

Arley Donovan
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HIST404
Final Research Paper

**ANT!: Auguste Forel, William M. Wheeler,
And the Perception of the Social Insect**

Throughout the late nineteenth century and the early twentieth century ants and other social insects were used to describe a wide array of human social phenomena, and then finally reduced to scary hordes that threaten us with disease and ruin our crops. A few individuals provided scientific study on ants that was presented to the scientific community and these studies were often highly influenced by their individual backgrounds and other areas of study. Myrmecology, the study of ant behavior, began in the late-eighteenth century with its modern founder Swiss Auguste Forel and American counterpart William Morton Wheeler.¹ William Morton Wheeler defined the history of myrmecology by coining the term itself and compiling one of the most thorough encyclopedias on ants.² Both Forel's and Wheeler's studies on ants and comparisons of them to the social patterns of humans are highly influenced by their background and education. Due to the values of these top individuals and then the government intervention the accepted importance of the study of social insects changes throughout the late eighteenth and early twentieth century according to who holds the top myrmecological position at the time.

The behavior of animals, both strange, and familiar, has been studied and revered by human cultures since the beginning of time. In ancient Andean cultures the stone relief carvings depict human-jaguar hybrids that have fangs and snakes for hair.³ Many different animals have been used to explain the way humans act. The history of scientific study on the ant and its evolutionary past is a particularly interesting example of social evolution in animals because of

¹ Sleight, *Six Legs Better*, p. 64.

² Ibid., p. 64.

³ Miller, Rebecca Stone. *Art of the Andes*.

their strong similarities and differences to humans. The ant lives in a colony like a human town or city, and many colonies have nurses and soldiers, but at the same time it is a tiny six legged creature that wears its bones on the outside of its body as an exoskeleton. The ant, the general Western public has looked at a tiny six-legged creature without a true brain in biology as both a model for human psychology and sociology, and as a symbol of fear and revulsion. The ant provides a fascinating example of social evolution and its connection and reflection of the human social organism.

Born in a small Swiss town in 1848, Auguste Forel grew up in a sheltered home with few companions except his mother and the surrounding wildlife.⁴ His Calvinist over-bearing mother, his grandmother, and the three colonies of ants that lived outside his childhood home largely defined Forel's childhood. He rejected his mother's avid Calvinism and over-bearing nature, and turned to the world around him instead. He wrote later in life of his regulated childhood and said, "I was cut off from all human intercourse. My mother would not even let me go into the garden alone."⁵ Young Auguste came to care so deeply for his pet ant colonies that when one was raided by an enemy horde of red ants he fetched boiling water to pour on the intruders. Unfortunately, it had no affect, but this shows how deeply he cared for these insects as a child.⁶ He avidly watched and tended to three different species of ants living around his home writing later in life.

Forel went on to pursue both entomological work, and developed an impressive career in psychiatry. He became a well-known scholar in neuroscience, which gave him medical prestige. He wrote books on insect behavior and taxonomy and psychology, writing *Les Fourmis de la Suisse*, in 1874, and *Sexuelle Frage* (a book on the prevention and treatment of sexual diseases), in 1905. He also worked for a long period of time in a mental hospital where he saw the social

⁴ Sleight, *Ants*, p. 30.

⁵ Sleight, *Ants*, p. 30.

⁶ *Ibid.*, p. 30.

ingrates of society. Ants were a stark opposing contrast of these people for him. He was an abstainer and a member of the Independent Order of Good Templars, because he viewed drunkenness as a peril to society. He viewed ants as an example of the ultimate “decent, sober individual,” and as if to emulate them in his own life he named his own home *La Fourmilière-The Ant Colony*.⁷ These two fields of study, myrmecology and neuroscience, although they might seem very different, were often intertwined for Forel. He was much more concerned with the observation of his subjects, similar to the way he spent his time as a young boy, and his fellow entomologists were often more concerned in collecting and naming as many ant species as they could.⁸ Forel was most interested in an “evolutionary study of behavior,” and he most likely sought to discover something about the human experience and psychology through his study of ants.⁹

William Morton Wheeler interest in natural history began in his youth. He became involved with Henry Ward’s natural history exhibition gallery in his hometown of Milwaukee, Wisconsin. He was a “talented linguist (thanks in part to his bilingual schooling in Milwaukee), he was also extremely well-read in history, philosophy, literature, and many other fields. In 1885, Wheeler taught at the unconventional Milwaukee High School that specialized in upper level biology courses at the encouragement of its principle.¹⁰ Then Wheeler was encouraged by C. O. Whitman to study embryology, so he received his doctorate and then he traveled abroad in Germany. This gave him the contacts, including Auguste Forel, and credentials to put him in on a good scientific trajectory to success as he returned to the United States. When he returned to the United States he make a number of job changes from teaching at the University of Chicago,

⁷ Sleight, *Six Legs Better*, p. 22.

⁸ Ibid., p. 52.

⁹ Ibid., 61.

¹⁰ Ibid., p. 65.

then at the University of Texas, Austin, then becoming the curator of invertebrates at the Museum of Natural History, and finally settling, in 1908, on a professorship of economic entomology at Harvard Universities Bussey Institute where he later became the Dean of the graduate program in applied biology.¹¹ This is ironic because he only wrote a total of two papers on applied entomology from the beginning of this professorship until the time he died.¹² This position did give him the platform from which he could push his own ideas about myrmecology and his ideas about the importance of the social insect and his version of the true biology. He was well versed in Ancient Greek philosophy and it seeped into all of his scientific studies.

From the time of William M. Wheeler's birth in 1865 to his death in 1927, a wide variety of scientific debates took place. First the wide-scale acceptance of Darwin's theories on evolution and natural selection were being scrutinized, criticized and then finally widely accepted by the early 20th century. Then in the early 20th century both Genetics, a new area of science, and Eugenics, a way of using science to purify the population, developed and were highly debated by the scientific community. It also began a time of exploitation of the public from the scientific elite because they were supposed to take the scientist said as fact and not question it. Wheeler and his intensive study of the ant, and the ant as an organism represented a part of the scientific community that was not moving on sciences general trajectory mostly because of the interests of its main researchers. At a time when Thomas Hunt Morgan and his "fly boys" were spending hour upon hour and day upon day in a lab, Wheeler encouraged his students to go out into the real world and learn. In Wheeler's article, *The Dry Rot of our Academic Biology*, he highlights the dangerous move away from field studies;

¹¹ Ibid., p. 67.

¹² Ibid., p. 68.

“The finest example of this lack of vision is seen in the stolid indifference especially in our eastern universities, to exploration and research in the remoter portions of our own country, in foreign lands, and especially in the tropics. We have in the Philippines and at our very doors in the West Indies, Mexico, Central and South America the most marvelous faunas and floras in the world, but we still persuade our traveling fellows to cut more sections in the laboratories of Professor Rindskopf”¹³

By calling out his scientific peers by name in this speech, Wheeler shows how ready he is to fight back against what he believes to be a painstaking degradation of the importance of fieldwork.

Forel’s work in psychology, on the other hand, was always in the background in his work with ants, but he had a hard time comparing ants to humans directly. He suggested that it was both dangerous to look at insects from an “anthropocentric” view and from a view of animal as “machine.”¹⁴ He looked at the insect mind, the ant mind as a psychologist would look at the mind of any individual he or she studied. This idea also shows up in Wheeler’s work, and as Forel and Wheeler kept in touch after Wheeler’s time in Germany they may have been working on this idea together. In Wheeler’s article *On Instincts*, he claimed to be guilty of and then proceeded to warn against being anthropomorphic in one’s studies, he said, “those who were responsible for the extension of the meaning of the word at the “endowed” end, for applying the word anthropomorphic to an entirely different thing-the granting of intelligence, purpose, design and human attributes in general to non-human animals, in order to stigmatize a concession to the “lower animals” which was repugnant to them- were the unconscious perpetrators of a successful fraud.”¹⁵ He is insulted that people apply this word to “higher animals” and ignore his lowly

¹³ Wheeler, “The Dry Rot of Academic Biology” p. 65.

¹⁴ Forel, p. ix-x.

¹⁵ Wheeler, “On Instincts”, p. 303.

insects, but at the same time he advised against ascribing human characteristics to these animals. While these two did compare ants to humans in some ways, they believed in the higher intelligence of humans, but whether they thought the human being was using their higher intelligence for a good purpose can be debated.

Darwinian Evolution was being widely talked about and debated during the early part of Wheeler's lifetime, and Wheeler brought together his diverse background and his area of study, ants, to provide alternative but not completely opposing ideas to Darwin's theories. There was still a lot of controversy around Darwin's ideas and Wheeler himself was not convinced of their validity because of the cooperation he witnessed with his ant colonies. Wheeler opposed Darwin by suggesting that not all evolution was driven by competition and "survival of the fittest," but that a certain amount of co-operation could also lead to evolution. This was proven to him through the highly sophisticated ant colonies that he studied, and especially through the mutual feeding process of trophallaxis.

Trophallaxis was probably Wheeler's most exciting discovery in terms of why the ant colonies he studies resemble whole organisms. In Wheeler's eyes, this is the most fascinating and important piece of the social ant puzzle. Trophallaxis refers to a mutual feeding process in which the adult worker ants care for the larvae and in return the larvae produce exudates the worker's eat as nourishment.¹⁶ He named this mutual feeding activity trophallaxis, in order to "stamp his authority on the phenomenon."¹⁷ The process of trophallaxis seemed to Wheeler to be the key to the entire functioning organism of the ant colony. The evolution of this phenomenon caused the ant colonies to evolve like they did. Wheeler shows the importance of trophallaxis not

¹⁶ Wheeler, "Study of some ant larvae," p. 35.

¹⁷ Sleight, p. 79.

just for the ant colony members themselves but also for the greater biosphere in the following quotation,

“I believe it can be shown that trophallaxis, originally developed as a mutual trophic relation between the mother insect and her larval brood, has expanded with the growth of the colony like an ever-widening vortex til it involved, first all the adults as well as the brood and therefore the entire colony; second, a great number of species of alien insects that have managed to get a foothold in the nest as scavengers.”¹⁸

For Wheeler, this was both a process that was special for the ants that led to their evolution as a social creature, but could also be found in similar ways in other social insects. This mutual connection was a key piece of the evolution of social species.

Greek philosophy was also intentionally placed into Wheeler’s scientific work and it showed that he thought of science and philosophy as equally important and not mutually exclusive. In *Science*, Henry Osborn Taylor, a historian and Greek scholar, wrote a short review of Wheeler’s monolith on ants in which he address the myrmecologists love for Greek literature. Taylor coos, “But very few of his friends and pupils are aware that a commanding knowledge of the Greek and Latin classics made part of the superb intellectual equipment of this self-taught man. he read them as we read French or German. One day last summer he said to me: ‘I have just read Aeschylus, Sophocles and Thueydides, and Tacitus.’”¹⁹ His published works show how tightly he intertwined his interest and learning on ants and ant societies and his knowledge and passion for Greek rhetoric. In many articles Wheeler refers to Greek stories. For example in *Dry Rot of Modern Biology*, he tells the story of Antaeus, “You will recall Antaeus, that mythical F, generation hybrid between Poseidon, the Sea, and Gaia, the Earth. His hybrid vigor was so great, we are told, that he not only grew to gigantic stature, but also insisted on wrestling with every

¹⁸ Wheeler. “On Instincts,” p. 326.

¹⁹ Taylor, Henry Osborn. “William Morton Wheeler and the Classics.” *Science*

stranger that happened to pass through his Libyan domain. He was always invincible in these encounters because his strength waxed with each successive contact with his mother Earth.”²⁰ He does not really explain how this relates to the topic he is about to discuss so in many cases he probably left the listeners baffled and thinking that they were in the presence of some great Greek scholar.

A man that studies a species so intimately, and for such a long time in some way must come to emulate them and bring them out of the scientific world and into their everyday life. In Wheeler’s work he does this often by writing with personification of ant or insect phenomena. For example also in the article titled *The Dry Rot of our Academic Biology* he states, “I was in the very act of laying-if you will pardon a French expression-a volume of some 1,100 pages on ants. This racking oviposition leaves me reduced to a mere blob of corpora lutea and so feeble that I can only crawl.”²¹ Oviposition being the act of laying eggs, referring to the ovipositor of female insect species. The words oviposition, corpore lutea, feeble and crawl all seem to allude to species he studies so closely, but he is using them to describe himself and his own actions. He also used his articles to poke fun at strict biological writing. In his article *Termitoxia*, he writes from the perspective of a termite queen chastising the human species for their evolutionary faults. In one section of *Termitoxia* he references all the traits he thinks most grand about social insects by writing, “Thenceforth parents and offspring no longer lived apart, for an elaborate exchange of exudates, veritable social hormones, was developed, which, continually circulating through the community, bound all its individuals together in one blissful, indissoluble,

²⁰ Wheeler. “Dry Rot,” p. 61.

²¹ Ibid., p. 62

syntrophic whole, satisfied to make the comminution and digestion of wood and mud the serious occupation of existence, but the swapping of exudates the delight of every leisure moment.”²²

Wheeler's interest in ant sociology carried over into his political and personal beliefs about human nature as well. He begins to pay increasing attention to the “sociological issues among the ants. Steeped in the European literature of evolution and group-thought he translated his work-literally and culturally for an interwar American context.”²³ Wheeler saw the ants as being complete socialists, with no distinction between working towards a better individual and working towards a better group. These became one and the same. In this sense he saw the worker as the kingpin of ant society, without the perfect worker ant, the colony could not exist as it does.²⁴ To Wheeler the ant was also a model of a society that used eugenics to weed out its lazy workers, and unwanted castes.²⁵ He was caught between the idea of trying to emulate the social ant in their perfection of society but also accounting for individual identity. Wheeler thought of himself as an impressive individual and he didn't want to reduce his individuality by suggesting that people become like ants so much that they become parts of the organizational system rather than individual human beings.

While both William Morton Wheeler and Auguste Forel seemed to have solidified their ideas and links of Ant and Man, the events of World War I affected them and their scientific work deeply. The horrific acts that took place during the World War caused these men to review the human “animal” with a more critical eye. Forel began to concentrate “on the differences between humans and ants, concentrating on the human frailties that in his view resulted from inherited

²² Wheeler, “Termitoxia,” p. 115.

²³ Sleight, *Six Legs Better*, p. 64.

²⁴ Lustig, p.287.

²⁵ Wheeler, “Termitoxia,” p. 119.

paradoxes of conflicting instincts, cooperative and aggressive.”²⁶ Forel’s limited association with children at a young age, avid anti-alcohol standpoint, and his work in psychiatric institutions for so long was catalyzed by the horrors of World War I to cement his ideas that humans are inherently immoral. Forel’s ants however were left out of this moral equation. Forel rated ant behavior as 97 percent instinctive and 3 percent intelligent, and in even more defense of ant behavior, ants only acted on a local scale while humans were becoming increasingly more global, and increasingly more immoral.²⁷ Forel and his counterparts seemed to battle with the ant as the model for the ideal human, and the ant as a strict impossibility for the human society to emulate. That being said, both Forel and Wheeler say many connections between human instinct and insect instinct. Wheeler related the phenomenon of trophallaxis with a similar human biological process in which “pubic hairs were responsible for diffusing sexually attractive secretions.”²⁸ This comparison shows Wheeler’s eagerness to connect instincts in ants to instincts in humans.

During Wheeler’s time as the myrmecological king, one gets the sense that he wanted to restrict admission to the field to only a few. He was a very intelligent and well-read man, and probably viewed himself as such. One gets the sense that he wanted to restrict his area of study because of the very complicated taxonomic system he developed. The Wheeler and Forel method of taxonomy used five taxonomic categories, genus, subgenus, species, subspecies, and variety, much more complicated than the traditional taxonomy of genus and species. Joshua Blu Buhs, in his essay “Building on Bedrock,” provides an example of an ant nomenclature created by Wheeler called “*Formica Formica trunicola integroides haemorrhoidalis*.”²⁹ Part of the appeal

²⁶ Lustig, p. 288.

²⁷ Ibid., p. 289.

²⁸ Sleight, *Six Legs Better*. p. 80.

²⁹ Buhs, p. 29.

of ants for Wheeler was that there only existed a small portion of the scientific population that worked on them. This limited status gave him the liberty to write his scientific papers without the intense scientific scrutiny of a large group of peers. Also, in the introduction to the precursor to his giant monolith on ants Wheeler proves himself even more elitist by attempting to be inclusive. Perhaps this lofty view of himself, and overuse of philosophy in his work led to a small band of follows that basically diminished by the time of his death and gave way to the more practical economic entomologists.

While economic entomologists do not work with ants too much because they are not pests it is important to include them because they changed the way both the scientific community and the public looked at insects in general and therefore ants. Leland Ossian Howard worked for the Bureau of Entomology in the government and searched to find the best way of keeping pests under control and only looked at them like a biological hazard. There was nothing to learn from them, they were only important insofar as to learn how to control them. Wheeler warned people about this in his article *The Dry Rot of Modern Biology*. He thinks that biology is losing its luster and part of that is boring laboratory work. To him one of the most important things about biology, what sets it apart from other sciences is adventure. The field studies and behavioral research means the most to him. Economic entomologists signify this because they conduct their studies on killing insects in a confined laboratory space.

On November 29th, 1930, Leland Ossian Howard published a 540 page volume titled, *The History of Economic Entomology*, in which he dully outlines all pests and disease insects inflict on society, and does not go into much detail about their behavior.³⁰ The economic entomologist was not searching for the hidden meaning of man or life in the life cycle of the ant. Rather, he was looking for the best way to restrict insect populations. In the article *The Rot of Modern*

³⁰ Howard, *History of Economic Entomology*.

Biology Wheeler alludes to warning about the downfalls of economic entomology as opposed to studying behavior like he does. He warns about the new “biology”, if one can even dare to call it that by Wheeler’s standards, because it is losing the passion it once held. It also didn’t leave room for the philosophical teachings that he liked to include in his scientific papers.³¹ Graduate students are no longer learning what it’s like to be sent out into the field and have to blindly find organism and describe and observe them.³²

L. O. Howard then went on to publish a book called *The Insect Menace*, in 1931, in which he warned the general public of the potential harm of insects from his lofty scientific perspective and a voice for the ants as a highly social complex organism died out.³³ Howard worked for the Bureau of Entomology in the United States government and this changed the way social insects were viewed as well. Since big business and the military-industrial complex were increasingly driving the government there was less space for academic scientists, like Wheeler, in the governmental research. A government that used laboratories at Universities for their federal research and agenda probably drove this view on the insect as a fearful creature and not as a model social organism. Without the two well-versed, well-educated and high stature myrmecologists still talking about the psychological and sociological similarities between ant and man the general public only received a harsh criticism of the insect.

After Wheeler’s death in 1937, the central scientific voice for ants, and other insects as a case study in sociality that can be applied to humans died out as well. Science was becoming increasingly about practical applications and there was no room for Wheeler’s philosophically infused treatises on insect culture. The economic entomologists strangled that voice with their war against pests in agriculture. There was also a portrayal of insects to the general public as posing a

³¹ Sleight, *Six Legs Better*, p. 69.

³² Wheeler, “Dry Rot of Modern Biology”, p. 62.

³³ Sleight, *Ants*, p. 87.

mortal threat to the human population as a whole. In 1944, *Popular Science Magazine*, included an article titled “Our Next World War-Against Insects” that warned the public about the many harms of insects at home and abroad. It conjured up the vision of our patriotic American troops hidden deep in the jungle fighting off hordes of mosquitoes that were threatening the very fabric of human society as Malaria ridden pests.³⁴ It is unfortunate that after so much time spent analyzing the intricacies and complex nature of ant societies they, along with their fellow *Insecta* species, are reduced to scientific lab animals to eventually be killed by many harmful pesticides.

As the world became smaller with air travel and a wider scientific community that communicated often even across continental borders many horror stories of ants made their way to America. Hans Heinz Ewers, traveling in Mexico, recalls an unfortunate scene of ant murder when population of ‘gypsy ants’ overtook a mother mouse and her children. In his account of the warm-blooded mouse family he invokes the readers mammalian connection in the following description of their horrific demise, “She was a nice, lovely House-mamma. Now she was being eaten up alive, she and her naked mouse children...If only those Mice were dead at last, thought I, but they squeaked and squeaked, every more wildly, uncannily, hopelessly....”³⁵ These descriptions of horrific, malicious, bloodthirsty ants from around the world overtook the vision that Forel and Wheeler had of the diligent, hard-working, society-based ant. The ideal of the communal living of ants also reinforced fears of Communism and led to the vilification of the ant. There was also a racial dynamic at play in the association of ant societies from the modern world and those from the more exotic places around the country.

Throughout history ants, and other social insects have been used in various ways to both demonstrate the faults and strengths of human society. For early myrmecologists like Forel and

³⁴ “Our Next World War-Against Insects”, p. 66.

³⁵ Sleight, *Ants*. p. 95.

Wheeler the ant was a fascinating example of socialism in the natural world, but also so mechanized that it was something humans could never attain. The mechanization of the insect colony couldn't be replicated by humans because these myrmecologists believed that humans were nowhere near as instinctual as insects and ants were. Forel rated ant behavior as ninety-seven percent instinctual, and human behavior as equally instinctual and intelligent.³⁶ While this was still quite a high instinctual rating for humans, it meant that human's decisions rational or irrational governed them more than instincts and so they too individualistic to be part of a completely socialist society like ant society. After the main behavioral myrmecologists died and the scientific community no longer heard their voices, professional or economic entomology, aided by government funding took over, social insects became more of a nuisance than an comparative psychology and biological interest.

³⁶ Lustig, p. 288.

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