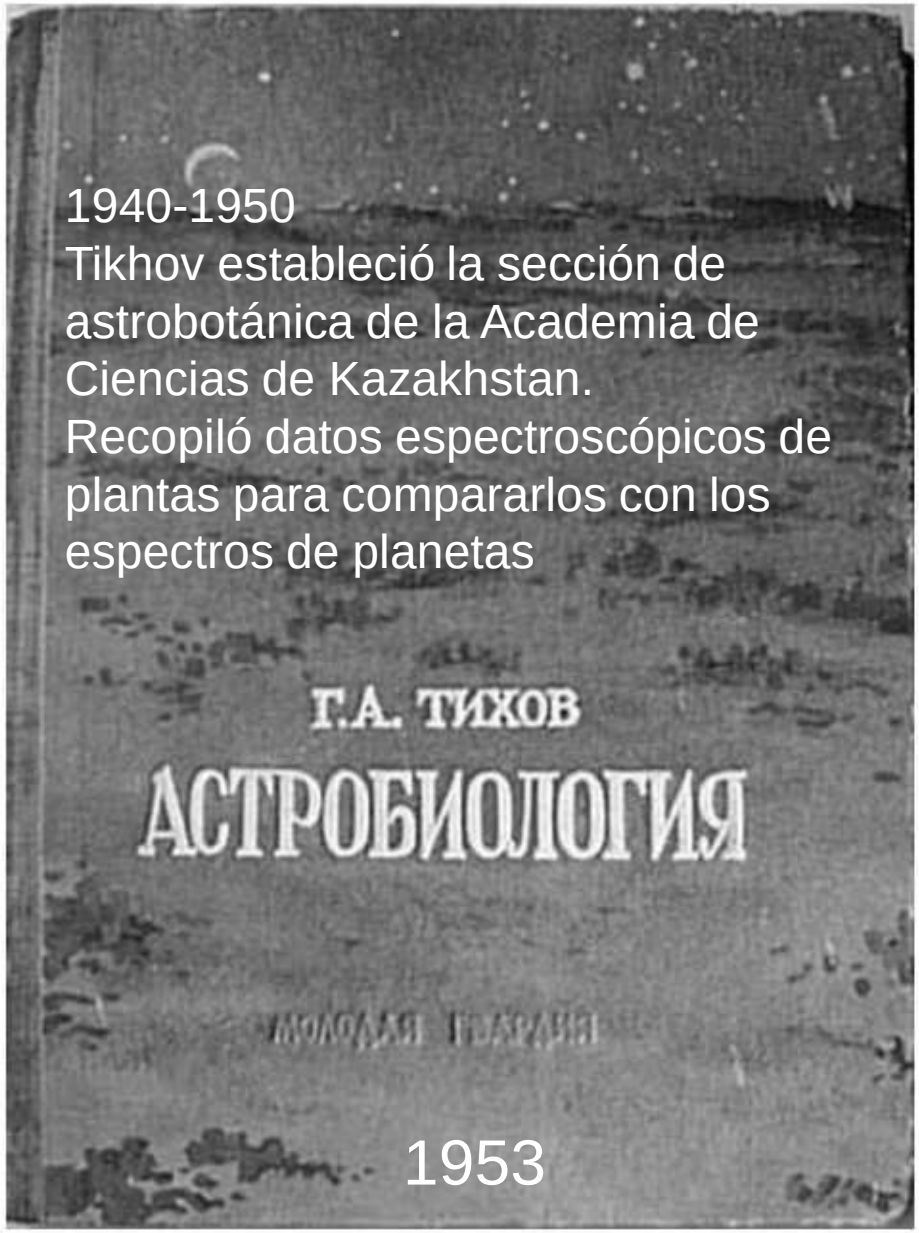
Astrobiología: en busca de vida extraterrestre

Antígona Segura Peralta
Instituto de Ciencias Nucleares
Universidad Nacional Autónoma de México
Sociedad Mexicana de Astrobiología
Virtual Planetary Laboratory, NASA Astrobiology Institute

http://hubblesite.org/image/2221/news/62-mars

1 Gavriil Adrianovich Tikhov

1940-1950
Tikhov estableció la sección de astrobotánica de la Academia de Ciencias de Kazakhstan.
Recopiló datos espectroscópicos de plantas para compararlos con los espectros de planetas



1953

2 Cover of the first edition of G. A. Tikhov's 'Astrobiology'

Cockell, 2011

1960

Exobiology: Approaches to Life beyond the Earth

Joshua Lederberg

Reprinted from SCIENCE, August 12, 1960, Vol. 132, No. 3424, pages 393-400

It is a privilege to discuss some basic problems in biology with an audience whose special concern is for the recent striking advances in the physics of the earth in the solar system. However, many of us are looking forward to the close investigation of the planets, and few inquisitive minds can fail to be intrigued by what these studies will tell of the cosmic distribution of life. To conform to the best of our contemporary science, much thoughtful insight, meticulous planning, and laboratory testing must still be invested in the experimental approaches to this problem. This may require international cooperation and also—perhaps more difficult—mutual understanding among scientific disciplines as isolated as biochemical genetics and planetary astronomy.

Many discussions of space exploration have assumed that exobiological studies might await the full development of the technology for manned space flight and for the return of planetary samples to the terrestrial laboratory. To be sure, these might be preceded by some casual experiments on some instrumented landings. One advantage of such a program is that time would allow exobiological experiments in early flights, whether or not manned space flight eventually plays a role in scientific exploration.

The author is professor of genetics at Stanford University Medical Center, Palo Alto, Calif. This article is adapted from a paper presented 13 January 1960 at the 1st International Space Science Symposium, Nice, France—a symposium sponsored by the Committee for Space Research of the International Council of Scientific Unions. The article will appear as chapter IX of the Space Science Board's copyrighted report-in-progress on "Science in Space," and is published here by permission of the National Academy of Sciences.

edge, from closer approaches, of the chemistry and physics of planetary habitats. Unfortunately, this orderly and otherwise desirable program takes insufficient account of the capacity of living organisms to grow and spread throughout a new environment. This unique capacity of life which engages our deepest interest also generates our concerns in the scientific management of missions beyond the earth. On account of these, as well as of the immense costs of interplanetary communication, we are obliged to weigh the most productive experiments that we can do by remote instrumentation

Motivations for Exobiological Research

The demons which lurk beyond the Pillars of Hercules have colored the folklore and literature of ages past and present, not always to the benefit of fruitful exploration and dispassionate scientific analysis. Apart from such adventuresome amusements and the amateur delights of a cosmically en-

1962

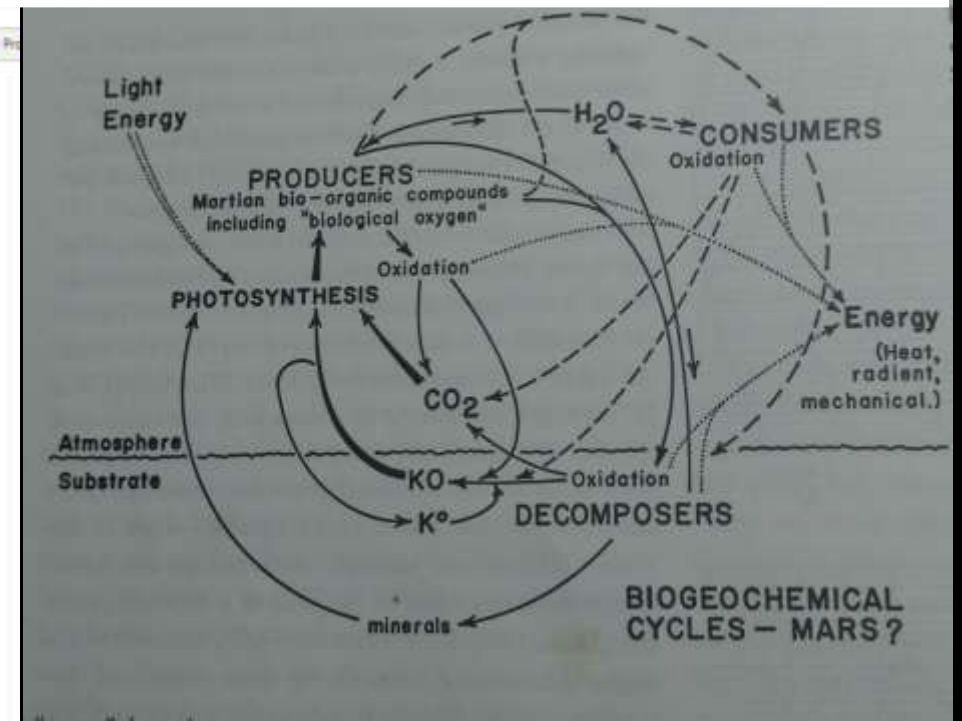
Martian Biology

Frank B. Salisbury
+ See all authors and affiliations

Science 06 Apr 1962:
Vol. 136, Issue 3510, pp. 17-26
DOI: 10.1126/science.136.3510.17

Abstract

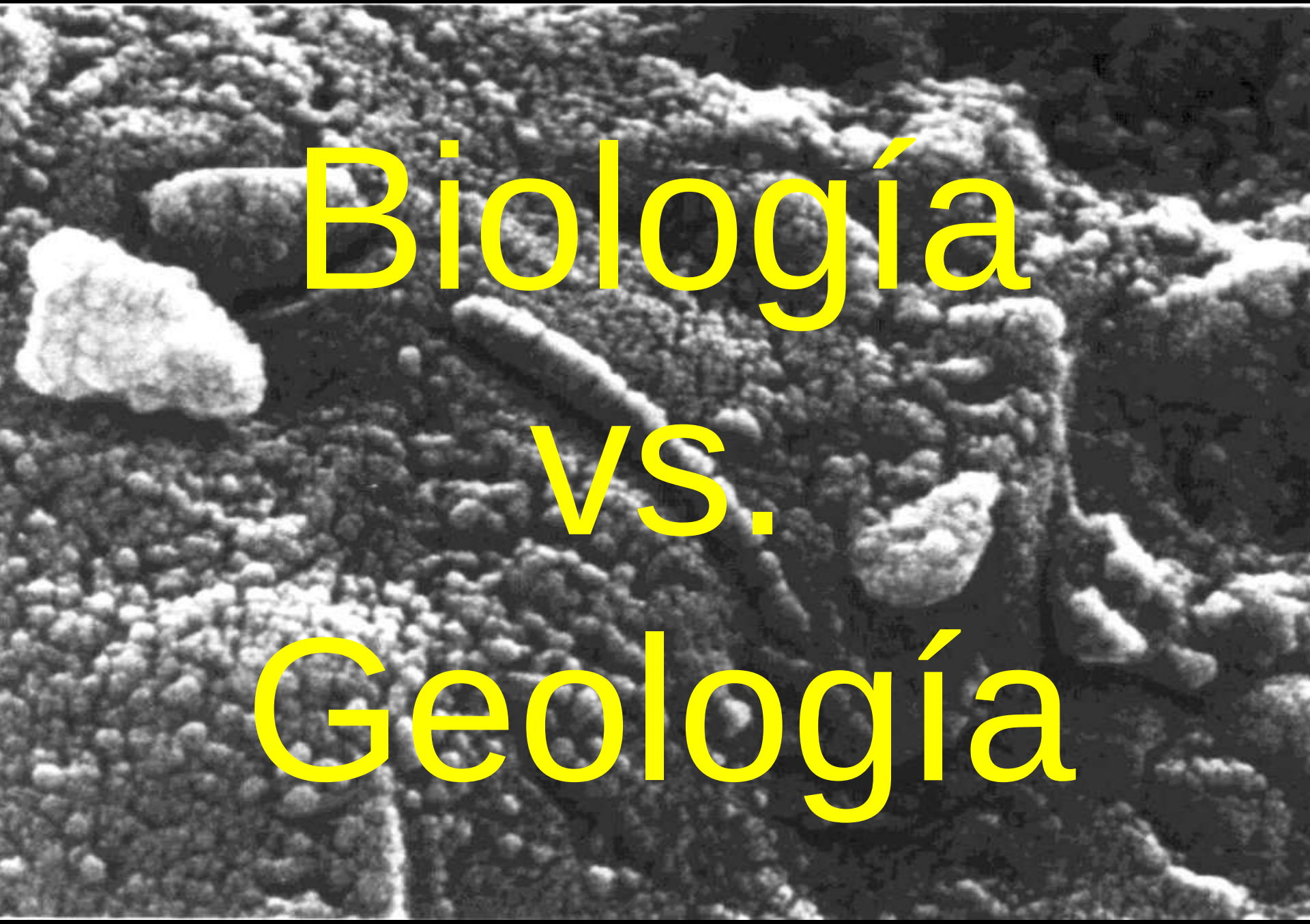
Of all the proposals put forth to account for the observed Martian phenomena, the idea of life on Mars seems to be the most tenable. And if this idea is accepted, we are immediately drawn to the conclusion that this life is a very well-adapted and flourishing one—not the struggle for existence so often suggested in light of the obvious difficulties earthly organisms would have in living on Mars. The suggested criteria seem to eliminate all the known life forms, but of all these forms, a higher plant would require the least modification in order to meet the criteria. The basic shape of the leaf of a higher plant seems suited to conditions on Mars, but the lower gravity might well result in some interesting modifications in morphology. Some life forms on Mars might resemble our own higher plants, but we should be prepared to encounter some interesting surprises in biochemistry.



Definición de astrobiología

- Es el estudio del origen, evolución, distribución y futuro de la vida en el universo (NASA).
- Exobiología es usado como equivalente aunque estrictamente no lo es.
- La astrobiología incluye el estudio de la vida en la Tierra como un ejemplo de vida en el universo.
- Considera a la vida como un fenómeno planetario, es decir, la vida requiere condiciones para surgir y evolucionar (energía, un líquido y una superficie sólida) que sólo pueden darse en un cuerpo planetario (satélite o planeta).


NASA Astrobiology Institute
LIFE IN THE UNIVERSE
Solar System and Beyond:
Our Journey of Discovery
Exoplanet
Biosignatures
Icy Worlds:
Habitability
and Life
Detection
Mars: NASA's Journey to Mars
Habitability
of Early Mars
Technology: Technology Drives Exploration
Global Partnerships Employing
Collaborative Technologies
Origin and
Nature of Life,
Co-evolution
with Planet Earth
NAI: the Community
https://nai.nasa.gov/about/



McKay et al. 1996

Estrategias

No tenemos una definición de vida

Depende del tipo de búsqueda:

- In situ
- Remota

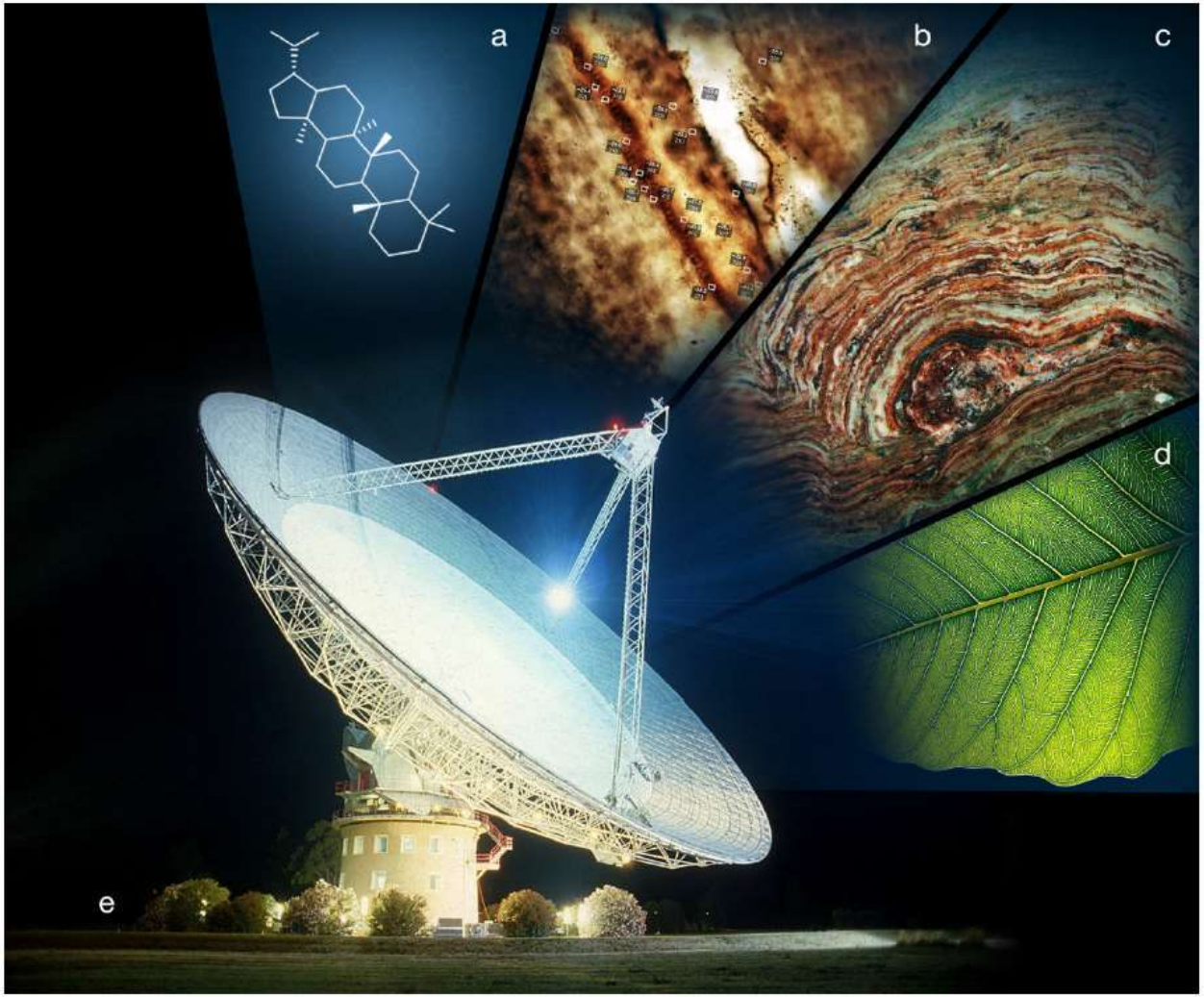


FIGURE 5-5. A variety of biosignature types, including (a) hopane, a lipid that can be preserved in rocks and is indicative of past biological activity, (b) a magnified view of chert, which contains microfossils, (c) a section of a stromatolite, which shows macroscopic layering due to microbial mat activity, (d) a plant leaf, whose characteristic reflectance suggests the complex process of photosynthesis, and (e) a radio telescope, as might be used to detect technosignatures from advanced civilizations. *Source:* (a) Image courtesy Toney 2015, with permission; (b) Image from Williford et al. 2013, with permission from Elsevier; (c) Image courtesy James St. John, Flicker; (d) Image courtesy Fasaxc 2010, Wikipedia. (e) Image courtesy of Kerton 2000, CSIRO.

NASA Astrobiology Strategy 2015

ASTROBIOLOGY
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Focus Article

AstRoMap European Astrobiology Roadmap

Gerda Horneck,[1,2,*] Nicolas Walter,[3,*] Frances Westall,[4] John Lee Grenfell,[5] William F. Martin,[6] Felipe Gomez,[7,*] Stefan Leuko,[2,*] Natuschka Lee,[8,9] Silvano Onofri,[10] Kleomenis Tsiganis,[11] Raffaele Saladino,[12] Elke Pilat-Lohinger,[13] Ernesto Palomba,[14,*] Jesse Harrison,[15] Fernando Rull,[16] Christian Muller,[17,*] Giovanni Strazzulla,[18] John R. Brucato,[19] Petra Rettberg,[2,*] and Maria Teresa Capria[14,*]

Abstract

The European AstRoMap project (supported by the European Commission Seventh Framework Programme) surveyed the state of the art of astrobiology in Europe and beyond and produced the first European roadmap for astrobiology research. In the context of this roadmap, astrobiology is understood as the **study of the origin, evolution, and distribution of life in the context of cosmic evolution; this includes habitability in the Solar System and beyond**. The AstRoMap Roadmap identifies five research topics, specifies several key scientific objectives for each topic, and suggests ways to achieve all the objectives. The five AstRoMap Research Topics are

- *Research Topic 1: Origin and Evolution of Planetary Systems*
- *Research Topic 2: Origins of Organic Compounds in Space*
- *Research Topic 3: Rock-Water-Carbon Interactions, Organic Synthesis on Earth, and Steps to Life*
- *Research Topic 4: Life and Habitability*
- *Research Topic 5: Biosignatures as Facilitating Life Detection*

National Aeronautics and Space Administration

ASTROBIOLOGY STRATEGY

www.nasa.gov

EXECUTIVE SUMMARY

NASA's strategic objective in planetary science is to determine the content, origin, and evolution of the Solar System and the potential for life elsewhere (*2014 NASA Science Plan*). Astrobiology research sponsored by NASA focuses on three basic questions: How does life begin and evolve? Does life exist elsewhere in the Universe? What is the future of life on Earth and beyond? Over the past 50 years, astrobiologists have uncovered a myriad of clues to answering these Big Questions.

Since the astrobiology community published its last roadmap in 2008, research in the field has focused more and more on the link between the "astro" and the "bio" in astrobiology—that is, what makes a planetary body habitable. "Habitability" has become a major buzzword in astrobiology as researchers have learned more about extraterrestrial environments in our Solar System and beyond and deepened their understanding of how and when the early Earth became habitable.

Why is Earth habitable? How, when, and why did it become habitable? Are, or were, any other bodies in our Solar System habitable? Might planets orbiting other stars be habitable? What sorts of stars are most likely to have habitable planets? These are just a few of the questions that astrobiologists are trying to answer today.

In preparing this new science strategy, hundreds of members of the astrobiology community collaborated in an intensive process of defining goals and objectives for astrobiology research moving forward. The community identified six major topics of research in the field today:

- Identifying abiotic sources of organic compounds
- Synthesis and function of macromolecules in the origin of life
- Early life and increasing complexity
- Co-evolution of life and the physical environment
- Identifying, exploring, and characterizing environments for habitability and biosignatures
- Constructing habitable worlds

This science strategy identifies questions to guide and inspire astrobiology research on each of these topics—in the lab, in the field, and in experiments flown on planetary science missions—over the next decade. The strategy also identifies major ongoing challenges that astrobiologists tackle as they attempt to answer these universal questions.

Progress and accomplishments in each of these areas of research over the past ten years are detailed in each of the successive chapters of this document.

What follows is a brief summary of the topics described in depth in Chapters 1–6 of this strategy.

https://astrobiology.nasa.gov/research/astrobiology-at-nasa/astrobiology-strategy/

Sociedad Mexicana de Astrobiología (SOMA)

SOMA es una sociedad civil sin fines de lucro dedicada al estudio y difusión de la astrobiología.

Está conformada por personas que hacen investigación, divulgación de la ciencia y estudian carreras de ciencias, ingenierías y humanidades y en general, por quienes se interesan en la visión científica sobre el origen de la vida, su evolución y la posibilidad de que exista vida en otros lugares del Universo.

www.soma.org.mx

Para recordar

- No tenemos evidencia de vida extraterrestre ni visitando la Tierra, ni en el sistema solar, ni en exoplanetas.
- Vida “como la conocemos” sólo implica carbono y agua líquda. No se refiere a humanos u otras especies.
- La única misión que ha tenido un experimento específico para buscar vida en Marte es la misión Vikingo.
- Cuando hablamos de planetas potencialmente habitables NO estamos pensando en HUMANOS.
- Para los astrónomos un “planeta como la Tierra” o un “planeta terrestre” NO es un gemelo de la Tierra, ni un mundo habitable, es un planeta con un radio o masa similar al de la Tierra.