Earth to ET: Is anyone out there?

CAPTURED BY ALIENS
The Search for Life and Truth in a Very Large Universe
By Joel Achenbach
Simon & Schuster, 415 pages, $37

RARE EARTH
Why Complex Life is Uncommon in the Universe
By Peter D. Ward and Donald Brownlee
Copernicus, 333 pages, $38.95

HERE BE DRAGONS
The Scientific Quest for Extraterrestrial Life
By David W. Koerner and Simon LeVay
Oxford University Press, 264 pages, $36.95

REVIEWED BY
MICHAEL R. LeGAULT

Notwithstanding the newly anointed field of astrobiology, the study of extraterrestrial life has always had more in common with movies, fiction and religious-like passions than it has with science. From *War of the Worlds* to *Star Trek* to *The X-Files* to alien abductions, human imagination has filled the universe with life forms that are enigmatic, organized, territorial, intelligent and, at times, neurotic — i.e. remarkably similar to humans.

Scientifically, the results have been less prolific. The celebrity-supported Search for Extraterrestrial Intelligence (SETI) project, for example, has turned huge arrays of radio telescopes on hundreds of nearby solar-like star systems hoping to catch any wayward signal from an advanced civilization. Going to print, SETI is batting 0-for-40-years.

Lack of evidence has not deterred the search for, or belief in, extraterrestrial life. In an unimaginably vast universe, logic says there should be ET life. There *must* be, others say a bit more stridently. Still, as Joel Achenbach points out in *Captured by Aliens*, a growing number of people insist there is extraterrestrial life — they have seen it with their own eyes.

Achenbach, a writer for The Washington Post and author of the Why Things Are series of books, pans alien mania in a skillfully contrived narrative that entertains as well as illuminates. His clipped prose pokes fun at a society that is a psychological stew of superstition, technological bravado and political correctness. On the Apollo program: "What was the point of spending $25-billion to send a dozen white men to the moon?" On the reusable space shuttle: "It was the spirit of recycling. Who could argue with that?" In the process he somehow manages coherently to weave serious science issues with Michael Jackson, the Loch Ness monster, Al Gore and observations on New Yorkers.

Achenbach traces the growth in the conviction that the universe is rife with advanced extraterrestrial life to the late Carl Sagan. Glib and euphoric, Sagan was the first scientist to appeal to a mass audience, racking up numerous appearances on *The Tonight Show*. Early in his career, Sagan speculated that Phobos, one of the two moons of Mars, was an artificial satellite and that aliens had visited the Earth 3,000 to 4,000 years ago. As the author of more than 30 books and narrator of the widely watched public television series *Cosmos*, Sagan popularized the Principle of Mediocrity — there is nothing special about Earth. Yet where astronomer Frank Drake, using a formula he derived in 1960, predicted there could as many as 10,000 advanced civilizations in the Milky Way galaxy, Sagan put the number as high as one million.

Dubious of "Saganism," Achenbach is nonetheless sympathetic toward the search for extraterrestrial life, as well as toward Sagan himself. (Sagan's flaws, Achenbach believes, are those of a big thinker — pitching ideas, not all of them meant to be taken seriously.) He doesn't believe in UFOs, but interviews people who do, including a senior NASA scientist. Hesitant at first to reveal his views, the scientist eventually opens up, letting the reader in on the onion-like layers of his beliefs in "anomalistics." At a conference on interstellar travel, he confides he is an adherent of the "Zoo hypothesis" — aliens are here, but just watching. Achenbach observes that if aliens *are* here, they apparently find the western United States more interesting than India and Africa, where UFOs and alien abductions are hardly ever reported.

Most originally, Achenbach sees people's willingness to believe in UFOs as a cultural spin-off from anti-establishment attitudes that originated in the sixties. In the cosmology of postmodern and New Age values, science simply says "no" too often to suit many people's beliefs, lifestyles and political agendas. Creating one's own reality is not only accepted, but commended in courts of law. It is no coincidence, Achenbach observes, that "Trust no one" is the slogan of *The X-Files*: Rebellion against the reality police is a prerequisite for believing in aliens and UFOs.

There are infinitely more dead zones in the universe than habitable zones. These include elliptical galaxies with mostly giant stars too hot and short-lived for life to evolve, double-star systems that are too unstable, edges of galaxies that are metal-poor, centres of galaxies where energetic processes would deter complex life, and planetary systems with giant planets in inner orbits.

Formation of complex life also seems to require certain planetary amenities such as oceans, a large Jupiter-like neighbour to clear out comets and asteroids, plate tectonics to build continents and regulate planet temperature, a magnetic field to shield life from harmful radiation, a large nearby moon to stabilize a planet's tilt, and other factors. Do the math and you arrive at Peter Ward and Donald Brownlee's *Rare Earth* theory: Complex, intelligent life as found on Earth is exceedingly scarce in the universe.

The authors, a geologist and an astronomer, duly admit the theory is not original and rests on the work of many other scientists, most notably astronomer Michael Hart. In a reconsideration of intelligent life in the universe, in 1977 Hart calculated that the Earth could not be more than 5 per cent closer to the sun or 1 per cent farther away and still maintain a habitable biosphere.

Still, in light of the recent discovery of microbial life thriving in the satanic environments near deep-sea thermal vents, the two have delivered a timely, entirely readable account that harmonizes and extends the theory's critical ideas. Yes, as "extremophiles" on Earth have shown, life can evolve and exist under harsh conditions possibly found on other planets and moons, even within our solar system. But, the authors note, getting from primitive life to complex intelligence is by no means a given. On Earth, multicellular animals did not appear until more than three billion years after first life, bacteria. Mass extinctions, set off by collisions with comets and other events, could be even more common on other planets than they have been on Earth. They estimate there could be fewer than 1,000 planets bearing complex life in our galaxy, 10 times lower than Drake's estimate, and a thousand times less than Sagan's.

One criticism of the Rare Earth hypothesis is that it is anthropocentric. Why equate water with life? Why should we assume all life is built from carbon-based molecules? Why not silicon, or even metals? Perhaps our very definition of life is too narrow. *Here Be Dragons*, by University of Pennsylvania astronomer David Koerner and Hollywood-based neurobiologist Simon LeVay, considers these and other exotica, and finds them good thought experiments, but unlikely. Silicon is reluctant to form double and triple bonds, an important structural feature in self-replicating bio-molecules such as amino acids. Water in bulk liquid form maintains a very stable temperature even as heat is applied or taken away — an ideal medium for life-forming molecules to meet and form more complex structures.

This discussion of exotic life forms distinguishes it from the previous two books, which on the whole are lighter reads. The strength of Koerner and LeVay's more academic style is that it takes a more detailed investigation of certain topics, for example the SETI project and the discovery of the supposed fossil-bearing meteorite from Mars, on which the other books touch superficially.

Taken together, the books make a convincing case for the inconceivable scarcity of higher consciousness in a hostile universe. Technically, we may not be alone. Practically, with life spread across billions of galaxies, we may be condemned to loneliness. Philosophically this may trouble few. Practically it is unfortunate. An encounter with a peaceful extraterrestrial civilization, which an advanced society is most likely to be, might immediately provide humans with the means to cure cancer, generate unlimited clean energy and put the Saddam Husseins of the world out of business. Death and taxes, of course, are another matter.

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JASON REDMISTON/The Globe and Mail