

et Spiritus

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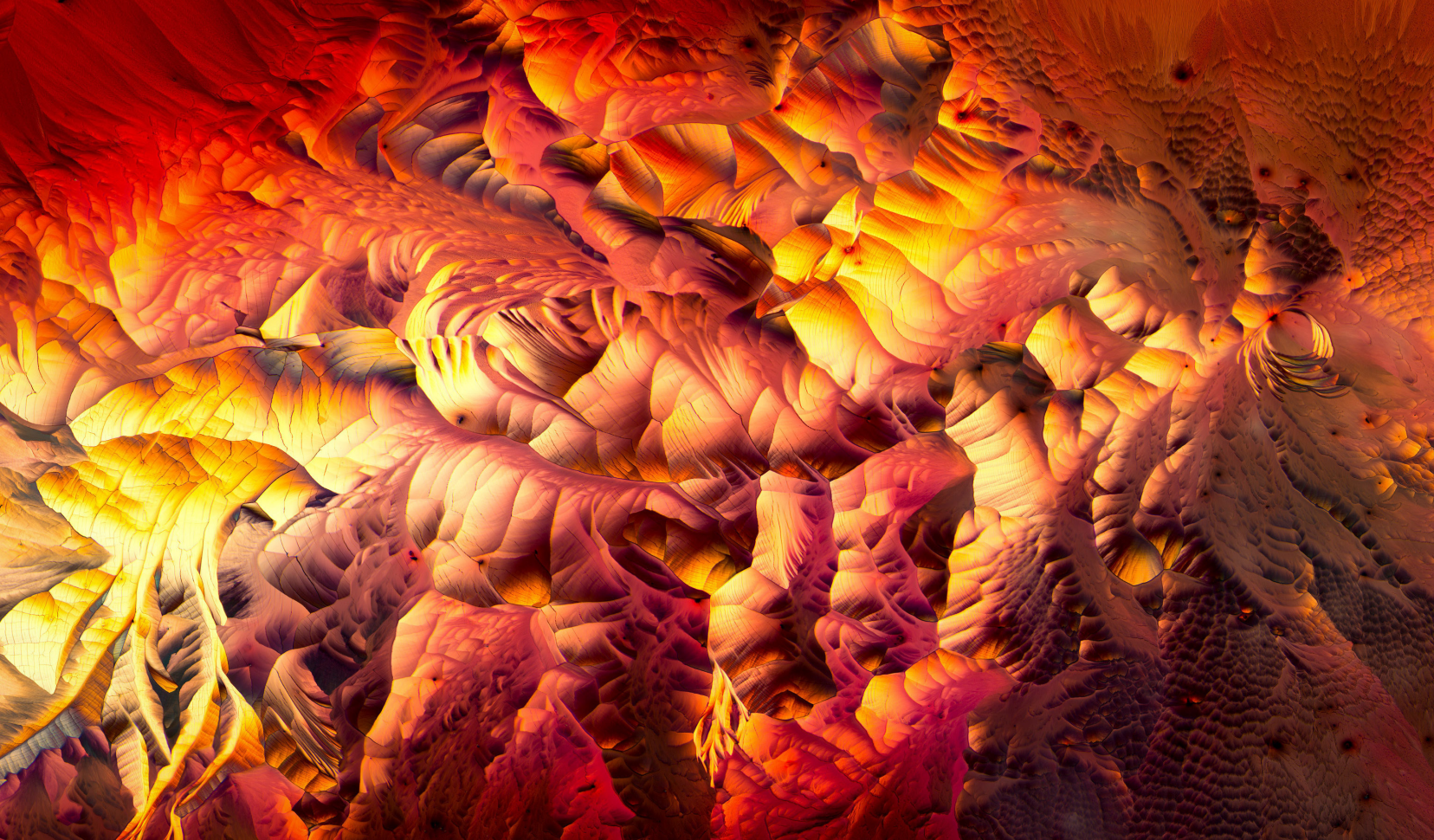


beauty.

featuring:
spinning creation.
why there is no meaning.
being good stewards.

spring 2020





Amino acid crystals (L-glutamine and beta-alanine), Justin Zoll

spinning creation.

It's a typical day in my biology research lab. To prepare my next experiment, I pipette various volumes of mostly clear, colorless liquids from one tube to the next. I become so focused on transferring the correct volumes and following a protocol that I begin to lose sight of the sacredness of my work—for with this very work, I am studying creation. So I stop and remind myself that within a few microliters of solution, there are swarms of precious protein molecules swirling with energy, despite my present tiredness. This small volume I hold in my pipette tip is full of beauty and excitement!

I then raise my hand to eye level and try to imagine all of the proteins reacting and carrying out their work at the nanoscale. If I zoom into one skin cell, the scene comes bursting to life: a couple billion¹ proteins are teeming

within this one cell, crowding and pushing past one another as they faithfully carry out all my cellular processes. Right now, proteins like myosin in my muscles are helping me to smile, endonucleases are fixing DNA damaged merely by breathing,² and photopsins in my retinas are allowing me to see this page. My body is a living masterpiece, created by God the Artist to not just work but to be excellently detailed and beautiful and “very good”.³

How might you and I be inspired and learn about God from these molecules that comprise 16% of our bodies?⁴ To rephrase naturalist Henry David Thoreau, “I went to the proteins because I wished to live deliberately, to front only the essential facts of life, and see if I could not learn what they had to teach, and not, when I came to die, discover that I had not

¹ Milo, R. & Phillis, R. (2015). How many proteins are in a cell? In *Cell Biology by the Numbers*.

² Markkanen, E. (2017). Not breathing is not an option: How to deal with oxidative DNA damage. *DNA Repair*, 59, 82-105.

³ Genesis 1:31

⁴ Carpenter, K., et al. (2018). Human Nutrition. In *Encyclopædia Britannica* online.

lived.”⁵ I have found that proteins, essential components of our lives, can point us to God and teach us much about our shared creator.

Protein Folding

Protein folding, the process in which proteins attain their 3D shapes, is a highly complex and beautiful process that increases my wonder of God. A protein’s amino acid sequence helps determine the precise molecular interactions and intramolecular bonds that allow proteins to fold like origami. Even just one amino acid change can distort an entire protein’s shape and result in disease. For example, one amino acid change of glutamic acid to valine in the protein hemoglobin causes misshapen red blood cells and thus sickle cell anemia.⁶ Our proteins are designed to fold and function with fearfully wonderful⁷ single-atom accuracy.

Although critical for function, the process of protein folding results in an array of attractive shapes that appear innately beautiful. Amino acid chains snake around each other in parallel lines (β -strands) or helical twists (α -helices), resulting in nano-sculptures in shapes as diverse as barrels, butterflies, and even bananas.⁸ Just like visual art, these elegant protein structures can inspire worship of God.

Proteins and Praise

*Praise the Lord from the earth,
you sea monsters and all deeps,
fire and hail, snow and frost,
stormy wind fulfilling his command!
Mountains and all hills,
fruit trees and all cedars!
Beasts and all cattle,
creeping things and flying birds!⁹*

When I think of the weather, the landscape, the plants, and the animals being made to praise the Lord, I cannot help but think of every atom, every cellular structure, and every

protein bringing praise and glory to God. The smallest and most invisible things among us can triumphantly display God’s splendor and pour forth his praise without human speech.¹⁰

Similarly, St. Augustine encourages his readers to stop and marvel at their own bodies: “Men go abroad to wonder at the heights of mountains, at the huge waves of the sea, at the long courses of the rivers, at the vast compass of the ocean, at the circular motions of the stars, and they pass by themselves without wondering.”¹¹ How often do we pass by ourselves without realizing our bodies, including every subcellular constituent, declare the praise and glory of God?

It seems like beauty really does lie within us in every small molecule and atomic constituent. Although “the heavens are telling the glory of God; and the firmament proclaims his handiwork,”¹² the nanoscale also reveals God’s glory. Every time a researcher looks at a protein structure, they are looking at God’s handiwork. This beauty can be enjoyed by all who look. For the Christian, though, this onlooking also invites adoration and worship.

Encouragement from Proteins

It’s easy for me to fall into routines, and it’s easy for me to feel downcast. But, like the psalmist, “I will call to mind the deeds of the Lord.”¹³ I must choose to remember the innate beauty within every living thing, including myself and the proteins within me. Thinking about the beauty of proteins in relation to God helps me develop a more worshipful mindset and allows me to recenter myself on God. I’d like to give you a few examples of how God has used proteins to encourage me or inspire me to worship.

One beauty is the Green Fluorescent Protein (GFP), discovered in a jellyfish,¹⁴ that is commonly used as a fluorescent marker in biological experiments. It is made of parallel

⁵ Original quote from Thoreau, H. D. (1854). *Walden*. Boston: Ticknor and Fields: “I went to the woods because I wished to live deliberately, to front only the essential facts of life, and see if I could not learn what it had to teach, and not, when I came to die, discover that I had not lived.”

⁶ King, M. (n.d.). *Sickle Cell Anemia*.

⁷ Psalm 139:14

⁸ Noguchi, H. (2014). Two- or three-step assembly of banana-shaped proteins coupled with shape transformation of lipid membranes. *EPL*, 108(4).

⁹ Psalm 148:7-10 (RSV)

¹⁰ Psalm 19:2-4

¹¹ St. Augustine of Hippo, *Confessions*.

¹² Psalm 19:1 (RSV)

¹³ Psalm 77:11 (RSV)

¹⁴ GFP was discovered by Osamu Shimomura in the jellyfish *Aequorea victoria* off the coast of Washington, for which he received the 2008 Nobel Prize in Chemistry.

β -strands that circle into a cylindrical barrel shape (β -barrel). When looking at the side of GFP, the strands appear to crisscross like a lattice, reminding me of the Song of Songs, in which the woman's Beloved, who can be a metaphor for Christ, is at one point "looking through the lattice".¹⁵ Sometimes, just looking at GFP is enough to comfort me, call that verse to mind, and remind me of how romantic God's love is. I utilize GFP in my work, which is such a joy, since the solution is not colorless but glows a highlighter yellow-green. I love thinking about all the tiny β -barrels swishing around in that cheerfully-bright solution.

The SNARE protein complexes are another encouragement. In these complexes, α -helices on opposing cellular membranes twist snugly around each other, thus causing two membranes to draw near and fuse together.¹⁶ This reminds me of our drawing near to God and He to us in a loving embrace until, just as the membranes, we become one.¹⁷ After reading about this beautiful cellular mechanism, my only response was worshipful prayer and tears as I kneeled in front of my biology textbook: "God, you made the proteins beautiful when you didn't have to!" I could scarcely comprehend that God would create something so exquisitely beautiful to perform the critical cellular process of membrane fusion—and He was allowing me to learn about it.

Even lectures and research talks are excellent opportunities to be amazed and encouraged by God, and for His glory to be on display regardless of the beliefs of those present. This is another way proteins can declare God's glory without speech.¹⁸ For example, the professor in one of my bioengineering lectures drew an arc to represent the surface of a cell with Y-shaped proteins along the arc. To me, this looked like a horizon line (the arc) with humans standing along it with outstretched hands (the Y's) and worshipping God. I immediately thought of all

the people across MIT and the Earth worshipping God together from the rising of the sun to its setting on the horizon,¹⁹ an encouraging reminder of the spiritual delight of worshipping together.

Another time, I attended a research talk about cellular anastasis that, to me, became a direct analogy to the Gospel. In anastasis, dying cells can be revived through the work of proteins like Snail.²⁰ I was immediately reminded of Jesus' resurrection (anastasis in the New Testament Greek²¹) and how our spiritually dying bodies can experience and also minister, like Snail proteins, the resurrecting and reviving power of Jesus.

These are just a few examples of how proteins have revealed so much to me about God, encouraged me, and inspired me to worship.

Languages of Creation

God sometimes reveals himself to me through proteins, and I believe God chooses to speak to me through proteins because it is a language I understand. What language does God encourage and speak to you with? Proteins? Proofs? Python? Find something in your studies that compels this kind of worship. Perhaps ask God to increase your awe and wonder of even the most basic truth of your field of study. The process of research in any field can be a form of worship when done with the purpose of glorifying God,²² since God is Master Designer, Mathematician, Scientist, Maker, and Engineer. Importantly, we do not worship the proteins or whatever we may study, since they all will pass away;²³ we worship the Eternal One who created all those things. I pray that the Holy Spirit may give you a fresh wonder of God's beauty revealed through His creation.

Zion Perry

¹⁵ Song of Songs 2:9

¹⁶ Lodish, H., et al. (2016). *Molecular Cell Biology* (8th ed.). New York: W. H. Freeman.

¹⁷ James 4:8, John 17:20-23

¹⁸ Psalm 19:2-4

¹⁹ Malachi 1:11

²⁰ Sun, G., & Montell, D. J. (2017). Q&A: Cellular near death experiences-what is anastasis?. *BMC biology*, 15(1), 92.

²¹ See <https://www.biblestudytools.com/lexicons/greek/kjv/anastasis.html>.

²² 1 Corinthians 10:31

²³ Romans 1:25