

General Disclaimer

One or more of the Following Statements may affect this Document

- This document has been reproduced from the best copy furnished by the organizational source. It is being released in the interest of making available as much information as possible.
- This document may contain data, which exceeds the sheet parameters. It was furnished in this condition by the organizational source and is the best copy available.
- This document may contain tone-on-tone or color graphs, charts and/or pictures, which have been reproduced in black and white.
- This document is paginated as submitted by the original source.
- Portions of this document are not fully legible due to the historical nature of some of the material. However, it is the best reproduction available from the original submission.

~~LANGLEY~~

N6
~~Katzoff~~

National Aeronautics and Space Administration
Goddard Space Flight Center
Contract No. NAS-5-12487

ST-SB-LPS-10816

IS THERE LIFE ON VENUS?

by

A.N. Kvashin and
L.I. Miroshnichenko

(USSR)

N 69-22323

FACILITY FORM 602

(ACCESSION NUMBER)	(THRU)
4	1
(PAGES)	(CODE)
100549	30
(NASA CR OR TMX OR AD NUMBER)	(CATEGORY)



18 MARCH 1969

IS THERE LIFE ON VENUS?

Journal "Priroda" - (Nature)

by

No.11, p. 77,

A.N. Kvashin and

Izd-vo "Nauka", 1968

L.I. Miroshnichenko

The conditions for the nascency of biological life on the surface of Venus are not favorable. But does it mean, that our nearest neighbour is totally devoid of life? Scientists Dr. V. Libby* and Kh. Morovitz**, assume that in the clouds of Venus the life is possible. There is abundance of water, carbon dioxide and bright solar illumination which are sufficient conditions for the photosynthesis.

Morovitz assumes that in the upper cloud region water exists in the form of ice crystals and in the lower in the form of drops. The temperature in the clouds is approximately 210°K above and 260 - 270° below. At such temperatures the pressure should be of the order of 1 atm. Ozone and other gases, as well as some quantities of mineral dust, thrown off from the planet's surface, possibly exist in the atmosphere composition.

Measurements performed by AIS "Venera-4" and "Mariner-5" have shown that the atmosphere of this planet is composed almost entirely of carbon dioxide. It is possible to assume that dissociative recombination of CO_2^+ also takes place in the atmosphere, which is easily explained by the airglow in the ultraviolet region.

The carbon dioxide and the atomic oxygen emerge as the result of recombination. According to M.S. Belton's (1967) spectroscopical data the relative content of molecular oxygen is less than $5 \cdot 10^{-5}$. The essential part of Venus ionosphere evidently consists of protons.

* Science News, v. 93, No.12, 1968

** "Nature", v. 215, No.5107, 1967.

Following is the life pattern on Venus that Morovitz deems possible to assume. The macroscopical organisms inhabit the clouds. They have to be at specific level, since below the temperature is too high, while above it the humidity and temperature are low. By their form, these organisms apparently represent some sort of a floating bubble filled with hydrogen. With photosynthesis, they may derive molecular hydrogen from water. Such organisms are known in terrestrial conditions. With reasonable assumptions, computations allow us to assume that their dimensions are of the order of 4 cm. in diameter or more.

It is possible that photosynthesizing organisms inhabit even below the clouds. Here they can obtain water in the form of rain, and capture with their sticky coating the macroscopical mineral particles ejected from the planet's surface.

Proceeding from other positions, Dr. Libby asserts that there exist on Venus an ice polar cap and definite forms of life. He points to the results of investigations, according to which the planet's composition is analogous to that of the Earth, and that there should be a sufficient amount of water. At a corresponding temperature, the polar cap of about 5 km. thickness should be containing water in the required amount. Since Venus' rotation axis is apparently practically perpendicular to its orbit plane, the yearly shift of seasons on the planet should be absent, and the question amounts to what the temperature in the polar regions really is. Measurements of the Soviet interplanetary station "Venera-4" yield a +550°K temperature on the equator (about +257°C).

V. Libby* expresses the opinion that in the polar regions the temperature may be much lower, possibly even below 273°K (0°C), and such a temperature creates conditions for ice formation. Moreover, due to planet's low rotation, the transfer of heat from lower to upper latitudes apparently will take place slowly. Dr. Libby imagines Venus with polar cap, melted at the edges, and streams of water rushing to the hot equatorial region, where the water evapo-

* "Sky and Telescope", v.35, No.5, p.296, 1968

rates. In the transitional region of carbon dioxide atmosphere, some forms of life may exist.

As may be seen, Dr. Libby's point of view coincides with the Morovitz hypothesis, who develops it further. He considers, that the exchange of organisms' substance is analogous to the terrestrial one, and biochemical processes are also similar. With the corresponding conditions, a steady reproduction of organisms is possible. Thus, the life on Venus may be investigated on the basis of known terrestrial principles. As far as is known, conditions in the lower clouds of Venus are much nearer to the terrestrial ones, than anywhere else in the solar system.

It is possible, says Morovitz, that life on Venus originated on the planet's surface, when more temperate conditions existed. After that, the variations which took place on the planet's surface, compelled the organisms to seek more suitable conditions in the clouds. The matter of course is now in the biological experiments.

* * * * THE END * * * *

CONTRACT NO.5-12487
Vot Information Sciences, Inc.,
1145 19th Street, N.W.
Washington, D.C. 20036
Tel: [202] 223-6700 X 36,37.

Translated by
Ludmilla D. Fedine
17 March 1969.
Revised by
Dr. Andre L. Brichant
18 March 1969