

THOUGHTS FROM THE TITANIC

A talk for the Unitarian Universalist Church of the Highlands

James A. Warden April 3, 2022

INTRODUCTION

For the next few minutes I invite you to consider a dispassionate overview of our species, *homo sapiens* (smart hominid): where we came from, how we're doing, and what may lie ahead for us. There's a mixture of expertise, relatively recent reading, and opinion included. The title is "Thoughts from the Titanic", which is just a metaphor and not exactly a spoiler alert. Let's just say I'm thankful for friends who keep me going with their optimism!

OUTLINE [Slides on human awareness, pale blue dot, and quotations]

1. Some facts and ground rules
2. The universe arises from the rules
3. Life happens, at least here
4. We are late to the party, and gradually awaken
5. Before we hit the proverbial iceberg

SOME FACTS and GROUND RULES

The astrophysics I'll include is almost universally accepted, well supported, peer reviewed science. Some of the terms may be unfamiliar to you, and a few ideas may seem far-fetched. I'll be happy to answer any questions at the conclusion of the talk. My biochemistry, sociology, and opinions are more at the amateur level.

Matter and energy are two sides of the same thing.

There are only four basic forces of nature; the scientific laws we have discovered explain how matter and energy interact to produce everything we know.

The universe has existed about 14 billion years; the Earth (solar system) only 5.

The universe continues to expand. It is an enormous place.

Nothing travels faster than light, meaning that

crossing vast distances requires time scales that are hard for us to accept.

Nature doesn't waste anything.

What we observe in the sky is history, sometimes seeing light generated before the Earth existed.

Humans are part of nature and are intimately connected to the Earth

Nothing in this universe lasts forever.

THE UNIVERSE ARISES

It begins with only the extreme energy of a plasma (a term for pure energy); photons (particles of energy) so thick the universe is opaque.

As the plasma cools over several hundred thousand years, some photons generate protons and electrons in a process called pair production.

As protons and electrons combine into atoms, soon there is lots of hydrogen and some helium; no other elements.

No periodic table, yet.

Hydrogen gradually clusters under gravitational attraction and stars form: the invisible template for building a star and making it work was built into the fabric of laws and forces of the universe, before the first one existed!

Each star began fusing H into He. This is called a star's "main sequence" life, and can last a long time, depending upon the mass of the star.

Late in a star's life, when available core hydrogen is gone, heavier elements (up to iron) form in the core. (This is called nucleosynthesis.)

Large stars then blow up, generating even more heavy elements and spreading almost everything they were made of into deep space.

Second and third generations of stars appear, with planets made of the newly abundant elements. All that old star material is recycled!

With all this raw material available, chemistry happens. Turns out that most of the atomic elements come with little "hooks" called bonds (outer atomic electrons if you like), and they readily snap together into larger structures we call molecules!

The element carbon is a major player, because it provides four possible bonds.

Star formation and evolution continues today all over the universe.

(Many of the photos in Astronomy Picture of the Day online are of star forming regions both inside our galaxy and beyond it.)

LIFE HAPPENS, AT LEAST HERE

As our Sun formed under gravitational attraction, leftover material in the disk surrounding it formed into planets, including Earth.

Earth's early stages were violent, with volcanoes, meteor strikes, and ice ages, but molecules continue to form freely; especially water and CO₂.

Earth's orbit, in the so-called "Goldilocks zone" was just the right temperature for liquid water, which facilitated chemical reactions

Carbon easily bonds with other elements in a profusion of so-called "organic" forms

At some point (probably more than once), self-replicating molecules were "invented"; we call this "life"

The extremely complicated process of life biochemistry was well underway nearly 4 billion years ago.

Earth life is tenacious and fills any available niche;

but it works this way only on Earth as far as we know.

(It might and probably does work elsewhere, but perhaps very differently)

We might consider the possibility that the molecular template for life is built into the laws of the universe as it is for stars!

Niches (suitable environments) appear for astronomical numbers of microbes, plants, fungi, animals, including, eventually, mammals, primates, and hominids. However, this process has no built-in "goal". Simpler units combine to form more complicated units. Whatever is successful, survives. The life process has started over, sometimes almost from scratch, several times in Earth's history.

To repeat:

We have learned, if not with universal acceptance, that more complex species build on simpler species, but every species continues to change through the process of variation (via mutations) and natural selection. Every new species that is successful is "just good enough" to survive in its niche.

WE ARE LATE TO THE PARTY, AND GRADUALLY AWAKEN

About 200,000 years ago, we appeared: *homo sapiens*, "smart hominid". We are one of many accidental species of Earth's biota, cobbled together out of handy, well tested spare parts: musculoskeletal system, digestive bacteria, binocular vision, immune systems.

What's new on Earth was our expensive big brain!
(The human brain is about 2 percent of our body by weight but it consumes 20 percent of the calorie intake.)

Although there are other creatures with large brain to body ratios, neural pathways apparently are wired more efficiently in us, bringing self-awareness. (It's amazing that we rarely think about just how fortunate we are to be aware in the first place!)

A bonus: we learned to figure out what other creatures are thinking, and even to imagine things that may not exist, which gave us considerable leverage over our hominid cousins (Homo Habilis, Neanderthals, Denisovans, etc.). It put *homo sapiens* at the top of the food chain, (usually.)

We invented new ways to organize, hunt, gather, and gossip. We invented religion as well, since shared mythology and ideology seemed to be critical to group bonding. It wouldn't be too much of a stretch to say that *homo sapiens* could be defined as the animal that has religion!

(My sociology from here on is informed by popular literature, so bear with me!)

The agricultural revolution 12,000 years ago (Harari, *Sapiens* et.al.) shifted our species from gathering from our environment to attempting to control it. At this point we began moving away from the niche we evolved in. Although we are an adaptable species, our instincts were not always helpful, and our new situation added stress to an already challenging survival. But the creation of what we call "civilization" was well underway.

Somewhere between here and the development of cities, states, and empires, the so-called "civilized world" developed a giant ego, partially because the religions which appreciate humanity's place in nature (attributed to the so-called "primitive" societies) gradually gave way to those that place humans outside of and above nature.

We awarded ourselves a license to "conquer" the Earth.
Greed, in my opinion, was a logical consequence.

The invention of science and mathematics, and rapid development of these disciplines over the last three centuries awakened a new understanding of nature. For example:

We have learned that we live in a universe of vast distances and time scales, with a reasonable idea of its origins.
(Important to our daily lives? No, although a dose of humility would serve us well.)

We figured out how stars "work" in the early 20th century, including our Sun.
(Important to our daily lives? Somewhat. Satellite technology and electronics are affected by solar storms. It is the source of almost all energy on Earth. How long will it be stable?) [UV sun slide]

We discovered many of the secrets of life over the 19th and 20th centuries, including the complexity of our biochemistry, how life evolves, and the sequencing of DNA.
(Important to our daily lives? Crucial!)

We began to learn of the magnitude of our limitations as a species, as members of world societies, as caretakers of our home planet.

For example:

With the advent of the industrial revolution, and the myth that growth without limits is the only way to have a successful economy, the fundamental conflict between greed and stewardship has accelerated.

Paradoxically, this era (since WWII) is called the "long peace", meaning that there have been no direct conflicts between major powers. This seems misleading, since in my lifetime the US has fought "limited conflicts" in Korea, Vietnam, Afghanistan, and Iraq, always with tragic consequences for the civilians caught in the middle.

THE PROVERBIAL ICEBERG LOOMS AHEAD

The evidence is plain: the universe does not care about life on Earth. Earth life has suffered five catastrophic extinction events so far. Their dates mark the divisions between the great periods and epochs of Earth's geological history.

So ... what do we care about? What should we care about?

A metaphor for our time suggested by the novel "Flowers for Algernon" by Daniel Keyes is useful. In the story a mentally challenged man is given experimental "stem cells" for the brain that raise his IQ to genius levels. He becomes a student and then a scientific researcher, who figures out that his enhancement is short lived and failing, and he must learn to accept his fate as he publishes the result.

What are we learning today?

Our rapidly swelling population is straining the resources of Earth,
but we don't seem able to control unchecked growth

We do not adequately feed the world's population.
(Or even that of Washington county, Virginia.)

Although, statistically, we are less violent than earlier times (according to Steven Pinker, *The Better Angels of our Nature*, et. al.), We are observing political upheaval, along with frequent epidemics, overwhelming evidence of climate change (more frequent wildfires, unusual tropical storms, severe droughts, plant migration), and severe pollution from plastic waste.

Our superb technology for communication (both social and mainstream media) is being used to generate an avalanche of hatred, nonsense and harassment.

A recent article in the journal Nature reported that in 2020 the mass of all human created material exceeded the natural biomass of Earth for the first time. We are in the middle of the sixth extinction, marking the division between the Holocene and (yes) the Anthropocene Epochs. We are destroying many successful ancient lifeforms and our genetic heritage.

So, in my opinion, we have bad news and good news.

Some bad, or at least sobering, news:

If we continue to "party on" as usual, our civilization almost certainly will collapse, with extinction virtually guaranteed.

Put another way: our intelligence is not proving to be a long-term survival trait.

We are struggling to survive outside the niche we evolved to inhabit.

We are here for the duration:

We cannot move Earth's human population to "another planet".

Our species is inseparable from the Earth's ecology.

(That doesn't rule out a few research or mining colonies off Earth, of course, but robots are hardier as permanent settlers and don't need an ecosystem)

Major threats to our civilization (and our species) continue to include a catastrophic asteroid strike (such as Chicxulub), a massive volcanic eruption (Yellowstone caldera), a nuclear war, or a super-Covid pandemic. Thankfully there are serious professionals who study these possibilities so that the rest of us can sleep. Personally I rate the civilized world's response to Covid as a C-minus at best, based upon a lack of application of the Golden Rule if nothing else.

Some good news:

The Earth has about 500 million years of life opportunity left. That's a long time. Do we want our great-grandchildren to stick around and enjoy it? No human civilization has ever lasted a tiny fraction of that span of time.

Is it possible to survive as a species (or at least an order) this long?

Yes indeed! The spider is an example. [Spider slide]

We are fortunate to have futurists and realists from each generation among us for guidance:

Greta Thunberg (a teenager concerned about her future),

Bill McKibben, (a well published expert on climate change) and

E. O. Wilson, (who proposed, among other ideas, that half the Earth should be left to nature)

and many others!

So, what could we care about? Our fellow humans, as a start.

Some possible futures (for us) can be found in the literature.

Quality of life versus mere longevity:

We could attempt the folly of turning the entire earth into a giant urban landscape containing just us, our microbial passengers, and our created animals, all eating manufactured "food-ish" substances. In my opinion, this would fail, partly because the estrangement from the natural world would create a dystopian scenario of declining physical health and psychological collapse. (Empirical evidence: the failure of experiments like Biosphere 2.)

[Jammed LA freeway slide]

It's a wild idea (explored in the SF literature), but we could genetically alter our species to match the dismal urban niche described above, making *homo sapiens* obsolete. Let's hope our replacements would be less greedy and more altruistic!

We could learn to balance population, urban design, and green space. (Recall E.O. Wilson's proposal.) Striving for a world of tolerance, empathy, and altruism is a long shot, but certainly worth pursuing.

[Green city slide]

Here's my bottom line:

The Titanic disaster was caused by arrogant design, cheating in construction, incompetence in navigation, and virtually no planning for emergencies. The few rescued survivors were incredibly fortunate that another ship was nearby.

Is humanity as a whole going down this path? This time there is no one "out there" to rescue us. I'll admit that these are worrisome times on planet Earth. However, our species has demonstrated that it is capable of incredible intellectual feats, heroic compassion, and boundless artistic expression. We are "smart" enough to make Earth into a sustainable paradise, for ourselves, our descendants, and our fellow lifeforms. Will we? Where do we start?

[Pickles cartoon: A Better World]