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Preface

Albert Einstein is reported to have said that if you cannot explain something simply, then you do not understand it. I want this book to be written for people with all sorts of educational backgrounds, not necessarily in any formal science, but with an interest in human nature and the findings in neuroscience. I want the reader to understand the issues coming rapidly in the neuroscientific arena, to see the value of faith assumptions alongside current assumptions, and research in the study of the human brain.

I want the book to be clear and accurate about science without straying into oversimplification. My overall goal remains to help the reader understand the issue or the science involved with the human brain without being too technical in my writing. For the reader's interest, I have added a reference list of books on neuroscience at the end of this book. Most of the books are very readable and deal with the topics I have included in this book. The authors are interesting thinkers and researchers. I have also included a smaller annotated reference list on books, some with a decided Christian perspective that many of us share.

A number of different viewpoints are trying to get to the heart of the same mystery, the mystery of ourselves, created with God's spirit, embodied in the flesh, and who will survive the death of our brains. We are one being, spirit and matter fused together, and we become in the Hebrew language *nephesh* or living being, until death, and then we await the resurrection of our bodies and brains.

CHAPTER 1

THE OLDEST BRAIN

As I sit at my desk I am looking at a picture from a science report on the oldest brain ever discovered. A team of scientists from the York Archaeological Trust discovered in 2008 a skull with a brain inside. The skull, which was found in an Iron Age site in the UK, has been dated to the sixth century BC. That makes it 2600 years old! Amazingly, the brain is still intact inside the skull! Its soft spongy parts did not decay because the person was decapitated and buried face down in the mud. The brain appears like yellow spongy material. I find myself asking, *who was in that skull*. Was he afraid as he was killed and buried immediately in that spot? And I wonder how old he was, and why he had to die. He was a person of worth and value as we all are. I am thinking a bit like Hamlet as he looks at Yorick's skull and ponders about a familiar life that once was in that court jester's skull and now is not. What is it about human beings with mere three-pound brains who must engage in such heavy thoughts?

A TITLE CAN SAY A LOT

The Three-Pound Universe

—Hooper & Teresi

THE HUMAN BRAIN: AN INTRODUCTION TO A MYSTERY

"If the human brain were so simple that we could understand it, then we would be so simple that we couldn't."
—Emerson M. Pugh

Atlas, the mythological Titan, is often seen in pictures, bending under the weight of the earth as he holds up the globe on his muscular shoulders. Zeus condemned Atlas to hold up the heavens for daring to make war against the Olympian gods. Lifting the whole planet is a load that none but an Atlas or a Hercules could possibly bear. However, we mere humans, small or large, weak or strong, with just our three-pound brains, manage to hold up the entire universe in our minds, on which to see and reflect. Our three-pound brain with its pinkish-gray surface of cells, as fragile as jelly, does not just move our legs, chew our food, and manage our reproduction. This mass of cells inside our skulls amazingly allows us to hold up and reflect on both the largest and the smallest parts of the universe and everything in between.

With our human brains of approximately 86 billion wet, neural cells, according to a recent count,[1] and one trillion smaller glial cells, you and I can almost see the ends of the universe, thirteen-and-a-half-billion-light years away through the lens of the space-traveling Hubble Telescope. Only a few thousand light years from earth, we can see in color the beautiful Hubble pictures of the Pillars of Creation in the act of giving birth to untold numbers of stars. That Hubble picture of those majestic pillars of stellar clouds was first shot in 1995 and then reimaged in 2015 with newer infrared cameras. The spectacular color image, looking like a hand with fingers pointing upward, makes us feel the presence of God since the starry heavens are spoken of in Psalm 19:1 as the "handiwork" of God.

With our same three-pound brains, and a change of camera and focus, we can also view the infinitely smaller stuff of our universe with the Hadron Super Collider on the French-Swiss border. The super collider name is accurate since this machine is a super atomic blaster. The LHC, as it is known, is the most complicated machine ever built. This human hammer of Thor operates three hundred feet underground and has a 17 mile, circular, atom-smashing tube crashing subatomic particles together at lightning speeds (99.99999 % the speed of light!) and with thunderous energy, exposing even smaller, subatomic particles yet undiscovered by human beings. We can hold up for inspection this enormous picture with just three pounds of our leaking and sparking brain matter using less energy than a refrigerator light bulb. With such a close-up view of

the tiniest parts of the universe, we say we can witness creation. With this focus on a foundational particle, scientists named the newly discovered Higgs Boson in the Hadron particle accelerator the "God" particle. Such heavy thoughts from just three pounds of brain matter! Interestingly, one of the experiments with the Large Hadron Collider is called the ATLAS experiment, looking for what holds up the supersymmetry fabric of our universe. Our interests in such projects makes us wonder what universal drive is up there inside our brains that is of such importance beyond the urge to eat and breed.

The human brain is not much to behold when you are holding it in your hands, or viewing it with its dead-white color, floating in a jar of formaldehyde. But when that brain is in the skull of a human being, look out! Alive, the brain becomes what we call a person, capable of deep emotions, amazing scientific discoveries, tender poetry, cruel behaviors, and love of other human beings and even God. That brain, now a person, does not just build cathedrals and compose love poetry, but it is consciously aware of what life feels like, of falling in love, of seeing red, and hearing middle C played on a piano. That brain, no, a person, is capable of feeling meaning, awe, joy, hate, beauty, truth, heroism, honor, guilt, and humor, and that person fills her paintings and novels with the same rich emotions.

As I describe some basic features of the brain, let me suggest that nothing I say about personhood should take away from the wonder of the human brain, because that brain is the embodied person, who is you. I am describing nature, but I am also describing you. And, the pieces of brain I will describe are unified, and are not just machine brain part names to memorize for multiple choice exams. We should train ourselves to see the brain and its functions as much as a dance as a complicated biology. Then, with a poetic eye, we can begin to see meaning and beauty in brain and our embodied selves. Dancing in a biology lab might make some silly sense, I suspect.

The self-consciousness mystery in our skulls, which is us, is fused to the activities of those 86 billion neural cells in the brain, each of which makes five to ten thousand connections with other neural cells. The trillion even tinier glial cells, some called stellate or star cells, surround the neural cells and make contact with anything in range, allowing more interconnections between brain cells than there are stars in the entire universe, far more than Hubble could ever view! The mystery of our conscious, thinking, feeling minds deepens with every brain scan we perform to find out more about this three-pound enigma. The facts we gain with the activity scans like the familiar PET and fMRI scans make us feel like we are just standing in ankle-deep water in the ocean and seeing how much more there is to explore. Indeed, with every step into the research, the waters get deeper with more mysteries to unravel. There is so much to understand in this mystery of three pounds. We have learned

to listen in on and initiate the activities of individual cells with our probing electrodes and micro pipettes. We study the rhythms of the brain with our EEG recordings as a person sleeps and thinks. We can lay down in an fMRI machine and watch where our brains are more active when we pray and when we laugh.

Step Back and See

In looking at a piece of art, one has to often step back from the framed picture in the museum in order to take in the whole of the picture and see what is being portrayed and felt on the canvas. Likewise, if you look at a map and want to see where you are, you might have to draw your gaze back a bit and look at a larger area on the map from where you think you are, and spot a few familiar landmarks or streets. The same seems true in our study of the brain and what has been called by most neuroscientists, "the most complex physical structure in the universe." We often need to pull back from the tiny bits of scientific data and see how our data fit in with the whole of other data and theories, especially since we human beings are the data being examined. That has not been the approach of neuroscience, as repeatedly the field often ignores larger views of human beings, and other ways of knowing than its empirical studies. The best approach to knowing what a painting is about, or where you are in a city, is not to look at every little color dot, or to look at every street sign, but to view the larger picture within which the smaller pieces of information will fit and be understood. You have to do both, see the big picture and look at the details. Looking at the details is referred to as bottom-up thinking and research. And, seeing the bigger picture is seeing from a top-down, higher view.

Radical empiricism is a way of knowing practiced by some scientists in which it is said that I do not need anything but knowledge by sensory experience and the methods that flow from that. Empiricism is a hugely successful way of knowing, and I believe I can know through my senses. More radical empiricists, like B. F. Skinner, of behaviorism fame in the middle 1900s, argued in favor of sensory empiricism studying behavior not the mind. No subjective reports, please, just objective information. A radical empiricist says to us, do not tell me about your feelings; I will gather objective data and put together the whole picture of you, and tell you what to believe about yourself.

Opposed to such radical empiricism, will be the approach that says keep in view the concept of personhood that we experience in ourselves and in our interactions with others while we study the details of the brain empirically. Do not assume that such top-down thinking means that religion or angry popes will be telling the scientist what is true in the details of the science. Such top-down viewpoints may indeed speak too forcefully at times, but the brain sciences should be open to stepping back and seeing the larger world of human experience and thoughts as

helpful guides to research directions and to the interpretations and applications of research findings.

In the interest of stepping back, in this book I will use examples of persons and their inner lives, and seek to explain personhood and not just explain it away. Such examples help us with the discovery of self and often help in the understanding of the neuroscience data we are unveiling. Many important discoveries about human nature are coming to us because of empirical studies in neuroscience research. Other facets of human nature can be revealed in the depths of poetry, art, music, and religion, and those forms of knowing are every bit as useful for understanding the complexities of human nature. Opening up ways of knowing in neuroscience seems like the wise thing to do because the subject matter, which is us, sits on the edge of matter and mind. We are hybrid creatures, embodied spiritual beings, and the one piece of creation in this natural world that is able to look up and reflect on this universe and our place in it. To call us freaks of nature ignores the personal examples of great genius and humanness that I will bring up in every chapter. This book is about neuroscience, and so I will be primarily discussing the brain and the research on it. However, I never want us to forget that there is more that is out there in the world of our common experience, which is related to our brain's activities, and connected to the world of matter and ocean and star and beyond. We will back up in every chapter with a look at some fantastic individuals, who have minds and personalities so much beyond the explanations of brain function that fill our textbooks.

It would be less than humble for me to be too specific about how I think the brain and/or mind of the person is unified and functions. Almost every neuroscientist seems to agree that the human brain is the most complicated thing we will ever find in the universe, and if we add a spiritual dimension to such brains, then our personhood is even more complex. I will discuss some theories of mind and brain in this book, and no apologies are needed to say that our theories may not be at all adequate to describe ourselves as persons. What I do want is to never lose sight of ourselves as persons, spirit and matter tightly knit together, whatever that means, and to move our scientific research in that direction.

The Pooh Bear Problem

As successful and skillful as we have been with our examination of the human brain, there is an obvious difficulty in studying the human brain and the mental life of the person. We are trying to understand ourselves using just ourselves and our own minds. I saw a Winnie-the-Pooh Bear cartoon once that showed Pooh Bear scratching his head as he looked at a toy pooh bear stuffed animal in his hand. The caption read "Will Pooh Bear ever be able to understand pooh bear?" In other words, how can Pooh Bear ever understand himself using just his pooh bear brain? The Pooh Bear caption was asking the same question as a famous 16th century woodcut from the

first edition of *De humani corporis fabrica* (on the workings of the human body) by Andreas Vesalius, which shows a human skeleton studying a human skull on a table. This book was first out in June of 1543, just days after Nicholas Copernicus had published his *On the Revolutions of the Heavenly Spheres*. The skeleton in the woodcut is leaning on its bony elbow as it stands at a table, peering closely at the skull. That woodcut and Pooh Bear make us ask ourselves how can we humans ever hope to understand our own brains, our purpose, and meaning in this immense universe, using only our own brains with which to investigate such things?

The answer often given is that we, like Pooh Bear, will never be able to understand anything beyond our material brains and our immediate environment. We are told not to worry about this limitation because that is all there is to you, a material brain of complicated mechanics. Reductionism, the philosophy of reducing all things to mere matter, says to stick to objective observations and do not make pronouncements beyond the brain sitting on the table in front of you. What is interesting, though, is that we, biological humans beings, do understand so much about ourselves and the universe in which we find ourselves, and more is opening up to us all the time. We appear to be so much more than the mere matter of our brains, and our discoveries with Hubble and LHC and our understanding of much in this vast universe are evidences of that. The fact that we have motives for searching out the meaning of the universe and its underlying physical framework seems to argue for more to us than mere brain cells. Why else do we long for more than bananas and grass in a universe that is supposedly mere matter?

We do understand so much of the brain, with our little Pooh-like, three-pound brains. We understand much of life, and of meaning, perhaps because the brain we examine in our heads is no mere brain, as we will see later. Those who believe in God say human beings are a union of brain matter and spirit from God. Call us a biological accident and a freak if you want to, but you are pushing a boulder up a steep hill. As good as a goldfish's color vision is, we do not expect it to understand what is on a color television set 12 inches from his bowl on Super Bowl Sunday. That is because seeing is more than generator potentials in rods and cones. What can the goldfish make of a football bowl game played a thousand miles distant from its little bowl of water? The game's image is carried on invisible waves, showing men who have hopes, dreams, wives, and families. If goldfish could think, and had their own schools of learning, what theories could they possibly develop as explanations for what they saw outside of their water worlds? Would they even want to? We, on the other hand, do not have that same, forever-inaccurate view of reality. The truth is, we understand so much more of what is out there calling to our deeper desires to know.

Finding an answer to the Pooh Bear problem is greatly improved when one considers that in the Christian worldview it is believed that God

communicates truth about humanity to human beings in the Bible. The revealed word of God in the Bible describes a view of the human person that fits the biblical record of matter and spirit fused together to create a unified, living being, a person. We believe that we survive the death of our brains, are resurrected with new bodies and brains, and have eternal value and purpose in God's eternity. We lean on the authority of inspired Scripture, and trust the writings of such great minds as the apostle Paul, the church leaders Augustine and Aquinas, and so many more. It has been obvious for such a long time in our own experiences that something more is going on in our three pounds of brain, and it does not have to necessarily be a body-soul dualism as pictured by Arthur Koestler's oft quoted book title, *The Ghost in the Machine*. A long line of poets and philosophers, priests and pastors, novelists, and scientists continue to voice this view of personhood down to this day. And never has a time needed such a personal viewpoint more, when so much depends on thinking clearly about science and the nature of human persons.

Oliver Sacks—A Person of Interest

We should step back and ponder the brain of Dr. Oliver Sacks, who died in August of 2015 at 82 years of age. He invested his professional time as a neurologist, seeing the personal in his patients, and that viewpoint allowed him to see more than just damaged brains. In his books, he viewed personhood for all of us. Dr. Sacks had a keen scientific mind, but he behaved more like a great, soft teddy bear around persons suffering from neurological problems. He became a gifted communicator, not just to his book audience, but especially to his patients as he showed a compassionate interest in them and their lives. He was poetic in describing people's lives and that allowed us to see more in their conditions. He examined people, not with his empirical hammer, but with a paint brush of compassion, and he searched for their human nature instead of their machine nature. Dr. Sacks' work was a challenge to how neuroscience should be conducted and communicated.

Sacks' vast reading audience began with his book *Awakenings* in 1973 (later a movie in 1990 with Robin Williams as Sacks). The story was Sacks' 'compassionate look at individuals paralyzed by the influenza virus and presumably not conscious of much for decades. Sacks tried L-dopa, a precursor chemical to the brain-transmitter substance Dopamine. The patients gradually came out of their paralytic stupor and began to reclaim their lives in the hospital under Sacks' care. Sacks reveals the tragedy of these people when they later began to revert back to their paralytic state, only this time knowing what was coming, because the medication could only work for a time.

Sacks continued his writings with his best known, *The Man Who Mistook His Wife for a Hat*, a book of neurological patients, whom he described in human terms to help understand their conditions. The patient

Dr. P. was the man who had prosopagnosia, a rare disorder of the brain where the patient cannot see or recognize faces. The title of the book comes from a time when Dr. P. reached for his hat only to grab his wife's head! It is interesting that years later, Dr. Sacks himself suffered from prosopagnosia. Throughout his career, Dr. Sacks described his patients for all of us, such as the brain surgeon with all the spastic movements of Tourette's syndrome. He wrote about a person with only minutes of short term memory, who, with no new memories, lived for years never aging a day in his mind. Sacks described with a biographical friendship the life of the intelligent autistic, Temple Grandin, a professor at Colorado State University and an expert in the treatment of animals. We the readers understood the brain better because we could see it so clearly united with real persons and not just symptoms.

These patients were treated by Oliver Sacks as persons and not as damaged brain machines, which is exactly how we should be studying the brain. The empirical approach by itself to studying human nature can only see what is present in the neuron's sodium and potassium influx and efflux, and synaptic vesicles carrying chemical passports to more neurons. Empiricism, or knowing through our senses, is fine if materialism accurately describes everything in the universe. A radical empiricism of objective data alone may show all when studying the elements of matter, but finding a periodic table of human beings can never describe what we are finding in the experiential life of a person. When studying the brain with personhood in mind, even the empirical data itself can take on new meaning and interpretation. To not view the human brain and experimental data with personhood in view, is a self-imposed poverty of the intellect and greatly limiting in ways that can never help us see the totality of what human beings and their brains are all about.

The Loss of the Personal in the Study of the Brain

It seems true that some of today's science has tried to banish mystery and personhood from human life. Neuroscience in particular, with its subject matter being more complex than any other we can imagine in the universe, seems bent on banishing all language and data that would argue for a larger view of the human brain than mere cause-and-effect activities of matter. Even education seems to have shifted its emphasis from *my what a miracle you are* and *look at the depth of the human mind and emotions in the narratives of life*, to *you are just a more complicated neural version of the C. elegans worm with its 302 neurons for a brain*. A mouse with 75 million neurons in its brain is almost understood, neuroscience claims. Can you, with your nearly 86 billion nerve cells, be very far behind in terms of being explained as a behaving, biological machine? In neuroscience, we are told that science is quickly removing the human brain from the dissecting table and the activity scanning machines and placing your brain on the book shelf with the supposedly

understood topics of genetics and life itself. Neuroscience supposedly can now consider itself on par with physics that some say is rapidly explaining the mysteries of the universe with only gravity and subatomic particles yet to be understood. Of course it would help the materialistic cause if the field of physics, the royalty in the sciences, got rid of the squabbles over the necessity of subjectivity in its work with subatomic particles.

Many neuroscientists seem to begin with the assumption that there is no self or mind beyond matter, and nothing beyond mere matter in the universe. Then, using methods that can only find matter, they develop explanations in line with all this. This is circular reasoning and only serves to reinforce a very unscientific start to explaining the human brain and person. Human achievement and complex mental experiences are seen as just made up of smaller pieces of biological explanations, and we will soon see how they all fit into the whole person observed. Whenever some complex behavior seems impossible to answer, some neuroscientists shout, "give us more time and we will have it, we promise." Or, for subjective human experience or feeling itself, seemingly impossible to explain in an objective, material universe, the cry is, "it's just an illusion," from some who think they already know the answer.

Once the assumptions in modern neuroscience have been given the status as proven, scientific facts, then issues dealing with human beings and their problems get tied down to material answers and solutions. The world of the present and the future, with its fractured way of thinking about the human brain and person, is going to have to deal with future ethical questions in mental health or the emerging neuro-technologies with only material guidelines in place. Materialistic views on human nature are having difficulty dealing with ultimate questions such as the value, purpose, and significance of human beings. What serious thinker would pick a method of knowing that could only find what it set out to find? A little humility of knowledge is needed in neuroscience when it studies you, the person, you with your three pound brain that can lift the Hubble Telescope and discover and awe over the widest parameters of the universe.

The Humanistic Renaissance from the 1200s to the 1600s resulted in a confidence in the human mind blossoming in the arts and sciences. That same surge of confidence to know, however, ended up relegating the human mind to the same category as the rock and the chipmunk. Those great humanistic thoughts uplifting human freedom and knowledge were quickly dissolved into a *Clockwork Orange* with no clock maker in the world. Even our great ability to know the world and ourselves has become stuck in an epistemological crisis of us no longer being able to trust our knowledge because, after all, even our words and thoughts are determined. The Renaissance, which began with such lofty thoughts about human potential, eventually put all of us in a box of our construction and shut the lid.

God-of-the-Gaps Problem

One argument against any supernatural view of this personal brain, is called the "God of the gaps" argument. Essentially it goes like this: Whenever science has not explained something about the human mind with biological explanations, Christians say that God did it, or He created some mysterious soul up there in the head of the person. You fill in the gaps with God or miracles, and thereby you can keep clinging to the belief in something still sacred and mystical about the human being. The popular accusation states, "before you say something is out of this world, make sure that it's not in this world."

We Christians need to not fall into the error of believing that somehow God always works on the outside of science, as if science was not also one of God's ways for us to learn about reality. However, realize also that the argument goes both ways when science promises, "just give us fifty more years and we will have the answer." Science, after all, has been so successful in understanding the essence of living things, and the nature of genetics. Can the physical nature of the mind be far behind? This is the promise of science in the future, and for something as important as the study of ourselves, and as difficult as unraveling the brain seems to be, we need to not be so confident. Science is throwing up its own "Science in the Gaps" answer. Science has made amazing progress, yes, but with every rock that we turn over in science, there only seems to be more rocks to lift. Rather than getting finished, science is showing us that the world of nature and the human brain as more and more complicated in every way. We must agree that the human brain is a fantastic mystery, a mystery that science is making progress on every year. Let us also agree that the three-pounds of our brain matter is also strangely us, and we are also that brain up there in the skull. That truth is too difficult to say clearly, but we are clearly living it out every day.

We are all living with the struggle of Atlas, holding up reality with which to contemplate and live in line. That struggle of knowledge is worth the effort, and we all should avoid the too-easy dismissal of anything not our view. The job for us is to be open to both ways here—religion and science. I highly respect the world of neuroscience and its methods and findings, but its conclusions about us as persons are often too much guided by prior assumptions heavy with reductive materialism (reducing everything about the person to nothing but matter). Hubris, the I-know-it-all attitude, often present in science, is never attractive in learning endeavors. Atlas struggled with the globe, and we too should struggle with the universe of facts all around us that we seem built to discover and interpret. Part of that struggle is staying clear of our own biases and pet theories, but not surrendering our world- and life-view as created beings in God's world. We live as persons, seeing ourselves as deeper beings, beyond mere objective, neural/synaptic descriptions, as seen in our moral notions, life after death hopes, and our longings after the meaning of beauty, truth, justice,

heroism, and love. This inner self ought to be listened to as we investigate this greatest of mysteries, the mystery of self, from the perspective of the scientist, and the larger picture of a God-created brain—a brain built to lift us higher, to see all that is true and possible in God's realm

An Overview

We will cover many topics in neuroscience in this book, from consciousness and mind/body issues in the first chapters, to free will, God Spots, and robots in later chapters. Neuroscience is unveiling applications from head transplants, mind-to-mind communication, and using thought as remote control over computers, artificial legs, garage doors, and televisions. Developments on the horizon include direct mind links to Twitter and distant music concerts. New brain-chip therapies for depression and other psychological problems are being tested, as well as the planting of or removing of memories and learning from human brains.

We will see the brains of worms with a mere 302 neurons, as well as mouse brains with a hefty 75 million, and of course the human brain with its 86 billion, said to be the most complicated physical structure in the universe. We will see the attempts to map the entire brain as a whole unit. We will see ancient brains, half brains, brains with missing parts, and brains that have been made see-through for better study. We will see how capable brains are in taking care of us without our conscious effort, and yet the belief in our free will finds much support in neuroscience labs. And we surmise correctly when we look at people and see in the data and interpretations of the data that we are both a part of the neural networks of our brains and yet strangely beyond those brains.

We will look through the brains and eyes of expert minds for help, from Nobel Prize winners such as Sir John Eccles of cerebellum fame, and Roger Sperry of split-brain fame. We will see famous writers who comment on our subject, such as T.S. Eliot, Marilynne Robinson, and the great Bard himself, William Shakespeare. All through the book, I will be referring to the work of eminent neuroscientists and philosophers, such as Wilder Penfield, V.S. Ramachandran, Christof Koch, Francis Crick, Patricia Churchland, and David Edelman, to name only a few. They are important voices on the main issue of the brain and personhood. Some of them I agree with, many I do not, but all are well worth reading and listening to. We need to think about this science before it is upon us, and it is upon us as I write. We undoubtedly need to reflect on our brains, ourselves, with the larger ethic and understanding of the Christian view on personhood in mind.

This book seeks to reclaim a sense of the sacred and the personal when examining the human brain. As the title suggests, this book will be about an almost inseparable relationship between our personhood and the neural activities and organizations of the brain. "Almost" is the key word. Evidence for our personhood exists in brain activity, in spite of a

rigid reductionism in many neuroscience labs arguing to the contrary. The self-conscious mind peeks out at us from behind the veil of objective data and it tells of the richness and mystery of personhood. We will continue to see in this book with two eyes blending their observations: a scientific eye to examine the amazing data in neuroscience research, and an overarching eye to help us look with a sense of awe at the mystery of ourselves as persons.

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"The brain's genius is its gift for reflection."
—Diane Ackerman (*An Alchemy of Mind*)

SOME BOOKS I THINK YOU WOULD LIKE

***An Alchemy of Mind: the Marvel and Mystery of the Brain*, by Diane Ackerman.** A great overview of the brain by a writer who knows how to write for all of us.

***The Man Who Mistook His Wife for a Hat*, by Oliver Sacks.** This is one of Oliver Sacks' first books, which established his reputation as seeing human persons in the midst of their neurological conditions. Informative, enjoyable, and compassionate.