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Microbe Hunters revisited

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It was the mid-1950s and I was a teenager when I first read *Microbe Hunters* by Paul Henry De Kruif (Zealand, MI, 1890–Holland, MI, 1971). It was the right time and the right age; I was fascinated. Here were heroes enough to satisfy any bookish young man interested in the natural world. *Microbe Hunters* was a book that inspired a generation or more of budding young microbiologists [4]. Not only that, however. It established a metaphor and a genre of science writing that has often been imitated.

Microbe Hunters is a series of 12 stories that describe major events in the history of microbiology, from microscopic observations of animalcules (literally “little animals”) by Leeuwenhoek (“First of the Microbe Hunters”) to Paul Ehrlich’s work on salvarsan (“The Magic Bullet”), which was the first specific chemotherapy agent against any microbe. Along the way we learn of the work of Spallanzani (“Microbes Must Have Parents!”), Pasteur (“Microbes are a Menace!”; “And the Mad Dog”), Koch (“The Death Fighter”), Roux and von Behring (“Massacre the Guinea Pigs”), Metchnikoff (“The Nice Phagocytes”), Smith (“Ticks and Texas Fever”), Bruce (“Trail of the Tsetse”), Ross and Grassi (“Malaria”), and Reed (“In the Interest of Science—and for Humanity!”). This collection of stories was first published in 1926 and has been in print ever since. It has been translated into at least 18 European and Asian languages and has sold millions of copies. By 1936, it had already sold about a half-million copies, an amazing number for a nonfiction book especially during the great depression and the interwar period.

These accounts have been described by one of De Kruif’s biographers, Ben Hibbs [8], as “sparkling, exciting narrative — history objectively written.” Hibbs went on to observe that De Kruif “was interested chiefly in the epics of science which had been finished, which had come to triumphant fruition — because it was these which made neat, well-rounded stories.”

Indeed, *Microbe Hunters* is a book about success: tales of brilliant research, incisive investigations, and heroic personalities. Yet it is far from “history-objectively written.” The formula that De Kruif hit upon in *Microbe Hunters* served him well: between 1928 and 1957 he wrote eleven more books on medical and scientific topics, all with the same “exciting narrative” and sense of drama. Some of these books were best-sellers and selected by the popular Book-of-the-Month Club. None, however, matched the popularity and appeal of *Microbe Hunters*.

De Kruif’s stories are full-scale dramatizations, complete with fictional dialog of the historical subjects, and first person interjections of the voice of the narrator, De Kruif. The prose is breathless and exclamation points abound. Consider this account of Louis Pasteur trying to encourage his assistants Émile Roux and Paul Chamberland when they had discouraging results with rabies immunization: “You would think that Roux and Chamberland, still youngsters, would have been the indomitable ones, the never-say-die men of this desperate crew. But on the contrary! ‘Its no go, master’, said they, making limp waves of their hands toward the cages with their paralyzed beasts — toward the tangled jungle of useless tubes and bottles. Then Pasteur’s eyebrows cocked at them, and his thinning grey hair seemed to stiffen: ‘Do the same experiment over again — no matter if it failed last time — it may look foolish to you, but the important thing is not to leave the subject!’ Pasteur shouted in a fury.”

The stories often begin in the middle of the research, at some critical point in the drama. The story unfolds bit by bit with a parallel development of the human characters. One of the charming features of *Microbe Hunters* is the emphasis on the personal qualities of the principle players in contrast to more conventional accounts which often emphasize ideas and the conceptual content of events. De

Kruif, as narrator, often directly addresses the reader with some observation, or comparison with modern times, thus bringing the reader into the narrative as well. While the title, *Microbe Hunters*, suggests a sporting theme, De Kruif more

medicine and science, played out in the thinly fictionalized laboratories of the McGurk (read "Rockefeller") Institute, portrayed the protagonist, Martin Arrowsmith, as a modern scientific microbe hunter. An entire generation of physicians and biological scientists cites these two books as its inspiration. *Microbe Hunters* was in several ways the sequel to *Arrowsmith*, published in 1925 by the American writer, Sinclair Lewis. De Kruif had worked with Lewis on *Arrowsmith*, and was to have been a coauthor, but in the end settled for one-fourth of the royalties.



Fig. 1 Covers of an American and an Spanish edition of the book

often employs military metaphors: battles, generals, troops, and skirmishes.

The other profoundly influential book from this era was the novel *Arrowsmith* [9]. The story of the conflicts between

The book

What can be said of *Microbe Hunters* as history? History is a selective business, and the historian is the one who chooses what to include, what to omit, and what to emphasize. The boundary between history and fiction is insecure, however. We assume, of course that the "facts" in history are "true", that is, names, dates, events and so on are supported by evidence that attest to their existence. But what about dialog, such as enlivens *Microbe Hunters* so much? Clearly not all of De Kruif's dialogs are direct quotes from archival sources, so how are we to read these passages? As fiction? As what might have happened? As what really did happen? Clearly, our understanding of the real events in these stories are shaped by how we interpret these invented dialogs. While apparently carefully researched, De Kruif's embellishments and exaggerations render them frankly hagiographic and clearly reflect De Kruif's heroic view of his field. However, one of his subjects, Ronald Ross, still alive when the book appeared, was so incensed at De Kruif's portrayal of him and his work that he sued De Kruif and managed to prevent publication of the offending chapter in the version sold in the United Kingdom [1].

In the early decades of this century scientism, the belief in science as a kind of ideology or almost a religion, was taking hold, and there was a huge interest in books, courses, and lectures making science and recent discoveries understandable to the popular mind. *Microbe Hunters* was an important example of this phenomenon. De Kruif was convinced of in the power of science to solve health problems, and of the public health message that militant attacks on germs would conquer infectious diseases. He wrote with the fervor of a talented and enthusiastic true believer.

The phenomenal success of *Microbe Hunters* won De Kruif a platform from which to carry on his crusades for health. He became a staff writer on medical subjects for *Country Gentleman* and *The Ladies' Home Journal*, published by the Curtis Publishing Co., while he poured forth a stream of books on important health issues of the day. Nutrition and agriculture were featured next in *Hunger Fighters* [5], followed by ten more titles dealing with such diverse topics as the health effects

of poverty, hormones, syphilis, health insurance, and mental illness. In most of his writings, De Kruif's style and approach closely followed that he used to great effect in *Microbe Hunters*: narrative essays on heroic feats involving men of science, locked in mortal combat against ignorance and disease. This style was easily adapted to magazine articles, and De Kruif had a long career as a writer of many short pieces on medicine for *The Reader's Digest*.

The author

Paul Henry De Kruif (1890–1971) was born in Zeeland, Michigan, the son of Dutch immigrants, and received a B. A. from the University of Michigan in 1912 and a Ph. D. in bacteriology in 1916. His thesis, prepared under the guidance of Professor Frederick G. Novy, was "Primary toxicity of normal serum". De Kruif served as a private in the U. S. Army with General John J. Pershing's expedition in 1916 to retaliate against the raids of Pancho Villa from Mexico into U.S. territory in the southwest. He then joined the Sanitary Corps of the U.S. Army and went to France when the U.S. entered the First World War. In his work for the U.S. Army he had contacts at the Pasteur Institute, and during the course of the war he came into contact with Hans Zinsser, William Elser, Stanhope Bayne-Jones, Emile Roux, and Maurice Nicolle. De Kruif's war work involved the immunological study of *Clostridium perfringens* (*Bacillus welchii*) [7], the microbe responsible for gas gangrene.

After the war, De Kruif returned to Novy's department in Michigan where he was Assistant Professor of Bacteriology. With Novy he identified a substance they called anaphylatoxin, now known as components C5a and C3a of the complement system [2]. They had found an alternate pathway of complement activation. Even though his work in Michigan was going well, in the fall of 1920 De Kruif moved to the Rockefeller Institute in New York to join the laboratory of Simon Flexner as an assistant in bacteriology. In Flexner's group he joined a new research program on laboratory epidemiology of respiratory infections in rabbits. He analyzed the changes in virulence in *Streptococcus* of rabbit septicemia and observed that the colony morphologies on agar plates (smooth and rough) correlated with the pathogenicity in animals. He also showed that a "pure" culture of virulent organisms could give rise to avirulent variants. De Kruif's experiments were the first to explain this phenomenon, called microbial dissociation, within the framework of genetic mutation in bacteria.

In New York, De Kruif joined several literary figures of his day, who encouraged him to try his hand at writing on medical and scientific topics for a popular audience. His first article was published anonymously, because he feared the reaction of his colleagues at the Rockefeller Institute. In this short essay De Kruif took medicine to task for its

claims of scientific authority while ignoring the basic notions of modern science. Two themes that De Kruif used in much of his later writing first appeared in this essay: the tension between science and medicine, and the military metaphors for medicine and science. This article is sprinkled with references to "soldiers of health", "the armamentarium of modern science" and "battalions of hygienists". While chiding his medical colleagues for their self-proclaimed image as "men of science", he described "science" as "concerned with the quantitative relationship of the factors governing natural phenomena" [3]. "No favourites are to be played among these factors." To illustrate his claim that medicine is not a science in the modern sense, De Kruif decried the lack of controls in medical research. This criticism, in almost the same form, would later appear in *Arrowsmith*. Simon Flexner, De Kruif's chief at the Rockefeller Institute, interpreted these and other articles as a veiled attack on the Institute as well as an embarrassment to him. In the fall of 1922 De Kruif resigned his position at the Rockefeller Institute and left laboratory science to become a full-time writer.

Morris Fishbein, the associate editor of the *Journal of the American Medical Association*, introduced De Kruif to Sinclair Lewis in late 1922 and De Kruif and Lewis took a quick liking to each other. They agreed to collaborate on a novel about American medicine: De Kruif would provide the scientific material and character sketches based on physicians and scientists he knew, and Lewis would supply the plot and dialogs. Thus, *Arrowsmith* was born [10, 11].

As he became a national spokesman for the exciting advances in modern medicine, De Kruif was enlisted by President Franklin Roosevelt to help in the "war" on poliomyelitis. In 1934 De Kruif was appointed secretary to the Commission for Infantile Paralysis which included such captains of American industry as Edsel Ford, Jeremiah Milbank and James Couzens. On this committee he was an effective voice in supporting basic research on polio prevention. De Kruif convinced the Commission to direct most of its funds to medical research under the guidance of himself and a board of medical advisers. De Kruif used his magazine articles to advance the cause of polio research and to support the work of the Commission. A few years later this Commission was reconstituted as the National Infantile Paralysis Foundation, a model for public medical action and philanthropy.

De Kruif's final book, *The Sweeping Wind*, was his autobiographical memoir written in 1962 [6]. While not deeply introspective, this book shows De Kruif as aware of his personal flaws, while holding fast to his social and scientific enthusiasms. His flair for a good story, his unshakable faith in scientific progress for human welfare, and his robust enjoyment of life are all hallmarks of his journalistic style. As an advocate for medical research and the advances in medicine which follow, Paul De Kruif reached several generations and significantly shaped our perceptions of science, medicine, and health.

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