

# Unravelling the cosmos

by Colin MacDonald

Why are we here? How did our universe come to be? Why does everything function the way that it does? These questions have been pondered

## BOOKS

*Dreams of Final Theory*  
Steve Weinberg

by humanity for years. In his latest book, *Dreams of a Final Theory*, Steven Weinberg tries to find answers which have been hunted by everyone from theologians to physicists.

His attempt to answer these difficult questions and find the "ultimate laws of nature" are insightful and, for the most part, easy to follow. Whether the reader wants to make the jump from a belief in theories that unite the laws of nature to actually accepting these theories as fact is up to the individual reader.

In his book, Weinberg chronicles the work that has gone into "the search for the final laws of nature." Beginning with a discussion as to why chalk is white, Weinberg takes the reader through the basic ideas behind the final theory and into what is actually being done to prove that one exists. He finishes with a discussion on what this universal theory will look like and how it will affect a person's outlook on their surroundings, and on how we will perceive religion and God. Throughout the book, Weinberg interjects with his own personal thoughts on his research and what the search for a final theory will mean to him.

In 1977, Weinberg was the winner of the Nobel Prize for Physics. Despite his vast knowledge, this is not a book purely for physicists. He writes in such a manner that virtually anyone can follow along with no

matter what their background may be. Nowhere in *Dreams of a Final Theory* will one find long and tedious formulae that will derail the reader from the real purpose of this book. There are sections where the book does become a very difficult read because of technical explanations, but these are for the most part unavoidable. One must realize that Weinberg cannot discuss the theory which explains how everything has come to be without going into such things as particle physics or how the Superconducting Super Collider (SSC) works.

Steven Weinberg not only writes very well while talking about the science behind the final theory, he also is quite good in covering the human factor of this theory. The chapters "What About God?" and "Against Philosophy" may not be to everybody's tastes, but what he conveys in these chapters are definitely thought-provoking.

One sticking point in the book is that the reader must understand that Weinberg has no concrete answers. There is no single theory that all the leading researchers can agree on. According to Weinberg, the best idea so far is string theory. This theory is that there are "tiny one-dimensional rips in the smooth fabric of space." This is a rather new theory, and as a result its specifics are constantly changing and becoming more defined with further research.

The only point at which this book fails is in its discussion of the SSC. The reader may have some difficulty in relating the work that the SSC would do to the final theory. It is true the work that the SSC would do is important, but it would only contribute a small amount into the research that would form the final theory. Further, in his afterword,

Weinberg expectantly argues against the US government's decision to end funding for the SSC. While his speech is persuasive at some points, his statements mentioning that the SSC budget (\$640 million) amounted to forty-three-thousandths of a percent of the US budget fall on deaf ears if one looks at the big picture of how science must interact with the current political climate.

Overall, Weinberg's book is intriguing and informative. It makes the reader think further on what makes our universe tick. Interestingly enough, in one of Weinberg's earlier books, *The First Three Minutes*, he says: "The more the universe seems comprehensible, the more it seems pointless." I must disagree, for the more we discover about the universe, the closer we will be to unlocking the mysteries contained within it.

# Dancing with diatoms

Diatoms are exquisitely symmetrical, silicon-shelled, single-celled entities. More than 11,500 species thrive on Planet Earth (Planet Water would be more accurate), living the length of their days in freshwater and marine environments. Diatoms are citizens of the phytoplankton community, meaning that they are worshippers of the Sun. Although they are infinitesimally small, they are infinitely abundant. All the world's diatoms produce more oxygen than every tree on Earth. Compared to these ancient beings, we humans are evolutionary neophytes. To them, we were born just yesterday.

As the foundation of the marine food pyramid, diatoms get little respect. A humpback whale devours

as many diatoms as there are stars in our galaxy. Tiny krill gobble them up like so many hot hors d'oeuvres. The krill become breakfast for little fish, which become lunch for bigger fish, which finally become dinner for the biggest fish and us. Such is Life as an open banquet: everyone is invited to the feast until one day you discover that *you* are on the menu.

Upon dying, the diatoms' opaline skeletons drift like snowflakes to the bottom of the transerlean sea. Over time, these skeletons accumulate into vast cemeteries hundreds of metres deep. Geological forces fossilized these graveyards into what we now call diatomaceous earth. Diatomaceous earth is used as an absorbent, a polishing powder, a component in potting soil, and as the reflective sparkle in roadway-lane stripping. 'Tis a strange creature that, after dying and sinking to the bottom of the sea, manages to get resurrected and to sparkle once again.

At this point, you may be in the dark as to the point of glorifying a creature no larger than the point at the end of this sentence. Perhaps a recapitulation may prove illuminating: (1) diatoms are one of Earth's dominant life forms; (2) they are the foundation of aquatic ecosystems; (3) their appetite for CO<sub>2</sub> helps regulate the global climate; (4) their remains form the basis of multi-million dollar industries; and (5) they are aesthetically elegant creations. Taken together, these observations beg for an answer to the question, "Why has no one heard of diatoms?"

I scan the seascape thinking about these diamonds of the deeps, imagining trillions upon trillions of them floating near the surface, gloriously basking in the Sun's divine light. Following an ancient recipe — written in a biochemical language we now understand — the diatoms combine liberal amounts of sunshine, a dash of carbon dioxide, an ounce of water, and a pinch of minerals to create food and oxygen. We exchange molecules with each other in a kind of greeting ceremony. Inhale their sweet oxygen, and exhale carbon dioxide; they inhale my sweet carbon dioxide, and exhale oxygen, *quid pro quo*.

From one perspective, an ocean — literally and figuratively — separates me from these ancient denizens of the deep. We are two aliens meet-

ing for the first time, each with a different morphology, a different language, a different niche, a different history, a different...

From a different perspective, we share much in common. We are both children of the Earth, unique but related. We are the transmigrations of inanimate matter into vibrant life. Our atoms share a common descent, traceable back in time to the same supernova crucible in which they were forged. In the deepest sense, we are made from the same stardust.

What do the diatoms think about all of this? Can they think? Do they meditate under the moonlight on the reasons for their own existence? I imagine each diatom to be a member of some single, vast, conscious organism distributed throughout the world's oceans. Our brain is a society of neurons, and our thoughts, we think, emerge from the synchronous activity of multitudes of neurons interconnected with one another in complex patterns. If diatoms think, this is probably how they do it: as a society of interconnected, dynamic, incessantly communicating individuals, no single one of which is sentient, but which functions intelligently when viewed from the proper perspective.

Such speculations are really no more implausible than the idea of extraterrestrial intelligence. For several decades now, we have searched for non-human intelligence in the solar system and beyond. We have peered into space with our telescopes, listened intently with our radio antennae, sent spacecraft spying on our planetary neighbours, and even put messages into spacebottles and sent them adrift in the vast cosmic ocean. So far, no one has phoned us or answered our long-distance calls.

When I am standing alone at the seashore, I cannot help but think about this idea of extraterrestrial intelligent life. Evidence of such life would compel us to reassess our place in the cosmic scheme of things. But then, during the silent pauses between the crashing surf, I begin to suspect that our ambitious search may be misguided. Instead of listening for signals of intelligent life from the nearest galaxy, we should be listening for signals from the nearest beach.

Farhad N. Dastur

## POINTLESS PONDERABLES

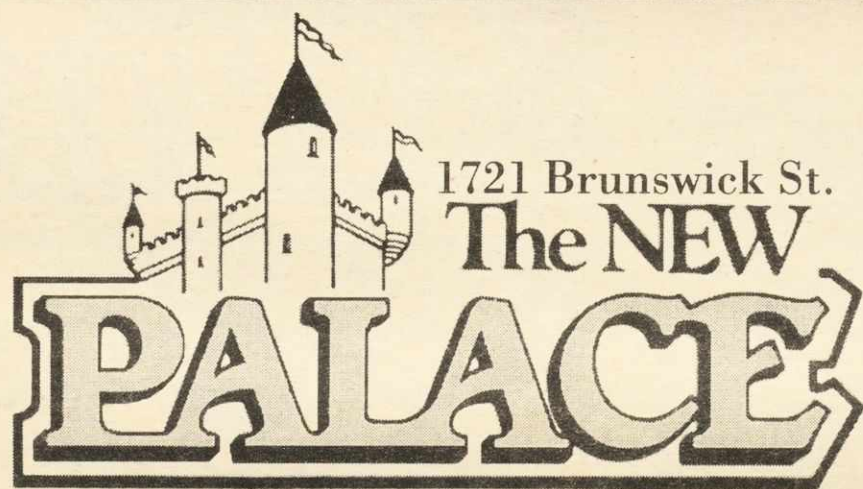
### ANSWER:

When we originally posted this problem, we thought we'd found a question with a single unique solution, and strictly speaking there is. What we forgot to figure on though is that a cash register has to round off to the nearest penny, so there are multiple answers that satisfy the problem. The answer we envisioned for the four items was \$1.20, \$1.25, \$1.50 and \$3.16. The winning answer was sent in by Martin Fay of Dalhousie, with Craig Poirier of SMU a close second with his answer of \$1.04, \$1.17, \$2.05 and \$2.85, which adds to exactly \$7.11 and when multiplied rounds to \$7.11.

### QUESTION:

You're sitting around with a friend one evening, and as your watch chimes off the hour, you notice your friend's wall clock is running exactly 3 minutes slow compared to your watch. When you question her about it, she says the clock loses exactly 7 minutes an hour without fail. Later that month you spend another evening with your friend and this time when your watch chimes off an hour, you notice the clock is right on with it. Given that your watch is accurate, how far apart are your two visits with your friend (in days)?

Please send answers c/o the Gazette, Room 312, SUB or by email to GAZETTE@AC.DAL.CA. Entries must be received by Monday at 4 pm.



Mon - Sun: Bats in the Belfry  
next week: I.C.U. with Pandora's Box

Starting Mar 13

EVERY SUNDAY IS KARAOKE NIGHT Be there  
to win cash prizes & to qualify for nationals in T.O.



LOONIES NIGHT!

It Pays to be at the Palace  
7pm - midnight  
Check it out!