

Star Bright?



C Bangs & Greg Matloff

The latest collaboration of artist C Bangs and astronomer Greg Matloff is their second foray into the land of the graphic artist's book, this time tackling no less a subject than the consciousness of the universe. Once again, they prove that dense scientific ideas can be made accessible to a broader public, successfully capturing the awe of their subject through a balance of text and imagery. The format of the visual book affords Bangs and Matloff an appropriately less traditional platform for the exploration of their novel thesis. Together they coax us into a world beyond the narrow boundaries of our own-and we are willing participants in the journey.

Matloff's text has been honed to the bare necessity to convey his ideas, rendering them beyond mere exposition of narration and into the territory of the poetic. Bangs continues the flight off the page with her imagery that both clarifies and clouds us in more mystery.

Linking quantum theory and the internet with human spiritual quests through the ages, Matloff and Bangs throw questions at us and come to conclusions that remain open-ended. They reach back into our early history to find a line throughout the ages that instinctually connects us to the heavens. We are left with the possibility of communicating, not just communing, with stars and perhaps finding ourselves on the cusp of a new science in its own right.

Maddy Rosenberg, Founder/Curator, CENTRAL BOOKING

Many of the astronomical images in this book were obtained by the extraordinary Hubble Telescope and the groups of dedicated professionals who have continued tirelessly to work for the evolution of humankind. They continue to give us a window into the cosmos, our origins and our ancestors.

Variations of these images will be used in our upcoming book, "Star Light, Star Bright?" published by Curtis Press. With gratitude to our publisher Neil Shuttlewood for understanding that an artist/scientist collaboration can enhance the scientist-artist book and view these ideas in yet another medium.

C Bangs Introduction

Ongoing conversations with my husband, Dr. Gregory Matloff about the laws of physics and our resulting collaboration of nine books on astronomy, astrophysics and one artist/scientist book continue to inspire my work.

What is it like working with and apart from Greg as we continue our dialogue that began when we met in February 1982? The dialogue that began with Arecibo and how my first trip there was the equivalent of a religious pilgrimage that reached its destination at our collective eye and ear to the cosmos. On a trip there three years ago with Greg who had never seen the extraordinary radio telescope, the largest in the world, we finally shared the experience that had cemented our relationship many years ago.

We take long walks together and have wide ranging discussions that cover the basics of our relationship to mythology, politics both local and global and, my personal favorite, the transcendental. Then we go off to our personal investigations that can be unrelated or collaborative work.

Our thirty year collaboration fits into the developing arts/science investigations that tackle ethical and political dimensions of complex problems.

The working hypothesis of stellar consciousness is that consciousness arises from the interaction of a universal field that has been dubbed "proto-consciousness" with matter through the agency of fluctuations in the quantum foam that underlies the universe and is the physical source of creation.

We live in a conscious cosmos interconnected and intertwined with the macrocosm and microcosm and are woven with elements produced by stars, the plants and animals we eat, wear or surround ourselves with.

In 1991 I met noted quantum consciousness physicist, Dr. Evan Harris Walker. A rebel and an early pioneer of consciousness physics, Walker was also an artist. We enjoyed an ongoing exchange of ideas until his death in 2006 on the reality or non-reality of "space-time" and on his innovative theories concerning the relationship between quantum mechanics and consciousness.

My first funded work for NASA in 2001 on the development of a radiation-resistant solar-photon holographic sail and my subsequent work in the summers of 2002-2004, as a NASA faculty fellow was an amalgam of mythologies, science and hope for human evolution. Working with physicists, engineers and space scientists I visualized their concepts by employing visual metaphors and working off archetypes to arrive at a new mythology for the In-Space Propulsion division at NASA's Marshall Spaceflight Center in Huntsville, Alabama.

Greg Matloff Introduction

You might rightly wonder how I, a researcher who has devoted most of his creativity to studying in-space propulsion techniques such as the solar sail, became involved in a consideration of panpsychism—the philosophical doctrine that consciousness pervades the cosmos.

There are several roots to my participation in this book. First, an early mentor was the late Dr. Evan Harris Walker, a pioneer in the field of quantum consciousness.

Second was a failure of nerve on my part. Because of my success in developing the concept of the interstellar solar-photon sail, I was invited to participate as a scientific consultant on *Encounter With Tiber*, a 1996 science fiction novel co-authored by John Barnes and Apollo 11 astronaut, Buzz Aldrin. For plot purposes, Buzz asked me to evaluate the possibility of a Jupiter-like gas giant planet existing close to its parent star. Although I thought the idea to be impossible, I located the appropriate equations and calculated. To my surprise, such planets could exist. But I lacked the confidence to challenge the scientific establishment in a peer-reviewed paper. In the mid 1990's astronomers began to discover many of these hot Jupiters.

Until my retirement from full-time teaching at New York City College of Technology, a division of CUNY in Brooklyn, I coordinated the astronomy program. I was very impressed by the courage of an undergraduate liberal arts student who questioned prevailing thought regarding dark matter, a mysterious substance thought to be responsible for anomalous motions of stars and galaxies that has remained undetected after seven decades of effort.

So in 2011, when the British Interplanetary Society invited me to participate in a symposium devoted to the work of Olaf Stapledon, a British philosopher/science-fiction author, I decided to take an unconventional route. Stapledon's master work is *Star Maker*, originally published in 1937. This novel has received much attention in the space-engineering community because of its technological projections. But I decided to check a central theme of *Star Maker*—the concept that stars have at least a limited form of consciousness. Is it possible that panpsychism might emerge from philosophy to become a science?

To my surprise, anomalies in the motions of nearby stars actually support this hypothesis, which led to a peer-reviewed paper in January 2012 issue of the *Journal of the British Interplanetary Society* (JBIS), contributions to Paul Gilster's blog *Centauri Dreams*, an article in the *Baen Press* on-line science magazine and a book, *Star Light, Star Bright?* to be published in the near future by Curtis Press.

Has panpsychism been proven? No. But it might now be possible to test models of cosmic consciousness by observation and experiment. The concept of a conscious universe may be emerging from philosophy into science.

Preface

This artist-scientist book explores the possibility that one of the metaphysical approaches to consciousness-panpsychism-might evolve into a scientific discipline. Essentially, panpsychism proposes that a proto-consciousness field pervades the universe. That mystery that we call consciousness is produced by the interaction of this field with matter.

The work presented here has several roots:

Both of us have been influenced by an early mentor, the late quantum/plasma physicist, Dr. Evan Harris Walker. Greg's collaboration with Harris was related to astronautics and C incorporated his equations and diagrams as sacred writing into her paintings referencing illuminated manuscripts.

The 1937 novel, *Star Maker*, by British author/philosopher, Olaf Stapledon investigated many aspects of the technological future, some of which influenced the work of space scientists and engineers. Greg decided to investigate Stapledon's more controversial premise that the anomalous motions of some stars are caused by stellar volition. This work was presented at a symposium of the British Interplanetary Society and was published in the peer-reviewed January 2012 issue of *JBIS (Journal of the British Interplanetary Society)*. Follow-on work is included in Paul Glister's *Centauri Dreams* blog and the Baen Press digital science magazine. Greg will present this work at an IAA (International Academy of Astronautics) symposium and C will present a video of the artist/scientist book there. *Star Light, Star Bright?* is scheduled for publication in 2015 by Curtis Press, where the science and art is investigated and presented.

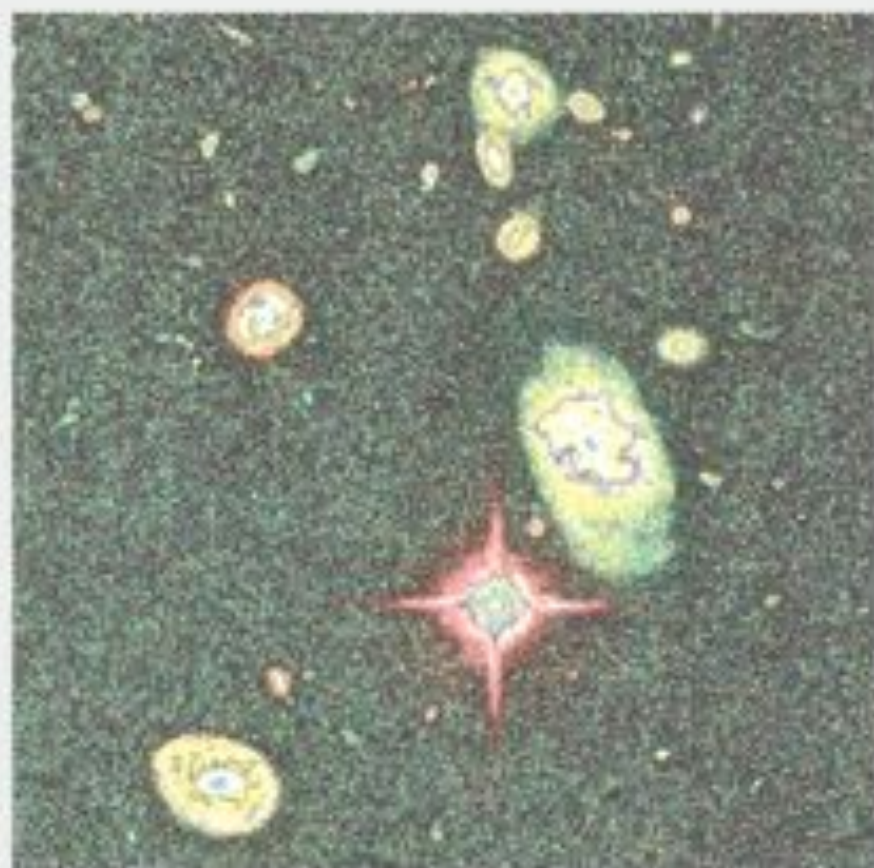
A Soviet-era Russian astronomer noted that stars of about the Sun's surface temperature and cooler revolve around the center of our galaxy a bit faster than their hotter sisters. Called Parenago's Discontinuity, this effect has been observed using data from Hipparcos, a European space observatory, in main sequence stars as distant as 260 light years (diagram in text) and giant stars more distant than 1000 light years (diagram/graph on the cover). A local explanation for this discontinuity seems to be unlikely. The discontinuity occurs at the place in the stellar temperature spectrum where molecules begin to be found in the spectra of the coolest stars.

Basing his thoughts upon a theory of consciousness developed by Sir Roger Penrose and Dr. Stuart Hameroff and incorporating work of quantum physicist, Dr. Bernie Haish, Greg presented a simple model for panpsychism: the proto-consciousness field interacts with matter at the molecular level through the Casimir Effect, which is a pressure on molecular bonds caused by fluctuations in the universal vacuum.

This is far from unreasonable: a stabilized fluctuation in the "quantum foam" is suspected to be the origin of the Big Bang and is therefore the most creative agent in the universe.

As a follow-on to Hipparcos, the European Space Agency has launched a new space observatory named Gaia. Over the next few years, Gaia will observe positions and motions of about 1 billion stars in our galaxy, which hopefully will support the conscious-star conjecture discussed here.

Uni-directional stellar jets will also be observed soon in greater detail. These jets are one way that conscious stars could control their motions. A more controversial suggestion is a weak psychokinetic (PK) force. Even though previous attempts to verify the existence of such "motion by the force of will", were hampered by possible self-serving motives of the best-scoring human subject, it may be time to reopen the investigation of weak PK effect.



The Shaman and the Sky

Today, few people consult the Shaman.

But for much of human prehistory,

Shamans were the repository of cultural lore.

Perhaps 20,000 years ago,

they created colorful images on cave walls.

This early human art was sympathetic magic:

to invoke the herds by painting them.

Early sky myths included the Sun and Moon.

In the New Stone Age, tribes constructed megaliths:

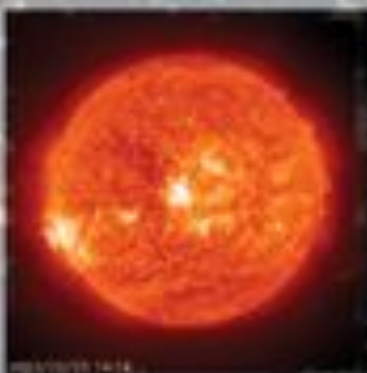
stone monuments to keep track of these deities.

Life was connected with the cosmos,

the destiny of humans was entangled with Sun and Moon.

The Milky Way was a river in heaven

to be traversed by spirits of the dead.





Earth Mother, Sky Father

*About 10,000 years ago, villages appeared,
agriculture and animal husbandry largely replaced the hunt.*

Sky Father fertilized Earth Mother.

*The Sun became the god Apollo; the Moon became the
goddess Diana.*

*Stone Circles like Stonehenge could be used to predict
eclipses:*

dreadful times for followers of Apollo and Diana.

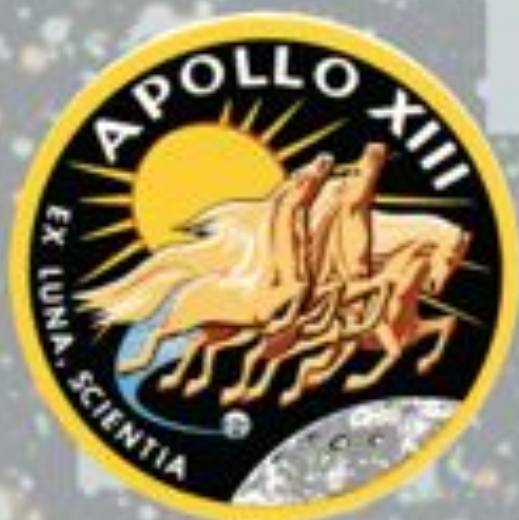
*Ancient myths such as the Labors of Hercules
may relate to the construction of these monuments.*

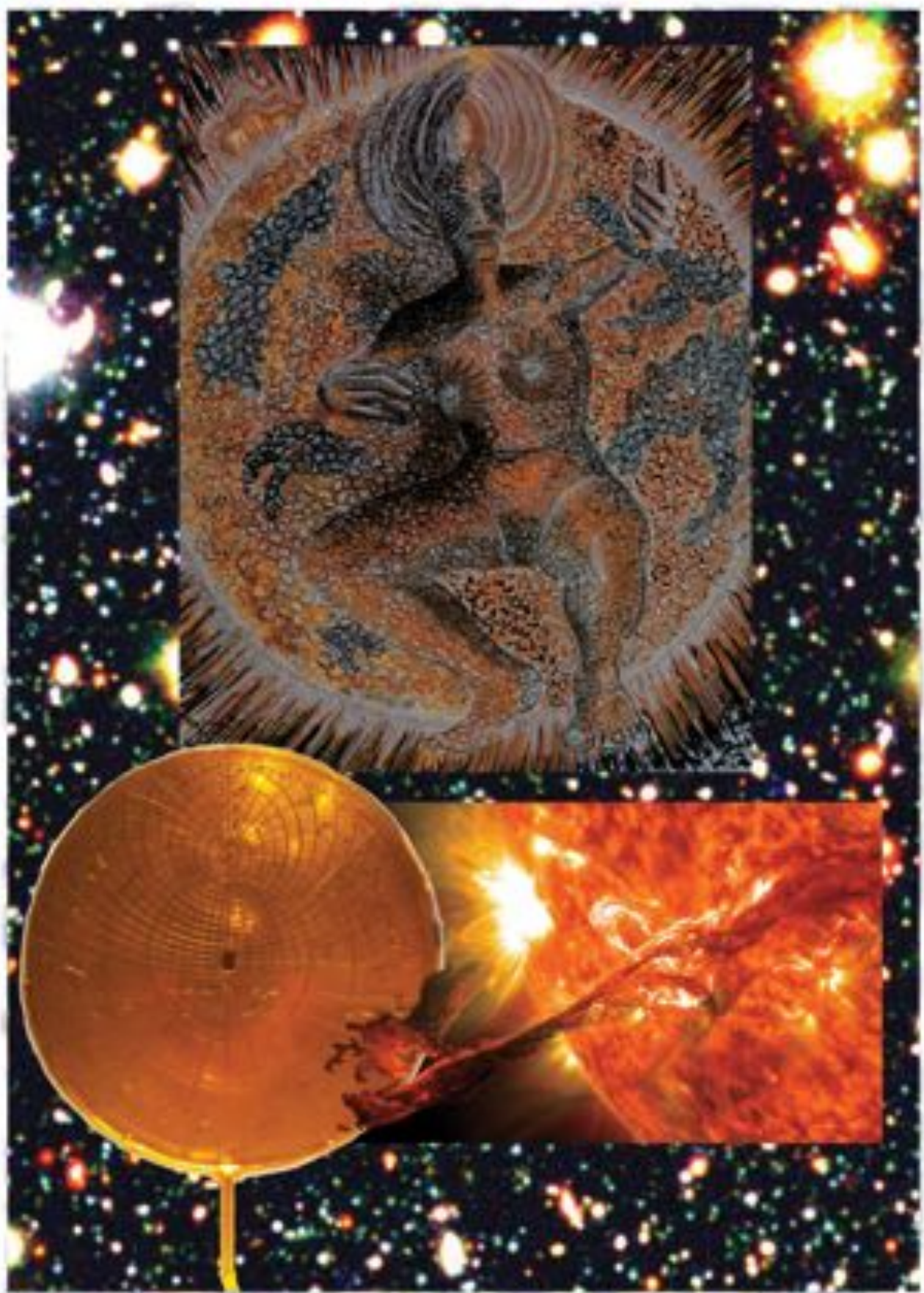




Wandering Sky Gods

*In 1000 BC, Babylonian priest-astronomers
had a new take on the heavens.
Atop their tall towers or Ziggurats,
they observed and recorded the motions of naked
eye planets.
These were identified with gods and goddesses.
Some of the "fixed" stars were identified in myth
with mortals or immortals:
including the Pleiades and the Gemini Twins.*





Medieval Mysteries

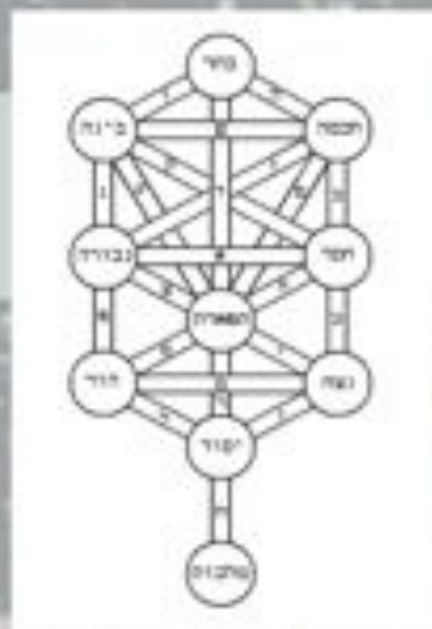
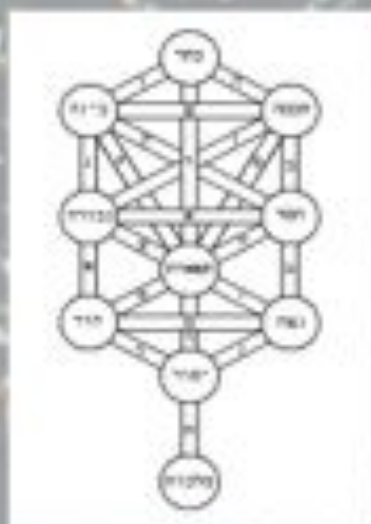
*In the West, the downfall of Rome was a grave setback.
Literature, art and science declined.*

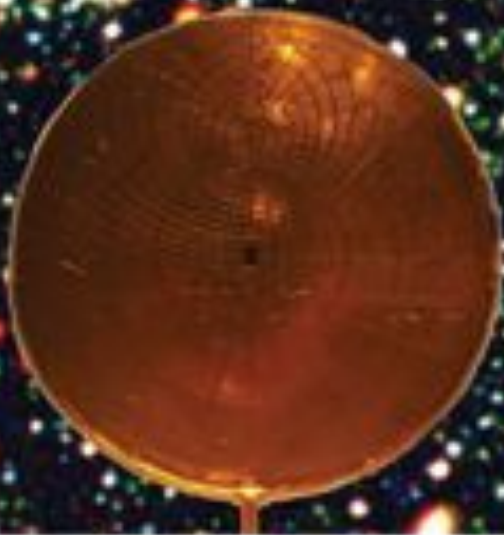
To practice philosophy was to risk your life.

*Underground mystery cults helped preserve some
ancient traditions.*

*Some of these considered celestial objects
to be conscious.*

*To others and in the East,
all creation was transcendent.*





Can we Pin Down Consciousness?

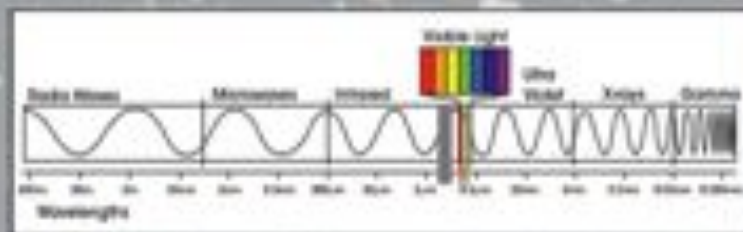
*We are all conscious beings.
That may be the only thing humans can be sure of.
But can we define consciousness?
Is it a thing or is it a process?
Is the mind the "software" for the brain?
At some level, is consciousness shared by all humans?
Or by all life?
Philosophers call consciousness the "hard" problem.
Answers to the questions above are slippery at best.*





Consciousness and Quantum Mechanics

*Quantum Mechanics is a well validated physical theory.
Our modern world would not exist without it.
In many interpretations of this theory,
conscious observers are necessary to convert probability
to reality.
Neurotubules are structures within the brain
of ideal size to host quantum events.*





The Uri Geller Affair

He scored brilliantly on CIA-sponsored tests of paranormal abilities. Physicists at Stanford Research Institute were convinced of the veracity of their results. But Geller became famous and rich bending utensils (he claimed) by the power of his mind. Utensil bending is a trick; Geller was unmasked as a magician. So is he a psychic, a magician, or both?

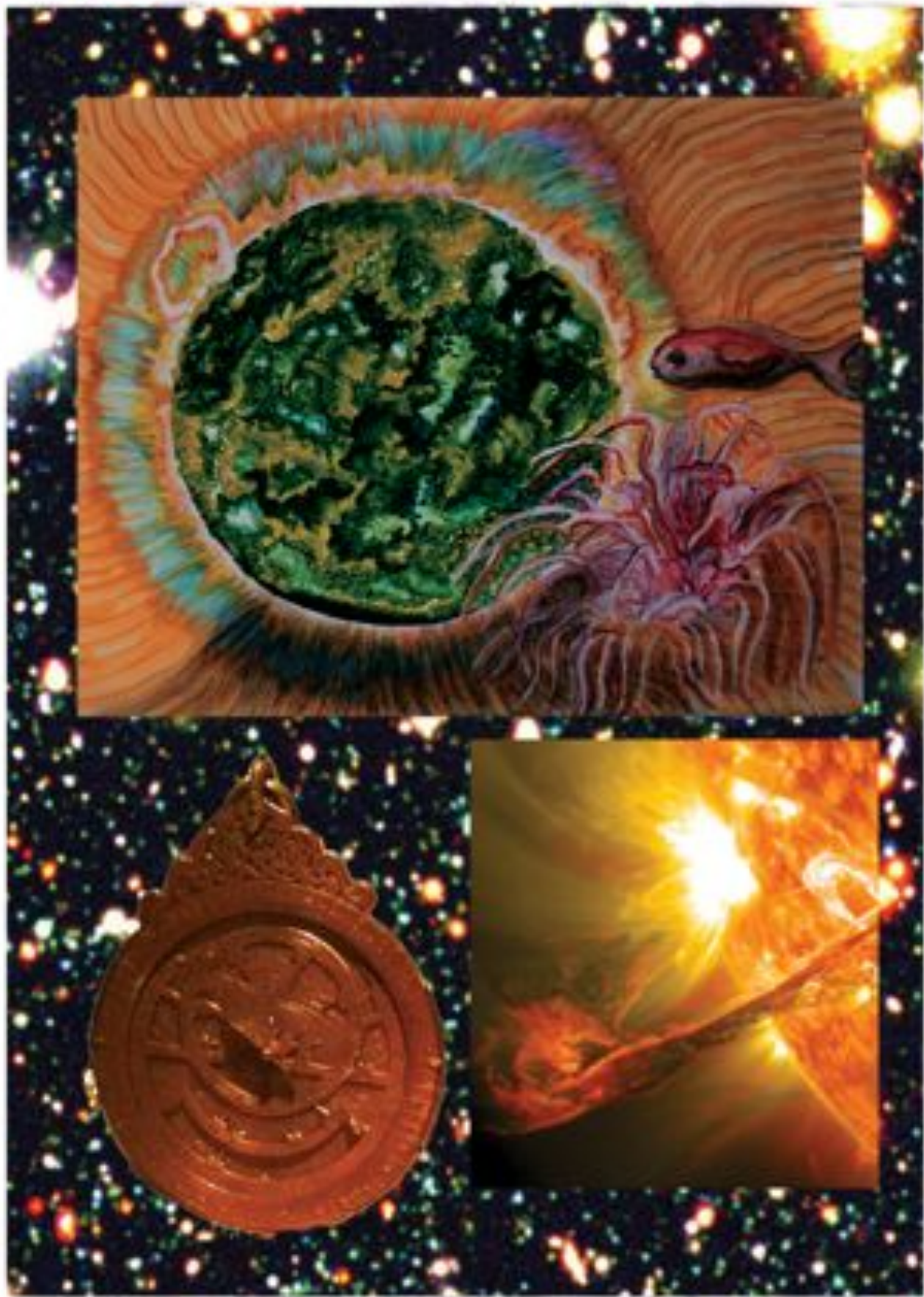




Gaia and Her Sisters

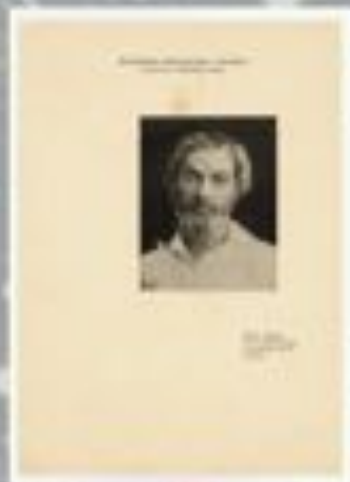
*Looking homeward from the barren Moon,
Apollo astronauts saw Earth as a fragile blue-white sphere.
Photos of Earth from deep space led to the revival of
Gaia, an ancient Earth goddess.
Perhaps our fragile living world is an entity.
Perhaps all life is united in an intricate web.
Perhaps humanity will evolve to serve as Gaia's
nervous system
and search the cosmos for sisters of this goddess.*





The Poet and the Cosmos

*To paraphrase Emerson:
the poet projects towards heaven
while grounded in Earth's soil.
Since ancient times
some poets have sung of living stars,
a conscious universe
and the relation of humans to the cosmos.*





A Visionary Named Olaf

Olaf Stapledon, a British science-fiction writer and philosopher penned the novel "Star Maker" prior to World War II.

In this work he predicted technological developments: nuclear power, space habitats, astro-engineering and interstellar travel.

But "Star Maker" concentrates on broader questions: What does it mean to be human?

Are stars and galaxies conscious in some sense?

Will an evolved conscious universe someday confront its creator?





Stellar Dreams in Sci-Fi

After World War II, many science-fiction authors further developed Stapledon's ideas.

In "Expedition to Earth", Arthur C. Clarke wrote of a galactic empire dying as its stars explode.

This sounds a lot like Stapledon's war between stars and planets.

In "Out of the Sun", Clarke describes fire beings living in the Sun's photosphere.

A malignant conscious being imprisoned in the heart of a dead star is considered by Clarke in "The City and the Stars".

Greg Benford and Gordon Eklund in "If the Stars are Gods" reconsider an ancient idea: the concept of stellar deities.

Sir Fred Hoyle's "The Black Cloud" postulates a conscious nebula.

Ray Bradbury, long before the revival of Gaia, writes of a planetary intelligence in "Here There be Tygers".

In "Solaris" Stanislaw Lem considers a sentient extraterrestrial ocean.

It should be noted that Benford, Clarke and Hoyle are or were scientists as well as authors.





A Dark Mystery

Some Stars move in a strange fashion.

Those closer to our galaxy's rim revolve faster than those closer to the core.

Our galaxy rotates almost like a solid wheel rather than an aggregate of stars under gravity's influence.

Why is this so?

Astrophysicists have postulated "dark Matter" to explain this anomaly:

an invisible, electrically neutral substance that pervades the outer galaxy.

These might be WIMPS-Weakly Interacting Massive Particles.

These might be MACHOS-Massive Objects in the Galactic Halo.

Perhaps the laws of Newton and Einstein require revision. But after seven decades of observation and experiment, the mystery persists.





A Kinematics Anomaly

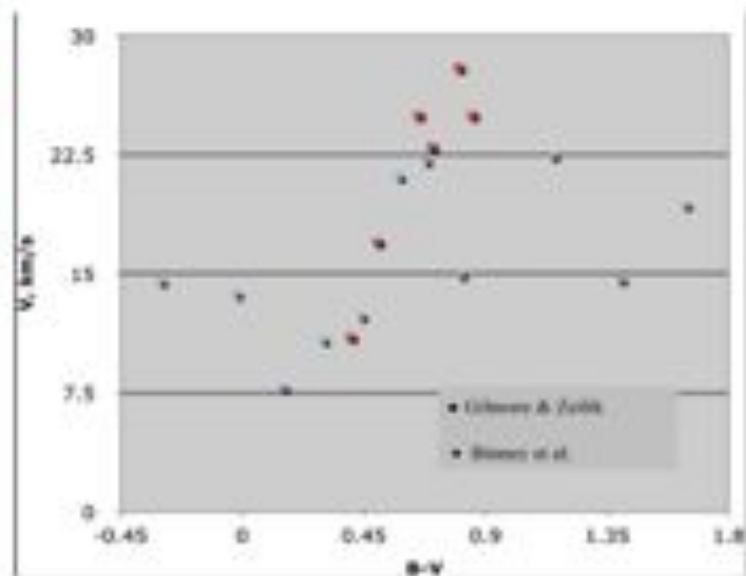
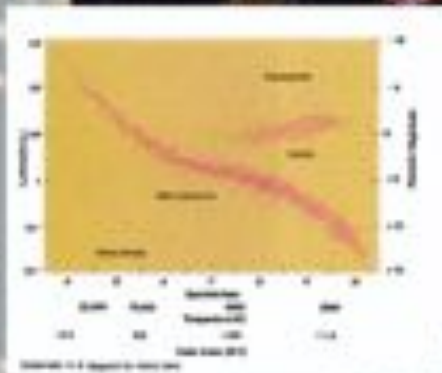
Pavel Parenago, a Soviet astronomer, noticed something strange.

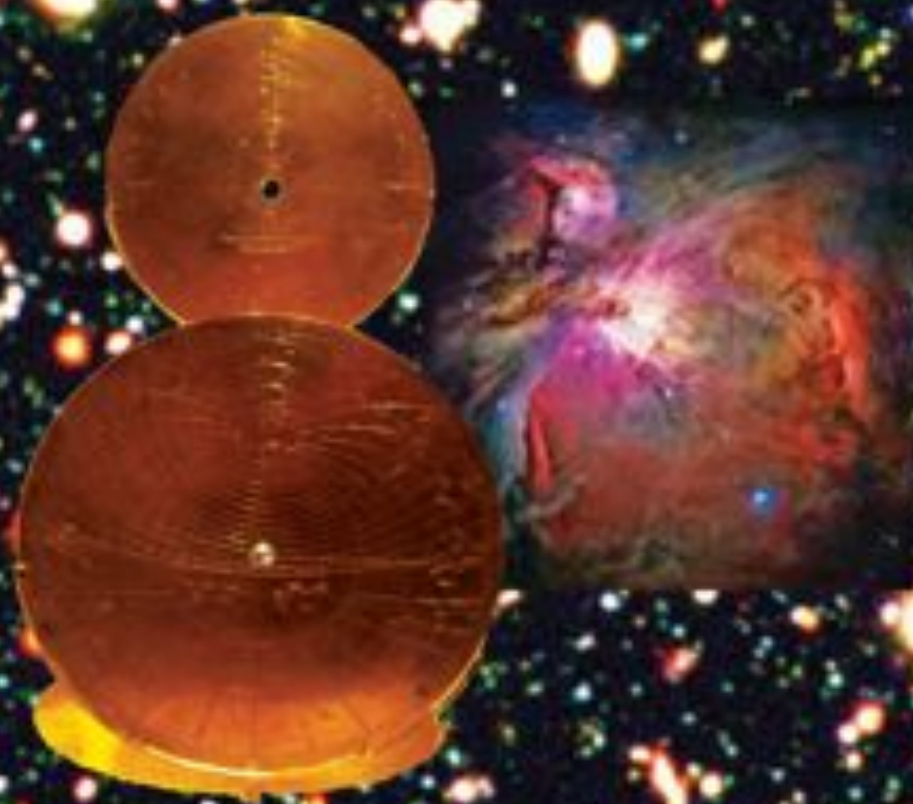
Cooler, less massive, redder stars such as the Sun circle the galaxy a bit faster than their hotter, more massive, bluer sisters.

Called Parenago's Discontinuity, this effect has been confirmed for main sequence stars as far as 260 light years from the Sun.

It might be significant that the Discontinuity occurs in the stellar temperature spectrum at the point where stable molecules begin to appear in cooler stars.

Might this be evidence for stellar consciousness?





The Volitional Star Hypothesis

In agreement with the philosophical doctrine of panpsychism, it is suggested that mind is omni-present in matter as a Universal Field.

Fluctuations in the universal vacuum, the "quantum foam", is the suggested source of this field.

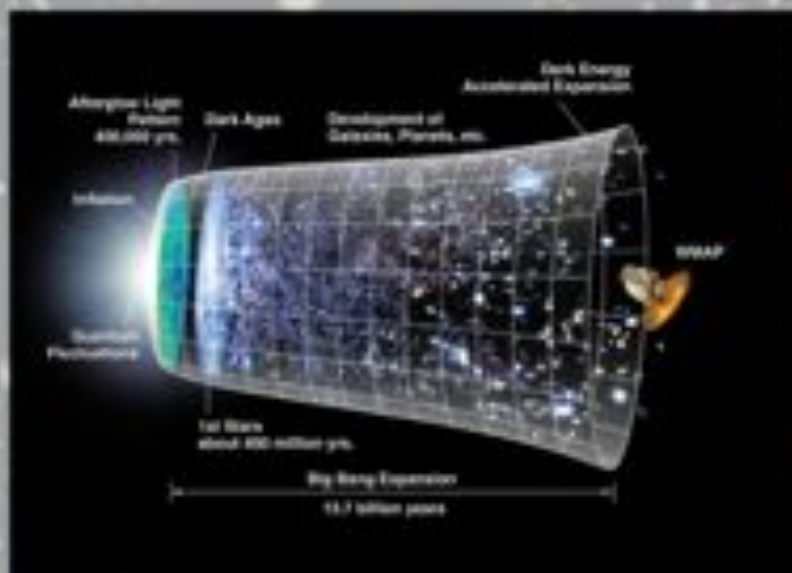
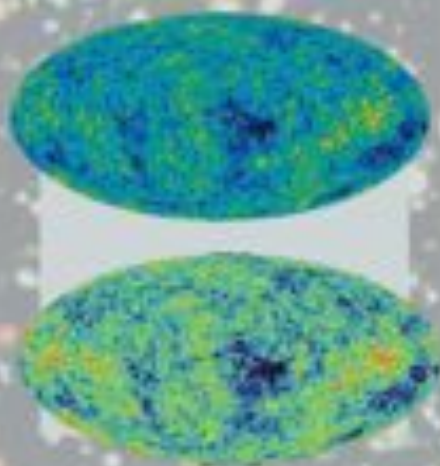
Vacuum pressure from these fluctuations is one agency bonding atoms in molecules.

Stars with many molecules are predicted to be conscious in at least a limited sense.

Volition is an observable aspect of stellar consciousness.

We can define, quantify, and observe methods a conscious star might use to alter its motion.

Galaxies and larger structures might also be conscious, or self-organizing.





Stellar Jets and Psi

There are at least three conceptual methods that can accelerate a molecule-rich, volitional star.

*One is uni-directional electromagnetic pressure;
More light being emitted in one direction than others.
While not impossible, this has never been observed.*

The second is uni-polar matter jets.

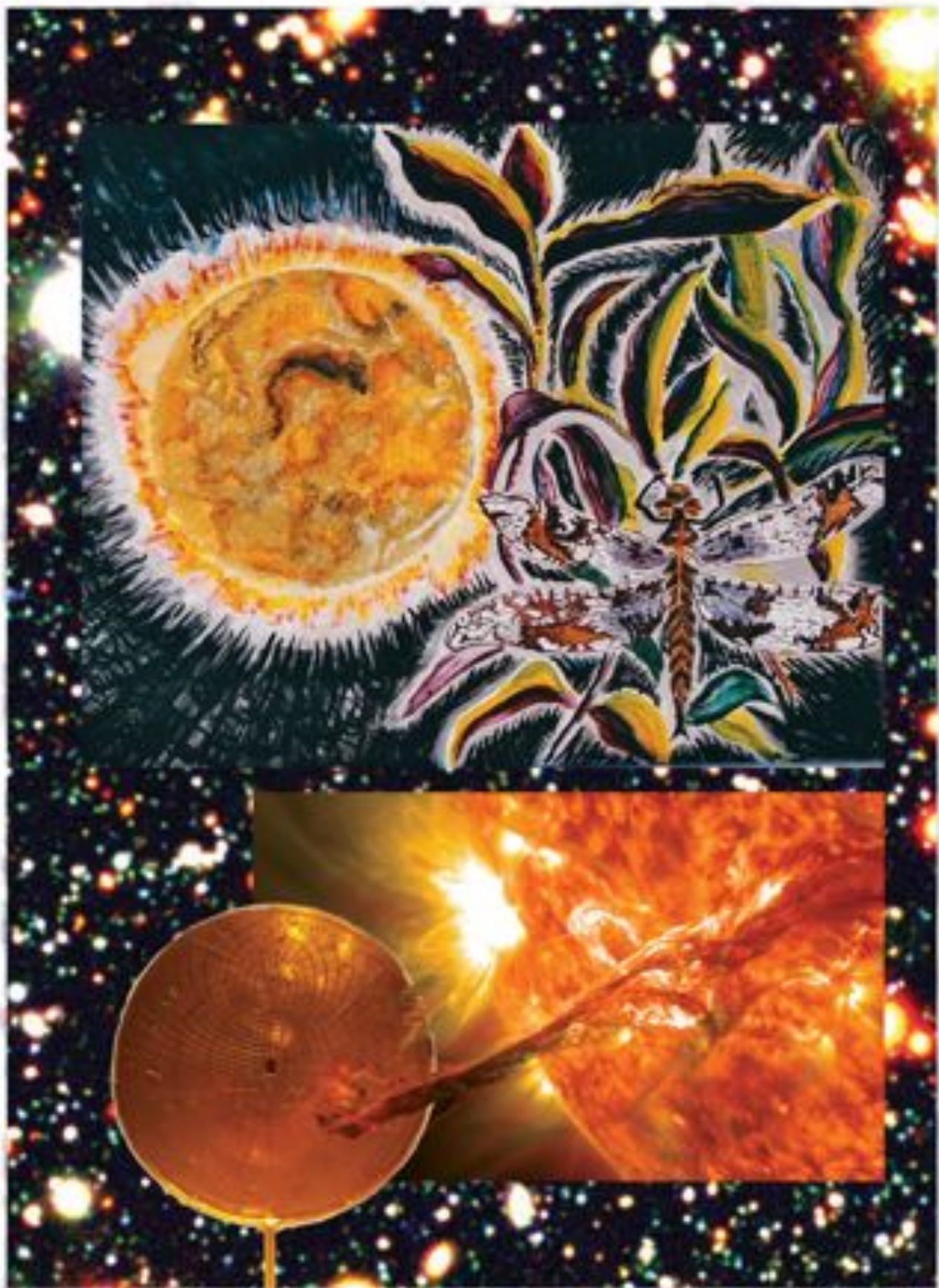
Some young stars emit more matter in one direction than others.

The reaction to this matter jet produces a thrust in the opposite direction.

The third is a weak psychokinetic force.

Although much weaker than the force required to bend a utensil, this hypothetical force is very controversial.





Of Publishing and Blogging

*Information transfer is a property of living organisms.
Humans have used cave paintings, pictographic scripts and
the alphabet for this transfer.*

*From papyrus scrolls and the printing press
the peer-reviewed journal evolved.*

*Peer review by anonymous readers usually selects valid
research for publication, but it is a slow process.*

Now we have the internet-based blog.

*If properly managed, this can distribute information to
a wide audience very rapidly.*

The blog may be another step towards a global brain.





Spiral Arms: An Alternative Hypothesis

*Some have proposed an alternative hypothesis for
Parsenago's Discontinuity.*

*Our Milky Way galaxy contains a lot of dust and gas
as well as a few hundred billion stars.*

*This material is concentrated in nebulae within the galaxy's
spiral arms.*

*Perhaps, when these nebulae drift through a star field,
they drag low-mass stars faster than more massive stars.*

One problem for Spiral Arms supporters:

These nebulae tend to be compact and widely separated.





Spiral Arms: Not Supported by Observation

To be accepted as valid, scientific theories must be supported by experiment or observation.

Parenago's Discontinuity applies to main sequence stars within about 260 light years.

But analysis of open galactic clusters in Messier's listing reveal few nebulae larger than 50 light years.

Other researchers have searched for spectral differences across the spiral arms of 12 nearby spiral galaxies.

The Spiral Arms hypothesis is not supported by these results but a lot more galaxies must be studied before Spiral Arms can be ruled out.





A Telescope Named Gaia

To verify Parenago's Discontinuity as a galaxy-wide phenomenon, it is necessary to measure motion and position of many stars.

In 2013 the European Space Agency launched a space telescope named Gaia.

Now on station in deep space, Gaia has begun her work. During the next few years,

Gaia will observe motion and position of about one billion stars.

We will learn a lot about how stars move from this data.





Observational/Experimental Panpsychism

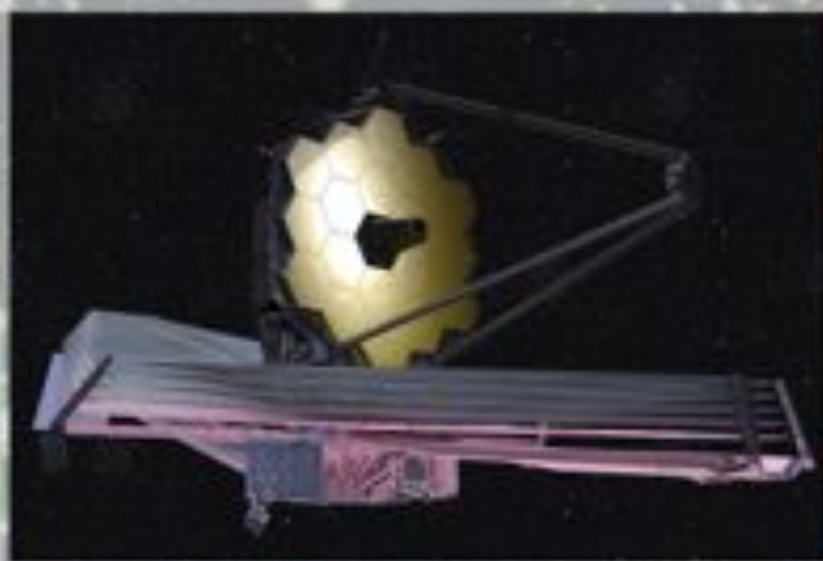
Panpsychism, a philosophical doctrine, considers consciousness to be omni-present.

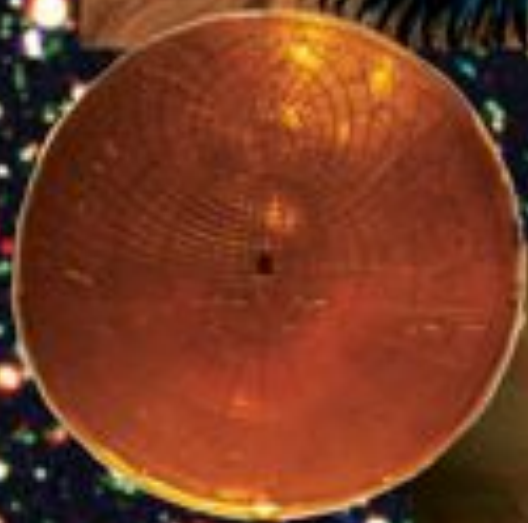
But it is proposed here that it may evolve into an experimental/observational science.

Perhaps the first person to perform a test of panpsychism was British author/scientist Arthur C. Clarke.

Researchers can go a bit further now:

Models of universal consciousness can be developed and tested by experiment or observation.





Can We Talk?

The assumption here is that some stars have a primitive herding instinct, a consciousness as high as a slime mold amoeba.

But what if ancient philosophers and some modern authors are correct?

What if stars are instead god-like?

Our record in communicating with the most intelligent non-human terrestrials is poor.

Our attempts to establish a dialogue with distant, technological extraterrestrials have not succeeded.

Could humans converse with our Sun, when a human life is equivalent to a solar second?

We may have to wait for a conscious Gaia.





Is the Universe Conscious? Might It Become Conscious?

Austrian astrophysicist Erich Jantsch speculated that the universe is self organized at all levels. He reasoned that the upper layers of stars might be the conscious zone.

He noted that many terrestrial species respond to cosmic cues.

Spiral galaxies like the Milky Way routinely absorb smaller galaxies with no disruption to their shapes.

American astrophysicist, Lee Smolin speculates that collapsing black holes produce daughter universes.

British mathematical physicist, Roger Penrose suggests that neutron stars might be conscious.

Since the black hole stage follows the neutron star stage might this be how proto-consciousness enters a universe?





Expanding Paradigms

Anomalies are building up.

Argentine astronomer, Richard Branham reports that giant stars more distant than 1000 light years display Parenago's Discontinuity.

Dark matter remains elusive.

The validity of a weak psychokinetic force remains controversial.

The Roger Penrose/Stuart Hameroff theory of quantum consciousness has received some experimental validation and a possible clinical application.

Some have speculated that the universe is structured like a giant brain.

Others reason that it is an immense hologram.

A paradigm shift might be in the wings.

In the not too distant future, panpsychism might emerge as a science.

