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For Your Information

By WILLY LEY

THE DEADLY TREES

LET me begin by quoting something:

"During the last two days, my native porters had done everything — short of physical violence—to prevent me from going on. They had made speeches; they had thrown themselves flat on the ground, refusing to move; in short, the only reason they came along at all was that they

were even more afraid to go back alone.

"So we moved along under almost unbearable heat. The outline of the distant mountains, even though blurred by the heat, slowly grew more distinct. We were still pushing forward through the shoulder-high grass while the sun was sinking in the west when I suddenly broke out of the grass into a clearing.

"It was a very strange clearing—the grass simply stopped along a well-defined arc. On the bare ground were the bleached bones of animals and at a distance something that looked like a human skull. So it was true, after all.

"Because in the center of this inexplicable and somehow ghastly hundred-yard clearing there stood The Tree . . ."

I know you are quite sure that you have read this before, but right now you have trouble placing it. The reason is simple: you have read this in various stories and in Sunday Supplements quite a while back and maybe even in a book.

The tree in the center of the clearing is, of course, deadly. It is either so poisonous that birds flying over it drop to the ground, dead, or else it is actively carnivorous. And because editors of Sunday Supplements used to suspect that their readers might not know what "carnivorous" means, the tree was dubbed "man-eating."

Depending on the version, the natives—those of Mindanao in one—either shun it or else—those of Madagascar in another—they worship it and appease it with victims of which the white man must be kept unaware. The best way to combine both requirements is, naturally, to feed the white man to the tree, which preserves the secret and keeps the tree happy.

AS far as I can tell, there haven't been any man-eating trees around for a number of years. The last one I know of was the blood-sucking tree of Mindanao of 1925 which did not live long in the public prints. The man-eating tree of Madagascar, on the other hand, is alleged to have flourished for almost half a century. But even this hardy (though tropical) perennial was not the first, for the myth of deadly trees is much older than that. In fact, it seems to have originated during the so-called age of exploration, when Africa was circumnavigated for the first time since the Phoenicians and when the Western Hemisphere was discovered.

I have a notion—for which I have no proof at the moment—that the deadly tree was origin-

ally a philosophical invention. Everything was contrasted by its opposite: light and darkness, heat and cold, life and death. The opposite of the royal lion was the deadly basilisk which could kill by a glance. Since the Bible spoke of a Tree of Life, it must have seemed at least likely that there was a Tree of Death, too. This belief seemed confirmed when travelers' tales followed hard upon the heels of the conquest of Central America. In the wonderland of the West Indies, there actually grew such a deadly tree. I don't know just how it was called at first, but later it was referred to very guardedly and with much awe as the Manzanilla tree. Scientists and especially botanists never mentioned it, yet it managed to survive as a literary tradition. The story reached its climax less than a century ago.

Giacomo Meyerbeer, born in Berlin in 1791 as Jakob Beer, returned to his native city in 1842 as musical boss of the Royal Opera, after living in Paris for two decades. But the *Herr Generalmusikdirektor* was not only supposed to conduct operas; he was also expected to compose some, and he did. One of his great successes was *L'Africaine;* in the last act, the heroine decides to die, which she does in a decorous manner by reposing in the shadow of a Manzanilla tree. When the opera was first performed in 1865, the assembled Berliners found this end most touching—and not a single one of them thought of inquiring whether there was such a tree. To some extent, the story died because nobody else dared use it any more, for fear of being accused of plagiarism.

But meanwhile another Tree of Death had made its appearance: the Upas tree. Later researchers have found what they believe to be the first appearance of this vegetable devil; an article in the *London Magazine* in 1783. Its author was a Dr. Foersch, who had lived for a number of years as a surgeon in Samarang. On his return, he told of the marvels of Java, among them the Upas tree, so poisonous that birds could not fly over it and animals could not pass near it. "All animal life within a range of 15 miles of such a tree will surely perish," Dr. Foersch stated.

IF that assertion had remained in the *London Magazine,* it would probably have been buried and forgotten. But Erasmus Darwin, the grandfather of Charles Darwin, was taken in and repeated the story in one of his works. This unfortunate fact did have one good aspect, at

least. Because Erasmus Darwin had mentioned it, people who went to Java looked for it. And they turned up with a tree which is now listed in botanical works as *Antiaris toxicaria;* in Java, it is commonly referred to as the Anchar tree or, by the natives, as the Ipoh.

It is a straight, slender tree, 60 to 80 feet tall, and it *is* poisonous. However, it can be approached without danger, as is shown by the fact that the natives cut holes into it to get its sap, which they use for poisoning arrows and other weapons. The sap tastes like quinine and contains a poison that is rather powerful if it gets into the body through a cut or wound, since it acts on the heart muscle and the central nervous system. But don't worry if your seafaring uncle brought poisoned arrows from Java. After about eight weeks, the poison stops being lethal.

The strangest part of the whole story is that old Dr. Foersch may not have sold a deliberate hoax to his London editor, but may have been honestly mistaken. Java is very strongly volcanic and there are areas, local depressions, which are full of volcanic carbon dioxide. Because this colorless and odorless gas is much heavier than air, it can fill a depression like water, forcing all the breathable air out. Small animals that enter such a place suddenly collapse, as if struck by lightning (or as if poisoned). Actually, they have "drowned" in carbon dioxide. Nobody had any idea of carbon dioxide in 1783 when Dr. Foersch told his story.

But there *were* areas on Java where animals collapsed and died and there *was* a poisonous tree on the islands.

While the Manzanilla tree of operatic fame and the Upas tree of Java were merely supposed to be poisonous and as little concerned with the fate of the accidental victims as a poison ivy vine, the third in the succession of deadly trees had a purpose in mind. It was an active killer, intent on feeding the vegetable equivalent of a stomach. I am now speaking of the "Man-eating tree of Madagascar" which was discussed at great length in a book with the title "*Madagascar —Land of the Man-Eating Tree*" by one Chase Salmon Osborn, Ll.D., published in New York in 1924.

I do not claim to be able to judge the chapters on tribal customs, native history, etc., of this book. As for the chapter on zoology, I do know that it is horribly amateurish, incredibly careless as to detail and poorly written. The chapter on the botany of Madagascar is no better and in

general I feel that the proverbial "grain of salt" isn't enough.

OSBORN'S book claims that the man-eating tree of Madagascar was first described in 1878 in a letter by a traveler named Carl Liche to a Dr. Omelius Fredlowski (neither of whom is listed in *Webster's Biographical Dictionary*). The book also says that the report appeared first in a German magazine in 1878 and two years later in the *New York World*. I haven't had the time to check either and therefore cannot vouch for this.

The alleged letter says that its author visited a primitive tribe in the interior of Madagascar which is called the Mkodo tribe. These people are said to be ignorant of clothing and have no native religion or tribal rites except the worship of the tree. After completely failing to identify the place and merely stating that it was a valley which could not have been more than 400 feet above sea level, "Carl Liche" claims to have reached a lake from which issued a small river.

But now I feel I should quote verbatim:

"The sluggish canal-like stream here wound slowly by, and in a bare spot in its bend was the most singular of trees. I will try to describe it to you. If you can imagine a pineapple eight feet high and thick in proportion, resting upon its base and denuded of leaves, you will have a good idea of the trunk of the tree which, however, was not the color of a pineapple but a dark dingy brown and apparently as hard as iron. From the apex of this truncated cone (at least two feet in diameter) eight leaves hung sheer to the ground, like doors swung back on their hinges.

"These leaves were about 11 or 12 feet long and shaped very much like the leaves of the American agave or century plant (did he think this was the same?—W. L.). They were two feet through at their thickest point and three feet wide, tapering to a sharp point that looked like a cow's horn; very convex on the outer (but now under) surface and on the under (now upper) surface slightly concave. This concave face was thickly set with strong thorny hooks . . ."

IN addition to the trunk and the eight spiked leaves, the plant had a large number of green tendrils "tapering from 4 inches to 1/2 inch in diameter, yet stretched out stiffly as iron rods," a hollow on top filled with "a clear treacly liquid, honey sweet and possessed of violently intoxicating qualities" and, to round out the picture, "six white almost transparent palpi reared

themselves towards the sky, twirling and twisting with a marvellous incessant motion.

"Thin as reeds and frail as quills, apparently they were yet five or six feet tall and were so constantly and vigorously in motion that they made me shudder in spite of myself, with their suggestion of serpents flayed, yet dancing upon their tails."

The alleged letter then goes on to tell that one of the native women was forced to climb the tree and that, all at once, the green hard tendrils wrapped themselves around her like pythons. "And now the great leaves rose slowly and stiffly, approached one another and closed about the dead and hampered victim with the silent force of a hydraulic press and the ruthless purpose of a thumb screw." For ten days the big leaves remained upright. "Then, when I came one morning, they were prone again, the tendrils stretched, the palpi floating and nothing but a white skull at the foot of the tree to remind me of the sacrifice that had taken place there."

Well! All I can say is that *if* there were a carnivorous plant of a size to catch and kill a victim the size of a man, it certainly would not function as described.

As I said, I have not checked whether the letter actually appeared in the *Carlsruhe Scientific Journal* in 1878 or in the *New York World* in 1880. I doubt it. All the references to the man-eating tree of Madagascar appeared after 1924; i.e., after the publication of Dr. C. S. Osborn's book. The whole thing may have been a one-shot hoax, rather than a literary tradition. If it was such a hoax, it certainly was successful for a time.

HOMEMADE PSEUDO-CELLS

LAST month, when I discussed research work devoted to the origin and definition of life, I felt tempted to insert a few words about experiments that aimed at cell imitation. But I decided to postpone this for a month so that nobody might be confused, especially since there is one case on record where a researcher (a Russian physician with the very un-Russian name of Martin Kuckuck) mistook his pseudo-cells for actual artificial life, loudly proclaiming that he had solved the "secret of spontaneous generation."

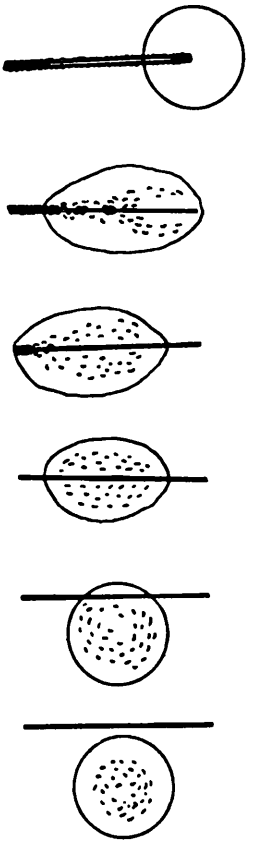
Perhaps the simplest of the imitation cells is the one found by Prof. Johannes Traube. Take a shallow glass dish and fill it with a solution of tannin. Then add one drop of old-fashioned carpenter's glue. Immediately a tough skin will form around the drop of glue. But the skin is not

impervious to water; the glue drop absorbs water from the solution, "grows" and finally bursts the skin. Of course a new skin forms immediately, which then again grows too tight for the water absorbed and so forth.

Even more astonishing in appearance is the "dividing cell" devised by the French physician Stephan Leduc. All it involves is a few drops of salt water on a piece of glass. One drop, placed in the center, consists of a weak salt solution to which a dye has been added. The two other drops, placed to the right and left of the first, contain no dye, but are somewhat stronger salt solutions. Then you make the three drops touch and observe the result with good magnifying glass. The result looks precisely like pictures of a real cell in division with "chromosomes" splitting off in both directions.

Or maybe you would like to see an ameba eating a small alga. Use a sliver of glass, about a quarter of an inch in length, coat it with shellac, put it in very shallow water and add a drop of chloroform. (See diagram). The chloroform drop will exhibit the most lifelike properties, finally throwing out the "indigestible" glass.

Finally, there are the "colpoids" of Prof. Alfonso L. Herrera of Mexico. The "nutrient"



A cell-like drop of chloroform "eating" and "digesting" shellac

of the "colpoids" is a mixture of olive oil and gasoline, two parts of gasoline (by volume) for one part of olive oil. The "cells" are a solution of washing soda in water that might be dyed to show things more clearly. The principle is the same as the cell of Prof. Traube—namely, osmotic pressure—but Herrera's are more active by far. They will move rapidly across the oil-gasoline "lake," pursue each other, eat each other and behave, in general, like irritated and hungry animalcules.

No, it doesn't prove anything directly. It merely shows that those physical forces that are utilized by an actually living cell can also put on a fine show by themselves.

MOTOR OR ENGINE?

ONE day, several years ago, after a lecture of mine on rockets and high altitude research, a gentleman came up to the platform and suggested with great politeness that I had made a mistake. An understandable and pardonable mistake since English is not my native tongue, but a mistake just the same. Of course I asked just what I had done wrong. "Well, sir," he said, "all through your lecture you spoke of rocket *motors* when you should have said *engines*." I asked why a rocket should have an engine. He didn't know, but insisted that it was not a motor. I then asked what was the difference between an engine and a motor. He couldn't explain, but maintained that there was one.

Since then, I have had several such conversations and one afternoon, when I had time, I went after that elusive difference between motor and engine, digging through encyclopedias, dictionaries, books on word origins and everything else that seemed pertinent.

The situation is about as silly as it can possibly be; it is best (if inadvertently) summed up by the first sentence in the article Motor-Boats of the *Encyclopaedia Britannica,* which says that a "motor-boat is a small vessel propelled by a gasoline engine." But if the motor-boat's gasoline engine is detachable, it promptly becomes an outboard motor. Similarly, with the aid of half a dozen or so engines in trucks, a company of soldiers is motorized. And every Englishman who can afford one drives a motorcar. Americans don't—they ride in automobiles, except younger ones who have motorbikes.

Linguistically, there can be no doubt that the right word is "motor," which is simply the Latin word for "mover." Trucks,

cars, motorboats, airplanes and rockets indubitably move, being moved by the thing many people insist on calling "engine."

As for the word "engine," it is supported by tradition only. Prior to the invention of the steam engine, the word "engine" was used in a sense which is expressed in present-day English by the words "contrivance" or "contraption." Remember that Domingo Gonzales, the hero of *The Man in the Moone* (1629), builds himself an "engine" to escape from St. Helena. It is—well, a contraption with a saddle at one end and harnesses for a dozen or so birds at the other. The word "engine" is derived from Latin, too, from *ingenium*, the word that also produced "ingenuity." The steam engine, when it came along, was just a special contrivance involving steam.

I know that this little dissertation is not going to change usage. Mechanics in garages will go on fixing engines, airplane pilots and operating personnel will continue to talk of the left outboard engine and so on. But I want at least to point out that there is no difference between "engine" and "motor" and that the latter is actually the better word. It merely has the drawback that it prevents the people who operate it from calling themselves "engineers" rather than "motorists,"

ANY QUESTIONS?

What is the "circular velocity" of a body and how is it related to the escape velocity?

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The "circular velocity" of a planet is the velocity a body has to attain to describe a circular orbit around the planet. In the case of Earth, this amounts to 4.943 miles per second at sea level. Theoretically a projectile or rocket, having this speed, would circle Earth indefinitely, but in reality it would crash very rapidly because of air resistance. For practical reasons, therefore, the circular velocity is always specified for a given distance or height, by saying that the circular velocity for a height of x miles is y miles per sec. You can calculate the circular velocity very easily according to the formula $\sqrt{g(r+h)}$ where r is the radius of the planet, while h is the additional distance above sea level.

If you fired a projectile (neglecting air resistance) vertically with circular velocity, it would rise to a distance of one planet radius above the surface. The following table leads

up to the second part of your question. Circular velocity is denoted by v_c.

height reached:	velocity:	
	v_c multiplied by	1.000
2 r	" " "	1.155
3 r	" " "	1.225
4 r	" " "	1.265
5 r	" " "	1.291
6 r	" " "	1.309
7 r	" " "	1.320
infinity	" " "	1.414

The last line in this table denotes "escape velocity" and since 1.414 is the square root of 2, the relationship between circular velocity v_c and escape velocity v_p is

$$v_p = v_c \sqrt{2}$$

and the numerical value of v_p is 6.9655 miles per sec.

In a 20-year old book which came into my possession, I found mention of a number called duodecillion. I would like to know whether such a number is still in use and how large it is.

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Names like sextillion, decillion, duodecillion, etc., are very rarely used nowadays, mostly because of the misunderstandings that might be caused by their use. Unfortunately, Europeans and Americans could never reach an agreement on how to name figures larger than one million. Up to that point they agree, but the Americans call 1000 million a billion, while Europeans call the same figure a milliard and reserve the word billion for a million million. (You may have noticed that I *never* say "billion" but always 1000 million, partly because this is correct mathematically and partly because of our foreign editions.) Similarly, the Americans use the "next higher name" after adding three zeros to a figure; the Europeans, after adding six zeros. Having progressed in either manner ten times, starting at a million, you get a decillion; after twelve times, a duodecillion. To avoid misunderstandings, large figures are now written in this manner:

$$2 \times 10^6$$

which means two million. You can remember this system most easily by saying that the exponential figure is the number of zeros following a one.

In the book The Universe and Dr. Einstein, *Lincoln Barnett, its author, says: "Contrary to popu-*

lar belief the moon does not revolve around the earth; they revolve around each other, or more precisely around a common center of gravity." Can you tell me if this is true?

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The answer is yes, Earth and Moon revolve around a common center of gravity. If they were both of equal mass, that common center of gravity, technically known as the barycenter, would be halfway between them. In the case of two bodies of unequal mass, the barycenter is close to the larger of the two bodies. In the case of the Earth-Moon system, the masses are so unequal that the barycenter is comparatively close to the center of the bigger mass; i.e., the Earth. It is 2900 miles from the Earth's center and since the radius of the Earth is 3950 miles, the barycenter is roughly 1000 miles below the surface.

What would happen if two galaxies collided?

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Let's see: in our section of the Galaxy, the average distance between stars seems to be of the order of 25 million million miles. The diameter of a star is rarely more than two million miles, so the distance is 12.5 million star diameters. Even in the denser sections of a galaxy, the average distance is still several thousand star diameters. It is, therefore, possible that two galaxies might "collide" by going through each other without a single star collision. In reality, there might be some very close approaches, but the overall picture would be that nothing happens at all.

—WILLY LEY