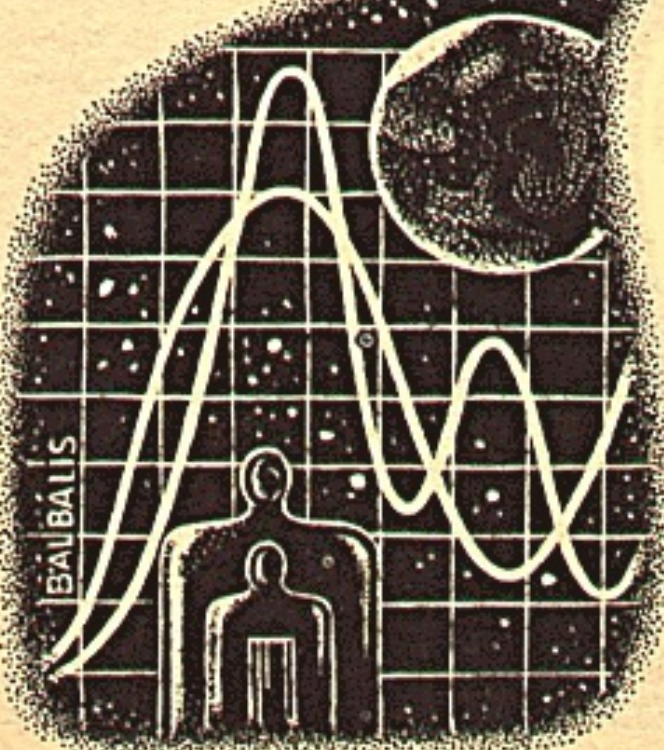


**for
your
information**



BY WILLY LEY

HOW TO SLAY DRAGONS

THE discussion I have in mind in writing this took place in Long Beach, California, and it happened to be in German. It also got nowhere, but the locality had nothing to do with this; the result would have been the same in Chicago, New Orleans, New York, London or West Berlin. The problem involved several unknowns and such discussions tend to get out of hand no matter when or where.

That the conversation was in German is a little more to the point because my indubitably honorable but less than learned opponent kept quoting books written in that language and never translated, as far as I know.

There were four books he kept bringing up.

The first of them was Hanns Hörbiger's *World Ice Doctrine*, published in Germany about 1910. By way of explanation, I have to say that this 800 page quarto volume attempted to explain the origin of the Solar System, the nature of the Sun and geological history. Since this attempt was made long before anything definite about atomic energy became known, it misfired, of course. You can succeed in understanding the nature of a star to about the same extent if you don't know about nuclear physics as you can in building a jet plane of wood and bricks.

The second book was by one Dr. Edgar Dacqué, published about 1925, and was an attempt to turn evolution around. What Dacqué tried to show was that the "human line" was the central line of evolution; in other words, that all living creatures above the level of single-celled organisms had descended from Man.

The third one was a book on Atlantis of about 1900 vintage and the fourth one was Velikov-

sky's ridiculous *Worlds in Collision*.

WHAT these four authors had in common was that they laid an enormous stress on legends. Hanns Hörbiger had ransacked the world's store of legends to prove his own ideas. One of his pet ideas was that at one time recently (geologically speaking) a moon of Earth had collided with us. So he hauled out every legend dealing with fire in the sky, the Norse gods battling in the sky, Biblical references to stars falling from the sky, and so forth and so on.

Edgar Dacqué repeated the game; he added to Hörbiger's store of legends — in the meantime, ethnologists had written some twenty books or so about tribal legends in various corners of the Earth — and quoted a whole set of different legends, those that might be twisted into having a bearing on evolution and the past in general. (His main source was a large work by Ben Gurion. I often wondered what Ben Gurion himself thought about all this.)

The man who wrote the Atlantis book had also quoted a large number of "age-old" legends, some of which were not so "age-old" at all, having been taken from a novel by the Hungarian writer Maurus Jókai. And, of

course, Velikovsky, whose book was full of the most surprising similarities to Hörbiger's work, also stressed heavily that what he said explained ancient legends and was, in turn, bolstered by them.

Our fruitless discussion revolved around the question of just how valuable a legend is, or can be. "You yourself," my opponent said, "have written in one of your books that African natives had a legend about the okapi. Then it was discovered." I pointed out that the natives did not have a "legend" about the okapi; they talked about it matter-of-factly. That some of the white explorers labeled the talk "legend" because they happened not to know the animal at the time was exclusively their fault.

"All right," said my opponent, "let's take an old legend then. Don't you think that the old legend of the dragon reflects a memory of the dinosaurs?"

I said no, I don't think so and that I have many reasons for not thinking that they do, the point being mostly that the dragon itself is a fairly late invention which cannot be traced back even as far as the time of Christ.

By that time my opponent, rather exasperated, asked the crucial question: "Don't you think that a legend has been caused by something?" He was

probably surprised when I said yes, certainly a legend is caused by something, some event. But unless you can establish the facts by other means, you will never be able to reconstruct the original event from the later legend!

As an example, I offered the story of the *Lindwurmdenkmal* in Klagenfurt in Austria, which happened to be fresh on my mind. Just two days earlier, I had met a man who had seen this monument before the war and wanted to know if I had any information — whether it had survived the war intact, or damaged, or not at all.

TRYING to describe the *Lindwurmdenkmal* in detail would be a waste of time since I can offer an illustration, Fig. 1. I only have to add that *Lindwurm* is the Germanic equivalent of "dragon" and that *Denkmal* means "monument." The location is the central square of the city of Klagenfurt where it was placed with proper ceremonies on June 2, 1636. The monument consists of two figures, a club-swinging giant and the dragon. It does not seem to be known who sculpted the figure of the giant, but the dragon was carved from stone from the nearby Kreutzberg by the sculptor Ulrich Vogelsang in 1590.

Legend has it that the skull of the dragon was found in 1335

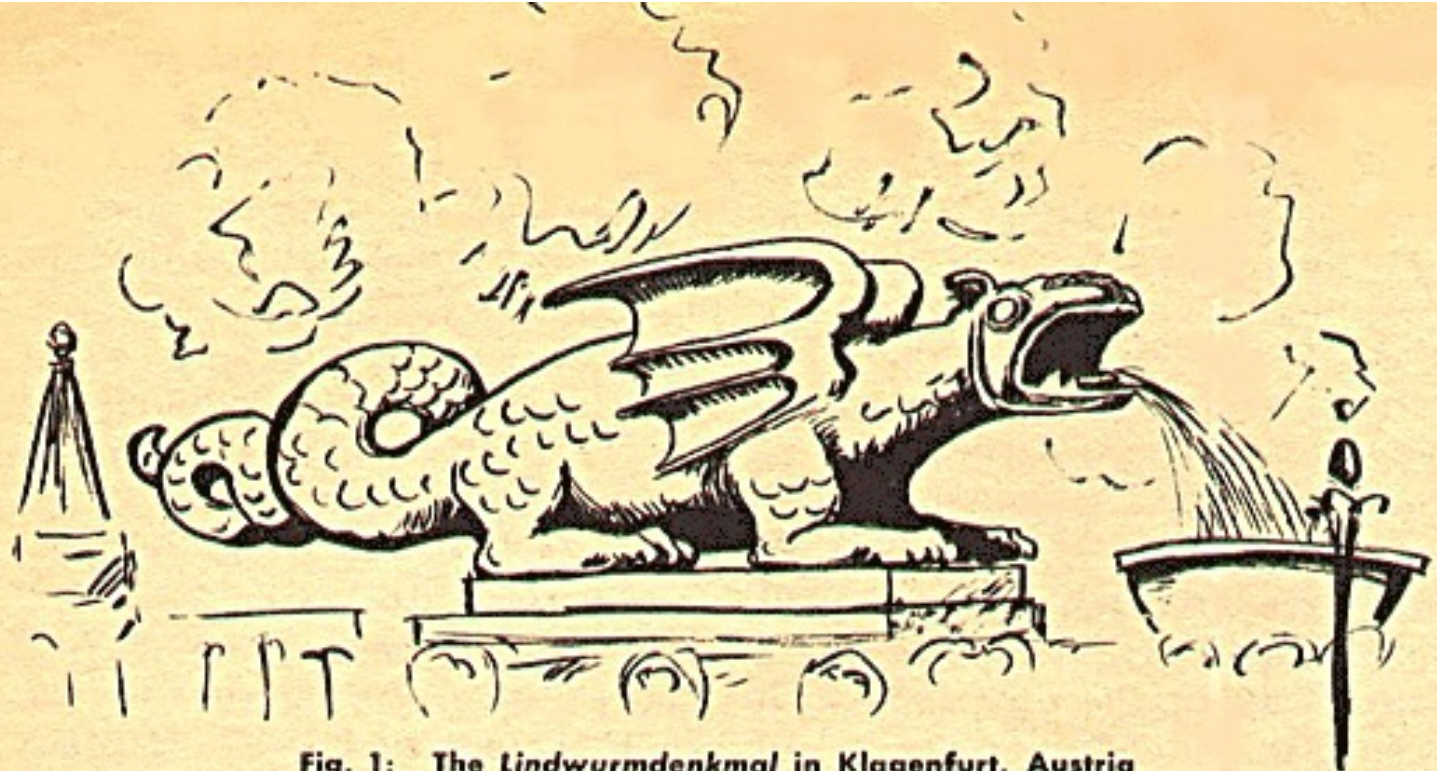


Fig. 1: The Lindwurmdenkmal in Klagenfurt, Austria

Drawings by Olga Ley

at the *Zollfeld*—the name means “customs field;” presumably some ducal boundary line ran through there at one time — in the vicinity of Klagenfurt. A gravel pit on this field is still called the dragon’s pit.

These are the facts.

Now try to reconstruct from this legend what really happened; try to guess at the “original event.” Well, obviously the dragon is actually the memory of large inimical animals which once existed; if not a memory of the dinosaurs, it might be a memory of large man-eating lizards of some kind. Mind you, the legend does not necessarily prove that these man-eating lizards lived around Klagenfurt, but it does seem to prove that

such animals existed at one time and that our remote forefathers had trouble with them.

How about the shape — specifically the bat wings attached to the body of a lizard? Well, the shape is so traditional that it probably reflects the real shape of whatever it was, and as for the wings, who can say that they did not have wings in reality? Of course one might conclude that the wings are just symbolic, indicating that these animals were very fast. All reptiles can move fast, can’t they? Have you ever seen a lizard turn around and run, or seen a snake strike?

(Having kept lizards, frogs and snakes for many years of my life, I know this fact well.)

All right, now let’s go on to the

giant who slays the dragon. What about him?

Well, in the first place, can one say that there never were giants? But it is possible that the meaning of the giant is symbolic, too. Just as the wings of the dragon — if they are symbolic — signify speed, so the large size of the giant might be taken to symbolize the incredible courage of our remote ancestors who stood up against these animals.

I did not make up these arguments. I could have quoted just this kind of reasoning from books, giving title, author, date and place of publication and page number, if desired. But that would have taken at least three times as much space as this condensation did.

At any event, these arguments have been seriously offered by people like Hörbiger and Dacqué. They sound reasonably logical and require only one two-part assumption, namely that a legend must have a cause and that this cause can be reconstructed by careful reasoning.

Fortunately, more than I have told so far is known in the case of the *Lindwurmdenkmal*, and because more is known, we can really reconstruct the background for the legend. The important point is that we cannot reconstruct it *from* the legend.

WHEN Ulrich Vogelsang carved his dragon, he had a model to go by — not a model of the whole animal, but at least a model for its head. He had the skull from the "dragon's pit" which had been found 235 years earlier. The nice thing about it all is that we still have the skull; it has been preserved in the Municipal Museum of the city of Klagenfurt.

It is the skull of a woolly rhinoceros of the Ice Age, known to zoologists and paleontologists as *Rhinoceros (Tichorhinus) antiquitatis*. Its nearest living relative is the white rhino of Africa.



Fig. 2: The skull of the "dragon pit"

You can see how the background splits right at this point into two backgrounds.

On the one hand, we have the background of the skull, which involves many thousands of man hours of scientific spade work (you can take the term literally, if you want to) leading to a knowledge of the Ice Age and the different kinds of animals which then inhabited Europe. Some of them including — or rather especially — the woolly

rhinoceros certainly were a menace to "our remote ancestors."

On the other hand, you have the background for the remainder of the dragon. Can we sit back here and let the legend hunters take over, acting like the Great Detective who shuts himself up with his pipe and reasons it all out while the dumb policemen have to go around checking laundry marks, dental records and ringing doorbells? In reality, it is the police who get the results, and with some checking — of old books in this case — we can trace the remainder of the dragon, too.

The word "dragon" comes from the Greek *drako*, which was the term used for especially large snakes; simply large snakes of the python type. The Germanic word *lind* (or *lint*) also just means snake. Readers familiar with the *Nibelungenlied* may recall, at this point, that the leaf which fell between Siegfried's shoulder blades, producing his one vulnerable point, was a leaf from the *Linden* tree. Actually the two words have no known connection, but the similarity in sound made a good poetic alliteration, to an audience familiar with the word *lind* for snake.

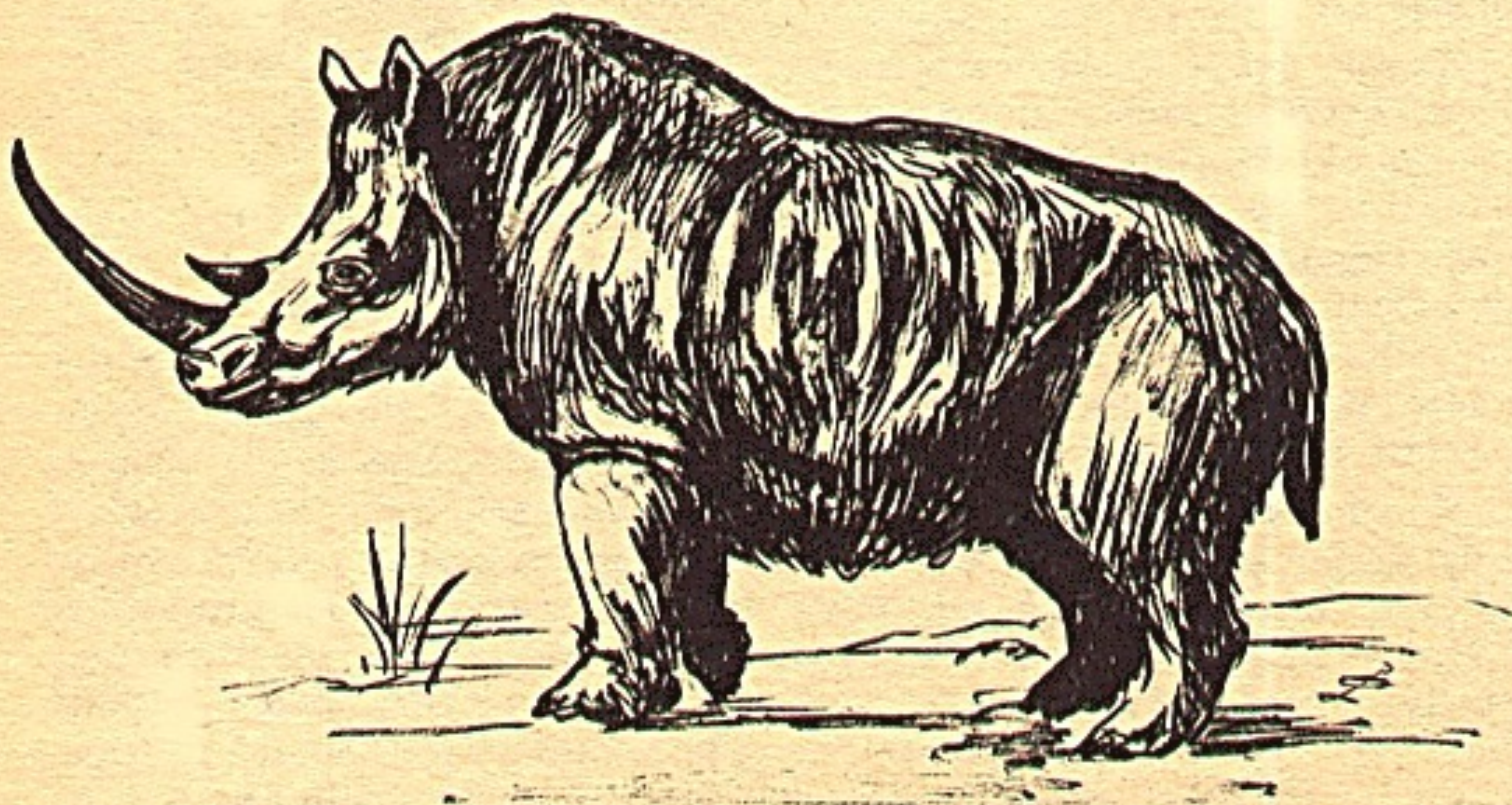


Fig. 3: How *Rhinoceros (Tichorhinus) antiquitatis* really looked

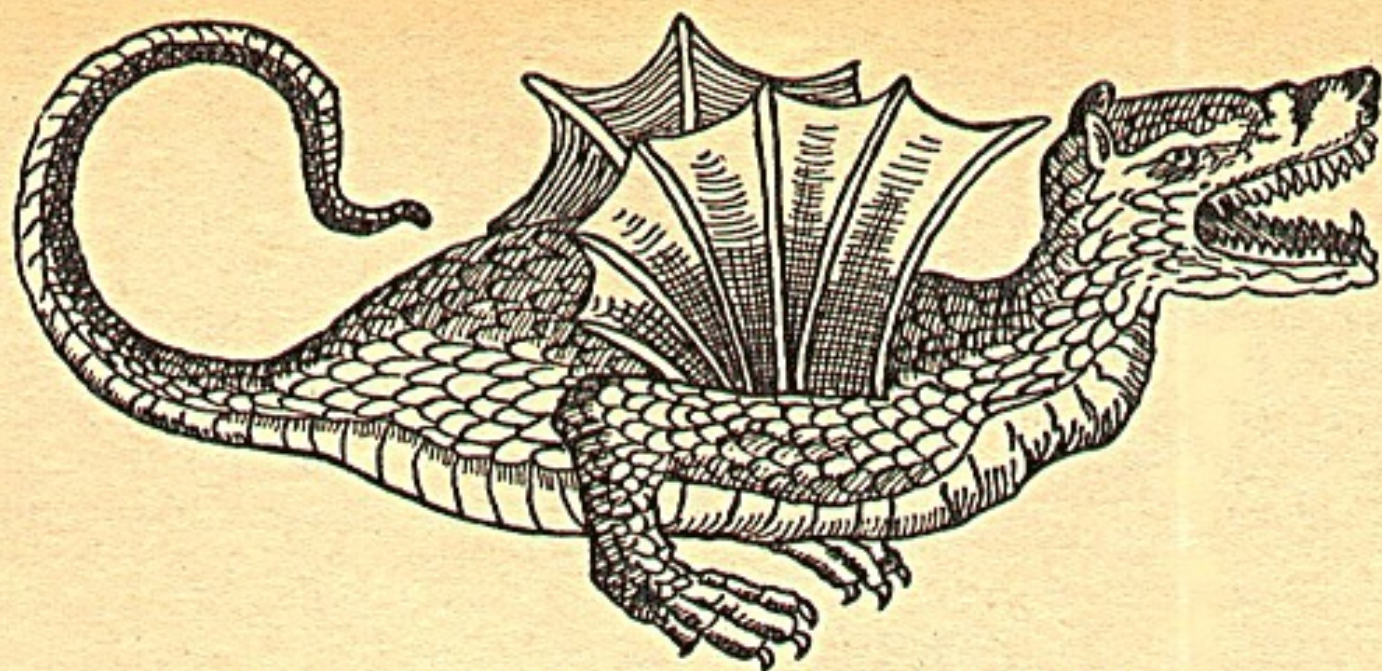


Fig. 4: "Young Dragon" as pictured in Pierre Belon's book

THE name dragon — or *Lindwurm* — therefore automatically suggested a snake-like body. Which again leaves the question of the wings. But these wings can be explained. The only assumption we have to make is that Ulrich Vogelsang had a few of the then better-known books to look at. We don't even have to assume that he could read, though an artist in the year 1590 probably could.

The Frenchman Pierre Belon — latinizing his name into Petrus Bellonius — had published his works on natural history some 30 years before that date, and in it is the picture of a "young dragon" (Fig. 4). It is the first picture where a dragon has wings. The reason: around the middle of the 16th century, the Javanese

tree lizard — which later was called, half-jokingly, *Draco volans* or "flying dragon" — became known. It is a small lizard, with a maximum length of about four inches, which has a "parachute." Half a dozen "false ribs" stick out from its body, connected by a membrane. The membrane can be stretched out or partly folded, but otherwise these "wings" cannot move.

There you have the origin of the dragon shape of the monument: the skull of an extinct rhinoceros, the body from the name, and the wings from Pierre Belon's poor and probably second-hand drawing of a Javanese tree lizard.

And now I can go back to the argument about legends, and the two-part assumption that a

legend must have a cause which can be discovered by reasoning. Yes to the first part; every legend certainly has a cause. But no to the second part; the legend itself very effectively cloaks its origin as a rule. Sometimes the cause can be unearthed, but only by the patient detail work which should have been applied in the first place.

BRINGING THE MOON DOWN TO EARTH

QUITE a number of years ago — at a guess, about 1922 — I encountered the name of André Laurie for the first time. I was then reading the German biography of Jules Verne, written by a Dr. Max Popp who was evidently an early science fiction fan, because nearly half of his 212-page book is devoted to stories of the Jules Verne type, but not written by Jules Verne.

"The hero of Laurie's story," Dr. Popp wrote, "intends to establish a connection between the Moon and the Earth by bringing the Moon to the Earth with the aid of an enormous magnet. The Moon does come uncomfortably close, but finally the friendly queen of the night proves to be more powerful than the magnetic mountain; the mountain is pulled out of the Earth and Laurie's

travelers inadvertently reach the Moon in this manner."

Naturally I did not remember that paragraph verbatim — I just now looked it up for the purpose of translating it — but its content stuck in my mind. I also remembered (this is mentioned elsewhere in Dr. Popp's book) that this French novel bore an English title, *Selene Company Limited*. Sometimes, when I was in a library for different reasons and purposes, I would recall that there was an old French space travel novel I should read one day and checked the index cards for it, unsuccessfully each and every time.

In between, whenever a new book on old science fiction appeared, I looked for André Laurie; maybe somebody would give a more complete synopsis. Nobody ever did.

Matter of fact, nobody even mentioned André Laurie's name. Philip B. Gove's *The Imaginary Voyage in Prose Fiction* takes no notice of him. Neither does J. O. Bailey's *Pilgrims Through Space and Time*, which is remarkable for its omissions all the way through. But even Marjorie Nicolson in her *Voyages to the Moon* doesn't have a word to say about Laurie — possibly because he is too close to the present to be deserving of her rather patrician notice.

The only place I found something about him is in Kenneth Allott's American Jules Verne biography where Allott says, with reference to the year 1885: "The only other publication that year was a work in collaboration with André Laurie — *The Wreck of the Cynthia*. Laurie admired Verne greatly and followed in his footsteps, writing scientific romances that had a wide circulation in France."

I finally got a copy of Laurie's book from an antiquarian, an English translation (called *The Conquest of the Moon*) published in 1894 in London. A label pasted inside states that this copy was awarded by B. Brucesmith, Esq., Principal of the Byron House and Ealing Grammar School, to William Henry Sinnott for being 1st in a class of 23 boys in Bookkeeping. I wonder whether the award winner ever read this book, which is rather removed from bookkeeping and, if so, what he thought of it.

Well, I read it. About 1:30 in the morning, my wife started complaining and I retired to my study with a bottle of wine, two cigars and the book. Is the book that wonderful? Yes, in the same way as the woman in England who was so incredibly ugly that no man could take his eyes off her.

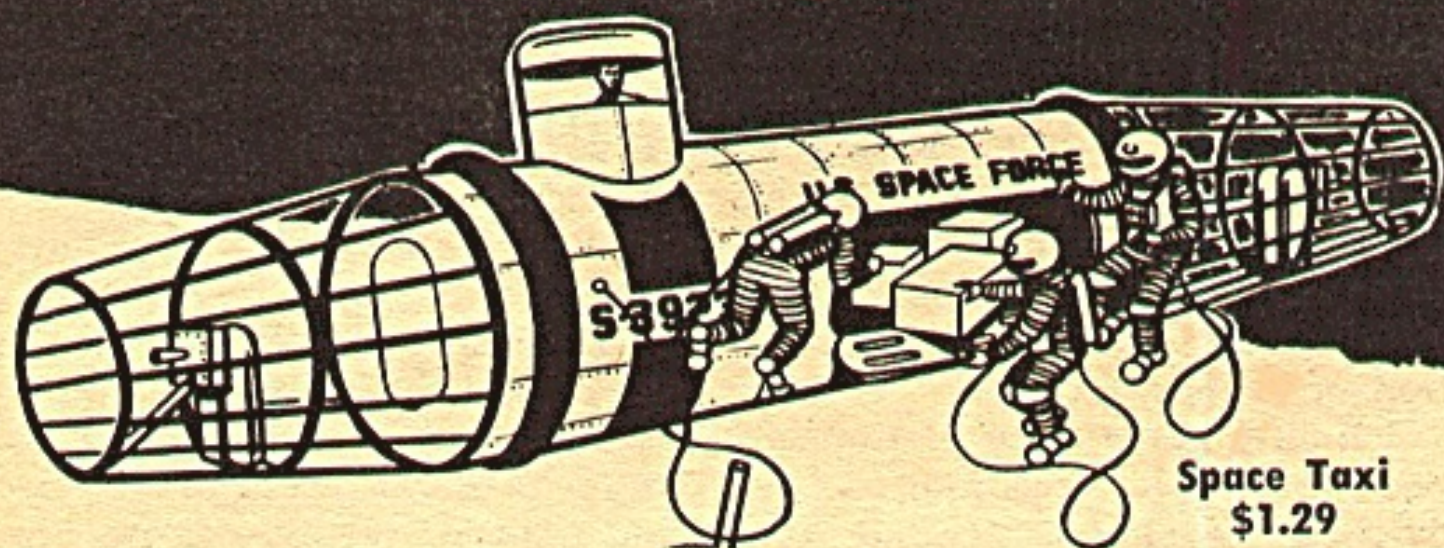
DR. POPP had summarized the main theme quite well.

A French astronomer has the idea of bringing the Moon closer to the Earth and reasons that a sufficiently large magnet must be built to accomplish this feat. (Don't ask me why a magnet of any size should influence the Moon.) He looks for a mountain of pure iron ore which could be magnetized and finally finds one, by lucky coincidence in the French Sudan. The French Sudan was in various kinds of revolt and political troubles at the time, which helped to fill the book with all kinds of sub-plots.

When the mountain is found, the necessary money is raised — in Australia, of all places — and the work begins. First the base of the mountain is insulated by pouring molten glass into spaces made for the purpose. The engineering aspects of the venture are rather vague, but there is the interesting touch that the energy is furnished by solar collectors. At about the time Laurie wrote the book, the French Professor Mouchot (mentioned by Laurie) made experiments with solar collectors and steam engines for pumping water for irrigation in North Africa.

An observatory and living quarters are built on top of the mountain. Cables are wound around the mountain to convert

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it into an electromagnet. Meanwhile an army of Arab rebels lays siege to the observatory which, however, this possibility having been foreseen, is "well provisioned with everything." The mountain is then magnetized and the astronomer predicts that within five days and a number of hours the Moon would be close enough to "be inside the Earth's atmosphere."

Up to that point, the main quarrel of a present-day reader would be with a wrong premise and a ludicrous style which is partly the fault of an inept translator. But then the scientific fun begins.

Acted upon by the giant magnet, the Moon comes closer and closer.

But does that change its orbital period? Oh, no — from everything that is mentioned, it is quite clear that its orbital velocity remains just what it always was. Even when closer than 22,000 miles, it still rises in the east and sets in the west. In reality, the Moon's main behavior, aside from appearing larger in size, would be first an apparent slow-down in motion (due to the fact that its true orbital period would decrease so that its apparent motion would not be almost exclusively due to the Earth's turning on its axis) and then an apparent reversal with

rising in the west and setting in the east.

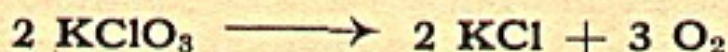
At the last moment, somebody in the observatory panics and reverses the power, and that's when the magnetized mountain is torn from its undermined foundations and pulled toward the Moon. The people in the observatory are knocked unconscious and, after awakening, first think that the Moon had struck the Earth. After a considerable time, they realize that their whole mountain has jumped to the Moon, luckily landing with its base first.

BY that time — wonder of wonders — the Moon is back in its original orbit! (Kepler, Newton, Halley, Cassini, Gauss and a few dozen lesser lights must have orbited in their graves when this was printed.) The Moon did take a little air along so that the travelers have time to stuff rags into the cracks of the window frames and so forth.

Now they have to make oxygen. Fortunately there are tons and tons of potassium chlorate among the provisions. This provides them with the oxygen they need. While nothing was said as to how the oxygen was produced, I suspected that the figures were prodigiously wrong. After finishing the book (and getting my delayed sleep) I took a handbook to check a few facts. Yes, my

handbook is recent, but these particular facts could also be found in the handbooks of André Laurie's time.

The chemistry of the case is this: potassium chlorate — the formula is KClO_3 — melts at not quite 700 degrees Fahrenheit. When you heat it beyond its melting point, you get the following transformation:



There is a small amount of practical trouble involved. It does not work below the melting point of the substance, but at only 50 degrees Fahrenheit above melting point, the release of oxygen is so violent that it can almost be called an explosion. Nowadays we can make this safe by adding an oxide of manganese (MnO_2) which causes the same reaction at lower temperatures. I don't know whether this was known at the time the book was written.

More important is the fact that the decomposition of potassium chlorate will produce about two-fifths of its weight in pure oxygen. Allowing for poor equipment and other losses, we'll say that every four pounds of potassium chlorate produce one pound of pure oxygen.

Now what does Mr. Laurie's hero do?

As the lunar night approaches,

he prepares the necessary oxygen for a dozen people for two weeks. So he decomposes 22 tons of potassium chlorate. Since this is a French book, these would be metric tons, totaling 48,501 lbs. avoirdupois. This would produce a minimum of 12,000 lbs. of oxygen, probably more, whereas twelve people will need about 600 lbs. of oxygen in two weeks.

Mr. Laurie has no excuse for this slip except the true one — he neglected to do his arithmetic. (That at another point the three villains dump something into a crater six million yards deep I take to be a translator's error. The original probably read *six mille metres*, 6000 meters.)

WELL, now, do I expect a novelist to calculate these things? The answer is: I do; but Monsieur Laurie did a few other things which are equally horrible and have nothing to do with arithmetic. For example, a dead man is found somewhere. A doctor who is a member of the party whips out his stethoscope to listen to the heartbeat and *then remembers that there is no sound on the moon!* He has to feel for the corpse's pulse instead! It was known in Laurie's day that not only air transmits sound.

Then they find an ancient building of the long-dead selenites. They marvel at the size of

the structure, but they remember that "since the Moon's gravity is only 1/6 of what we have on Earth, the foundations must be made more massive and dug deeper down in proportion." Why? To support one-sixth as much weight?

Once inside they see a number of artifacts "made of pure gold, now tarnished with age." And I always thought that one of the attractive things about gold is that it does not tarnish or discolor. It does not even dirty easily.

And so it goes on. I just could not stop reading in incredulous but sustained amazement. In the end the travelers get home: they use their magnetic mountain once more to graze the Earth's atmosphere and then jump off with a large parachute. (Yes, the Moon snaps back into its orbit again.) Then they find that nobody will believe their tale.

No question about it, the "good old science fiction" had more "sense of wonder" than today's. Almost every page of *The Conquest of the Moon* makes one wonder how it got by the author, editor, typesetter, proofreader and reader.

This book aside, some of the good old science fiction was good. Now it is merely old.

ANY QUESTIONS?

MISS Petra Helmssen of Carbondale, Illinois, writes me as follows:

At a party recently, a young man said that he could write down, without any preparation, numbers of six figures all of which would be divisible by 13 and also by 11. He made good his boast. Miss Helmssen wrote down a few of the numbers he produced, but states that he went on for almost an hour. The numbers she transmitted to me were 495,495; 318,318; 957,957 and 101,101. The question was, "How did he do it?"

I did not know how, but as I brooded over the numbers, the last one caught my interest. It was obviously a multiple of 1001. So were all the others, I saw, as soon as I realized the fact. Now 1001 is divisible by 13, by 11 and, as you can find out easily, also by 7. In fact, 1001 is 7 times 11 times 13. In order to produce figures divisible by 13 and by 11, you don't have to do anything more strenuous than to mentally multiply 1001 with anything — anything at all.

Mr. D. A. Turner of Visalia, California, has a far more serious problem on his mind. "Is it not possible, or even likely, that a few years from now a manned space vehicle might be rammed and destroyed by one of the many, many (by then) Sputnik-

Vanguard-etc. satellites whizzing around Earth in their various and sundry orbits? Is this problem of man-made space hazards being given any attention at this time?"

The answer to the question is yes, naturally scientists are very much aware of this problem. One of the reasons why research satellites were placed on long elliptical orbits with their perigees inside the atmosphere was that satellites in such orbits would clear themselves out of space again by gradual orbital decay and final burn-up.

On January 1st, 1960, nine artificial satellites were in orbit; by December 31st, only six of these will be left. Three of them are expected to burn up this year — coincidentally, at about the time this issue will be on the newsstands, namely Sputnik III, Explorer VI and Discoverer VIII. Twenty years from now, only two will be still in orbit — Vanguard I and Russia's Cosmic Rocket III, the one that took the first pictures of the far side of the Moon.

In short, the intention, when a satellite is fired into orbit, is that it will burn up in the end. But every once in a while one happens to slip into an orbit where even the perigee is so high as to be outside the Earth's atmosphere. This happened with

Vanguard I and was a more or less accidental result of the shot around the Moon. The latter could just as easily have run into the Earth on its first trip back.

In time, a number of such accidentally too-lucky shots will accumulate in space and, will have to be removed when the era of manned space flight arrives. What better way to take them out of space than by a manned maneuverable ship?

TWO MEN AND ONE BIKE

THE riddles I stuck in just for fun in recent columns, such as the one about the number of hairs on a girl's head, seem to have been received with enthusiasm. Readers asked for more, although one sternly cautioned: "Don't use the same that Martin Gardner has in the *Scientific American*." I won't. But here is another.

The main means of transportation in The Netherlands is the bicycle. Unlike bicycles elsewhere, Netherlands bikes must follow traffic regulations and patterns as if they were automobiles. Moreover, there is a strictly enforced rule: three days in jail for both if the rider lets someone else ride on the handlebars.

Now we have Cornelis Potgieter and Pieter van Gelderbrook

standing on a road. They both have to be in a place 10 kilometers away. They should arrive more or less at the same time. And they have only one bike.

Says Cornelis: "Tell you what we do. Here is a key to my padlock, I'll ride 500 meters ahead and chain the bike to a tree. You walk, then take the bike and ride 500 meters. I keep walking in

the same direction in the meantime. Then I take my bike which you have chained to a tree after 500 meters of riding and ride 500 meters myself, and we keep alternating till we get to our destination."

Question is: what do they gain by this procedure? Or do they gain anything at all?

— WILLY LEY

