

*Christian Thermodynamics  $S = k \log W$*

<sup>Genesis 1:1</sup>In the beginning God created the heavens and the earth. <sup>2</sup>Now the earth was formless and empty, darkness was over the surface of the deep, and the Spirit of God was hovering over the waters.

<sup>3</sup>And God said, "Let there be light," and there was light. <sup>4</sup>God saw that the light was good, and he separated the light from the darkness.

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Happy Father's Day! And I know we especially wish our greetings to the "Father" Rob and "Father" Joel, who lead us each week.

Before I read today's Gospel lesson, I first want to thank Rob for the invitation to speak – I hesitate to say "preach" – on this Father's Day, 2018. And then, second, I want ask him "what were you thinking? Did you really mean to ask someone who presents stuff in 50 minute and 75 minute blocks to give a 15 minute sermon?"

But congregation members can relax, there are no notes to take, quizzes to follow, or homework to turn in. Let's get started: if we're lucky, I'll get us out of here early.

Our Gospel lesson is from Matthew 5:13-16. You can find it on page 4 of your pew bible. This reading is actually from year A of the lectionary, not the year B readings that Rob and Joel are currently working through. Listen now for the word of God to us:

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Towson Presbyterian Church  
E. F. C. LaBerge

**Matthew 5:13 You are the salt of the earth; but if salt has lost its taste, how can its saltiness be restored? It is no longer good for anything, but is thrown out and trampled under foot.**

**14 "You are the light of the world. A city built on a hill cannot be hid. 15 No one after lighting a lamp puts it under the bushel basket, but on the lampstand, and it gives light to all in the house. 16 In the same way, let your light shine before others, so that they may see your good works and give glory to your Father in heaven.**

For the Word of God in Scripture,

For the Word of God among us,

For the Word of God within us,

**People: Thanks be to God!**

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OK. I'm an engineering geek. I'm going to prove that up front, because whenever I hear today's lesson from Matthew I think about a very non-Biblical personality, Ludwig Boltzmann. Herr Dr. Boltzmann was an Austrian physicist who lived from 1844-1906. Part of Boltzmann's fame comes about due to his quantification of what physicists call the Second Law of Thermodynamics. It's written there in your bulletin:  $S = k \log W$ . In non-mathematical terms, the Second Law says "entropy tends to increase". In non-scientific terms, we might say "things tend to get worse."

We see the Second Law every day, although most of us don't recognize it. Here's an example. I drink a lot of tea. I take my English Breakfast tea bag, pour boiling water over it and wait a few minutes. Then I

add some sugar and go back to work. My mornings are often very busy. Students come in with various problems, the next semester's schedule needs to be created, and there are always lectures to prepare and give, and homework to grade. So it's not unusual that I forget to *stir* the tea after I add the sugar. In fact, sometimes I get so involved that I forget to *drink* the tea until almost lunch time. If both these things happen, then I usually don't even notice that I forgot to stir the tea. The sugar has dissolved from its crystalline state and diffused throughout the tea. So it all tastes sweet.

Let's look, for a moment, at one crystal of the sugar. In this crystal are about a billion, billion little sucrose<sup>1</sup> molecules all lined up next to each other like Crayola crayons in their box. They are very orderly, very neat. And if I forget to stir my tea and then drink it right away, I get unsweetened tannic acid at the top and syrupy sludge at the bottom of the cup. But if I wait long enough, the nice neat pile of sucrose molecules has fallen apart and the molecules – all thousands of billions of billions of them – are dispersed throughout the cup. When they are dispersed, they aren't in their original nice neat order – they are disorderly. Using the other analogy, our crayons are all over the kitchen table. And when Boltzmann spoke of "entropy", for which he used the letter "S" in his Second Law, he meant "disorder". So in the case of the sugar in my cup of tea, or our box of crayons, the disorder tended to increase as time goes on.

But it turns out that the Second Law is not just about microscopic things like molecules and atoms and such, but about big things as well.

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<sup>1</sup> Thanks to Sandy Burt for pointing out that the food chemistry wasn't quite right in the original version of this talk, which used "dextrose" instead of "sucrose".

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Every year Lorene and I host a New Year's Eve party for a few families we're especially close to. The week between Christmas and New Year's Eve is spent baking and preparing, not to mention picking up and cleaning, to get the house festive and ready for our guests. After the New Year's celebration, when the busy winter sets in, classes start up again for both of us, along with choir and handbells and other things, the disorder gradually grows throughout the house. Clothes aren't always picked up, and my school books appear in the den and the kitchen. *Sing to Me* lesson plans are usually confined to the kitchen and the couch, but various papers and envelopes containing cryptic penciled notations like " $PSD = \text{Field}^2/120\pi$ " or "Es = energy per channel symbol" followed by a lot of math accumulate on assorted flat surfaces. In short, disorder, that is, *entropy*, increases.

And the Second Law applies in still larger contexts, as well. We have seen it in the past here at TPC. Disorder increases: programs become less sharp or relevant, certain activities aren't supported. The same thing holds in the world in general: terrorism, gun violence, cries about the corrosive impact of social media, increasing environmental damage. The Second Law is true on both macro and micro levels. Increasing disorder is the way of the world.

Now from a physicist's standpoint, Boltzmann's form of the Second Law is not an absolute statement, like Newton's Law of Gravitation – which says that two masses will always attract each other -- or Coulomb's Law – which says that two electrons will always repel each other. The Second Law requires that the system being observed is isolated from outside action. Furthermore, the Second Law states only that the disorder *tends* to

increase, not that increase is inevitable. To see what these two conditions mean, let's return to my warm (no longer hot) cup of sweetened tea.

In my cup of sweet tea, each swallow is just as sweet as any other swallow; each drop as sweet as any other drop. From the physicist's viewpoint, the little sucrose molecules are uniformly dispersed throughout the liquid. From the Second Law viewpoint, their distribution throughout the whole system is as random as possible. If I took any little drop of the tea and made it a tiny bit sweeter by sucking in additional sucrose molecules, the rest of the tea would be correspondingly less sweet. There would be more sugar, and therefore more order, in that drop than in any other drop. So the disorder is maximized when the distribution of sucrose is uniform. **But** if I pour my cold, sweet, tea into a pot, and put the pot back on the stove, and boil away the water, low and behold, I wind up with sugar crystals again. Stained and brown, but still crystals. The sucrose molecules are again lined up, this time more like broken crayons put back in their box, but aligned and orderly, none the less. Entropy has been *decreased*. So what happened to the Second Law?

What happened is that I added energy in the form of heat to the system. And in this case, heat is just a form of light! When I did that, the system wasn't in isolation anymore, overcoming the Second Law for my tea. The analogy holds on the other levels, as well. In the week between Christmas and New Year's, Lorene and I put a lot of energy into the house, reducing the disorder and reintroducing order—well, a little order, anyway.

So what does this have to do with us, or the salt or light that Matthew mentions in our Gospel Lesson? Well, a number of things. Where

does the energy come to repair a disordered congregation, or, even more importantly, a disordered world? The way I see it, our job, as Christians, is providing that energy, bringing order in the sense of participation, justice and compassion. *We* are God's energy – God's light -- to combat the world's entropy. Genesis 1 tells us that God's *first* act is to create this energy, this light, for all of His creation. Matthew directs us to not hide that light, to not conserve it for ourselves. We must apply it in the world.

"Wait a second," I hear you say, "my own life is in disorder and I don't have the energy to fix *that*, how can I hope to make a difference in the world beyond my own life?" The answer is the Pentecost answer that came to Peter, James, and the others in Jerusalem 2000 years ago. In the disorder of post-crucifixion Jerusalem, the Holy Spirit applied the flame, the energy, the *light*, to restore order. The Holy Spirit, a gift from God to those who believe in Christ, gives us an exact, yet indeterminate, amount energy. How much is this exact amount? *Just enough* to reorder our lives around His will. *Just enough* to affect *just enough* of the congregation or community or world at large to achieve *just the effect* He needs us, as individuals, to have.

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"But I don't have that energy! How do I get it?" *That's* not a new question, just as concerns about the contemporary church and society as a whole aren't new complaints. Paul's letters to the churches in Macedonia and Asia Minor all deal with this *exact* problem. In each case entropy has set in, and things are not going as well as when Paul was present. And what advice does he give?

"Find your strength in the Lord", he tells the Ephesians.

"Live at peace among yourselves...rebuke the idle, encourage the faint-hearted, support the weak, and be patient with everyone. See to it that no one pays back wrong for wrong, but always aim at what is best for each other and for all." is his advice to the Thessalonians.

To the Galatians he says: "You my friends, were called to be free; only beware of turning your freedom into license for your unspiritual nature. Instead, serve one another in love; for the whole law is summed up in a single commandment 'Love your neighbor as yourself' ".

To the Corinthians "...but I will show you a better way... there are three things that last forever: faith, hope and love; and the greatest of the three is love. Make love your aim; then be eager for the gifts of the Spirit."

So that's the light part. What about the salt – or in my case the sugar? Well, from a physiological viewpoint, salt "is not salty", nor sugar sweet, when it is in crystalline form. We need to separate the molecules in order to savor the salty/sweet taste. And we TPC Christians can't exhibit the love and energy we are called to give to our troubled world while we're in this nice orderly configuration – packed like little white sucrose molecules in our neat Sunday order. We need to accept the energy of the Holy Spirit and disperse into Towson, and Baltimore, and Maryland,

...and Honduras, Harrisburg, West Virginia, Vermont, Maine,

...Louisiana, Jamaica, Bangladesh,

...and wherever else we are called to be –

...Towson University, the Bloomberg School, UMBC, Hopkins Hospital,

...our banks or law firms,

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...our pre-school, elementary and secondary schools,  
...Northrop-Grumman, IBM, Textron,  
...Sunday Community Lunch, Habitat for Humanity  
... in short, wherever we work and live and serve.

We combat the entropy of this world when we apply our Christian energy, our *light*, while we are dispersed into the world. Otherwise, we are the sludge at the bottom of my unstirred tea – a small patch of concentrated sweetness -- while the rest of the world gets tannic bitterness.

Paul tells the Galatians "But if you are led by the Spirit, you are not subject to the law." He's talking about the Jewish Law. But the thought holds for Boltzmann's Second Law, as well.

Matthew tells us "let your light shine before others", and "you are the salt of the earth".

So... be God's energy in the world. Disperse... and do His work.

**We** are salt and light.<sup>2</sup>

Amen.

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<sup>2</sup> Rev. Robert Carter sermon, *Discover and Do*, February 5, 2017

**Charge and Benediction:**

So friends, be God's energy in the world. Disperse... and do His work.

And may the Blessing of God the Father, the grace of Jesus Christ the Son, and the light and energy of the Holy Spirit be with you and empower you as you disperse into God's world this week, remembering that ...

We are salt and light.

AMEN..