really had no idea what disease, or diseases, that were caused by the anthrax microbe. I vaguely recalled from my medical school days that the anthrax microbe is a Gram-positive rod. I also recalled that Louis Pasteur had developed a vaccine against anthrax, but that was about all that I could remember. Accordingly, I consulted my microbiology texts and went on-line, to see what I could learn.

From my texts I learned that the anthrax organism has the unusual property of undergoing a metamorphosis from a multiplying vegetative bacteria into a *spore* (from the Greek, *sporos* = seed), which is defined as an inactive resting or resistant form produced within the body of a bacterium.

I also learned that anthrax was the first disease actually proven to be caused by a microbe, by Dr. Robert Koch, who reported on his experimental findings in 1876 [3]. This piece of information really piqued my interest, because I had no idea that anthrax was so central to the history of medicine. Like most other physicians of my generation, I had never seen nor heard of an actual case of anthrax. However, I did know that anthrax was often mentioned as a possible bio-weapon that could be used by terrorists, but I did not know why it was so dangerous, or exactly what symptoms were produced by the infection.

I remembered visiting one of my friends at the Frederick Cancer Research Facility (FCRF) in Frederick Maryland in the 1970's. The FCRF was originally Fort Dietrich, which from 1943 to 1969 was the U.S. Army base devoted to chemical and biological warfare research. My friend pointed out a large 5–6-story building that had all of the windows and doorways covered over with concrete blocks. This building had housed all the anthrax research, and it was still contaminated by anthrax spores, which were extremely deadly, so that the building had been hermetically sealed, rather than razed, when President Nixon discontinued chemical and biological warfare research. As far as I know, that building is still there in Frederick.

To learn more about Robert Koch and anthrax, I turned to a book by Eli Metchnikoff, published originally in 1905, entitled **"The Founders of Modern Medicine: Pasteur, Koch, and Lister"** [4]. Metchnikoff was a Russian zoologist, who observed the phenomenon of phagocytosis for the first time, while studying starfish larvae off the coast of Naples in the 1870's [5]. Subsequently, in 1885, he was recruited by Pasteur to become the first *Chef de Service* at the newly formed Institut Pasteur in Paris, where he championed the idea that cells actually are responsible for immunity.

Beginning with Ignaz Semmelweis' observations on the possible cause of puerperal fever (childbed fever) in 1850 [6], the notion that small microscopic living things might cause disease and death began. Then, Louis Pasteur's demonstration in 1857 that fermentation of lactic acid into alcohol and carbon dioxide was actually caused by living organisms (animal infusoria), and not by the then popular theory of "spontaneous generation", set the stage for the importance of microbes in everyday processes [7]. Subsequently, Joseph Lister's 1867 descriptions of the use of antiseptics in the practice of treatment of compound fractures and at surgery [8,9], promoted a growing notion that removal of microbes isolated from wounds and other degenerative tissues could improve the outcome of the patient. However, the most common belief still held was that any microbes found in suppurating tissues were the result and not the cause of the fetid, morbid state. The morbidity was thought to arise spontaneously via chemical reactions. Any association with living microbes was considered fortuitist.

In the words of Metchnikoff,

"A powerful impulse was necessary to change this inchoate idea of organized (chemical) ferments into a rigorously proven scientific truth that microbes were responsible (for putrifaction and disease). Robert Koch started such an impetus in his 1876 paper on anthrax. This young health officer in the little city of Wolstein, a god-forsaken hole in Posen (Prussia), suddenly came into the limelight of science. His work was indeed a model of true scientific creativeness. Living in a region in which anthrax was endemic, he set about to study it, without the help of laboratory or library, and was always thrown back on his own resources. He worked in his own rooms where for lack of gas illumination he was obliged to use a petroleum lamp. By means of plates covered with moist sand he constructed a semblance of an apparatus for growing cultures of bacteria. Nevertheless, he achieved results superior to anything yet accomplished. He was the first to succeed in changing the thread-like microscopical corpuscles identified by others (in France) into identifiable filaments (chains of rods) and then into beads consisting of minute grains, the spores. This great discovery of the spore of anthrax removed all doubts regarding the role of bacteria in the causation of anthrax, for it illuminated all points hitherto left unexplained."

Throughout medieval times, anthrax was a disease primarily of livestock, and it still is considered so, which explains why I was unfamiliar with it. In humans, the most common affliction is a skin inflammation that matures into a very characteristic ugly black eschar, from whence the disease was named from the Greek: anthrax = *coal, carbuncle*. In the 19th and early 20th centuries, cutaneous anthrax was also known as "wool sorters disease", because farmers and woolen workers would contract it from handling animals and wool contaminated with anthrax spores. For the livestock industry, anthrax was a