My Reality and Yours

Robert Pearlman, PA-C

I was having coffee with a friend in a Greenwich Village café when he announced suddenly that we had to leave. "*Why?"* I asked. Because, he said, acid was dripping from the ceiling. I thought for a moment and took a chance. I asked whether he wanted me to take him to the VA hospital in Northport, about an hour's drive from Manhattan. His answer, "*yes*," was a surprise—and a relief. The dripping acid seemed real enough for him to act urgently, but he had enough grasp on reality to know he was ill and needed treatment.

Many years later, I had an artificial lens implanted in one eye. The acuity in that eye improved, but I was delightfully surprised—because I had not thought of it—that colors became bright and crisp as they must have been when I was a child. My other eye now saw things with a sepia tint that I had not been aware of. I joked that I could choose between two realities—an amusement made possible because I could account for it. But what if I couldn't – what if somehow I had been born *like that*? Which perception of the world would be be "real"? Or, since I could not rely on my eyes, could "real" be something entirely different? If thought derives in part from experience, this is no idle question. It has engaged philosophers for 2,500 years with significant implications for medicine.

But it is science, not philosophy, on which modern medicine is grounded. Science has given us understanding of vitamins, hormones, microbes, neurotransmitters, nucleotides, the cellular substance and functions of our bodies and the disorders that attend them. Science now promises a new personal medicine customized to our individual genetic particularity. Who could fault us for believing that for all queries science will provide? And so, it is to science that medicine looks for understanding of mental illness

Neuroanatomy began, so far as we know, in biblical times[1] and began to advance 500 years ago when Vesalius reviewed and corrected Galen's anatomical descriptions. With keen observation, experiment and, later, with the power of electronics, neuroscientists have been mapping the brain and localizing function with finer and finer precision. Neurochemistry, on the other hand, is only about 50 years old.[2] In this time, we have gained enormous insight into complex neuronal physiology and discovered about 60 neurotransmitters including acetylcholine, monoamines, amino, acids and peptides. Some excite. Some inhibit. Some arouse. Some sedate. New drugs are introduced every year to modulate these actions; the result has been a transformation of psychiatric treatment, virtually emptying the wards of mental institutions and changing the way we think about mental disease.

Neuroscientists are now primed to seek biological explanations for human thought and behavior. There is already a complete map of gene expression of the mouse brain (Google: "allen brain atlas") and there is underway at the Howard Hughes Medical Institute a huge project to build a complete working model of the fruit fly brain. The lead researcher, who expects to accomplish this in ten to twenty years, says, "In a hundred years, I'd like to know how human consciousness works."[3]

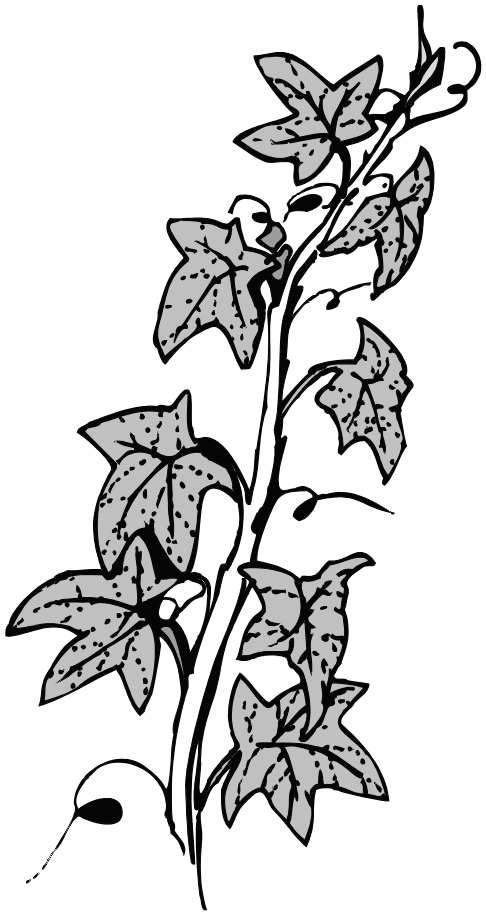
Two eminent scientists, both honored in Stockholm, the late Francis Crick (who needs no introduction) and Eric Kandel for his work on short term memory have expressed confidence that science one day will explain how a material brain gives rise to a spiritual consciousness. After Crick solved the problem of inheritance, he spent the rest of his life trying to establish a neuronal correlate to consciousness. On his deathbed, he was polishing a paper written with Christof Koch that proposed an obscure tiny cortical area called the claustrum, which itself means hidden away, as a possible seat of consciousness.[4] They compared it to a conductor of a symphony orchestra. It was published posthumously in *Philosophical Transactions of the Royal Society of London* (doi: 10.1098/rstb.2005.1661).

Kandel, a psychiatrist, was awarded the Nobel Prize in Physiology or Medicine nine years ago with Arvid Carlsson and Paul Greengard for signal transduction in the nervous system. In his autobiography,[5] Kandel describes the joy of working in research. He also describes the dissatisfaction with psychoanalysis he and many psychiatrists had in the 1960s because it was not scientific and had, in his view, lost its way—transformed "from an experimental medical discipline closely related to neurology into a nonempirical specialty focused on the art of psychotherapy." During his residency, he perceived in his mentors "an indifference, if not disdain for, biology." Even worse was "a lack of concern among psychoanalysts for conducting objective studies, or even for controlling investigator bias." Initially used to treat neuroses, "psychoanalytic therapy gradually extended its reach to almost all mental illnesses, including schizophrenia and depression" and thought asthma and peptic ulcers among other disorders were psychosomatic –induced by unconscious conflicts. What was needed, he concluded, was to put psychoanalysis on a "firmer scientific foundation." This has been his life's work, and he believes it even more strongly now.[6]

Unconscious conflicts aside, we have long known the effects emotions have on the body. More than 150 years ago a retired Army surgeon, William Beaumont, studied the chronic gastric fistula of his patient, St. Martin. When the latter was angry, fearful or depressed, "the villous coat (became) sometimes red and dry, at other times, pale and moist and (lost) its smooth and healthy appearance; the secretions (became) vitiated, greatly diminished, or entirely suppressed; the mucous coat scarcely perceptible; the follicles flat and flaccid with secretions insufficient to protect the vascular and nervous papillae from irritation."[7]

Strong emotion can even be lethal. In 1942, Walter B. Cannon wrote "Voodoo Death,"[8] in which he reported stories from around the world about persons frightened to death by "medicine men" believed to have supernatural power. Once a spell was cast, like an Australian witch doctor pointing a bone at a tribal transgressor, his victim became terrified, convinced he was doomed. Very shortly afterward the victim died. But this does not happen only to primitive tribesmen. Martin Samuels, professor of neurology at Harvard, has had an abiding interest in sudden unexpected death without apparent cause of otherwise healthy persons. During the past 25 years, he has collected hundreds of cases, and it is now recognized as a significant epidemiologic problem,[9] caused by autonomic dysfunction in which the heart is flooded by catecholamines released not from the blood but by direct neural connections. The lesion is described as coagulation myocytolysis by which cells die in a hypercontracted state with myofibrillar damage. It is also called contraction band necrosis or "stone heart." Samuels wonders whether this, and not infarction, was the fatal lesion of Ken Lay and Slobodan Miloševic, both of whom were about to serve many years, perhaps the rest of their lives, in prison. (The lesion of infarction, coagulation necrosis, is much different—the cell dies in atony without myofibrillar damage.)

If emotion can change the gastric mucosa and terrifying thoughts can seize-up the heart, what are we to conclude when science finds a correlation between pathophysiology and mental illness: which is the chicken and which the egg? Does excess dopamine in some parts of the brain induce schizophrenia, or is it the other way around?



After I dropped my friend off at the hospital, I never saw him again. I sometimes wonder about that dripping acid. Was it an illusion like different hues transmitted by my natural and artificial lenses? Maybe it was a dissociative hallucination produced by neurochemically altered synaptic connections. Or perhaps it was a symbolic expression of his sense of danger and had profound meaning for him—like voices of a Beautiful Mind or Lady Macbeth's obsessive compulsion to wash her regicidal hands again and again, never in her mind to be cleansed of Duncan's blood. If it were a warning about impending danger, why dripping acid and not something else? Does it matter?

We owe a great debt to science: it has transformed our world and our understanding of it, but it has its limits. Neurochemistry can take the edge off Lady Macbeth's remorse but it cannot help her come to terms with it. Assuming we could plot every one of my friend's firing cerebral neurons, map the complexity of their connections, analyze and measure the synaptic flow of his neurotransmitters, we could not have known what significance, if any, his experience and thoughts might have had. They were his and his alone—personal, private and inaccessible to science in any meaningful way.

Like Moses who led his people to the Promised Land but was not himself able to enter, science has led us to the edge of the mysterious chasm that exists between the brain and its soul. To fathom the mind, it takes a poet who uses words, an artist who uses images or a psychoanalyst who uses both.

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Disclosure of Financial Interests

The author has no financial interests to disclose.

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