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THE MIDAS PLAGUE
By Frederik Pohl

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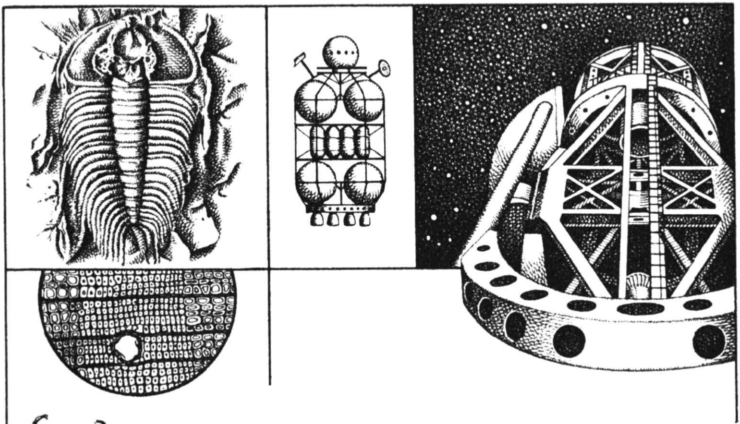

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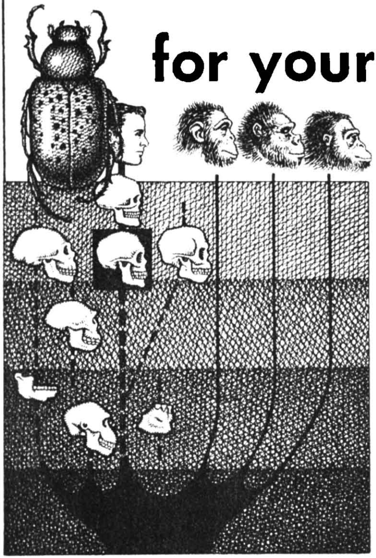
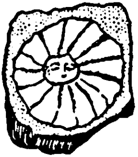


By WILLY LEY

THE CASE OF THE LYING STONES

IF this piece has any moral at all, it should be construed as a lecture on credulity. Not only should you be careful believing what you hear and read, you can't even always trust "tangible evidence." Of course tangible evidence is evidence all right, but there still remains the question: "evidence for what?" But let's proceed with what is probably the worst recorded case of mis-



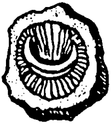
leading evidence in all history.

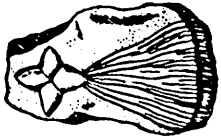
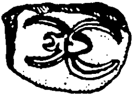
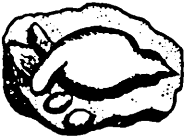
The year was 1710 A.D. The place was the city of Würzburg, the capital of Lower Franconia, in southwestern Germany. Würzburg has a university that is famous for several reasons. One of these reasons is that it was founded twice, once in 1403 and once in 1582. Another reason is that this is the place where Dr. Wilhelm Konrad Röntgen discovered his Röntgen rays or X-rays in 1896. And the third reason for its fame is the case I am going to talk about.

In 1710, some people informed the professors of the university that they had found an enormous bone, as hard and heavy as stone and so huge that only a giant could have been its original possessor. A few days later, several men, groaning and sweating, carried the bone up the steps and placed it on a sturdy oaken table. The professors of the university were not as happy about this as professors of a modern university would be. They would have preferred to close their eyes, but the government had asked for an opinion and there was nothing else they could do but give one.

The professors met in a formal council and, since the object did seem to be a bone, the Professor of Medicine was the logical chairman. His name was Johann Bartholomaeus Adam Beringer.

THE bone was actually the fossilized relic of a member of the elephant tribe which had lived in the area of Würzburg some 10 or 15 million years earlier. But the council of professors, prodded by its chairman, arrived at the

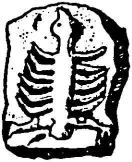
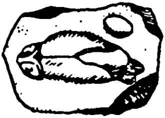
conclusion that this was a *lusus naturae.* The term they used may be rendered in English as "play of Nature," but what they had in mind when they used it will probably remain a mystery for all time to come.

Fossils, in those days, were recognized for what they really were by only a few advanced thinkers. Most of the savants held a vague kind of belief of a mineral creation paralleling animate creation, but did not agree with each other on how it had come about. A few thought that, under special circumstances, a plant seed or a fish egg might develop in a mineral environment, producing a mineral plant or mineral fish. Others suggested a vapidly mystical life-giving mist coming from the sea. Still others held astrological influences responsible. And some said that the mineral creation may have been the result of God's practicing with mineral matter before He progressed to animate creation.

But all the proponents of these conflicting beliefs presented a united front against the fantastic heretics who said that a fossil fish probably once was a live fish before it became a fossil. As for the *Professor medicinae* Beringer, he was convinced that such an explanation was sheerest nonsense and he lectured his students on "plays of Nature." The students were perfectly willing to absorb their professor's opinions. They went along with the first repetition and the next. They had, after all, enrolled to study medicine.

At about that time, Prof. Beringer started looking for fossils,



presumably to have more material for his interminable arguments. There are fossils in the Würzburg area, but Prof. Beringer happened to have a very special kind of luck. One day he came home with a slab of stone showing in unmistakably clear bas relief the picture of a comet. Maybe those who thought that astrological influences caused the "plays of Nature" were not so wrong, after all. Some time later, he found a stone slab with a crescent moon. Then another comet. Then a whole bird, complete with egg.

The more diligently Prof. Beringer dug in his favorite place, the more astonishing the results. Strange animals that nobody had ever seen alive and which were not mentioned in even the biggest natural history books. Enormous spiders and their webs. And one day a stone slab with Hebrew letters.

Like other scholars of his time, Prof. Beringer had been taught three classical languages: Latin, Greek and Hebrew. These letters seemed to spell the name of God.

In so important a matter, Prof. Beringer did not wish to rely on his own knowledge alone. He got in touch with the rabbi of a nearby Jewish community and the rabbi confirmed his opinion—the letters did spell the name of God!

BERINGER hired an artist to make careful drawings of his finds, then an engraver to transfer the drawings to plates. Meanwhile, he wrote a book—in Latin, of course—of fourteen chapters, with a long preface and a nine-page dedication to Dr. Christopher Francis, the Prince Bishop of Würzburg. Since Beringer was not at all secretive about his work, everybody around the university knew about it. He had friends who tried to make him realize that he had been hoaxed. A few students even confessed that they had made the "lying stones" that Beringer had dug up. His friends quoted the case of Father Athanasius Kircher, S. J., who had also taught at Würzburg for a while and who had been similarly hoaxed by his students.

Beringer grew indignant. All this "friendly" advice and the student's confessions were merely part of a plot to rob him of the glory of his discovery. He finished his book and it appeared in 1726 under the title *Lithographiae Wirceburgensis.*

The laughter that greeted the publication was unanimous. And, it is said, at the same time Beringer was confronted with a stone on which he could read his own name in "fossil" Hebrew letters. Shocked, he spent what money he had trying to buy up all available copies of his expensive work.

Fourteen years after the publication of the book that was to make him famous—and did, in a way—Beringer died. By then the book was famous in itself and a bookseller in Hamburg bought all the copies left in the hands of the original publisher and sold them. They sold so briskly, in fact, that another edition was printed in 1767.

There can be no doubt that no man has ever been more thoroughly hoaxed than Beringer. It is still doubtful just why. That students made the "lying stones" is certain, but whether they did this as a joke or whether some unknown enemy of Beringer's was behind the whole cruel deception has never been cleared up.

In 1940, the University of Würzburg still had 30 of the original "lying stones" in its collection. I have not been able to find out what has happened to them since. But copies of the book are in many large libraries.

THE IRON PILLAR OF DELHI

OLD Cajus Plinius Secundus, or Pliny the Elder, as he is often called to distinguish him from Pliny the Younger (who was his nephew), indulged in one of his comparatively rare philosophical speculations when, in the course of writing his monumental *Natural History*, he came to the subject of iron. Iron, he said, is useful for building houses, cleaving rocks and for many other purposes. But it is also used by robbers and for war.

However, he continued, "Nature, in conformity with her usual benevolence, has limited the power of iron by inflicting upon it the punishment of rust; and has thus displayed her usual foresight in rendering nothing in existence more perishable than the substance which brings the greatest dangers upon perishable mortality."

The modern engineer may not be too convinced about the "usual benevolence of Nature," but he is still fully aware of the "punishment of rust." Much of what goes under the general term of maintenance is the effort to counteract this fact. Our big bridges are tended by permanent groups of painters; by the time they have finished painting at one end, it is time to start again at the other. And everybody know what happens to a piece of machinery that is left outdoors for a year.

But while everybody has been reconciled to the fact that the "punishment of rust" existed, there seemed to be a nagging example, apparently pointing out that things did not have to be that way.

In the city of Delhi—more specifically, in the so-called Old City, which is some ten miles from the modern section—there stands an impressive old tower. Its name is Kutb-Minar and it was built to commemorate the victories of an old Mohammedan general whose name was Kutb-ud-din. The tower is 238 feet tall and is built of colored sandstone, with red sandstone at the bottom that gradually changes to bright orange sandstone at the top. Part of this monument is an iron pillar.

This Iron Pillar is untended in the sense that nothing was ever done to prevent it from rusting. The Iron Pillar is virtually uncorroded in spite of lack of care. And it is almost 1500 years old.

For almost two centuries, the Iron Pillar of Delhi has been quoted as an example of iron that does not rust. As is usually the case when the real reason for something is unknown, the rust-resistance of the Iron Pillar inspired multitudes of conjectures. The most obvious and least provable idea was, of course, that this was an example of a "lost art." Presumably some Moslem savant, or armorer, or even a simple blacksmith, had found a method of making iron rustproof by the addition of some now forgotten substance. Or, which would be even harder to establish, by a process of treatment.

Another idea—the one I heard from a professor of mine when I was a student—was that the Iron Pillar might be rustproof because of the absence of all additions. All the iron we use, from steel beams to razor blades, is chemically "impure"—it contains various additions, ranging from other metals like vanadium to simple carbon and silicon. In fact, it is very hard to produce iron that has almost no impurities. So the reasoning ran that somebody in the Moslem world of 1500 years ago had hit, evidently by a lucky chance, upon absolutely pure iron. And it was postulated that absolutely pure iron would not rust.

That assertion is doubtful, to say the least. But the mystery of the Iron Pillar has been solved.

Everybody had been looking in the wrong direction. People had studied the pillar instead of its surroundings. After a careful survey made by J. C. Hudson of the British Iron and Steel Research Association, it seems that the famous pillar is still standing in Delhi because of the dry climate. According to Hudson, there is virtually no rusting as long as the relative humidity of the air is less than 70 per cent. And at Delhi that humidity is very rarely even approached.

No "lost art." Nothing that is in any way mysterious or impressive. Just dry weather for 15 centuries.

ANY QUESTIONS?

Many stars, perhaps the majority, are double or multiple. Has it been established that an orbit stable enough, as well as suitable in other respects, can exist for a hypothetical planet to permit long-term evolution of life in these systems? If so, have any general requirements for the systems been laid down?

Alfred B. Mason, M. D.
Camp Lejeune, N. C.

Offhand, I can think of three kinds of stable orbits in double-star systems, depending on the type of system.

If we have a close double with the two stars not much more than one star-diameter—say, one million miles—apart, planets at a distance of about 100 star-diameters will orbit around the pair as if it were a single star.

On the other hand, if the two stars forming the binary are 1,000 star-diameters apart, each star could have a family of planets that would be only slightly perturbed by the other star.

Finally, there is a possibility that the two stars are about 100 or 150 star-diameters apart and that one of them is several times as massive as the other. In this case, a planet could well revolve around the larger of the two in an equilateral ("Trojan") position.

Planets in stable orbits are therefore possible in binary star systems.

The V-2 rocket as used against London in the last war had, I understand, a mass-ratio of about 3 1/2. What is the mass-ratio of the most efficient rocket developed in the USA since and what effect does the two-step rocket have upon the overall mass-ratio?

Alan Jackson
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Since the weight of the structure of the V-2 rocket was (in rounded-off figures) 3 tons, the weight of the payload one ton and the weight of the fuels 8 tons, the mass-ratio of the V-2 was almost precisely 3:1. The mass-ratio of the *Viking* rocket, of less overall weight, is very close to 4:1.

In step rockets, the final velocities attained by the various steps add up, which has the same result as if the mass-ratios were multiplied. Imagine that the lower step is a V-2 with its 3:1 mass-ratio and that the payload carried is a smaller rocket, which also has a mass-

ratio of 3:1. The final velocity reached by the second step is equivalent to a rocket of the mass-ratio of 9:1.

But a mass-ratio of 9:1 would strain the resources and the ingenuity of the designing engineer to the utmost, while it is comparatively easy to build two rockets, each with a mass-ratio of 3:1.

Having read a great deal about gigantic stars like Mira, I wonder which star is regarded as the smallest star. Also, if we found a lonely body in space which is not luminous, would it be called a planet because it does not shine or would it be called a dead star if it is big enough?

Gerd Lipschitz
Trenton, N. J.

For a number of years, a star catalogued as "BD + 4° 4048," discovered at the McDonald Observatory, Texas, was believed to be the faintest known star. It *was*, in fact, the faintest known star from 1944 until 1952, when Drs. Luyten and Carpenter, working at the Steward Observatory, Arizona, established a still fainter star. Its luminosity is so low that 60,000 of its kind would be needed to give off as much light as our sun. And its diameter is only about 300 miles larger than the diameter of our moon, which is 2160 miles. But this tiny star, catalogued as L886-6, has 40 per cent more mass than our sun, which means that its density must be some 55 million times the density of water!

As for your second question, it is this high density that would be used as a criterion when a large dark body is found. If this body, as you specify, is not luminous, but had such a high density, it would obviously be a dead star. If it had a density comparable to that of the planets, which ranges from not quite 1 for Saturn to 5.5 for Earth, it would have to be considered a planet that was somehow torn from its sun.

Whether there are actually non-luminous dead stars is doubtful. The so-called superdense "White Dwarfs," of which the two faint stars mentioned above are examples, are regarded as the end of stellar evolution and may be called "dead" in the sense that they no longer generate energy and have nothing left with which to do so. But they are still hot because they have not yet had time to cool off and turn dark in the process. Because of their large (and hot) mass and their small surface area, they cool very slowly.

The time needed to cool is estimated to be longer than the present age of our universe. If this reasoning is correct, as it appears to be in the light of present knowledge, no star has been able to cool to temperatures below visibility.

I have just read your article on the "Trojan Planets" and would like it very much if you wrote an article on the moons of Jupiter. All I know about them are the names of the four largest ones. What are the names, sizes and distances of the others?

John Slivka
58 Greenwood Avenue
Lackawanna 18, N. Y.

The moons of Jupiter, except for the four largest, which have been known since 1610, have never been named. They are designated by Roman numerals preceded by a J. Because they are numbered in the order of discovery, their sequence, counting from Jupiter outward, reads J-V, J-I (Io), J-II (Europa), J-III (Ganymede), J-IV (Callisto), J-VI, J-VII, J-X, J-XI, J-VIII, J-IX, J-XII.

Jupiter's moons clearly form two main groups, with J-V as a special case defying classification. J-V is only 112,600 miles from the planet, needs half a day for one complete revolution and has a diameter of about 100 miles.

Then comes the inner group of moons, those which have names. They are big. Io has a diameter of 2300 miles, Europa a diameter of 2000 miles, and Ganymede and Callisto are of equal size, 3200 miles in diameter (200 miles more than Mercury). Their distances are, respectively, 261,800, 416,600, 664,200 and 1,169,000 miles, and their periods of revolution 1.77, 3.55, 7.15 and 16.7 days, respectively.

The outer moons are all rather small and again form two groups. J-VI, J-VII and J-X are between 7,100,000 and 7,350,000 miles from the planet, needing between 250 and 260 days for one revolution. J-VI has a diameter of 100 miles, the other two less than 50 miles apiece.

Another group is formed by J-XI, J-VIII, J-IX and J-XII, all small bodies of less than 50 miles in diameter at distances of between 14 and 14.9 million miles from Jupiter. Their periods of revolution are between 660 and 760 days.

In all probability, the group or groups of outer moons are far more numerous than we know, but the other members are too small to be discovered from Earth.

—WILLY LEY