

THE WEAKNESS OF THE VENUS GREENHOUSE THEORY

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In the April 1967 issue of the *Yale Scientific Magazine* (pp. 18-19), Professors Albert W. Burgstahler and Ernest E. Angino of the University of Kansas offered some thoughtful criticism relevant to the thesis of *Worlds in Collision*. Among other things, the subject of the validity of the Venus "greenhouse effect" was discussed and the following quote from the book *Intelligent Life in the Universe*, by I. Shklovskii and C. Sagan, was introduced.

". . . From a variety of observations at visual, infrared, and radio frequencies, it has recently been established that the clouds of Venus are indeed made of water: ice crystals in the colder cloudtops, which are seen in ordinary photographs . . . and water droplets in the bottom of the clouds, which are 'seen' at long wavelengths. [Now proven to be incorrect. See *Popular Astronomy* (Jan., 1976), p. 26.] The CO₂ and H₂O in the Cytherean atmosphere, plus the water in the clouds, combine to produce a very efficient greenhouse effect. The atmosphere is in convective motion. Sunlight which is deposited on the surface heats it immediately; the sunlight which is deposited in the clouds or atmosphere is transported by the downward convective motions to heat the surface. The hot surface attempts to radiate in the infrared, but the absorption by the atmospheric CO₂ and H₂O and the water clouds is so great that very little heat from the surface or lower atmosphere escapes directly to space. The surface temperature must then be sufficiently high so that the small fraction of radiation which does escape to space equals the intensity of the sunlight which is absorbed by Venus . . . extensive oceans of water or hydrocarbons can be excluded." (pp.323-324)

Velikovsky's response to Shklovskii and Sagan and the proposed Venus greenhouse effect was published in the same *YSM* issue as part of "A Rejoinder to Burgstahler and Angino" (pp. 20ff.). That material is reprinted below. - *The Ed.*

The lengthy quote from Shklovskii and Sagan demonstrates only the desperate state of the search for an explanation for the detected heat of Venus. Under its clouds, Venus was thought to be of room temperature and was included in the future plans for landing astronauts. One of the highest temperature estimates that by H. Urey in 1959, was about 47°C; D. Menzel revoked his earlier estimate of 50°C as much too high; generally, Venus below the clouds was thought to be of room temperature. It was, however, discovered to be over 400°C (close to 800°F). Several futile attempts were made to explain the phenomenon: aeolian theory of great winds causing sand to rub and create heat; electrical charges of opposite polarity on the light and dark hemispheres of the planet; electrical discharges in the atmosphere; or the greenhouse effect. The last scheme involved more than a few scientists in trying to figure out how it could work.

In order for the greenhouse effect to work, solar light needs to go through a transparent atmosphere, hit the ground, change its wavelength, and then find the atmosphere opaque for the new (infrared) wavelength; the trapped radiation would account for the heat of Venus.* The presence of water vapor and carbon dioxide is conducive to the greenhouse effect. H. Urey claimed that should carbon dioxide be present in Venus' atmosphere, it would preclude the presence of water vapor. A few years ago, G. Kuiper found that the highest temperature that could be achieved in this way would be something like 170°F. Early in the century, Arrhenius stressed that there is a limit beyond which any additional concentration of water vapor or carbon dioxide stops increasing the effect.

[Footnote: *But see *Optical Spectra* ((Dec., . 1975). p. 10. *The Ed.*]

The Mariner II probe did not disclose the presence of water in the atmosphere of Venus (not more than one-thousandth of the concentration in the Earth's atmosphere); carbon dioxide was also judged as not present in any substantial quantity in the envelope, though it could be present below the envelope.

Here are a few of the estimates concerning water or ice in the envelope or above it.

"The absence of any response at the water-vapor line at 13.5 mm. wavelength as recorded by Mariner II, confirms what was already known from ground-based microwave radiometry. There is no water on Venus worth mentioning" (E. J. Opik, *The Irish Astronomical Journal*, June, 1963).**

[Footnote: ** See *Science News*, Vol. 113, No.18 (May 6, 1978), p. 298; *Science News*, Vol. 113, No. 13 (April 1, 1978), p. 198: Walter Sullivan, "Mariner Data Give Hint of Origin of Venus," *New York Times* (Feb. 8, 1974), p. 32: Cp. *Popular Astronomy* (Jan., 1976), pp. 22-26; *Aviation Week & Space Technology* (Nov. 3, 1975), p. 19. - *The Ed.*]

V. I. Moroz of the Sternberg Astronomical Institute, writing in the *Astronomicheskoy Journal*, Vol. 40. says: "The monochromatic albedo curve contains no features characteristic of reflection from ice crystals. Evidently the clouds consist of neither ice nor water but of dust." Also: "The form of the monochromatic albedo curve in the 2-2.5 micron range contradicts the notion of a greenhouse effect due to water vapor."

G. V. Rosenberg of the Institute of Physics of the Atmosphere, Academy of Sciences, USSR, writes in its *Doklady*, vol. 148, #2: "The extreme weakness of the absorption bands of water in the vapor state and in the condensed state in the light reflected from Venus excluded *a priori* that clouds containing water exist on the planet." Also "the existing estimates of the gas composition of the atmosphere of Venus based on absorption-band intensity measurements (in particular of CO₂) cannot be considered reliable and are seriously in need of revision."

A. Dollfus, making a spectral search from a high altitude observatory, and J. Strong, from a balloon, claimed to have discovered a small quantity of water vapor *above* the cloud envelope of Venus. But Rasool and others pointed out that there is a comparable amount of water vapor in the terrestrial stratosphere that could be responsible for that effect.

H. Spinrad used various techniques and obtained a negative result for water. L. D. Kaplan showed, in a series of papers and JPL reports, that the clouds could not be of water and this for very decisive physical

reasons. His evaluation of Mariner II results served NASA in its appraisal of the contents of the clouds.

Also G. Kuiper was unable to detect water on Venus. "Venus' spectrum [is] incompatible with the ice band . . ." (*Kitt Peak National Observatory Contribution* #24, 1963). In the November 1, 1966 issue of the *Journal of Geophysical Research*, W. Ho and I. A. Kaufman of Columbia University Radiation Laboratory and P. Thaddeus of NASA Goddard Institute of Space Studies discussed the visual infrared, and radio-frequency observations of Venus, and found: "An enormous mass of dust - many tens of grams per square centimeter column - would have to be suspended in the atmosphere to account for the microwave observations . . ." Also: "There is now abundant evidence that the centimetric radiation from Venus originates at the surface of the planet and is thermal in nature."

It is, however, possible that some water vapor is present above the envelope of clouds. Saturn is a water planet, and Jupiter, collecting dispersed parts of the disrupted planet, could have endowed Venus with water; . . . but the story of the close approach of Venus to the Earth has no immediate pluvial crisis. The Earth was enshrouded by heavy clouds but not of water. Thus it appears that water was disassociated in Jupiter to oxygen and hydrogen and re-assembled in other groupings. Venus could also detach some atmosphere and hydrosphere of the Earth when in a close contact. The same disassociation process with CO₂ as a product would have taken place on Venus, too.

The cloud cover on Venus *is* a very good insulator and the heat is coming from Venus itself. A few years ago, Sagan wrote: "An explanation of how the surface stays as hot as it does is one of the key unsolved problems in understanding the Venus environment."

Shklovskii and Sagan do not sin in what some others do - they do not claim that a fifteen miles thick and massive envelope is transparent for solar light. Without the light going through the atmosphere and hitting the ground, there can be no greenhouse effect. Therefore they let the upper surface of the atmosphere (cloud envelope) absorb solar light as heat and transfer it by convective motion to the ground. But the clouds lit by the Sun are - 39°C cold, the inner surface of the envelope is of the temperature of boiling water, and the ground surface temperature is high enough to melt many metals. The inadequacy of the model is evident: it violates the second law of thermodynamics.

If light in the visible spectrum does not penetrate the massive atmosphere (and it is of dust), no recourse to the additive effects of many atmospheres of pressure can be of help. Such a model, if workable, should be patented because solar light could then replace fuel and furnaces for melting metals.

The proponents of all these schemes are also oblivious of the fact that the night side of Venus - on the cloud surface (measured radiometrically) and on the ground surface (measured by microwaves) is, if anything, warmer but certainly not cooler than the sunlit side.* This alone, as Burgstahler noticed, should terminate the greenhouse-effect argument.

[Footnote: * See L. M. Greenberg, "The Venus 'Greenhouse Theory' - Debunked," *KRONOS* III:2 (Nov., 1977), pp. 132-134; See also *Science News*, Vol. 102 (Sept. 16, 1972), p. 180. - *The Ed.*]

The heat is coming from the subsurface of Venus, as Kellermann found, exploring the 11-cm radiation.

"The absence of a strong phase dependence at 11 cm is consistent with the idea that the thermal radio emission at this frequency occurs somewhat below the Venusian surface where the temperature variations are small . . . at the subsurface layer where the radio emission originates [it] is about 670°[K] ." (*Icarus*, September 1966).

This gives the answer to the problem. However, it does not answer the question of why Venus' surface is so hot. Writing in *W. in C.* that Venus is very hot and gives off heat, I explained the mechanism of the origin of its heat. It can be traced to the natal heat of recent birth by expulsion from Jupiter, to interplanetary electrical discharges and subsequent radioactivity, to passages close to the Sun when the protoplanet travelled on a long stretched ellipse, and to conversion of motion into heat at near collisions with other members of the solar system.

I offered a new crucial test by claiming that Venus is cooling off. Burgstahler believes that other explanations could account for such a phenomenon, if verified. What are these other explanations?

That Jupiter was also found to be hot does not detract from my claim, but strengthens it: the two major planets were in near collision some time before the birth of Venus by cleavage from Jupiter. The natal heat of Venus was derived from Jupiter.

As to the composition of the cloud envelope of Venus, L. D. Kaplan, in a series of papers, claimed hydrocarbon dust and gases as its main constituents, and this for very definite physical features detected in this envelope. In his estimate, only the polymerized radical CH possesses the characteristics observed in the envelope -at the highly differing temperatures of its upper and lower surfaces.

Mariner II had no spectroscopic instrumentation and the conclusion by the Jet Propulsion Laboratory and NASA was dependent on the correctness of Kaplan's analysis.

But on this score, too, there exists a direct observation. In 1954, before the high heat of Venus was detected, N. Kozyrev discovered an emission spectrum in the light coming from the dark side of Venus. Spectrum of emission is observed only in the light coming from hot bodies. Other researchers then and later looked only for the absorption spectrum: Solar light received the imprint of the Sun's own gases, and going through the atmosphere of a planet, the imprint of that atmosphere, and finally of the atmosphere of the Earth before reaching the observer. But the emission spectra come directly from hot bodies, and, in the case of Venus, such a spectrum shows the presence of *organic* matter in Venus' atmosphere [*Izvestia Krymskoy Astrophysicheskoy Observatorii*, 12, 169 (1954)]. Kozyrev's finds were confirmed (cf. B. Warner, "The emission spectrum of the night side of Venus," *Monthly Notices of the Royal Astronomical Society*, 121, 1960). Unprepared to think that Venus is hot (his estimate was 30°C), Kozyrev assumed that electrical discharges in the upper layer of Venus' atmosphere caused the effect.

Thus we have also a direct confirmation that organic material is present in the clouds of Venus. With this, both claims, of the temperature and of the composition of Venus' clouds, are confirmed.
