

Faith, Science, and Biophysics
'all for One and One for all'

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Now there are varieties of gifts, but the same Spirit; and there are varieties of services, but the same Lord; and there are varieties of activities, but it is the same God who activates all of them in everyone.

I Corinthians 12:4-6, NRSV

However that may be, let each of you lead the life that the Lord has assigned, to which God called you. This is my rule in all the churches.

I Corinthians 7: 17, NRSV

I begin by citing these verses in an effort to restate and re-emphasize the freedom we have in Christ to pursue a variety of occupations and endeavors. As Reformed Christians, we believe that our salvation is ultimately God's doing. Therefore, we do not exert ourselves in vain attempts at self-justification, but rather acknowledge our indebtedness to God and respond to His grace by living grateful, generous lives. We should not be surprised that this doctrine of salvation spills over into the area of vocation. Scripture makes it abundantly clear through the above verses, through Paul's affirming of God's diverse gifts in the body of Christ, and in other passages that God intends for his people to serve Him in all manner of careers. The Great Commission to go into the world is not merely geographic in extent. Hence, we should not regard one career or academic specialty as better or worse than another. Likewise, I do not need to make an effort to justify why a Christian should pursue my specialty of biophysics, as God has already made it abundantly clear that He desires people to pursue all lawful professions. Rather, confident in God's provision that my career is of worth, I will gratefully examine how the life and teachings of Christ offer encouragement and support to the scientific endeavor

and explore some of the more visible fruits of scientific study in general and biophysics in particular.

One of the striking and yet often overlooked features of Christ's life is that most of his time was spent in his profession as a carpenter. Though scripture details Christ devoting time to explaining some of His deeds and sayings, there is no direct comment on his career choice. I see two reasons for this; first, a lack of direct commentary on career choices combined with His avocation of Christian liberty suggests affirmation that all lawful careers can be used in His service. A direct commentary might inadvertently suggest that certain careers are preferred and consequently cause a rush of Christians into wood-working. Instead, we have, by virtue of Christ's labor, the silent affirmation that carpentry is a fine Christian profession, but no compulsion for all Christians to duplicate this choice. Indeed, though I know that various denominations require a number of different things for a person desiring ordination as a pastor, I have yet to hear of a seminary requiring certification in the building-trades. A second reason for the absence of direct commentary is there is sufficient indirect commentary to illuminate this matter. Insofar as He could have chosen any profession, it seems appropriate, given His apparent penchant for Aramaic puns, to good-naturedly underscore that 'All things came into being through Him' by spending most of his incarnation in construction. Construction metaphors are securely embedded into scripture, with Christ noting that He will build his church upon the rock and Paul's description of Christ as the cornerstone. Others have noted that it is no accident that scripture begins with the Garden of Eden and ends with the City of God. The making of things and the concurrent investigation of creation is by no means incidental to the corporate calling of humankind.

Having established that carpentry is a valuable pursuit, I wish to expand upon how Christ's career choices offer support to the scientific endeavor. In line with my initial thesis, I must underline that this is emphatically not an argument that a scientific career somehow has exclusive support of scripture; rather, I take an inclusive position. Drawing connections between Christ and science does not preclude others drawing their own connections between Him and their professions; on the contrary, even as He draws all to Him, all good things and career choices are drawn from Him. Next, let us consider the fundamental underpinnings of carpentry. First, there is an intrinsic affirmation of both the creation and manual labor, which runs counter to world views that regard the physical world as intrinsically evil and physical labor as degrading. Secondly, there is a counter to the other extreme, a pantheistic view of the world as being God, insofar as the carpenter exerts dominion over creation in changing and altering the physical world. With this foundation laid, we can move on to the practice of carpentry. Before construction begins, a numerical model or plan of what is to be built must be developed. From this model, construction follows, with the model justified or modified by the emerging building. This is, one could argue, the rudimentary precursor of physics, the numerical modeling of physical reality that is constantly checked and corrected by physical investigations and constructions. As an aside, it can be noted that this is, in some sense, the inverse of Platonic idealism. Rather than have the physical world be an imperfect image of some theoretical ideal, our theoretical models are imperfect models of the true physical reality.

With this perspective in place, we can move on to Christ's second career as teacher or rabbi. In passing, it should be noted that this two career path has been followed by modern day physicists such as Howard Van Till and John Polkinghorne. In

all of these cases, the second career is by no means in opposition to the first, but flows from and draws from the first career. Christ's attachment to using physical metaphor to understand theology accomplishes joint purposes. First, it pushes us to think of building when we think of theology; secondly, it reminds us to think of theology when we are building. It also serves as a gentle reminder to physicists prone to abstraction that if theology is best taught with physical examples, then surely it is a true dictum that the path to understanding physics is best paved with concrete metaphors.

The Christian scholar C. Stephen Evans lists the academic disciplines in a line, an order that roughly correlates with the degree of quantitative analysis in each. The sketch is titled 'Relevance Continuum', with relevance being in reference to the role of Christian faith in shaping the discipline, at a minimum for mathematics and steadily increasing towards theology. I think this is an unfortunate choice of words, especially given the irenic tone of his writing. A better label might be 'Intrinsic Overlap', indicating that there is a good deal of common ground for Christians and non-Christians in the sciences, just as there is in plumbing or carpentry. For, in mathematics and the physical sciences, all are involved in pursuing the truth about mathematical and physical reality. It is inescapable that this truth is not a human construct and that we all strive to see that truth so clearly as to be in agreement. If a building collapses or a septic tank overflows, there may be argument among the contractors on how to best deal with problem, but there is no disagreement that there is a problem. In the twirling winds of relativism, where, sadly, text is too often viewed as devoid of meaning and truth regarded as societal convenience, math and physics offer a deeply rooted anchor in the reality that a truth beyond us exists and is knowable.

This anchor moors both teaching and research. In the classroom, it occasionally happens that I, like all teachers, make a minor error in a derivation. Generally, either I catch the mistake and the students observe me correcting myself, or a sharp-eyed student sees it first and then they see me correct myself at the behest of a student. In both cases there is a healthy mirroring of one aspect of Christian life; correction inspired by self-examination or the insight of others. Furthermore, there is a clear affirmation that there is a truth worth studying that cannot be changed by me, any more than I could make the sun rise in the west. In research, my students sometimes ask me what results I expect before performing an experiment. In general my answer is that I don't know; if I did, we wouldn't need to investigate. It is quite satisfying to help train and direct a student to make new measurements and then have the flow of knowledge reversed as the student shares the results of those new measurements with me. Though I direct and lead, it is clear to us that we are both seekers looking for a truth outside of ourselves.

My field is biophysics and my particular research interests are in the structures formed by lipid-water systems. Lipids in water exhibit a behavior known as self-assembly; the laws governing their behavior are such that they automatically form a variety of structures from sheets and cylinders to exotic 3-dimensional shapes. Biologically, lipids are the fundamental building block of cell membranes. As Christians we affirm the unity of truth, and biophysics offers a specific affirmation of that unity. The laws of physics governing lipids have substantial implications for biological behavior. Likewise, intriguing biological behavior can prompt new physical investigations. There are also overlaps with materials science. There is growing interest in building structures or materials at the molecular scale. Biomimetics (literally, miming biology; practically, mining biology) is the science based on the realization that there are

already a large number of functional engines and structures at the molecular scale in nature and that it behooves us to profit from these examples. As a graduate student I helped to discover a new structure in polymers, the gyroid. Though I had no intention of studying polymers, it turned out that my expertise with an analogous structure in lipid water systems was quite applicable.

The unity of truth, the beauty and usefulness of God's creation are all hallmarks of biophysical science. Biophysics is not only an example of the unity of truth, but not inconsequentially brings together people of different disciplines. I enjoy and profit from scholarly conversations with colleagues in physics, biology, engineering, computer science, and chemistry. In some sense biophysics at a Christian college is one of many manifestations of Christian unity drawn from the Incarnation. Even as Christ referred to His Body as a Temple that could be torn down and built up, we see the use of physical construction to describe biological reality. In the Incarnation, we see that physical and biological reality are not incompatible with each other or even ultimate Truth; as a Christian biophysicist, I delve into, celebrate, and re-affirm the unity of God's good creation and the unity of His people.