Fraser Code, Erindale United Church Sunday, January 26, 2020

A Reflection on “Knowing Things About Science and Faith”.

- A number of years ago at a Friday evening open stage event here in this church, my friend Jim Bright asked me to talk about why I, as a scientist, still believe in Christianity. I suppose Christianity is representative of many religions, but since the time of Copernicus, who died in 1543, parts of Christianity have had a notable history of trouble with science. Here, I am reminded of Galileo’s 1633 conviction for heresy in Rome, and the 1925 Scopes Monkey trial about teaching evolution in the public schools of Tennessee.
- But first let me say a few things about my own faith.
- Faith has been my personal pilot through many of life‘s difficulties and unknowns.
- I remember talking with one of my graduate students at U of T. He was just starting his own PhD research and was concerned about the difficulty of coming up with something totally original. I said it really wasn’t that difficult, because nature was very rich. All you had to do was to look very carefully at some small aspect of nature, perhaps with new equipment, and you would easily find something that no one else had noticed. He turned to me and said “Gee I wish I had your faith but I’m afraid that I don’t.”
- So you see even in the midst of scientific research, the scientific community can talk about faith.

- Returning to Part 1 of my main theme:. Knowing things is all about information, or having the right ideas at the right time.
  - I claim that having useful information is the bread and butter of both priests and scientists.
    - By priests, I mean any religious authorities, not just Christian ministers. In traditional societies, I would consider the shaman as essentially being a priest.
    - However, there is a very important difference between scientific knowledge and other types of knowledge, Namely, our accumulated scientific knowledge has all been verified by experiments. Verification by reproducible scientific experiment is a technique that is only five or six hundred years old. Some experiments are hard to do, and other experiments take considerable resources. It is obvious that experiments can’t be done on future situations,

and so scientific knowledge of the future can only be based on extrapolations of presently completed experiments.

- Now I claim that most of the information people actually use in navigating through their lives has not been experimentally verified, but merely asserted by words. Asserted information may be “fact checked” by logic or by comparison with independent sources, but usually not by rigorous and reproducible scientific experiments.
- The origin of asserted knowledge lies deep within our use of language. If we give something a proper name, then we can refer to it, and maybe even understand it. Throughout the world, creation stories that name the earth, the stars, the oceans, the plants and animals, etc. may give people a sense of unity with nature. The beginning of our Bible has a wonderful example of this type of creation story, in which several stages of creation are named in order, and when finished, God declares creation to be good, and rests.

- Part 2: We live in God’s world.
  - How many have heard this phrase? What is it? Is it linguistically asserted knowledge or experimentally verified knowledge? Surprise: - It’s neither one. It is one of the core axioms (or basic assumptions) of our religious faith.
  - In my work as a physicist, I have explored several little corners of God’s world. Generations of scientists have explored other parts of nature. But nature to me is just a shorthand word for God’s world.
  - Now it’s an easy step forward to say that people who get answers from experiments on nature, are getting their information directly from God‘s world. I think this is the closest way that humans can come to find interesting things about their Creator’s handiwork. So the question for all of us now is: is our concept of God big enough to include my beloved subject of Physics, or more correctly, the whole world of Science?
- Part 3. The problem of being a Physicist.
  - Recently I had a conversation with a psychiatrist about knowledge and the brain. It was just at the time that functional magnetic resonance imaging was giving the first information about brain activity associated with thought processes. She said to me that years of practising music can change your brain, and undergoing cognitive behavioural therapy can rewire some of your neural

circuits. My internal reaction was “Oh my gosh, what about years of studying physics - imagine what that does to your brain!” .

- Part 4: My bird’s eye view of the evolution of human knowledge:
    - As soon as humans could talk, they began telling stories and counting things. So some people became knowledge keepers to pass on hunting skills and stories to the next generation. About 45000 years ago humans just like us painted images of large animals being hunted. They did this on a smooth wall inside a very dark Indonesian cave. They must’ve had fairly sophisticated language abilities to do such a project. Meanwhile, as oral stories became longer and more complex, it became necessary to organize them into songs and poems with melody and a strong rhythmic beat. With this substructure, long stories could be easily remembered without forgetting something.. Then came the ability to write down and record both words and numbers on clay and skins and paper. Writing changed the world forever. The mathematics of counting for loans and contracts was recorded on clay tablets in Mesopotamia 7500 years ago. The Greeks gave us geometry about 2400 years ago, the number zero was introduced in both Mesopotamia and Central America (referring to the Mayans) near the birth-time of Christ, the term algebra was coined in Baghdad in the 9th century, Calculus emerged from Europe about 350 years ago and now Einstein’s equations for General Relativity are about 100 years old. We are immersed in a world of big data, quantum cryptography, and rumours of artificial intelligence. The explosive growth of science and technology has left most of us standing in the dust, holding our smart phones, and wondering how we will ever pay those exorbitant Canadian cell phone bills. But with the computing power of about 100 cell phones and some advanced mathematics, humans can now solve astrophysical equations that describe the size and age of our observable universe. That’s an impressive degree of progress in our knowing things about God’s world. By the way, I don’t have a negative view of cell phones, even in Church! I am very sympathetic to the beautiful metaphor attributed to the late Steve Jobs that smart phones and computers serve us as bicycles for our minds.

- Part 5: How I read the Bible.
    - I’ve studied physics so much that when I read the Bible I get into trouble.
    - I particularly enjoy the fantastical stories in Genesis, where it suggests in ancient times, healthy people lived at least 10 times longer than they do today.

I looked up the age of Methuselah, the longest living man in the Bible at 969 counting units,- sorry for getting ahead of myself, - years of life. Scientifically, we know human lifetimes couldn't have changed very much since the last Ice Age. I then thought: what if the numbers are right but the calendar units were wrong since long numbers would've been easier to memorize with the help of rhyme, meter, and melody than a short measure word such as years or months, especially if a new calendar system had been suddenly adopted by defeat in war..

- I used Methuselah as an example of what happens when you get the calendar units wrong in a first year class for non-Physicists at UTM, just to get their attention, like I am doing right now with you. So if Methuselah had lived to 969 counting units of months instead of years, then his lifetime would've been approximately 79 solar years, which makes me happy as a physicist.
- But there were strong objections to my suggestion from my Muslim Teaching Assistant who knew in the Koran, another patriarch, Noah, of Noah's Ark, lived 1000 years, and not 1000 months (or 81 solar years) because in the Koran, in its original Arabic, the contemporary measure word "years" is used, not "months" and furthermore he claimed the Arabic text is actually infallible.
- There was an extensive discussion about this in my office and finally I said we are at a stalemate!. He had a choice either to believe the literal Arabic text to be "true" and live within that limitation; Or believe the calendar units were wrong (and should have been months) and open his mind to some new interpretations of the Holy Koran.
- Further examples of how I read the Holy Bible will be discussed after this service, where there will be a chance for questions.

- Conclusions.

- In this short reflection, I devoted more of my time to describe the historical development of knowing things about mathematics rather than knowing things about the theology of comparative religions. My reason for doing this is because, as Galileo famously stated "Mathematics is the language of Physics", and theoretical physics is based on the much smaller collection of all experimentally verified scientific knowledge rather than the very much larger collection of linguistically asserted knowledge that is the domain of the study of comparative religions.

- My resolution of the conflict between Science and Religion is that Science is practised in God's world by God's creations (namely scientists, who are made of about 10^{28} atoms, and who study atoms and other stuff in nature). The information that comes from this application of the modern scientific method is part of God's message to us about who we are and where we live.
- Furthermore, it is my belief that all people of faith must learn enough science to prepare their minds to read and re-interpret the religious literature of the past in a manner consistent with all present-day experimentally verified knowledge.
- Finally, I would like to end on the topic of Jesus. A minister I knew had a personal rule that none of his sermons in the Christian church would end without the mention of Jesus. I would humbly import his rule to this reflection on "Science and Faith" by mentioning what Jesus means to me.
- I've said I view nature as being the same as God's world. Sometimes when we face the enormity of nature we wonder what our personal worth is in comparison to the incredible intergalactic scope of our observable Universe. A month ago, we celebrated the Christmas season. Christmas recognizes the amazing axiom of our Christian faith, that God entered into creation to send us a message of redeeming love. This is the personal message of Jesus. This is a message that is stronger than death.
- And, it's one of those basic things that I think we all should know.
- Thank you for your attention.