

Life in the Habitable Zone

Where and when did life begin here? How do we know?

What elements were here from the beginning? Whence came the heavy elements? What are amino acids, and why are they important? What is chirality—and why would we care about that?

What is the Murchison meteorite? Whence came it?

What evidence do we have of liquid water on Earth for at least 3.8 billion years? How did the water reach Earth?

What is unusual about our sun in contrast to most other stars?

What is the “habitable zone”? What is the heliosphere? (Such a lovely word!) What is the Local Bubble?

How might the intrusion of meteorites contribute to the development of various life forms?

What is “minor mass extinction” as occurred in the late Miocene?

What Goes Around Comes Around

What are Milankovitch cycles? How long are they? How do they affect us?

What periodicity does Randall wish to prove? Why? How will such periodicity support her overarching argument? Therefore, 26-million years, 27-million years, 62-million years—which works for her?

What do we learn about periodicity in examining craters?

Flinging Comets from the Oort Cloud

Read the first sentence on page 252—what do we learn here?

Where is the Oort Cloud? What bodies come to us from the Oort Cloud—and when and why? How does the Sun influence bodies in the Oort Cloud?

How does Jupiter “swing” comets around? What is the Central Bureau for Astronomical Telegrams?

Who was Ernst Julian Opik, and why is he important to this study? What is the Alvarez proposal?

What is the galactic tide? How far out does it dominate the Sun’s gravitational pull? How does that tide influence our Sun? Other bodies such as comets?

Read the paragraph beginning bottom of p. 262: “However, the failure . . . perhaps 65 light years.” What do we learn here?

What can we glean from Figure 34 on page 263?

See top paragraph on p. 267: what does Randall propose about dark matter here?

The Matter of the Invisible World

What is a WIMP? What does a WIMP tell us, if anything, about dark matter? Again, why are ordinary matter and dark matter considered asymmetric?

What is a baryon? So then, what is baryogenesis? And Xogenesis? Do we need to remember? Do we need to know about charge-parity problem, charge-parity violation?

What are MACHOs? And what is primordial nucleosynthesis? (Does creating and learning and using polysyllabic words and multi-polysyllabic phrases make us all smarter?