**Mercury**

Mercury, the planet closest to the sun, is like Venus, a morning and evening star. But whereas Venus circles the sun in 224.7 terrestrial days, Mercury completes its orbital revolution in 88 days. Being so close to the sun it is rarely visible. Copernicus never saw it in the murky sky of Pomerania and wrote of it in his *De Revolutionibus* from what he learned in Claudius Ptolemy, the by then fourteen century old authority. Mercury is smaller than Venus and its mass was computed to be less than one eighteenth of the mass of the earth, whereas Venus is more than four-fifths of it. Mercury’s diameter is by one half larger than our moon’s diameter. Its orbit is a rather stretched ellipse whose perihelion, the point closest to the sun, and aphelion, the furthest point, are in the approximate ratio of two to three.

As the moon is locked with one side to the earth, its primary, so, and for the same reason, Mercury was thought to be locked permanently with one side to its primary, the sun. It was estimated that when the planet was in the process of formation, the sun must have caused in it tides, and this, in turn, must have exerted a tidal friction, and breaking of axial rotation. Thus the planet, so close to the sun for billions of years, must be permanently locked with one face to the sun.

In 1845 Adams and, independently, Leverrier, calculated in advance of its discovery, from perturbations of Uranus, the existence and the position of Neptune, thus supplying the world of physics and astronomy with what was (and often still is) regarded as the best confirmation of the scheme in which only gravitation and inertia direct the run of the celestial bodies. But in the same year Leverrier also calculated that the perihelion of Mercury advances in the direction of the planet’s motion; it is the precession of the perihelion, or what is the same, a slow rotation of the long axis of the Mercurial orbit.

Laplace, who preceded Leverrier by half a century, acquired fame at the age 23 by showing that all kinds of irregularities in the celestial motions that have the appearance of “running down” and were so viewed by Newton himself who thought that Divine intervention is needed from time to time to rewind the mechanism, all these irregularities are not of a kind that accumulate, but are temporary, are actually swings or oscillations that after certain intervals reverse their direction and that therefore the celestial mechanism will never need rewinding.

Mercury’s anomaly was obviously continually accumulating, and therefore not of an oscillating nature, not a swing. The anomaly was actually very minute. The observed precession amounts to 570 seconds of the arc in a century; of this amount, over 530 seconds of the arc of precession was attributed by Leverrier to the action of the planets perturbing Mercury; but some 35 seconds of the arc were unaccounted for, a figure increased by later investigation to 43 seconds. Since Mercury revolves in 88 terrestrial days around the sun, it makes more than 400 revolutions in a century and the anomaly amounts to as little as circa one tenth of a second of an arc of unaccounted precession at each revolution. How small this angle of deviation is one may perceive if one imagines a penny, 1.9cm, nearly three-quarters of an inch in diameter, viewed without magnification from a distance of about thirty miles. But so proud was the world of the mathematics of the first half of the nineteenth century, with its achievements, that such an unaccounted discrepancy in the Mercurial motions was paraded to show the acumen of science.

Leverrier, ho predicted the existence of Neptune, a planet on an extreme orbit, thought that the residue of the Mercurial precession would be accounted for if yet another planet, still undiscovered, revolves inside the Mercurial orbit; because of the proximity of the sun it would not be easily observed, but Leverrier thought he had detected it. No confirmation came in the decades that followed. Other conjectures were made, such as a surmise that the mass of the Sun is not uniformly distributed, or that the Sun is a slightly “loaded” body; but there was nothing to support this particular claim apart from the fact tht the anomaly of Mercury needed to be accounted for. Thus Leverrier in the same year 1845, by discovering Neptune confirmed the gravitational theory of Newton, and by discovering the anomaly of Mercury he cast doubt on the theory’s infallibility.

Seventy years after Leverrier calculated the anomaly, Einstein offered his explanation of it in his General Theory of Relativity (1911-1915) Ten years earlier he had published his Special Theory of Relativity (so named when the General Theory was adduced). In the Special Theory (1905) he deprived space and time, or their units, of the attribute of constancy--a second or a meter on a body moving in relation to an observer is no longer exactly a second or a meter, and he attributed constancy to the velocity of light, independently of whether the source of light is or is not in motion in relation to an observer. In the General Theory Einstein tackled the nature of gravitation. Space not being endowed with the attribute of constancy, Einstein visualized it as curved in the presence of a mass.

For the General Theory of Relativity Einstein offered three observational cases as proofs. The Mercurial anomaly is almost exactly what his theory would presuppose of a planet that moves in the curved space caused by the proximity of the huge mass of the sun. The next observational evidence accountable by the General Theory was the shifting towards the red (red shift) in the spectrum of light emanating from the sun, compared with the light of laboratory sources, a phenomenon in Einstein’s explanation resulting too from bending of space by the presence of heavy mass (sun).

The third phenomenon would be in light emitted by a star and passing near the solar disk (bending of the ray).

Einstein did not make “three predictions” for the validation of the General Theory of Relativity as it is often said; Sir James Jeans in his article on Relativity in the Encyclopedia Britannica refers in such terms to the three phenomena:

Einstein, knowing the mass of the sun, found himself in a *position to predict absolutely* what the motion of the perihelion of Mercury must be. It was found to be 42.9” a century, a figure which agreed with observation to well within the limits of errors of the observation . . . . The theory makes one further prediction which admits of experimental test: The light received from a calcium atom situated in the intense gravitational field near the sun’s surface ought to be of slower period, and therefore of redder colour than the similar light emitted by terrestrial atoms . . . W. S. Adams found an actual shift of 0.32 A. It is hardly possible any longer to doubt that the spectral shift predicted by Einstein really exists . . .

A star or other massive body distorts the continuum [of space] in its neighborhood . . . in the neighborhood of such a body a ray of light does not travel in a straight line; it is deflected by the gravitational field of the body . . . None of the expeditions had of course measured the deflections of the stars actually at the sun’s limb; most of the stars were several diameters away from the limb, the observed deflections being corrected so as to bring them to the limb. The deflection of stars at all distances were found to agree well with the predictions of Einstein’s theory.

Actually in a paper published in 1911 Einstein, claiming redshift in solar light writes in a footnote:

L. F. Jewel *(Journal de Physique,* VI (1897), 84), and especially Ch. Fabry and H. Boisson *Compt. rend.* 148 (1909), 688-90) have actually established noticeable shifts of fine spectral lines from the sequence(?) here calculated, but have ascribed them to the effect of pressure in the absorbing layer.[1](http://www.varchive.org/ce/mercrel.htm" \l "1)

As to the Mercury’s anomaly, it was announced by Leverrier in 1845 and often discussed since. Thus only the bending of light passing near a mass was in the category of prediction. A paper was printed by Soldner in the Bode’s Annual but Einstein evidently did not know of that paper. Soldner calculated that following Newton’s concepts of light as a stream of particles the ray of light passing near the Sun is deflected by a small angle; Einstein, however, claimed a deflection twice as large.

Every textbook on astronomy used to relate that Mercury is locked with one and the same face in relation to the Sun as the Moon is in relation to the Earth; tidal forces must have produced such effect.

With one side turned to the Sun and the other facing the cold space, it was estimated that Mercury must be as extremely hot on the lit side while the temperature on the other side must be very close to absolute zero.

Space probes have obtained the surprising result that the non-illuminated side of Mercury is comfortably warm, actually is 60 degrees F., or of room temperature. In order to explain such phenomenon it was assumed tht Mercury, thought to be without atmosphere, actually has one consisting of gases of heavy atoms; the atmosphere could carry the temperature from one side of Mercury to the other. Mercury had been thought to be void of any atmosphere because the small planet could not keep the molecules of gases from dissipating into space; first, lighter gases, but then also heavier would need to be lost to space; but in view of the observed temperature on the night side of Mercury, the assumption was made that heavy gases must have still survived on it. Great was, however, the surprise when Nicholas Kozyreff, investigating Mercury on presence of an atmosphere, announced the detection of hydrogen, the lightest of all gases. This was in sheer conflict with all theoretical computations. In the effort of finding the cause of the Mercurial temperature on the side turned away from the Sun, a new riddle that instead of explaining a phenomenon needed its own explanation, and this was not forthcoming because Mercury, millions or billions of years on its orbit, could not preserve an atmosphere of hydrogen.

In further search of the cause of Mercurial thermal “anomaly,” the evident thing was undertaken and the planet was investigated by radar. There was another surprise lying in wait. The planet was rotating. This, too, was in conflict with the theoretical computations. Mercury had to be locked with one face to the Sun. But it is not. The rate of rotation was found to be once in 58.65 days, whereas one orbital rotation of the planet equals 88 terrestrial days. The heated state of the night side of Mercury appeared to have now an explanation, though a more careful analysis must show that rotating once in 58 days, Mercurial surface temperature must drop far below 60 degrees F. It is, for instance, observed that the surface temperature of the Moon warmed by the Sun precipitously falls when during lunar eclipses Earth interposes itself between the Sun and the Moon—and the duration of an eclipse is counted in minutes, not days, as in the case of Mercury’s rotation.

With the discovery of the Mercurial rotation, not sufficient to explain the thermal question, the question of why Mercury is not locked with one face to the sun became a matter of new perplexity. The observation was made by a team of Cornell University scientists. Thomas Gold speaking for the team announced that Mercury could not have been stationed on its orbit for long—400,000 years was, in the opinion of Gold, the longest stretch of time that could be allowed for Mercury to remain unlocked. On the assumption that the solar system is six or nine billion years old, 400,000 years represent only 1/10,000 of the time since the planets, following the accepted view, obtained their positions and acquired their rotational rates—and this is the upper limit. Neither the tidal nor the nebular theories can square with the newly discovered fact.

Mercury is beset by riddles: it should not have a hydrogen atmosphere, but, if Kozyrev is right, it has such atmosphere. It should not rotate, but it rotates. It should have the night side much cooler than 60 degrees F. but it has this temperature.

Actually all three unexplained phenomena point toward an adventurous past, a past counted by thousands of years, but not by millions. Mercury has heat of its own, not just reflected heat of the Sun; Mercury has still an atmosphere of hydrogen, the last vestiges of a more extensive halo and trail (caduceus) seen by our ancestors in the fourth or third millennium before the present era; Mercury rotates because it is on its orbit for only several thousands of years. It is on a stretched orbit—a relic of its recent arrival at its present orbital path. As to the last point, I would reserve an opinion because magnetic forces near the Sun need to be calculated in any motion of the planet. These forces are most probably also responsible, in our understanding for the precession of the perihelion of the planet, and Leverrier’s discovery of this precession does not require a geometic curvature of space.

Mercury, Hermes of the Greeks, was thought to keep well his secrets. The ancient writings not intended for circulation but for the study of the initiated only were called hermetic books. In our days Mercury disclosed four secrets: first that it is warm on the darkened side; then that it has a hydrogen atmosphere; next, that its axis is wobbling, and finally that it is not locked with one and the same face toward the Sun. Each of the four revealed facts is in conflict with accepted solutions. All together offer a solution—a planet on a new position since, in astronomical sense, recent times.

In the story as told in the volume *Worlds in Collision* the planet Mercury plays no role; however in the projected volume about earlier events on the celestial screen, Mercury was a participant and was not an idle spectator of the theomachy, the battle of the gods. It had an epoch of its own, or an act in which it was the principle actor, in the early historical times, in an age antecedent to the events in the solar system, dominated (as seen by man from the earth) first by Venus, then by Mars. But despite my not having introduced Mercury into the narrative of those later times (15th-7th century before this era) it could not remain even then as a completely inactive member of the planetary family. Especially if planets are charged bodies, the entrance of a new planet (Venus) intothe system must have caused much havoc also on planets not in collision or near collision. One should think of the changes which the entire solar system would undergo and also keep in mind what the entrance of a new proton or electron would signify for an atom—the result could amount to the transmutation of an element.

The Romans as well as the Greeks pictured Mercury with wings, either on his headgear ot at his ankles, and with an emblem, caduceus, twin snakes winding. The Babylonian name of the planet was Nebo, and he was an important deity, as the name of the mountain Nebo, on which tradition lets Moses die (Sinai, by the was, was consecrated to the Moon, Sin in Babylonian); Nebo in the names of the Kings Nabopolassar and Nebukhadnezzar testifies to its significance in the Babylonian pantheon as late as the seventh and sixth centuries. Equally pronounced was the role of Thoth, the planet Mercury of the Egyptian pantheon, the theophoric part of the name Thutmose or Tut-ankh-amen.

Mercury, or Hermes of the Greeks, was a swift messenger of the gods that speeded on his errand sent by Jupiter or Zeus.

In my understanding Mercury was once a satellite of Jupiter or of Saturn and under circumstances not understood by me, was directed toward the sun and caught there in an orbit still elliptical. It could, however, have been a comet passing near Jupiter and the entwined snakes of the caduceus may memorialize the appearance it had when seen by the inhabitants of the Earth. There are indices that point toward Mercury’s involvement in the catastrophe that is described in Genesis as the confusion of the builders of the Tower of Babel, something that in modern medical terms seems like a consequence of a deep electrical shock.

The claim is that Mercury travels on its present orbit only since some five or six thousand years. This view conflicts with both standard alternatives—of nebular and of tidal theories of the origin of the planetary family and with the assumption that the planets occupy the same orbits since billions of years. Since the early days of modern science, actually since Aristotle, it was considered undisputable that since the origin of the solar system, Mercury has been moving on the very same path. The study of ancient texts convinced me that there was nothing to this belief besides wishful thinking: the entire solar system was repeatedly rearranged. Mercury does not occupy its orbit since six billion years—the assumed age of the universe (which by the way was repeatedly re-assessed from 2 billion when I stared my studies till by now 10 and 12 billion years are occasionally heard).

Already before the publication of *Worlds in Collision* I considered (and let it be set in print) a system of the world in which the sun, being a charged body in rotation, creates a magnetic field; the planets, being charged bodies, move in that magnetic field and are compelled to proceed on their orbits; to this phenomenon I gave the name “circumduction” (see my *Cosmos Without Gravitation,* 1946), borrowed from J. Kepler. I considered Mercury’s precession, discovered by Leverrier in 1846, as resulting from such an effect, and, possibly, from a growing charge on Mercury (besides its not havinng completely settled after the celestial “battles”). I considered Einstein’s use of Mercury’s precession as an *ad hoc* argument for the General Theory of Relativity (certainly not a prediction, as James Jeans wrote in *The Encyclopedia Britannica).*

In my debate with Einstein, already early, in a letter written in August or September, 1952, I drew his attention to charges and consequences for Mercury, traveling in the extended corona of the sun. I returned to this also later in our correspondence.

Dr. Dicke came up with an oblate sun as a partial cause of the Mercurial anomaly. I drew his attention to the fact that he disregarded the by then discovered solar plasma and the magnetic field centered on th sun and permeating the solar system. He gave me a strange answer: “That is something we have to disregard.”

In my paper at the San Francisco Symposium, “Velikovsky’s Challenge to Science,” I once more drew attention to the problem and its consistent evasion in discussions of rhe General Theory of Relativity. Even in the days of Einstein he must have known of the general magnetic field of the sun, discovered by Hale a few years before Einstein used the argument for his theory; the magnetism of the solar spots was discovered earlier by Hale. Eistein corresponded with Hale on other matters.

As a matter of methodology it appeared to me improper that Einstein selected the case of Mercurial anomaly (precession of the perihelion) for the support of the General Theory of Relativity, without eliminating first the possible effect of the solar magnetic field on the precession of Mercury.

According to Newton an inverse cube effect when superimposed on an inverse square effect would result in a precession. A regular dipole magnetic field would produce an inverse cube effect when superimposed on an inverse square effect, due to gravitation.

The general magnetic field of the Sun was made known by G. E. Hale in 1912 at the time when Eistein was construing his General Theory. The magnetic property of solar spots had been discovered at the beginning of the century by the same Hale.

On the 14th of October, 1913, Einstein wrote to Hale on the issue of another of his advance claims, actually the only one that could put claim to this definition. In his letter he inquired whether there was a possibility to observe in broad daylight, very close to the rim of the sun, some fixed star, this with the help of the powerful telescope that Hale built (Mt. Wilson 100-inch telescope). It was a naive inquiry; however, it was suggested to Eistein by another physicist in Zurich and he followed the advice—the idea was that if the answer were positive there would be no need to wait for a full solar eclipse for observing whether the sun (or any large mass) deflects a ray of light from its rectilinear path. Writing to Hale, Einstein showed much respect—but where he had to take into account Hale’s great discoveries, he omitted to do so. Only by excluding the possibility that magnetic fields deflect a ray of light from rectilinear passage, would Einstein have cleared the way for offering an explanation based on a new principle in science.

In my understanding that goes back to the forties, the Sun being a rotating charged body creates a magnetic field that stretches far into interplanetary space. This field rotates with the Sun on which it is centered; at the distance of any planet, the field travels the length of the planetary orbit in the same time it needs for one axial rotation, or one turn of the Sun on its axis.

Mercury is a charged body and it moves in the solar magnetic field that rotates swifter than Mercury proceeds on its orbit.

In August 1952 I started my long debate with Einstein on the question whether inertia and gravitation are the only forces responsible for all the movements of the celestial clock, or whether electricity and magnetism, to whatever extent, need to be considered, too. I put the problem of Mercury squarely before him on this issue. I wrote:

Now the visible streamers of the sun that conveyed to Hale the idea that the sun is a magnet reach a long way towards Mercury, almost half the way. Was the electromagnetic state of the sun ever considered as the cause of the anomaly? The effect of the electromagnetic action must have been reckoned, and possibly excluded, but not disregarded.... Also the fact that the sun radiates at the expense of splitting (or building-up) of atoms was never followed through to the inevitable conclusion that the sun *is* a charged body in motion. At least the action of the magnetic spots of the sun with a field intensity reaching four or five thousand gauss should have been, if only once, taken into computation for its influence on planetary motion, Mercury in the first place, if only for the purpose of showing it as ineffective.

When, nine years later, Prof. H. H. Hess, upon being appointed, or elected, chairman of the Science Space Board of the National Academy of Sciences, wished to hear from me some suggestions for the activities of NASA (National Aeronautics and Space Administration), I offered, on September 11, 1963, a program for a series of investigations; concerning Mercury I wrote:

The cause of the precession of the perihelion should be re-examined in the light of the presence of a magnetic field of solar origin and solar plasma through which Mercury ploughs. An artificial satellite with a perihelion close to the sun could be tracked as to the precession of its perihelion.

Since I wrote this suggestion for experiment more than twelve years have passed. I have not heard or read of such a satellite having been dispatched.

At the symposium “Velikovsky’s Challenge to Science” organized by the AAAS in San Francisco in February 1974, in my paper, entitled “My Challenge to Conventional Views in Science,” I returned to the problem of the electromagnetic nature of the solar system and of the universe in general, and said concerning Mercury’s anomaly:

It was, of course, known since Gilbert that the Earth is a magnet and G. E. Hale discovered that solar spots are magnetic and that the Sun possesses a general magnetic field. But this did not keep Einstein, a few years later, from accounting for the Mercurial precession by a new principle instead of first eliminating the effect of the newly discovered solar magnetic field on Mercury’s movement.

If I was conpletely at odds with the cosmogony that had the solar system without history since creation, I was also carrying my heresy into a most sacred field, the holy of holies of science, to celestial mechanics. I had a chapter on the subject at the end of *Worlds in Collision,* but I kept those galleys from inclusion in the book and instead I included only one or two paragraphs—and the only italicized words in the book are found in them—namely: “The accepted celestial mechanics, notwithstanding the many calculations that have been carried out to many decimal places, or verified by celestial motions, stands only *if* the sun, the source of light, warmth, and other radiation produced by fusion and fission of atoms, *is as a whole an electrically neutral body,* and also if the planets, in their usual orbits, are neutral bodies.” I showed how the events I reconstructed could have occurred in the frame of classical celestial mechanics, but coming from the field of studying the working of the brain—I was the first to claim that electrical disturbances lie at the basis of epileptic seizures—I was greatly surprised to find that astronomy, the queen of sciences, lives still in the pre-Faraday age, not even in the time of kerosene lamps, but of candles and oil. It was, or course, known since Gilbert that the earth is a magnet and G. E. hale discovered that solar spots are magnetic and that the Sun possesses a general magnetic field. But this did not keep Einstein, a few years later, for accounting for the Mercurial precession by a new principle, instead of first eliminating the effect of the newly discovered solar magnetic field on Mercury’s movement.

Thus I did not omit once more to challenge the accepted view that Mercury’s anomaly serves as confirmation of Einstein’s concept of space curved in the presence of a mass, independently of whether Einstein was right or not in the theory itself. But if the Mercurial precession has a different cause than that which Einstein envisaged, the absence of the effect expected by him could not but be damaging to his theory of the nature of gravitation.

It did not take long after the symposium in San Francisco and the Mariner X probe passing upon passing and surveying Venus, approached Mercury.

Even from a great distance the photographs of Mercury taken by the unmanned probe showed a surface that attested to a very stormy past of the planet and as the probes came closer, the features grew in detail. It revealed itself as a battered world. Its surface featues were never before observed by a telescope from the Earth; but after the scientific world accustomed itself to the Martian photographs of American and Russian space probes, there was no outcry of surprise anymore, though this planet closest to the sun was the least known as to its surface features. But the explanations applied to Mars and Moon for the phenomenon of cratered surface, namely, that these celestial bodies are in travelling, Mars more, the Moon less, in the zone of the asteroids that supposedly by collisions with Mars and the Moon have caused these features, could not well be applied to Mercury, out of reach of almost all asteroids. And there were other features on the Mercurial surface that bespoke a violent past.

Very shortly after the February, 1974 symposium, Mariner X, passing near Mercury, established to the great surprise of all scientists, that it possesses a magnetosphere. Since it rotates slowly, in my opinion the magnetosphere results from the speedy relative motion of the space satellite and Mercury on its orbit. On the second passage, and third, of the satellite, the existence of the magnetic field around Mercury (magnetosphere) was confirmed. Now it becomes possible to abstain from considering the effect of the Mercurial magnetosphere traveling with the planet through the magnetic field lines centered on the sun.

“The accepted celestial mechanics, notwithstanding the many calculations that have been carried out to many decimal places, or verified by celestial motions, stands only *if* the sun, the source of light, warmth, and other radiation produced by fusion and fission of atoms, *is as a whole an electrically neutral body,* and also if the planets, in their usual orbits, are neutral bodies.” *(Worlds in Collision,* Epilogue, p. 387). “In the Newtonian celestial mechanics, based on the theory of gravitation, electricity and magnetism play no role.”

The precession of Mercury, the planet closest to the sun, is claimed by the General Relativity theory as one of the proofs of the curvature of space around mass; but since Mercury moves close to the charged sun and actually in the outer reaches of the solar corona, the magnetic field of the sun must act on its motion; therefore the claim of the relativity theory needs reexamination as to its validity. (Already Laplace showed that should a celestial body attracted by its primary as inverse square of distance be subject to another attraction that changes as the inverse cube of distance, a precession by that body would result.)

Things axiomatic need to be repated again and again over a score of years; the omission to take into account physical realities and calculate their effects should not be placed solely at Einstein’s door; in over sixty years since the publication of the General Theory nobody was disturbed by this situation and in mearly a score of years since the space investigation started, with by now probably a thousand artificial satellites having been launched, an experiment intended to observe the behavior of a satellite on the Mercurial orbit and on an orbit perpendicular to it have not been performed or even planned.

An electromagnetic effect must be incalculated in the celestial mechanics, whether its action equals to a substantial part of the gravitational attraction, or to only a minute part: the precision of the celestial motions and the advance knowledge of planetary positions to a small degree of a fraction of a second of the arc, raises the question as to the part the electromagnetic interrelation must account for.

The discovery by John H. Nelson of certain dependence of the radio transmission and reception on the relative position of the planets (March 1951 issue of *RCA Review)* points in the same direction of an electromagnetic interdependence of planetary bodies. If an electromagnetic effect is present between these bodies, the exact masses of the planets must be recalculated, in order to leave also for the newly detected forces a role, small, however yet detectable, in the phenomenon of perturbation, or attraction of a planet by another.

**References**

1. “Über den Einfluss der Schwerkraft auf die Ausbreitung des Lichtes,” *Annalen der Physik,* XXXV (1911)