

## MEDICINE AND SOCIETY

### *Parasites!* Graphic Exploration of Tropical Disease Drug Development

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#### Abstract

*Parasites!*, a 2010 comic sponsored by the Wellcome Trust Centre for Molecular Parasitology, demonstrates that a graphic narrative can play a role in energizing public debate. Part of the genre known as graphic medicine—comics about illness, treatment, disability, and caregiving—*Parasites!* is intended to educate readers of all ages about illnesses less known in the developed world. Two visual strategies in particular enable the comic to offer an alternative and aesthetic response to questions about developing drugs to treat tropical diseases for profit. By including visuals and text, and not just one of these formats, viewers must reorient themselves aesthetically and epistemologically to ethical, social, cultural, and political structures that adversely affect human health.

#### Introduction

Tropical diseases such as sleeping sickness, [malaria](#), and kala-azar that primarily affect populations too poor to pay for drug treatment pose a significant bioethical question. How should priorities be established for the funding of research and development of the drugs required for treatment when no profitable market for them exists? Arguing that more bioethical attention should be focused on the tension between the need for such drugs and the capacity for users to pay for them, Gericke et al. identify open public debate as a crucial part of the deliberative process for establishing equitable means of setting priorities for funding research for unprofitable drugs [1]. Conventional modes of evaluating economic priorities should be enhanced, Gericke et al. argue, by attention to the ethical issues involved in the process of setting funding priorities as well as their profitability. In this essay, I examine one means of raising awareness of ethical issues and catalyzing debate about the funding of drug research for tropical diseases: graphic medicine. In the graphic narrative *Parasites!*, the aesthetic combination of text and image encourages readers to explore new ways of thinking about the ethical, social, cultural, and political structures that adversely affect human health.

*Parasites!*, a 2010 comic written by Jamie Hall and Edward Ross and illustrated by Edward Ross, demonstrates that a graphic narrative can play a role in energizing public debate [2]. Part of the genre known as graphic medicine—comics about illness, treatment, disability, and caregiving—*Parasites!* is intended to [educate readers](#) of all

ages about illnesses less known in the developed world [3]. One of three comics created by the Wellcome Trust Centre for Molecular Parasitology (WTCMP) as part of its public engagement program, *Parasites!* was followed in 2012 by *Malaria: The Battle against a Microscopic Killer* [4] and in 2016 by *Sleeping Sickness: The Fight against a Nightmarish Disease* [5]. While all of these comics are fascinating, *Parasites!* deserves close attention as the first one created for the WTCMP's public engagement program. The textual and visual narrative strategies used by authors Hall and Ross, and the illustrations by Ross, evidently impressed the WTCMP enough to launch this public engagement project and to motivate the creation of the comics that followed.

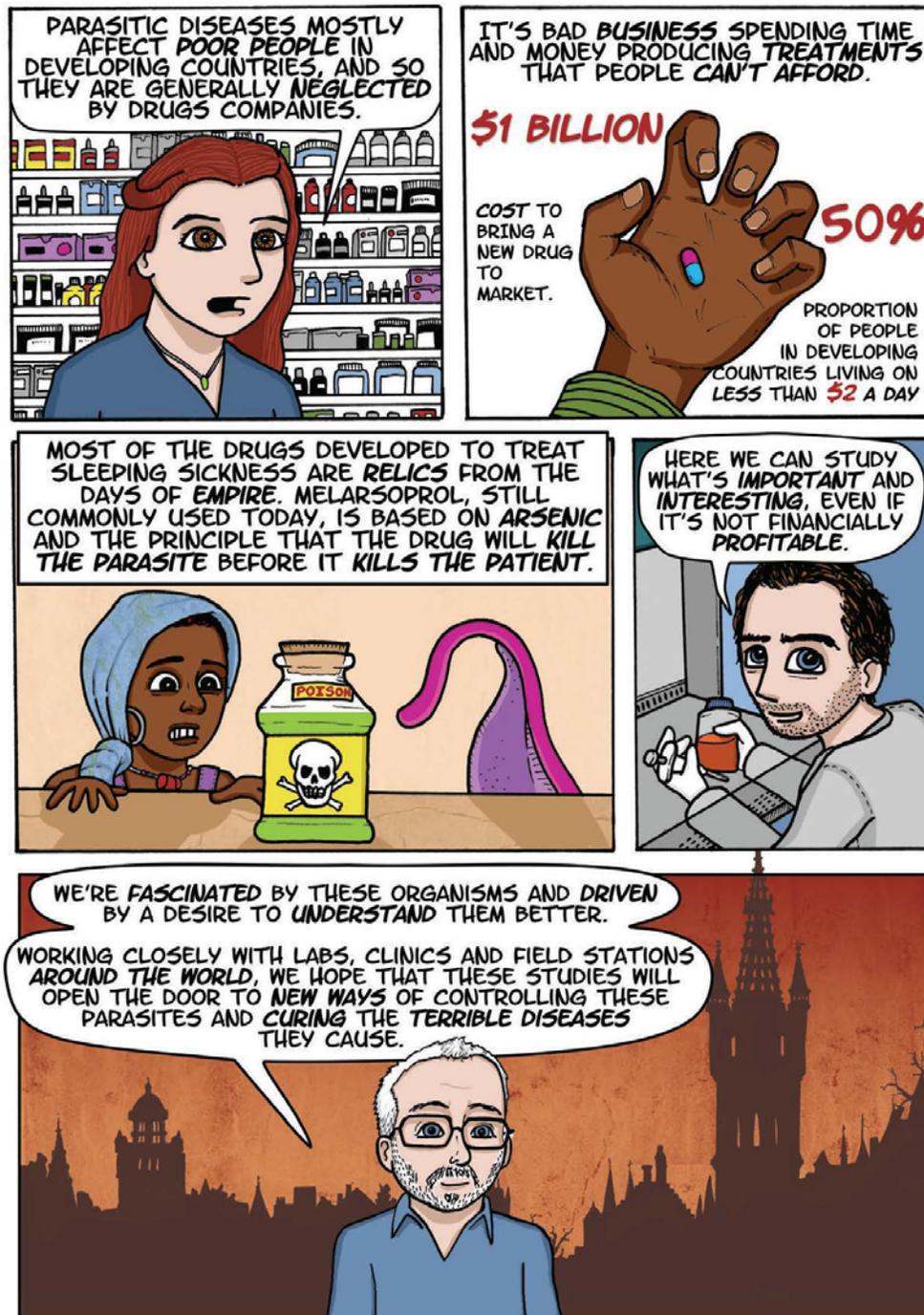
### **Visual Strategies for Engagement, Education, and Ethical Analysis**

Comics intended for public outreach and education must often perform a balancing act between didacticism and inspiration. *Parasites!* marries visual and text-based storytelling to hit that balance. The simplified illustration of scientific concepts, use of storytelling and narratives, and focus on central characters with whom readers can identify—often real researchers at the WTCMP—are all part of its strategies for engaging a diverse public. The text in speech balloons, text boxes, and captions covers a brief history of parasitology and the nature of the three parasites under study. It also expresses the goal of the individual scientists and the WTCMP as a whole to remove a “major obstacle to development” by finding “new ways to control, treat, and eventually eradicate these diseases” [6]. Like the speech of the researchers it includes as characters, the narrative uses direct declarative prose and, judiciously, bold print to convey the challenges posed by an attempt to control parasites. We learn of the biological processes triggered by three parasites under consideration—Plasmodium, Trypanosoma brucei, and Leishmania—as well as the mechanisms by which they cause malaria, sleeping sickness, and kala-azar. We also learn about the importance of Scots David Livingston, William Leishman, and Patrick Manson in the study of tropical diseases. And we learn of the many strategies contemporary researchers use to study parasites: from the use of fluorescent dye to tag their genes to the process of gene sequencing, enabling the comparison of entire genomes of different parasite strains. A tension between research as pure science and research to aid the global development project is evident in both the textual narrative and the visual images, as I will go on to demonstrate.

### **Aesthetic and Ethical Analysis in *Parasites!***

While the WTCMP has said that it created this comic to provide educational outreach, it also provides a visual platform for ethical and social analysis of drug development research [7]. Comics lend themselves to such ethical and social analysis, since the medium has a long tradition of speaking for the outsider [8]. *Parasites!* joins that tradition by voicing and visualizing the experiences not only of Western parasitologists but also of African peoples far from the dominant economic, political, and social cultures of Europe. Two visual strategies in particular enable the comic to express complex ambiguous and emotionally-charged issues: its control of perspective and its deployment of scale, by

which objects are ordered in a sequence or hierarchy. Just as changing the angle from which we look at something can let us see it anew, so, too, reevaluating the scale at which we encounter a concept, person, or process can enable us to revise our response to it. The aesthetic strategies of the comic draw the reader into an exploration of ethics, moving her to challenge assumptions in the text because of her emotional engagement with the images.



**Figure 1.** Excerpt from *Parasites!*, by Jamie Hall, Rachel E. Morris, and Edward Ross. © 2010 Jamie Hall, Rachel E. Morris, Edward Ross, and the Wellcome Trust Centre for Molecular Parasitology. Reprinted by permission of the Wellcome Trust Centre for Molecular Parasitology.

In figure 1, we can see how the ethical, social, and political issues central to parasitology at the WTCMP are explained textually and embodied visually. The first panel on the page, picturing a white woman standing against a large array of neatly arranged pharmaceuticals of all kinds, explains the problem of drug development for tropical diseases: "Parasitic diseases mostly affect poor people in developing countries, and so they are generally neglected by drugs companies." In the second panel, that dry summary is replaced by an image compactly contrasting that Western and Northern world of plenitude and order to one of stark need. The statement describing the problem of unprofitable drug research initially seems unarguable, even inevitable: "It's bad business spending time and money producing treatments that people can't afford." The ethical justifiability of this purely economic rationale is challenged by the accompanying image, however. At the panel's center, a brown-skinned hand curls tensely around a green and blue capsule. This hand—so distinctly human and so full of agony—divides two columns of text that flatly sum up the brutal calculus at work in the research and development of unprofitable drugs: "\$1 billion: cost to bring a new drug to market," and "50%: proportion of people in developing countries living on less than \$2 a day." The ethical sleight of hand in the top right panel is exposed in the visual image of the grasping hand. The text labels the decision not to make a drug available to patients "bad business," a label that obscures the company's ethical obligation to patients and the clinicians who serve them to develop a drug, even an unprofitable one, targeted to a specific population if a company has other profitable, or even lucrative, revenue streams. This distinction between viability and profitability presented textually in the top right panel disappears in the bottom right panel, where we learn that the WTCMP researchers ignore economic considerations and merely study "what's important and interesting."

This shift to a close-focus perspective on the human bodies of those affected offers an alternative to the monetary rationale for the lack of drug development for tropical diseases, one that puts social, cultural, and ethical categories at the center. In the next panel, this new perspective is conveyed by the disruption of visual scale. A young woman who might suffer from sleeping sickness stares in horror at a bottle of medicine. The woman is positioned on the left of the bottle, while to the right, at a surprisingly large scale, looms a large purple and pink trypanosome. The bottle's skull and crossbones icon and POISON label echo the text above the bottle: "Most of the drugs developed to treat sleeping sickness are relics from the days of Empire. Melarsoprol, still commonly used today, is based on Arsenic and the principle that the drug will kill the parasite before it kills the patient." The arsenic-based drug melarsoprol, one of only four drugs available to treat sleeping sickness (the others being pentamidine, suramin, and eflornithine) is currently prescribed only for second-stage sleeping sickness [9]. Yet though suramin, a drug prescribed for the earlier stage of the disease, is without arsenic, it, too, exemplifies what we might call the ethical, social, and political side effects of drug treatment.

## The History of Unprofitable Drug Development

Why are these sleeping sickness drugs “relics from the days of Empire”? The history of African trypanosomiasis, or sleeping sickness, is interwoven with the African slave trade in the eighteenth and nineteenth centuries. The many deaths it caused were viewed by the slave traders as property losses, leading them to call for increased research on the disease [9, 10]. Sleeping sickness still ravaged Africa at the turn of the twentieth century, killing an estimated 300,000 and 500,000 people in the Congo Basin and in the Busoga focus in Uganda and Kenya, respectively, between 1896 and 1906 [10]. As with the deaths in the slave trade, this later epidemic also led the colonial administrators to call for a cure [10]. Thus the [history of colonial oppression](#) is intimately interwoven with the history of drug development.

Just as the slave traders were driven by a profit motive in seeking a cure for the disease (to reduce property losses), so a different kind of profit motive appeared in the early twentieth century as countries and emerging corporations jostled for extractive profits from African territories. By 1917, the Bayer Company had succeeded in synthesizing a compound it called Bayer 205 or, with nationalistic pride, Germanin™ (also known as suramin) [9]. Despite its breakthrough efficacy, this drug was not immediately made available to African territories, although sleeping sickness remained a terrible problem there [9]. Instead, realizing that this drug could be of great importance to nations intending to profit from their African colonies, the Bayer Company approached the British government and attempted to trade the drug formula for the return of Germany’s African territories [9]. These were the colonies lost during the “scramble for Africa,” the period in which Africa was occupied, divided into territories, and colonized by European nations between 1881 and 1914 [11]. When the British government refused to carry out the exchange, obviously valuing their colonial possessions more than the health of Africans, the Bayer Company kept the formula secret. In 1924, it was published by Frenchman Ernest Fourneau, but Bayer only confirmed it as accurate in 1928 [9]. Such frequently imperialist and oppressive relations between governments, emerging corporations, European scientists, and African peoples [10] are the imperial relics referenced in *Parasites!*

When we return to the panel in which the frightened woman, the trypanosome parasite, and the bottle of arsenical drug appear at the same visual scale, we see how the image captures the ethical problem at the core of the unprofitable drug dilemma: the focus on profit that reduces people, parasites, and pills to the same level. The tug-of-war between the United Kingdom (UK) and Germany over Germanin is a historically relevant ethical point, demonstrating the harsh economic calculus that dismissed the welfare of the African peoples in the struggle for valuable territories and extractive profits. The issue still has ethical relevance now, as the Drugs for Neglected Diseases Working Group (DND) of Médecins sans Frontières (Doctors Without Borders) argued in 2002: it advocated “an international not-for-profit initiative that would focus on drug

development projects for the most neglected diseases” in order to “remove the process of researching and developing life-saving drugs from a market-driven logic” [12].

After exposing the core problem in drug development for tropical diseases—target populations that are too poor to pay for drug treatment and the ethical failure to shelter the process of drug development from market-driven logic—*Parasites!* broaches the question of whether alternatives exist to for-profit research as a means of drug discovery. The next two panels purport to give us our answer. In the first, we are back in Glasgow at the WTCMP, where we peek over the shoulder of a young researcher who explains that he studies “what’s important and interesting, even if it’s not financially profitable.” Then, against a silhouette backdrop of nighttime Glasgow, a white-haired researcher explains his passion for the work of the WTCMP: researchers, “fascinated ... and driven by a desire to understand” rather than the profit motive, study these parasites in “labs, clinics and field stations around the world” with the hope of “controlling these parasites and curing the terrible diseases they cause.” Yet even as these concluding panels of the comic celebrate science for science’s sake, they shy away from formulating the more far-reaching and complex issues that structure the development of unprofitable drugs: the selection of which scientific research gets done, for whom, and in what economic, ethical, and political context.

### **Conclusion**

By including visual images that require us as viewers to reorient ourselves ontologically and epistemologically, *Parasites!* illuminates the structural features of imperialist oppression that adversely affect human health. As we look at these images, we are forced to ask ourselves questions that transcend the economic factors that limit access to health care: Where should we place these parasitic diseases in the scale of scientific knowledge? And where should we place their victims in the scale of human life? By providing the context in which readers can explore these questions, *Parasites!* enriches the public debate about global priority-setting for drug research funding and draws attention to previously unexamined assumptions about obligations of drug developers as global citizens and the impact of labeling pharmaceutical markets as “viable” or “profitable.”

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