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A Humorous Lesson

by Becky Reichel

(Honors Chemistry 1551)

Throughout history, humanity has reached for and fallen short of an explanation for the physical phenomena of life- even if each stretch seems to bring us a little closer to the truth. We have such patterns in most fields of science, including medical practice and pathology. For centuries, spirits and gods were to blame for disease, and the cures were logically sought along the same lines, but as we progressed, we began to look at our actions as having a more direct affect on our own health. It was Hippocrates who gave the medical world one big push forward with his use of observation and his thorough, systematic examinations and diagnoses. But while he is commonly known as the “Father of Medicine,” like all major human advancements, his pathology did not quite encapsulate the truth.

One of Hippocrates’ big contributions to the medical sciences was the determination that it was not, in fact, spirits or broken taboos that brought about illness, but something chemical. Where he went wrong, however, lies in the details of his not-quite-theories, and the way others built upon them. During the Age of Pericles, Hippocrates was the one to introduce humoral pathology, or the belief that illness and other ailments were caused by in imbalance of chemicals in the body, according to Fielding Hudson Garrison in his work, *An Introduction to the History of Medicine*. Some Greek beliefs of the time pointed to four elements (water, fire, earth and air) as making up the world and the humors mimicked this distribution, being categorized as four main humors of which too much or too little of one or the other could cause nearly any ailment not directly attributable to some obvious injury. Though some continued to believe spirits could unbalance the humors, the actual cause of whatever ailment inflicted was accepted to be due to the humors themselves, and the system spread through the western world.

Despite regional differences in other beliefs and applications, it was widely accepted that the humors were four fluids, which the body contained, classified as blood, phlegm, black bile and yellow bile. Blood and phlegm (mucus) are just as well known today, though not as humors. Yellow bile was likely the bile vomited by fasting patients, visible when no food was present to obscure it. Black bile was known as the “massive foul-smelling black loose stools” produced in the event of some diseases and the consumption of various herbs, including the toxic hellebore, according to Michele Fornaro, Nicoletta Clementi and Panataleo Fornaro’s “Medicine and Psychiatry in Western Culture.” Yellow and black bile stood as opposites, black being seen as the cause of melancholia and yellow, of mania, as well as, cholera. In the face of this, it is not a surprise that black bile was also known as the melancholic humor, and yellow bile as choleric. As for the other two humors, blood was also called the sanguine humor, while phlegm received the less original moniker, phlegmatic. These four bodily fluids were linked to both psychological and physical ailments or conditions, and were assumed to be influenced by dietary *or* environmental factors.

According to Hippocrates, it was a person’s physical and mental activity, as well as their diet and environment, which imbalanced the humors within a body, not insufficient worship of the sovereign deities. In fact, Helen Christopoulou-Aletra and Niki Papavramidou’s “Methods Used by Hippocratic Physicians for Weight Reduction” reveals that when treating a patient, they took into account the effect of “the profession of the patient, the amount of body exercise and athletic endeavors, walking, sleeping, sexual activity, baths, steam baths, [...] and the feelings of the patient” on the humors, seeing the connection between some activities (or lack of activity) and disease, and

then chalking it up as a factor of imbalance. Other environmental variables such as the climate were also commonly known to imbalance the humors or to weaken a person's resistance to illness. One such climate thought of as particularly treacherous was any that had hot, damp summers and cold winters. Hippocrates thought people in such climates were "languid, moist, and generally 'cowardly' in their souls" while cold climates fostered "extremely thin persons with sinewy, firm flesh" (Christopoulou-Aletra 514). The cold and dry appeared to lessen the overall amount of fluid in the body, leading to a total humor deficiency that supposedly caused this extreme thinness. Likewise, a surplus of all humors led to obesity, in the eyes of those who followed the humoral pathology. Yet, though the humors seemed to coincide with different combinations of hot, cold, dry, and wet, and thus could be increased or decreased by exposure to their own or their opposite characteristics, as in the example of cold climates discussed above, the categorization of what was hot, dry, cold, or wet could be quite complicated, if not seen for their effects, rather than on their own worth. As seen in Daniel L. Heiple's "Renaissance Medical Psychology in 'Don Quijote'" for Tulane University, such things as lack of sleep and excessive studying were thought to dry out the body and mind, increasing the amount of the melancholic humor, black bile. This can be explained with the simple assertion that an increase of black bile was believed to cause a depression and spiral into madness which, in fact, could be prompted or worsened by lack of sleep or the stress which usually causes or is brought about by excessive studying. Much of the interactions of humors with the world and the categorization of foods, behaviors, and regions as hot, cold, moist, or dry was based on after-the-fact correlation, and later used to semi-accurately predict possible ailments without understanding the real middleman, providing what seemed like proof of the humors to the people of the time.

There were other reasons to believe in the humors and their influence. Treatments based on the humors ranged from a change in behavior and diet, to the "bleeding, blistering, purging, vomiting, and sweating" the pathology is most known for today and in John Duffy's *From Humors to Medical Science*. Yet, nearly every treatment had some noticeable effect, even if not an intended, or beneficial one. It is when a curative has no effect, for good or ill, that a patient truly begins to lose hope in its power, after all, and every time the physicians lucked into the use of something like St. John's Wort (which has potential antidepressant properties) to combat a surplus of melancholic, black bile, the practice gained more plausibility. Hippocrates' careful and systematic observations of his clients, and the passing on of this process, certainly didn't hinder the humoral pathology's spread, either. Even popular literature towards the end of the humors' reign still incorporated the humors' effects, as seen quite obviously when the main character of *Don Quijote* regained sanity twice through extensive bleeding from battlefield wounds, reinforcing the healing power of humors to the very end (Heiple). Truthfully, the power of the humors lay in their explanation of the link between behavior and disease; they were not correct, but they allowed physicians to encourage behaviors and lifestyles that they saw correlated with good health with a persuasive, non-spiritual explanation of *why* and *how*. And that was a step forward in itself.

Eventually, the sun would set on humoral pathology's reign, but not until the late seventeenth and early eighteenth century would the last rays begin to dim. Most educated medical practitioners traded in the reigning humoral pathology in exchange for the iatrophysical and iatrochemical theories, which, respectively saw the body as "a machine motivated by 'life force' circulating through the nerves" or as a system of acids and alkalis, of which disease was the result of an abnormal reaction (Duffy 13,14). Yet these theories only dealt the deathblow to humors' prominence in professional circles, with more attractive explanations for disease. The silent killers of humoral pathology would be the invention of microscopes and the discovery of microorganisms by Robert Hooke and Antoni Van Leeuwenhoek during the medical renaissance, published in *Micrographia* in 1665. Leeuwenhoek went on to observe and report the discoveries of microscopic protozoa and bacteria, and this quiet assassin of the humors bided its time for nearly two centuries, until in the 1870's, "pathogenic bacteria were identified as the aetiological agents of infectious diseases" by

Louis Pasteur in his famous germ theory of disease, according to Alfred Tauber's "Metchnikoff and the Phagocytosis Theory." The discovery that microorganisms could actually cause disease without a surplus of this or a deficiency of that left humors dead in the water, even if there were those who would fight it, such as a "Professor Bastian" who wrote a letter to *IN NATURE* magazine stating that "such germs when present would be sure to go on increasing until they brought about the death of their host," since the immune system was not yet known, in the November issue of 1871. Granted, a more detailed knowledge of human anatomy was likely helpful as well; after all, if there was meant to be a surplus or deficiency of black bile at any time in a human's cycle, it'd be difficult to explain why most bodies simply didn't have any. Overall, however, the discovery of bacteria and the late arrival of the germ theory disproved the influence of humors on the body for future medical practitioners and researchers, even if their influence on medical history would linger forever.

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