
SCIENCE AS CLEAR THINKING

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EARL HAUTALA *THE WRONG COLOR OF BLOOD*

YOU DON'T FEEL WELL. The hospital smells funny. To top it all off, the doctor wants you to have some "routine" blood tests to see if they will help diagnose the problem. Now you are waiting for someone to draw blood, your blood. How does getting stuck with a hollow needle get you any closer to feeling better? In this sterile, funny-smelling place, you have come face to face with "science," whatever that means.

The word "science" means different things to different people. Let me offer a tentative definition of science to explore the possibilities.

Science refers to the conscious process used to establish relationships between process-events. By "process-events" I mean whatever goes on, from what you observe, to what others say and do. The word "establish" in the definition creates a background for everyone like you, who starts from observation. Science becomes the neutral arena where we can reach agreements about whatever-goes-on. Science carries the connotation of something objective and agreed upon, at least until circumstances change. A recent survey (1989) suggests that nine out of 10 adults suffer from scientific illiteracy. That ignorance of science can have needlessly terrifying consequences.

My wife works as a medical technologist, fully licensed to obtain routine specimens from patients. As circumstances dictate, she draws blood from patients. She performs the prescribed tests and reports the results to the appropriate medical personnel. In her capacity, as part of the medical community, she sees the general public in a scientific environment.

Some people recoil (and perhaps even flinch a little) when confronted by the sight of their own blood flowing into a clear sterile glass tube. Most of these people have passed the state where they "cannot stand the sight of blood." Having patients flinch when they have a needle in their arm causes problems for any technologist. After too many such experiences, my wife thought to ask one of her anxious patients, "What's wrong?"

"My blood *looks* wrong. Why is my blood so dark?"

A little scientific ignorance can cause both patients and medical personnel problems in terms of shocks to the nervous system. Let me give you my version of what has happened from an outsider's point of view. Most people only go to hospitals and clinics when they don't feel well. They *expect* to see their

own blood about the color of steaks at the meat counter at the supermarket. What they *see* of their own blood does not meet their expectations. They get a sudden shock which causes dismay. The color of blood drawn for routine analysis approaches the color of liver. It comes from a vein. In order to understand what has happened, we have to refer to some storehouse of knowledge.

My sources in education say that the overwhelming majority of students in high school have taken a course in biology. If the course covers blood circulation, most high school graduates should have learned about the color differences between venous and arterial blood. Steaks at the meat counter appear a bright shade of cherry red because the blood has been in contact with oxygen from the air. People who have had a cut see their own blood a bright shade of red: It has contacted oxygen in the air. Under the stress of not feeling well and going to have a blood sample taken, patients who have forgotten their high-school biology may have quite a shock when their blood appears "the wrong color." They feel that something has really gone wrong with them and some may flinch.

The healing arts include more than just tongue depressors and pills. Patients feel anxiety in the foreign setting of a hospital, added to the discomfort of whatever symptoms they may have. A little cheerful explanation often helps to dispel the gloom.

Let's return to the patient we left who had just asked:

"Why is my blood so dark?"

My wife has learned to respond:

"We take blood from your veins where it only has a little oxygen. Blood from the veins normally looks just like yours." This explanation helps to reassure the patient and illustrates one or more of the principles of general semantics. The patient receives information which relieves an unnecessary anxiety now, and possibly in the future. The technologist may have helped other members of the medical community who will see a better-informed, less "jumpy" patient.

That squares with the tentative definition of science I offered earlier in this paper. The patient has learned about an established relationship between venous blood and color. The patient has gained some information about what to expect in the course of a particular type of process-event. That information may prevent shocks to the nervous system at a later time.

Information of this type may even lead to better health for the longer term. *Science News* has run a series of articles in the recent past which indicate that how we react to stressful situations affects physiology. Scientists don't know enough about our inner workings to say for sure how emotional reactions affect the immune and cardiovascular systems. I don't think that it adds much to my life when I respond to a near collision on the freeway with shaking hands and a pounding heart. I can't do much to change those types of emergency responses, but when it comes to visiting the local hospital or the dentist, I'll respond more like an ideal patient if I know what to expect.