz swoich żywicieli i co za tym idzie, uznawane były albo za objawy braku wewnętrznej równowagi żywiciela, albo jako przyczyny tej nierównowagi. Koncepcji tej użyto w tym rozdziale do zinterpretowania dwóch powieści: miejska biedota z Dickensowskiej *Samotni* odczytana zostaje tu jako wytworzona z rozkładającej się materii londyńskich slumsów, natomiast panowie Bulstrode i Raffles z *Miasteczka Middlemarch* – jako przychodzący z zewnątrz obcy burzący równowagę lokalnej społeczności.

Alternatywna teoria pochodzenia pasożytów jest tematem Rozdziału IV, który wprowadza pojęcie literatury infekcji – jako podgatunku literatury inwazji (*invasion literature*). Czerpiąc zarówno z bakteriologii jak i medycyny tropikalnej, literatura ta prezentuje wizje, w których wrażliwa tkanka imperium brytyjskiego zostaje zaatakowana przez zjadliwe, egzotyczne czynniki patogenne. Jako przykład literatury infekcji, której antagoniści interpretowani są jako nosiciel i patogen użyta jest tu powieść *Znak czterech* Arthura Conan Doyle'a.

Innym przykładem literatury infekcji jest analizowana w Rozdziale V powieść Richarda Marsha *Skarabeusz Izydy* (*The Beetle*), która ukazuje atak pojedynczego, ale niezwykle wirulentnego, egipskiego najeźdźcy. Rozdział zawiera dwie opowieści o infekcji; jedną zgodną z dziewiętnastowiecznymi normami i stereotypami, i drugą kwestionującą te normy. W dalszej części rozdziału zawarte są przykłady na analogiczne zachowania, które przejawiają zarówno antagonista z powieści, jak i pasożyty obserwowane w naturze. Aby wyjaśnić te analogie, wprowadzono tu wywodzące się z nauk ewolucyjnych pojęcie

konwergencji, tj. procesu, w którym odrębne gatunki biologiczne wykształcają analogiczne cechy funkcjonalne.

Ostatni rozdział rozwija ideę konwergencji w literaturze i nauce na podstawie dwóch koncepcji wywodzących się z prozy wiktoriańskiej, które później odnajdują się w studiach parazytologicznych. Naukowa hipoteza Czerwonej Królowej odczytana jest jako nowa wersja idei, które pierwotnie znalazły się w *Po drugiej stronie lustra* Lewisa Carrolla, natomiast przykłady zawarte w teorii unikania pasożytów (*Parasite Avoidance Theory*) Valerie Curtis są odnajdywane w następujących wiktoriańskich powieściach: *Samotni*, *Miasteczku Middlemarch*, *Znaku czterech* i *Skarabeuszu Izydy*.