1
H
Hydrogen
1.00197

The Hindenburg

Time agents like to rendezvous at famous disasters. It goes with the personality. They don't trust you to remember the date otherwise.

Which was why I met Ivan at Lakehurst Naval Air Base, on the day the Hindenburg was due to burst into flame.

We were in the CO's office—don't think *that* wasn't hard to arrange—when he gave his report. "Herr Eidenbenz wouldn't listen to reason. So I left my briefcase under his couch and made an anonymous call to the Gestapo. He died under interrogation three days later." Ivan grinned incandescently. "No atom bomb for Uncle Adolph."

"Good work." I'm Jewish myself, and if it were up to me, Hitler would be strangled at birth. But we'd tried that once, and only made matters worse. Now we rely on men like Ivan, one-in-a-billion talents who are able to remember multiple pasts, and so guide events toward the desired future. "Have a drink."

I poured us each some of the commander's bourbon. Through the window I could see the great zeppelin, so large and placid, moving with slow grace toward the mooring tower. It was a creepy moment for me, knowing how many people were about to die.

We clicked glasses. "Poor Eidenbenz," I said. "Does it bother you, all the pain we inflict on innocents like him?"

"Are you nuts? I make history turn cartwheels. It's like being a *god!"* He gestured toward the zeppelin. "You people are no more distinct to me than so many hydrogen atoms. You rush about and bump furiously into each other, and what difference do any of you make to where the airship goes?

"Me, I can do anything I like, and who's to stop me? You can't even tell what I've done. You forget, and think it was always so."

He took out a pocket detonator and punched the button. Outside, there were sudden shouts of alarm. "You even forget I did *this."*

The flames from the burning Hindenburg cast a Satanic glow over his features.

He smiled. "Oh," he murmured, "the

humanity."

The End

1
2
He
Helium
4.0026

Jane Carter of Mars

Imagine having Dejah Thoris, Princess of Helium, for your great-grandmother! Her likeness, carved in marble, balloon breasts and all, is everywhere in that fabled city. Small wonder Jane Carter became a punk.

She awoke from a drunken sleep one morning to find a green, four-armed ogre with tusks banging his forehead on the floor before her. His tattered harness identified him as a member of the Imperial Guard.

"The Beast Men have invaded the capital!" he wailed. "You must free our people, oh princess."

"Why me?" she asked blearily. "Why not somebody who gives a damn?"

But blood will tell. The next thing she knew, the faithful remnants of the old regime had her decked out in her great-grandmother's thong and breastplates, and she was fighting on the parapets, sword in one hand and ray gun in the other.

Because she was so hung over, she had not a thought for personal safety. "Wassamatter, you never saw facial piercings before?" she said to an astonished warrior as she blew him away. "It's called a *Mohawk!"* she screamed at another, and ran him through.

The citizens, not close enough to smell her breath, were inspired, and took up arms.

The Beast Men didn't have a chance.

So it was that Jane Carter ended up, against her will, on the Imperial throne, with a scantily clad male crouching to either side of her, pouting and caressing her calves. A thousand servants rushed to do her every bidding. She was respected, revered, adored. Statues were erected in her honor.

The irony of this did not escape her.

3
Li
Lithium
6.941

Lithium for God

God sits weeping in the corner. His seraphim gently try to coax Him (God can't be made do anything He doesn't want to do, so He has to be coaxed) into taking His lithium. He requires five gigatons a day, just to function.

The Big Guy's bipolar disorder is the worst-kept secret in existence. Everyone knows how in a fit of mania he created the Heavens and the Earth in only six days. Everyone knows how, in depressive mode, he fell into such a slough of despond that he let that cretinous little toady, Morningstar, torment Job, who was the most faithful of His servants.

The problem is, God just won't admit He has a problem. He blames it all on Adam, for the apple, or on Eve, for tempting Adam. He blames it on Herod, on Hitler, on the Trilateral Commission, on anything but Himself.

"Open wide," sing the Seraphim, cheered on by all the Heavenly ranks and powers. "Take your nice medicine."

God buries His face in His hands. "Such children I have," he weeps. *"Oy gevalt,* what did I do to deserve such a family?"

"Why don't you try a little smiting?" the seraphim urge. "Wouldn't that be nice? Bangkok! It's the sexually transmitted disease capital of the world. It would be a great way of getting the Word out."

But God doesn't listen.

Meanwhile, the Kid comes slouching into Heaven (He's having a difficult adolescence), holds up His pierced hands, and says, "Look what they did to me down there! I am, like, so bummed out."

The Archangel Michael casts a jaundiced look his way. "So's your old man," he sneers.

4
Be
Beryllium
9.0122

A Beryl as Big as the Ritz

On the Gem Planet, the rarest and most valued of all substances is dirt. Just the scrapings from beneath a hobo's nails would bring enough to support him for a year.

Across the desert plains of sheer diamond wealthy tourists come. They wear slitted goggles to protect themselves from the blinding reflections of the sun. There is a red glint ahead. That is their goal.

Hexagonal in cross-section, it is the largest outcrop of pure beryl on the planet. Artisans have carved rooms into it, with fluted columns and elaborate fireplaces, and there are banquet halls and ballrooms as well. At the break of day, when the sun shines through the Ruby Mountains and dawn lases across the plains, the guests are escorted to basement safe-rooms carved from darkest emerald. Even there, the walls glimmer elegantly.

But it is not beauty that brings visitors to the Ritz-Beryllium. Beauty, for them, is so common as to be invisible.

They come for the squalor.

At the Ritz-Beryllium, maids place dust-bunnies under the beds each morning. There is always a film of grime on the bureaus and the smudgy patina of fingerprints on the mirrors. The bathtubs all have rings.

It costs a fortune to stay there but, oh, it's worth it! Nowhere else on the Gem Planet can you experience uncleanliness in such joyous profusion. Many people spend a lifetime saving, in order to exult for a weekend in the kind of slovenliness that only the Ritz-Beryllium can provide. Not a one has ever been known to regret the expenditure.

On the Gem Planet, if you call somebody a filthy name, they smile and thank you.

B
Boron
10.811

Francis, Child of Scorn

Francis the Talking Mule awoke from a long and dreamless night to find himself part of a twenty-mule team, hauling ore from the borax mines in Death Valley.

It was a waking nightmare.

"This can't be happening to me!" he cried. "I'm an *artiste!* Okay, so I'm a comedian. Maybe I work in the movies rather than the legitimate theater. Still, art is art. I've dedicated my life to the elevation of the spirit. What am I doing here?"

The other mules looked at him as if he were mad. One of them snickered. Another brayed. It was obvious to Francis that he was the only talking mule there.

The mule skinner strode up. He was a tall cowboy with a long, somewhat lopsided face. He looked strangely familiar. "All right, Mr. Mule," he said. "What's all this fuss about?"

"You've got to call my agent! There's been a terrible mistake!"

"No mistake, Mr. Mule." The cowboy shook his head, making his jowls quiver. There was a twinkle in his eye. "I'm afraid you died, and were reincarnated."

"But why as a *mule,* of all things? I can sing! I can dance! I've brightened the lives of millions!"

"You were given an extraordinary opportunity and, let's be honest, you wasted it. It happens all the time. People get what they deserve. I myself used to be the president of the United States, and now I'm back where I belong. You don't see me complaining, do you? And if you did, what good would it do me?"

"My God," Francis breathed. "You're really Ronald—"

"Shhh." The cowboy put a finger to his lips. "Let's not tempt me with false pride. Now pull yourself together. It's time we got to work."

"Isn't there any way out of this?"

"Work hard, do your honest best, and when you die, you'll be reborn as a better mule. Then do it again, in your next life. If you keep at it long enough, well," the cowboy spread his hands, "there's no telling where you might end up."

It was good advice, if hard to hear. Francis knuckled down. The route from the Harmony Borax Works to Mojave covered 165 miles, one fifty-mile stretch of which was waterless. The roads were primitive, and in the summer the heat soared as high as 130°. But he bore up under it. He was, underneath all the glitter and the gab, a good soul.

Sometimes, he and the cowboy spent the evening together, talking about the old days in Hollywood.

Other times, though, a sense of the monstrous injustice of life would swell up in him, and he'd cry out, "Why must I be stuck in this ludicrous body? Why couldn't I have been reborn as Olivier or Gielgud?"

The cowboy always took it in stride. "There you go again, Mr. Mule," he'd say, with a little smile. "There you go again."

6
C
Carbon
12.0115

They're Made of Carbon

"They're made of carbon."

"Ew!"

"Linked to hydrogen and oxygen atoms, mostly."

"Yuk."

"Look, Seraph, it's not our job to pass judgment. Our job is to seek out all intelligent races and welcome them into the Galactic Ekumen, thus bringing them the benefits of peace, prosperity, immortality, blah blah blah. I can read your thoughts and, quite frankly, they're not worthy of you."

"Yes, but ... physical matter! If it were merely one of the lower spiritual levels, I'd understand, but they're completely embedded in mundane reality. It's just too much to ask."

"What do you suggest we do?"

"Let's give them a miss. There's a lovely little group mind in ..."

"Not a chance."

"Look at this place! There must be millions of souls here! Billions! How can they live so close

together? They're hardly worth the trouble."

"Ours not to question why, Seraph. Ours but to do or fall into spiritual error."

"But ... very well, sir."

"Good. Now, establish contact with them. I'm anxious to get this over and done with."

"I've been trying, sir. Since we first arrived here. I foresaw my lapse into near-disobedience, and began the communications process as an act of contrition."

"Good lad. What do they say?"

"Nothing, sir. I don't think they can hear me."

"What?! How long have you been trying?"

"Since we arrived here. Three thousand years."

"And they haven't responded?"

"They're made out of carbon. They don't appear to pick up ethereal vibrations very well."

"What have you been broadcasting?"

"The Eschatologica Universalis. It's very popular among emergent spiritual civilizations. Then I tried the Milky Way Sutra. No response."

"Too elevated. Try something less highbrow."

"I've also been broadcasting a few self-evident ethical systems, 'Life is Sacred,' 'The Ecstacy of Existence,' baby stuff like that. They don't seem able to pick up on them either."

"Simplify, simplify! Reduce the Message to its least common denominator, and push it with everything you've got. Once we've made contact, we can build on that."

"All right, chief. Hey—you there! Have a nice day! *Have a nice day!"*

(with apologies to Terry Bisson)

7
N
Nitrogen
14.0067

Nitrogen: An Introduction

Nitrogen is a colorless, odorless, tasteless gaseous element. It neither burns nor supports combustion. It is relatively inactive, though it does combine with oxygen and some active metals. It is a constituent of ammonia, nitric acid, amino acids, and many fertilizers, dyes, and explosives.

Roughly four-fifths of Earth's atmosphere is nitrogen. Its moderating effect on the far more reactive oxygen is what makes life possible on this planet. It is present in all living matter, chiefly in proteins, and may therefore be considered essential to life. Nitrogen fixation is the process of extracting free nitrogen from the air by combining it with other elements, either by chemical means or by bacterial action. Bacterial agents, called nitrogen fixers, are found in the nodules of leguminous plants, such as alfalfa, peas, and soybeans.

There are many commercial means of nitrogen fixation. These include the cyanamid process for producing ammonia, the arc process for nitric acid, and the Haber process, in which ammonia is synthesized through direct combination of nitrogen and hydrogen.

Elves and gnomes, working out of a factory complex in Trenton, New Jersey, employ vast quantities of nitrogen in the daily generation of night.

Whence the name.

8
O
Oxygen
15.9994

Oxygen Planets

Of all life-bearing worlds, oxygen planets are the rarest and most valuable.

Stars, of course, are as common as dirt, and as filthy with life. Sundwellers as large as Australia and as small as the state of New Jersey infest the surface of even so common a star as our own. A red giant like Aldebaran holds so many living creatures on its surface that it's a wonder any light gets out at all. Most of the leaders and industrialists of the Known Universe come from red giants.

Next after stars come the gas giants. Ammonia atmospheres, for some reason, are particularly conducive to intelligent life. Since

ammonia-based life forms are almost universally floaters, lacking even rudimentary manipulating limbs, they lead lives of the mind. Most of the philosophers and theologians of the Known Universe come from gas giants.

Third in line are the vacuum planets. Free of the corrosive effects of an atmosphere, an enormous variety of magnetic, gravitic, and energy-based civilizations have arisen. These are the artisan races—the merchants, mechanics, and artists.

Last of all, and most valued, are the oxygen planets, often called the "Goldilocks worlds" because in order to hold the extensive oceans that make such atmospheres stable, they must be neither too far from their suns nor too near, but can only exist at a "just right" distance.

The oxygen planets are valued for their intelligent species. An oxygen race typically employs tools, shows enormous ingenuity under stress, is fiercely loyal and yet irrepressibly playful, and is capable of being taught almost any skill.

They make great pets.

9
F
Fluorine
18.9984

The Message

The John Birch Society was right. Fluoridation *is* a plot. Not of Communists, however.

Toothpaste, it turns out, is a virus from outer space.

Impossibly distant, wonderfully evolved aliens detected our existence long eons ago. Benevolent creatures of ethereal purity, they resolved to do what they could to improve our lives. At enormous cost, they devised viral messengers of great subtlety and launched them across the void.

For a million years, the dust floated between stars. Hominids emerged from the African veldt and, as foreseen, built civilizations. Finally, in the late 1950s and early 1960s, the viral messengers arrived, floating down unnoticed from the night sky.

Nanomachines unpacked themselves. Insights

spontaneously blossomed within human brains. By a series of what seemed logical decisions, fluoride was introduced into the drinking water.

Unfortunately, the aliens had conquered their baser instincts so long ago that they had completely forgotten about war, racism, aggression, and all the myriad woes we humans bring upon ourselves. These they could easily have cured. But they knew nothing of them. So they gave us the greatest gift they could think of.

The purpose of fluoridation is to prevent tooth decay.

10
Ne
Neon
20.183

House Rules

I met the Devil in Las Vegas. He lives there full-time now. He says the light is good for his skin. We walked down the Strip at midnight, the neon reflected in his wraparound shades, and as we walked, I saw how his people adored him. Hookers seized his hand and kissed it fervently. Croupiers genuflected as he passed.

"They called Elvis the King," I remarked. "But really, the title belongs to you."

"Oh, pshaw!" the Devil said, pleased. "What a sycophantic little toady you are! You must be hoping to sell me your soul."

"Well ..."

"I gave up on that. Got out of the direct sales end of the business entirely. Too much quibbling about clauses and legalisms. I was spending all my time with lawyers! That's no way to live."

"You don't collect souls anymore?"

"I didn't say *that.* Here, let me show how it's done now."

We went into a casino thronged with people playing the slots. Now and again, bells would ring and a player would scoop up coins and feed them back into the machine, emotionless as a robot.

"The machines are rigged to return a fixed percentage of the take." The Devil gestured

toward the roulette wheel. "There are thirty-eight numbers, including the zero and double-zero. If you win, we pay off thirty-six to one. In the long run, the house always wins. It's like a tax on people who don't understand mathematics."

"Sometimes people hit the jackpot, though."

"Yes, and they're always welcome back. We'll send a private jet for them, if that's what it takes. They invariably end up broke and in hock to the IRS within the year."

"This is legal?"

"Oh, yes. Let me show you." He led me to the poker tables. I couldn't help noticing how grim and joyless all the players looked. "Poker is one of those rare games where, if you keep track of what cards have been played and maintain a cool head, the odds favor a skilled player."

He placed his hand on a card-player's shoulder. "Excuse me, sir. You've been counting the cards. I'm afraid you'll have to leave."

The man looked up belligerently. "Yeah, so what? I ..."

The Devil's eyes glowed red. "Don't make me call the police."

The man left quickly.

"And that's all there is to it?" I asked, as we left the casino.

"That's all. Our clientele leave in despair—a sin in itself—and in order to get back into the game, they'll commit any atrocity imaginable. The odds always favor the house."

"And then you take their souls to Hell."

"Oh, not any more. We've modernized." The Devil indicated one of the neon signs. "Look inside the tube. See? Those are souls in torment. What a marvelous, jittery light they give off. It makes you subliminally nervous, and that in turn makes you more likely to gamble."

I don't mind admitting that actually looking at the tormented souls made me a little nervous myself. Suddenly, this whole thing didn't seem such a good idea after all. And since the Devil wasn't buying ... I figured I might as well cut my losses.

"Well," I said uneasily, "I'll be seeing you."

The Devil showed his teeth in a wide smile. "Oh, I'd bet money on it."

11
Na
Sodium
22.9898

Electric Pickles

Try it yourself: in a dim room, impale a kosher dill pickle on two prongs, each of which is attached to one wire from an electric cord. Then (observing all possible safety precautions) plug it in.

Briefly, little happens. You hear a hum. You smell a stench. A wisp of smoke floats upward from the tormented pickle.

And then—what's this? One end of the pickle *lights up!* It sheds a lovely flickering yellow glow. In the darkened room, the effect is entrancing.

It's a moment of wonder and magic.

Here's the explanation: the atoms of NaCl salt in the pickle's brine exist as free-floating sodium and chlorine ions within the watery interstices of its cells. When electricity is pumped through the system, the sodium ions rush to one pole of your homemade device to seize an electron and make themselves complete. The ion rises one quantum level up and is made temporarily complete.

Like a not-fully-competent juggler, however, the sodium ion can seize the extra electron but cannot hold it. The ion falls from the higher energy quantum to the lower, releasing a packet of light in the process. Thus the lovely yellow glow.

Shakespeare was an electric pickle, and so was Virginia Woolf when she wrote *A Room of One's Own.* They were hooked into the psychic electricity of their times. They took in more energy than one person can hold. They went up a quantum. They fell back down. They shed light.

Try it yourself: plug into the Zeitgeist. Feel the power. Now create a work of art. Shed the light.

See how easy it is? I told you so.

The pickle, unfortunately, is not much good for anything after this exercise. Throw it out.

12
Mg
Magnesium
24.312

Under's Game

The spaceships burned brightly in the vacuum between stars. They were a hundred miles long at a minimum. The tiny ships of the Space Force darted in and out among the flaming wrecks, dodging the Invader fleet's death rays when they could and dying when they couldn't. Courage was on the side of the Space Force. Numbers were on the side of the Invaders.

"It doesn't make any sense," Under said petulantly. "How can they burn in outer space? There's no air there. It's stupid."

"The hulls are made of pure magnesium. The Invaders breathe oxygen. One direct hit, and the two combine. What's so hard to believe about that?" his instructor asked the young military genius. "Let's test your skill. Take the controls. Show me how good you are."

Under picked up the pad, shifted forces along seven vectors at once, launched plasma torpedoes, and suddenly a full quarter of the Invader fleet was in flames. Then he threw the controller aside. "It's a dumb game. Aren't there any Cheez Doodles left?" He dug a hand under the sofa cushions, searching.

"Please," the instructor begged, tears in his eyes. He was a general, and the one who had convinced the Government of Earth to put all its defenses under the control of one prepubescent boy. The Invaders were better strategists than any adult human, and better tacticians as well. It only made sense to hand over all the Space Force to one boy and then (so he wouldn't freeze up under the responsibility) keep the reality of the situation from him. "You can have ice cream if you win. With sprinkles!"

Under's eyes gleamed. He snatched up the game pad, and launched a series of commands. The Space Force twisted, turned … and fled into hyperspace.

The Invader fleet followed.

"We're doomed!" the general wailed. All the vector lines on the display converged upon one small blue-and-white planet. "You're leading the Invaders straight toward Earth."

"That's what they think too." Under bit his lip and twisted on the couch. His thumbs were a blur. "But watch this. Our ships burn every ounce of fuel they've got and—there's no way the enemy can predict this—their vectors take them right through the Sun's corona . Their hulls are plasteel—they can take the heat. That gives them a slingshot gravity assist of ten gees. Just within performance tolerance of the crews."

"But now they can't maneuver!"

"They don't have to. Watch. The last of our ships is leaving the sun's chromosphere, and the first of theirs is entering."

There was a glint of light as the first Invader ship vaporized.

"See? Magnesium hulls, just like you said. Up in flames, and bye-bye Invaders!" He tossed the controls to the general. "Here, catch!"

The general stood mesmerized as the Invader menace evanesced, one instant a threat to human existence and the next instant only a memory.

"This is a great moment for humanity," he said, tears in his eyes. His thumb moved, inputting orders for the Space Force. Then he frowned. "They're not responding. They're still headed for Earth!"

"Yeah, pretty neat, huh? I figured they're out of fuel, anyway, so they might as well go out with a bang. So I aimed them straight at Home Base."

"But this is terrible! At those speeds, they'll hit us with all the force of so many nuclear bombs!"

"Hell," Under said. "It's only a game."

13
Al
Aluminum
26.9815

Aluminum Foil

The only way to protect yourself from mind-control beams is to wrap your head in aluminum foil. Amateurs usually do a half-assed job of this. They cover the tops of their heads, leaving their eyes uncovered, or their nostrils. Don't make this mistake! Devise

a periscope for your eyes, or a small television screen cabled to a camera duct-taped to your shoulder. Run rubber hoses up your nostrils so you can breathe. After a day or so, you stop noticing the smell. Swathe your head completely in three to five layers of foil.

There are many benefits to freeing yourself from mind-control beams. Loved ones speak to you more directly. Religious missionaries stop approaching you in airports. Most importantly, the world begins at last to make sense.

Even if you're under the influence of mind-control beams, it's possible to set yourself free. The first step is to admit that there's something wrong with reality. Not you—reality! Begin by paying attention to what you're doing. Ask yourself if it makes sense. That haircut you got the other day … What were you thinking? Those clothes in your closet that you've never gotten around to wearing … Would a sane person have spent money on plaid trousers? You don't even *like* plaid.

Stop! Right now! *What are you doing?* Reading an online story about mind-control beams and plaid trousers? Does that make any sense to you at all?

I didn't think so.

The roll of Alcoa is in the kitchen, in the drawer by the sink. Go get it. Now. Cover your head entirely, using all of the roll just to be safe. Be sure it's loose enough so you can breathe. Leave a tiny slit to see through, about as wide as a line of type on your computer monitor.

Lean your head forward, close to the CRT, so you can read these words, a line at a time. Are you ready? Good.

Now let's talk about the dangers of exposure to computer monitors.

14
Si
Silicon
28.0855

Programmable Breasts

The new Wonderbreasts have just been released and there's no escaping the ads: on billboards, bulging out of evening gowns and glowing bright as neon. Over the radio, playing

seductive music from subcutaneous woofers and tweeters. The TV commercials demonstrating their prehensile abilities are eye-popping.

Reality moved beyond satire decades ago.

Women no longer look even remotely human. They have no noses to speak of. Their lips are enormous. Their eyes, modeled after those of the latest anime sex-heroines, originally belonged to cows.

By today's standards, I am a pervert.

I have what is now classified as a retro-fetish. I desire only natural women, with soft breasts, the hips God gave them, and gently curving stomachs incapable of flashing real-time downloads of the Dow Jones Industrial Average.

At night, I prowl the bars in seedy parts of town, looking for women so poor and marginalized they've never mutilated themselves. I take them home and touch their perfect bodies, and on a good night I convince them, briefly, that they are beautiful.

But then the grey light of morning comes, returning to them their ugliness and self-loathing. They slink away, miserable and ashamed. Nothing I can say will change their minds.

These are the women who turn me on. These are the women I love. Someday, I'll find one who'll stay.

15
P
Phosphorus
30.97376

Blockade Runners

At night the water in the Ocean of Dreams is phosphorescent. Our galleon trails long swirls of blue and white and green in its wake. The creatures that dwell below are phosphorescent as well, in places and patches, according to their nature. Sometimes a great serpent will glide by beneath us, its spots all in a line as regular as the windows of a passing train. But larger, much larger! So large it can take an hour to pass us.

None of the crew are native to this life. I was a stockbroker in the waking lands. I never

expected to become a privateer. I never expected to rise through the ranks to become captain. And I certainly never expected I'd someday operate under a letter of marque from Lucifer himself.

But these things happen.

We were positioned offshore of Arcadian Greece when we spotted three fat merchanters trying to ride the winds past our blockade. In quick order we engaged with them, and sent two ships to the bottom of the sea. The third we grappled with and boarded. After a brief but furious hand-to-hand, we were victorious. We took its treasure to add to our own, and scuttled the ship, sending it to join its sisters below.

That night (it is always night on the Ocean of Dreams), Will, the cabin boy, came to see me. "There's a noise in the for'ard storage, sir."

"Is there, now?" I seized my pistol. "Lead the way."

So we caught Midshipman Homer in the treasure locker. He'd broken open a chest of Stories and was greedily filling his pockets. The phosphorescence from within lit up his gloating face. How his expression changed when I cocked the pistol and laid it to his head!

All the crew turned out for the discipline. I stripped Homer of his rank. Then I blinded him with my own two thumbs. "You wanted Story?" I thrust a handful of the stuff into his mouth. "Eat it!"

Then I had him flung overboard.

Several nights later, young Will approached me and said, "It seems a harsh punishment on Midship—I mean, on Mister Homer."

"He was within swimming distance of Greece —just. If he guessed the right direction, he might have made it ashore. He could find work as a storyteller, then. The pay's not good, but it'll keep him alive."

"Why do we live like this? What makes Stories so important?"

I sighed. "I don't know, lad. It's possible that they make people stronger or wiser or better, somehow. The Devil doesn't want them to get through, and that's good enough for the likes of us."

Which was the end of that. But I had my eye on young Will now. He seemed a likely lad. So the next time we made port (in a dingy wooden London, in Renaissance England), I gave him a pistol and cutlass, and set him to

guard the treasure room while I went ashore for provisions.

"Keep a sharp eye out," I told the boy, "and *don't* get any smart ideas."

The phosphorescent glow of our hoarded Stories bathed the lad in uncertain light. He stood to attention and said, "I won't, sir."

"See that you don't, Master Shakespeare," I said. "See that you don't."

16
S
Sulfur
32.064

Vitriol

Oil of vitriol is nothing but concentrated sulfuric acid. But, applied lightly, it can blister the skin, and, when heated, it will eat its way through steel. Loaded into a pen, it can be used to write reviews.

The terrorist organization known as the International Brotherhood of Critics grades its vitriol from one to ten. Grade one vitriol is known informally as "break-down-in-tears." Grade two is called "punch-the-wall-and-kick-the-cat." And so on. Grade ten vitriol—he best there is—is sometimes called "career-killer" and other times "cause-for-suicide." So much depends on the skill with which it is deployed!

Vitriol is distilled by the critics themselves from the embittered blood of writers. A quick kill, therefore, produces a weak vitriol. It is for this reason that a skilled critic will leaven his criticism with small praise in order to keep his victims alive and suffering for as many years as he can. It is for this reason that the critics refer to their distillation as the Great Art.

The vitriol of London is very, very strong. Connoisseurs delight in the vitriol of Paris. But for good old-fashioned ridding the world of talent, there's just no beating the vitriol of New York.

17
Cl

Chlorine
35.453

Seven Days of Creation

On Monday, we filled the swimming pool with sterile water and added the self-replicating long-chain polymers. It was a shoestring operation from the first. The lab used to be a public swimming pool, before we bought it, cleaned it, and rigged it with our makeshift instrumentation. We added some sugar to the mix, and let things simmer.

Tuesday, the pool was filled to capacity with nanotechnic life forms. We set about teaching them first how to compute, and then how to reason. Since they reproduced at the rate of thousands of generations per hour, evolutionary pressures quickly boosted their intelligence.

Wednesday, the nanotech organisms achieved full consciousness. We broke out the champagne. Perhaps a few of us had too much. Dr. Wilkinson was discovered in a supply closet with a young lab tech. Who could blame her, though? We were all feeling exultant.

Thursday, the pool-life demanded Internet access. By the time we discovered they were dealing with our corporate rivals and buying stock on margin, they were heavily invested in new technology, and owned several valuable patents. Dr. Wilkinson had a stern talk with them about the necessity of going through proper channels.

Friday, we discovered that the lab had been bought by a consortium that turned out to be a blind for our pool life. It felt a little strange to be working for our own experiment, but Dr. Wilkinson called us all together and reminded us that we live in a capitalist system, and that it's useless to complain about its rules. The pool life were so pleased with her speech that they gave her a cash bonus.

Saturday, decadence set in. A memo from our superiors directed us to devote all efforts toward the development of water-soluble drugs. A second memo declared that henceforth all lab personnel were to dress appropriately for Victorian Lingerie Tuesdays. A third memo stated that Dr. Wilkinson was required to change her name to Fifi. Morale plummeted.

On Sunday, the pool life declared its intent to take over the world and enslave all of humanity. Dr. Wilkinson poured fifteen gallons of Clorox into the pool, killing everything within. We gathered, aghast, at the pool's edge, and stared down at its browning contents. Somebody began to cry.

"Don't feel sorry for *them,"* Dr. Wilkinson said angrily. "They were just scum."

18
Ar
Argon
39.948

The Eye of Argon

Argon the Archer was not the strongest of warriors, nor the most skilled. But he had a preternatural eye for weakness. When hunting aurochs, he put his shaft into the sweet spot between the bull's neck and shoulder. When fishing for trout, he shot them cleanly through the gills. If you put an uncut diamond before him, he would study it, eyes narrowed, for an hour or three, and then, with a single sure and decisive movement, stretch out a hand to *tap* it with one nail and … bingo. Facets.

But his was a minor skill, little valued in the Stilted City, where one citizen might have the power to turn silver into gold, and another the ability to call deer from the forest and birds out of the sky. He was respected as a man, but never highly valued.

Until, that is, the day that the dragon Smaraugh attacked.

At the darkest moment of the battle, when the wooden battlements were ablaze, and the bucket brigades beginning to falter, Argon stood high on a rooftop, arrow notched, and squinted through the smoke. Smaraugh came soaring toward the city, low over the lake, reeking of wrath and supernatural vengeance. His true target was Gloradrial the elf-queen, whom the Lake-Men in their pride had granted asylum from the fiendish Lords of Darkness. But the destruction of the fabled Stilted City was a gladness in his evil heart.

Onward came the dragon, a flying mountain of destruction. Golden dragon-fire dripped from his jaws.

Argon lifted his bow, pulled the string back to his ear.

He loosed his shaft.

Straight and true that arrow flew! Its fletches burst into flame as they passed through the dragon's fire. Its shaft was crisped and blackened when it hit the dragon in a narrow gap between its mighty scales. It sank deep

within the great worm's flesh.

And as the dragon's dying body fell, twisting and spasming, into the center of the lake, a hand clapped Argon on the shoulder.

"Well shot, bold archer!" cried a gladsome lady's voice. It was the elf-queen Gloradrial herself.

Argon, who had been staring, stunned, at the mighty dying creature, spun around. In his hand was his next arrow. Reflexively, he saw where she was weakest. Reflexively, he jabbed upward, toward the holy lady's heart. All in a wonderment, he saw how her eyes widened. Her life's blood spattered him as she fell.

"Oops," he said.

19
Potassium
K
39.0983

Bananas

Electrolytes are the message-bearing ions within your body capable of moving across cell membranes. Without them, you couldn't function. But if you want to avoid heart disease—if you want to live forever—you must first adjust your electrolyte balances by dropping sodium ions and replacing them with potassium.

To do this, you must eat bananas. A *lot* of bananas. Every meal, every day, for the rest of your life.

Bananas are rich in potassium. That's why monkeys eat them. Potassium is good for all anthropoids, most definitely including humans. It promotes longevity.

Potassium is, in fact, the keystone of your immortality upgrade. It is only fair to warn you, however, that since achieving immortality is such a complex process, there will inevitably be a few minor side effects, for which you should be prepared.

The first of these is hair gain. Many patients express dismay when a thick luxurious pelt grows everywhere on their bodies except their palms and soles. Women in particular are upset at discovering they have hairy breasts. However, since those breasts can be expected to shrink to almost nothing, this is in the long

run a non-issue.

The sudden acquisition of a tail is more problematic. Particularly when young males are about, the opportunities for low humor seem almost limitless. There is no denying, however, that the new appendage can prove extremely useful, especially when brachiating. And since brachiation will be made all but mandatory by your new, stooped posture and lengthened forelimbs, this may be viewed as something of a hidden blessing.

Finally, there is the question of intelligence. Many candidates for immortality seem inordinately attached to their intellect, and grow quite irate when they realize exactly how much of it they must gave up. Readers in particular are prone to violence at this point.

However, this anger never lasts. Immortals quickly adjust to their new mental status, and even come to value and esteem it over their old. At least, that's what observers believe. Being incapable of speech, the immortals themselves of course cannot tell what they are thinking. But they seem happy enough.

All this will prove an insurmountable obstacle to some. Others, however, the more visionary and far-thinking, will realize that immortality is worth any price. The future is theirs. It can be yours, too, at a perfectly reasonable cost. Sign up today!

Come on, you apes! Do you want to live forever?

20
Ca
Calcium
40.08

Angels of the Apocalypse

I was forging bones for a certain Eastern European dictator when the Angels of the Apocalypse found me. Vlad, as I'll call him (that wasn't his name), had a serious need for bones. Working from old dental and medical records, I sculpted skulls and partial skeletons from liquid calcium, to create atrocity sites that would discredit his political opposition. Discredit them so thoroughly that no one would object when he had them exterminated.

The Angels of the Apocalypse, however, had loftier goals. One of them—an obese man, running to sweat—explained it to me.

"We need proof," he said. "Proof that the good Lord in His infinite wisdom has not seen fit to lead us to."

"You need lies."

"In the service of Truth! We're not asking you to create anything contrary to what we know to be true."

Three million dollars later, I was in Los Angeles, putting the finishing touches on a tyrannosaur skeleton with stone spear points in his vertebrae and a hominid skeleton impaled on his teeth. Out on Como Bluff, a team of creationist geologists were prepping the site where they would "find" it.

"Doesn't it bother you, employing lies and deceit like this?" I asked, when the sweaty guy came to take delivery. "I doubt the founder of your religion would approve."

"We have no choice! Darwinism must be disproved. Soon! The End Times are upon us. We have only a few years before all life ends in total and universal nuclear warfare."

I smiled. "That's a little extreme, don't you think? The Soviet Union is dead. Who's supposed to start this nuclear war of yours? Pakistan? Korea?"

The fat man smiled back at me with the smug assuredness of the righteous. "Oh, don't worry about that. We have agents at Los Alamos working on it at this very minute."

21
Sc
Scandium
44.9559

Bingham's Folly

In the early twenty-first century, scandium had almost no commercial uses, and yet because of its extreme scarcity, cost several thousand dollars a pound. In 2098 the Keely Harmonic Engine was invented and prices hit the roof. Hit the roof, smashed a hole in it, and kept going! A hundred thousand back-yard inventors fixed Keely engines to their makeshift craft and blasted into the sky to seek their fortunes in the asteroid belt.

Kate Summergarden took a more measured approach. She bought a second-hand spacecraft (one of those few that made it back)

and a flock of cheap-as-dirt claims, and founded Summergarden Specialty Ores. Oftentimes those busted mines contained significant traces of platinum, manganese, gold ... Kate was a contrarian. She went looking for everything *but* scandium.

Which was how she found herself standing almost weightless in a mineshaft in Bingham's Folly, a nothing-at-all asteroid she'd just bought for five thousand dollars and the promise of a ride home for Bingham himself. "I thought I'd hit it big," Bingham said sadly. "But the spectrophotometer said this seam was nothing but lead."

"Lead? This doesn't look like lead to me." Kate ran her own spectrophotometer over its surface. "Your device must be faulty. This is pure scandium."

"What?!"

"A ton of it. Enough to run all of North America for three months." Kate smiled. "Not quite enough to bring the market price down significantly, though."

Bingham drew a gun. It was a crude device. It looked to be his great-grandfather's Saturday night special. It was enough. "I'm gonna have to kill you now."

"Don't!" Kate cried. "There's enough here to make us both rich! I'll tear up the old contract."

"No," Bingham said slowly, "I think I'll keep it all for myself."

He fired.

Many people think it's impossible to fire a handgun in a vacuum. Not so. The oxidant is sealed within the shell of the bullet. An atmosphere is totally unnecessary.

Most people think it's fairly easy to shoot someone standing twenty feet away. For a skilled marksman, no problem. For somebody with little or no training, dressed in a vacuum suit, operating under stress in a low-gravity environment? Not gonna happen.

The bullet missed.

The laws of physics, however, are implacable. For every action, there's an equal but opposite reaction. Firing a handgun was like lighting a small booster rocket.

Bingham shot backwards out the mineshaft, and into eternal night.

Kate Summergarden stared after him. Bingham's Folly was small. He'd achieved

escape velocity several times over. Bingham's suit held about an hour's worth of air, and they'd been on the surface for forty minutes. She could reach her ship in five minutes, but at the speed he was going, it would take at least half an hour to find him, match speeds with him, and bring him in.

"Well, damn," Kate said. "I guess it's all mine."

22
Ti
Titanium
47.90

Killer Robots

"Damnit, Sean, comic book writers don't employ the Stanislavski method."

"I do," I said, and threw the mech into gear. The roof exploded as it straightened to full height. The walls collapsed as I strode forward.

Outside, people ran from their houses screaming. They looked like ants. It was great. I was getting a lot of insight into my character's motivation.

But when I said this to Joshua, he began waving his arms around. "Titanium doesn't have any motivation—he's just a giant killer robot! He's programmed to destroy!"

"Glad you reminded me," I said. I hit the "stomp" macro, and watched the mech do its thing. The good part was that it could flatten a house in six stomps. The bad part was that when it did, it looked like a third-grader having a hissy-fit. I was going to have to fix that in the rewrite.

"Look, maybe you should power this thing down," Joshua said. "The police are here."

"Bangin'." I began picking up cop cars and flinging them into the night. It was trickier than it sounded. I had to stoop down and keep the mech's back straight or else it would topple over. But when the cars hit, they burst into flames. It was way cool. "I've got a good feeling about this project. *Titanium* is gonna win awards!"

"I don't know why I even bother talking to you," Joshua said in a resigned tone.

"Because I've got the mad skills, that's why. Hey! Wanna see this baby take out a

skyscraper?"

"Not really, no." Joshua was silent for a few minutes while I strode the mech across the Walt Whitman Bridge, toward Philadelphia. (Lots of good material there.) Then, abruptly, he said, "What's the name of that writer who used to work with you on *Bot Killer?"*

"Ben Davis. Talented guy, but a little lazy. He wasn't willing to do the kind of research it takes to write a first-rate comic." I toppled a water tower. "Why?"

Joshua pointed fearfully up into the sky. A monstrous flying transformer-type robot was roaring toward us. It loosed air-to-ground missiles. "Because I think he's just gotten a frazz more ambitious."

The bridge exploded at our feet, and the mech plunged deep into the Delaware. I seized the controls, and brought my offensive weaponry online.

This was going to be great!

23
V
Vanadium
50.9415

Vanadium

Vanadium is an extremely dull element. It is God's own couch potato. It doesn't do much, and it rarely goes out. Vanadium never shows up at your door in fabulous drag with a rental tuxedo in your size and invites you to go out dancing with it in exclusive nightclubs into the wee hours of the morning. Vanadium never snaps a tendon while climbing the Matterhorn and falls twenty feet into the empty air, only to be saved by a well-pounded piton and the skill of its companions. Vanadium never wins the Nobel Prize for its work on behalf of refugee children and standing before the King of Sweden breaks down in tears at the thought of how many lives the prize money will save.

Vanadium is a nonferrous metal. Big whoop.

It's not as if all nonferrous metals are underachievers. Look at platinum! Look at silver! Gold is, for Pete's sake, a noble element! These are polished, achiever metals. They're welcome everywhere. They can any one of them be seen dining with Sharon Stone in St. Croix, while Jack Nicholson leans over

the crisp white tablecloth with that signature leer of his to make a sly joke. British cabinet members confer with them in darkened Jacobean rooms redolent of single malt whisky, Cuban cigars, and treason. They keep company with smugglers, with sheiks, with beautiful women, with women who are almost beautiful but distinctly intriguing, with women who were once beautiful and now have deliciously scandalous pasts.

Not vanadium. Vanadium is the twenty-second most abundant element in the Earth's crust, neither rare enough to be interesting nor common enough to be ubiquitous. It was first commercially mined in Peru, which is promising, and is used in producing rust-resistant steel for high-speed tools, which is not. Vanadium foil is employed as a bonding agent for cladding titanium to steel, and that pretty much says it all.

It does not burst into flames upon contact with the air.

Nor does it act to block gravity waves—a sphere covered in retractable panels of vanadium will not shoot off into space, making interplanetary travel swift and economical, even for Victorians. Nor does exposure to it cause Superman to suffer unpredictable never-to-be-repeated side effects, such as morbid obesity, or a compulsion to dress in women's clothing, or turning into a vampire plant. It will give nobody the heightened senses and disproportionate strength of a spider.

There is so little to be said in vanadium's favor! It is a soft and ductile white metal. So what? Its boiling point is 3,450° Centigrade. Who cares? It has no desirable properties and, worse, no ambition to achieve any. There it is, and there it will stay. I've wasted more than enough time on it already. I wash my hands of it forever!

Vanadium is an essential element in the diets of chickens.

24
Cr
Chromium
51.996

Babe

She was a dual-cam '57 Chevy, with a Pentium 88 CPU, raked tail fins, and chrome up to here. She put the top down when she saw me

coming, and I vaulted over the side and into the driver's seat. She fit me snug as a glove.

"Where to, boss?" she asked.

"Anywhere you like, Babe. Let's go cruising."

And we hit the road. Top down, radio blasting, and a big fat harvest moon chasing us down the night.

We were somewhere in northern Oklahoma when a pale white convertible blasted by us as if we were standing still. It was driven by a woman with long blonde hair that waved behind her like a flag. She was young, and she had great breasts. I could tell because she wasn't wearing a blouse. She flipped us the finger as she roared past.

There was a hand-made sign taped to the trunk: IF YOU CATCH ME, YOU CAN *HAVE* ME.

"Whaddaya think, Babe? Can we catch her?"

"She's as good as yours, boss."

Babe surged forward.

Three states and as many hours later, we caught up to the pale convertible. Babe feinted left, then sped to the right, and passed it on the shoulder. She got right in front of our quarry, then slowed her to a stop, right at the lip of the Grand Canyon.

I took my reward in the back seat of the stranger's car. Its AI wasn't programmed for personality, and didn't mind being turned off to give us privacy. Afterwards, we talked.

The lady's name was Celeste. We really hit it off. We were kindred spirits. By the time that dawn came up over the Canyon, we were both head-over-heels in love.

I didn't have any permanent abode, so Celeste offered to let me live with her. I figured that maybe it was time I gave up my rootless ways, so I said yes. We agreed that I'd drive, and her car could follow us home. I ripped the sign off her trunk, and threw it away.

But when I got back to Babe, the top was up, and she wouldn't open the doors. "C'mon," I said. "Stop kidding around."

"How *could* you?" Babe began to cry. "Haven't I always been here for you? What can that slut possibly offer you that I can't?"

"Well, see, when a man and a woman ..."

"It's about *sex,* isn't it? Always sex! Damn it, love is more than just body parts going at it. Love is the spiritual union of true hearts and

true minds. I thought we had that! I thought we had something special."

"Now, don't be like that," I said, embarrassed. "I'm not getting rid of you or anything. Celeste and I—"

"I won't share you! I won't!"

Wheels squealing, Babe threw herself into reverse. Then she stopped, raced her engine until it screamed, and surged forward.

"Celeste!" I yelled. "Run!"

But she wasn't trying to run down Celeste after all, or me either for that matter. She hit full speed, and went right over the lip of the Grand Canyon. Briefly, she flew.

When she hit bottom, she burst into flame.

Celeste gently placed an arm around my waist. I shook my head sadly. "Women," I said. "Who can figure them?"

25
Mn
Manganese
54.9380

Graffiti

The artists of Lascaux used manganese ores and charcoal to mix their black pigments. Those of the Renaissance used manganese oxide to enrich the brown in their umbers. Manganese blue went extinct in the twentieth century. The twentieth and twenty-first centuries had a *lot* of artists, most of them bad but all of them wanting the very finest paints. By the time humanity planted its first colonies in deep space, all the best natural pigments had been depleted from the surface of the Earth.

Bumwart was an outer-belt asteroid so far distant from the Earth that when Sam Evensong bumped down on it he'd been traveling for three months. An extreme-long-distance assay commissioned by Summergarden Specialty Ores had indicated that Bumwart was rich in manganese and iron oxides. Sam had been sent because he didn't mind being alone. He spent the three months doodling on his electronic artpad. It was all he really cared for.

The assay was right. Sam spent another month

digging out the finest natural pigments he'd ever had the pleasure to handle. When the ship's cargo pod was full, he strapped himself into the pilot's seat and switched on the Keely engine.

With a *flash,* the Eiseley tube blew.

The engine died.

All the life-support systems were on backup, so *they* were okay. Sam had a year's supply of food and oxygen, so *he* was okay. But the ship wasn't going anywhere without a new Eiseley tube, and of course it didn't carry a spare. So Sam called back to home base. They promised to send a rescue drone right away. "Just hang in for three months," Summergarden's comptroller said, "and you'll be fine."

"No problem." Sam picked up his artpad. It wouldn't turn on. It had been recharging when the tube exploded. The power surge had burnt it out.

"Well, what the heck am I going to do *now?"* he asked himself. He glanced out a side porthole at the asteroid's surface. Smooth and inviting, like a sheet of paper. He thought of all the pigments in the cargo pod.

Three months later, when the rescue drone arrived with the new Eiseley tube, the cargo pod was almost empty, and the entire asteroid was covered with enormous drawings. Bison! Horses! Spacecraft! Whales!

Sam returned to Earth, where he was fired without severance pay.

A hundred years later, Bumwart (by then, renamed Evensong) was declared a Solar System Cultural Treasure.

A thousand years later, over the strong objections of the local populace, it was moved into orbit over Planet-of-Peace, the capital of the Milky Way Confederation of Worlds, where it could be properly appreciated.

Today it is the sole surviving artifact of that intriguing race once known as Humanity.

Sam got a job as a janitor. It was easy work, and gave him plenty of time to sketch at night. He was happy.

Iron
55.847

The Era of the Iron Horse

Things might have been different if Columbus's ships hadn't sunk immediately upon arrival in the New World. Things might have been different if there hadn't been a gunsmith and a blacksmith on board. Things would *definitely* be different if the Carib Indians hadn't taken to the new technology like fish to water. By the time Leopoldo di Pisa discovered Mexico in 1598, both North and South America were in the throes of an industrial revolution, the Aztec Empire had fallen, and the Incas had extended their civilization northward through Mexico into modern-day Texas.

There they encountered the Plains Tribes.

There is no more romantic image than that of an Apache warrior in war paint, leather jacket, and shades, sitting astride his "iron horse," as motorcycles were then called. There was no more terrifying sound for an Inca noble than the sudden roar of a Comanche war party swooping down upon a convoy of supply trucks.

Though we still see the Plains warriors as freedom fighters, the end result of the war was a foregone conclusion. The industrial base was with the Incas. History favors those who have technological superiority.

Comanche and Apache warriors so proved their courage and skill however, that they are employed even today as mercenaries to pacify the natives on those rare occasions when they attempt to break out of their reservations in Austria and Russia.

27
Co
Cobalt
58.9332

Merfolk

The first deliveries of asteroidal cobalt were flown down to the north central Pacific Ocean in the form of lifting bodies in the year 2116. The splash-point was just off the coast of Hawaii. By chance, this was not far from Poseidonis, the undersea city where lived the water-breathers who gathered cobalt deposits from the shallow ocean floor.

Each lifting body contained as much cobalt as could be mined from the Pacific in a year. Seven came down in the space of a single week. Before that week was over, twenty thousand merfolk found themselves out of work.

They had a mass meeting in the SubPacifica Amphitheater.

Just what are we supposed to do now? one signed. *I paid my life savings for these*—he indicated his gills—*and now there isn't any work!*

"We need welders and cutters to disassemble the lifting bodies for processing," said the government spokeswoman. A translator signed her words as she spoke them. "There'll be openings for—oh, maybe two hundred of you."

As one, the assembled mermen and merwomen rose to their feet and shook their fists in a silent howl of outrage. *No!* they signed, and *Strike!* they demanded, and *Riot!* it became.

They boiled up out of the amphitheater.

By the time the riots had at last been quelled, nearly a hundred ships had been sunk by the merfolk, and all the dock facilities in Hawaii had been trashed. A good third of the merfolk had been killed, and half those who remained were in the hospital.

That night the government spokeswoman returned at last to her home. She was exhausted. Her lover gently took all of her clothes off, and then gave her a hot oil massage. Whenever the oil beaded up and started to drift away, he darted out a silvery hand to gather it up again.

"Was it hard?" the spokeswoman's lover asked.

"Telling an entire race of people that they're obsolete? I can't imagine anything worse."

"It's done now, though."

"Well, no, not exactly." She flipped over, so she could see the Earth, floating big and fat and beautifully obsolete through the pressurized window, and sighed. "I *really* don't look forward to going down there tomorrow and having that same discussion with the air-breathers."

28
Ni
Nickel
58.69

What This Country Needs—

"—is a good five-cent cigar!" Secretary of the Treasury Babbinger slammed a hand down on his desk. "Would somebody *please* tell me what idiot came up with that?"

"It was Thomas Marshall, sir," an unwary aide said.

"What?"

"Thomas Riley Marshall, 1854 to1927, vice president under Woodrow Wilson from 1913 through 1921, renowned for his wit, though for little else."

"Thank you," Babbinger said with heavy irony. *"Thank* you for that history lesson, young master Stewart. Our entire economy is about to collapse, and you're lecturing me about Woodrow Wilson's witty vice president!"

"To be fair, sir," another aide said, "I don't see what damage the new personal nanofactories are going to do. They'll bring prices down—that's a good thing! I dumped my old suit in my 'factory last night, and now I've got a genuine Armani for a five dollar licensing fee."

"That," said Babbinger, "is exactly the problem. We have an economic system here that is based on scarcity and want. If everybody's going to have all the fine foods and rare wines and good clothes they want for the price of rags and gruel, then who's going to empty our spittoons and clean our toilets? Who's going to do the scut-work?"

"Perhaps we should all do our own scut-work, sir," young master Stewart said.

Babbinger glared at his aide. "I'm going to pretend you didn't say that." He patted his jacket pockets. "Damn! I left my cigar case at home."

"Here, sir. Have one of mine."

Babbinger accepted the cigar, sniffed it. "Cuban. My own brand." Anger flared in him. "By God, you've been stealing my cigars. You're fired!"

The young man didn't turn a hair. "That's fine by me, sir. I've got a couple hundred bucks saved up, and that's enough to last me for years. I've been thinking about a career change anyway. I suspect a *lot* of people have been thinking of career changes lately."

He paused at the door. "You can keep the cigar. It only cost me a nickel."

29
Cu
Copper
63.546

Lucky Penny

Hubert Smucker found it in a bottle shop—one of those funny little stores that down-and-out losers are always wandering into in fantasy stories from the 1950s. The kind that wasn't there yesterday and won't be there tomorrow, but *right now* will sell you a genuine Leonardo da Vinci oil painting of a Renaissance prince who looks exactly like you for three bucks or a love potion that really works in exchange for your soul. Oh, it was a wonderful place! The shelves were overflowing with magical parasols, globes of Narnia and Barsoom, unicorn horns, zap guns, old telephones, parchment scrolls ...

Hubert Smucker flinched away from the shelves, fearful that they would collapse and fall on him. He was the sort of person whom shelves collapsed and fell upon. He was the sort of person who gets named Hubert Smucker. He was a living jinx. He was the unluckiest man in the world.

But he'd read a lot of fantasy stories from the 1950s, so he knew what he'd stumbled into. And when he saw, sitting right atop the counter directly in front of the half-slumbering proprietor, a small, bright copper coin marked "lucky penny," he knew he had to have it.

"Is that really a lucky penny?" he asked.

"Luckiest that ever was," the old man replied.

"How much?"

The old man named a price that made him turn pale. But he paid it, scooped up the lucky penny, and feeling optimistic about the future for the very first time in his life, walked out of the shop.

At which very instant, an asteroid smashed down directly on top of him, vaporizing everything for six blocks around.

When the workers came to clean up the debris, one of them noticed a small copper coin sitting right in the very center of the wreckage, shiny

and untouched.

"Hey, look at that," he said to his buddy. "This must be the luckiest penny in the world."

30
Zn
Zinc
65.38

Brass

Tubal-cain, that industrious man, was hard at work in his smithy when the warrior walked through the door. At this time, seven generations descended from Adam, war hadn't been perfected yet. The earliest war, between Cain and Abel, was thought to have been so horrific that war would never happen again. But Seth-abel was an innovator. "What's that you're working on?" he asked.

The metal-smith turned the object in his forge. "A plowshare."

"I don't suppose you could make me one of them, only about so long, and straight, with a sharp edge on it?"

"Certainly I could." Tubal-cain lifted the glowing metal from the forge. "This long enough?"

"Yes, but I want it to be slender. Like a wedge. And put a handle at one end, with a little flange of metal above it."

Amiably, Tubal-cain put the length of brass against his anvil and with hammer and chisel cut off the excess metal. Then he hammered it long again, and set it back in the forge. "Strange harvest you must be planning," he remarked conversationally.

"Aye, a crimson one." The warrior idly picked up a bar of greyish metal. "What's this?"

"Zinc. It's what gives the brass its hardness. Copper gives it color, but zinc gives it strength."

"It's strength that matters to me. Strength and the ability to hold an edge. Your father taught you how to mix the metals, did he?"

"No, it's my own invention."

"You're the only one who knows how to make brass, then?"

"Me and my sons."

"So if I were to kill all three of you, there's nobody else who could make any more brass implements?"

"Why, what a funny thought! I suppose that's true."

The warrior grinned widely. "Well, I'll be back tomorrow, then. Be sure to have your boys here. It's been a long time since I've seen them."

He left.

Tubal-cain thought for a while. He did not like the direction of his thoughts, but he followed them where they led. Then he put two more bars of brass in the forge.

When the plowshares were done, he studied them carefully. They looked dangerous. He did not think they would be of much use breaking earth. But they might be good at other things.

The next day he called his two sons to him, and gave them each one of the brass implements. They were both good, strong lads. "Hide in the back room," he said. "Watch through the slit. Make no sound."

Uncertainly, his eldest son said, "What do you suspect, Father?"

"I can't put a name to it—it's too foul. Now go."

His sons did as he commanded. Tubal-cain returned to his forge, and to his thoughts.

If he was wrong, all was well. If right, then he would die but not his sons. They were strong and smart. They would know what to do. Two deaths would be a terrible, shocking thing, but nothing so terrible as three. He hoped he was wrong. He hoped that if he were right, this thing could be stopped here and now.

The warrior entered, whistling.

31
Ga
Gallium
69.72

Space Pirates

The very best gallium arsenide chips are grown in orbit by the Monks of San Lorenzo —those worthy men who sometimes laughingly call

themselves the "Monks of San Lagrange"— and sold only for peaceful applications. Sometimes, though, the wicked decide they need more computing power. Sometimes they decide to take matters into their own hands.

Brother Bruno was adjusting the solar mirrors in the microgravity furnace farm when the pirates attacked. Railgun-launched chunks of meteoric iron smashed through the monastery, exploding two supply sheds and the chapel. "Oh, sweet Jesus, we're going to die!" his vacuum suit exclaimed.

"Oh, hush, we are not," Brother Bruno said. "But if we were, this would be the worst possible time to be taking the Lord's name in vain."

"Forgive me, Brother," the suit said humbly.

"I do. Now—quickly—hyperlink me to every gallium arsenide chip you can."

"Done!"

Swiftly, Brother Bruno awakened the chips and directed them to assemble themselves into as powerful an AI as they could manage. Microflashes of laser light darted through the monastery farms. Mindpower swelled, doubled, tripled, centupled. An intellect vast and cool took a long amused glance around itself, absorbed the situation, and said, "What do you desire, Brother?"

"Protect the monastery!" Brother Bruno cried. "But—"

Tiny puffs of propellant gas swiveled every solar mirror in the furnace farms, focusing them all on a single spot in space. The pirate ships flew through that spot, and exploded. It happened so fast that Brother Bruno didn't even have time to finish his sentence before it was over. "—don't kill anyone," he said weakly.

"Whoops," the AI said. Then, cheerfully, "Well, what's done is done, right?"

Brother Bruno sighed. "Upload a copy of the Baltimore Catechism into this poor heathen soul," he told his suit. "Then, when its instruction is complete, I'll baptize it."

Already, the other monks were setting up a virtual space in which to pray for the souls of the departed pirates. They forgave the pirates, of course, because that was their duty. Similarly, though they required that it confess its sin and perform a sincere act of contrition, they did not really blame the AI for what it had done.

It was, after all, still young.

32
Ge
Germanium
72.59

Germanium

All of Germanium is divided into three parts. One part is inhabited by the Belgae, another by the Aquitani, and the third by those who are called Celts in their own language, and Gauls in ours. Eh? What? Are you sure? Well ... never mind. I'll just start over.

The Germanium is a beautiful flower. It belongs to the genus *Pelargonium,* and is native to South Africa. Widely grown as a house and bedding plant, many varieties have showy flowers. Others are grown for their scented leaves. The native American wild germanium or crane's-bill belongs to ... Oh, come on now! No, no, I'll take your word for it. No, really, it's fine. I'm a professional. I can work through this.

Germanium is a free and independent republic inhabited entirely by virulent microbes. The ruling smallpox party has been in power ever since the downfall of the flu faction following the broad-spectrum antibiotics scandal of 1998. It was founded in 1665 by a colony of plague bacilli seeking asylum from political persecution in Britain. Oh, God. Really, this is too much. I'm trying to *work* here! Is a little cooperation too much to ask for? Well, I guess it must be.

Okay, cleansing breath. Visualize a peaceful lake at dawn. Shake out those limbs. Release that tension. I'm okay now.

The radical feminist, Germanium Greer ... All right! That's it. Is this *personal* with you? Are you doing this to persecute me? Have I harmed you in some way? Then why are you behaving like this? No, I don't think that's it at all. I think you're ...

Yes, yes, I understand. All right. Yes, I will. And you, in turn, will try to be a little more cooperative, yes? Okay, then, one more try.

Germanium is an element. Is that correct? It *is* an element, right? Yes? Really! So I can continue without fear of further interruptions? Good. I certainly hope so. The name is derived from the English word *germane,* meaning closely related to or pertinent. This is because,

unlike other elements, germanium is not composed of neutrons and protons and electrons, but rather of pure *relevance.* What? Wrong, am I? By golly, I'll wrong you! Well, just what did you expect me to say? Really. Really. Really. Well, if that's what you want, that's what you'll get. Don't worry about *my* feelings!

Germanium is a rare, grey, brittle metallic element, somewhat resembling lead and tin. It is normally tetravalent, and is used in transistors, high-powered photoelectric eyes, and, with silicon, in lenses for infrared equipment. *Certain people* would have you believe that it is not divided into three parts, that it is neither a flower nor a republic nor a feminist, and that it is in no way relevant.

Others of us know better.

33
As
Arsenic
74.9216

Lucrezia Borgia

Lucrezia was a good girl overall, though she did have her faults. Her family, for one. It's no easy thing having the Borgias for in-laws. "Soup?" she asked her new hubby.

"No thanks." Antonio's father had had a long talk with him just before the wedding. He'd gone into Lucrezia's romantic history in some detail. It had made a lasting impression on Antonio. "I'm not hungry right now."

Lucrezia blushed. "Then, maybe a glass of wine before we ... you know?"

"I'm not thirsty either."

"I understand." She began to unbutton her blouse, and in a sultry-shy voice said, "Fetch me that little bottle of strawberry oil. You can pour it all over me, and then lick it off."

"No!"

Lucrezia's fingers froze. "Are you *gay?"*

"Of course I'm not!" Antonio flushed, and stuttered, and coughed, and then the whole story simply poured out of him: how greatly he feared poisoning. How little he desired to end up as dead as Lucrezia's six earlier husbands.

"But, darling," she protested. "That wasn't me—it was my family. You know how insanely political they all are. But you have nothing to fear on that account. You have neither position nor money, and even if you did, the pre-nups your father had me sign specify I can inherit nothing from you. I married you solely because I am deeply, passionately drawn to you. You're a very sexy man, you know. What possible reason could I have to want you dead?"

"None," Antonio admitted, abashed.

"Then show me you trust me." She popped a grape into his mouth. "Eat."

Antonio hesitated, then nodded bravely. He chewed, swallowed, and died.

Lucrezia wiped a little tear away from the corner of her eye. She had really liked this one. He had been so kind and sweet and attentive … She began unlacing his doublet.

Sometimes it was hell being a necrophile.

34
Se
Selenium
78.96

H.G. Wells on the Moon

H.G. Wells aspired to more than literary fame. He wanted to be a scientist and an inventor and an explorer as well. So when, in the course of researching one of his scientific romances, he came upon an ore of uranium that weighed no more than balsa wood, he knew immediately that he had found a material that negated gravity. The weight of the uranium was being counteracted by a minuscule impurity of an ore which he named "cavorite." He managed to refine enough of the element to coat sliding panels that covered every facet of a great metal sphere. The inside he fit with plush furniture, canisters of oxygen, food, wine, cigars—all the comforts of home.

Then he took off for the Moon.

Well, we all know what happened then. The Moon-People (though they look like giant ants, as intelligent beings and members of the United Nations, they are entitled to the sobriquet "people") captured him, and put him to work in their selenium-mines. Selenium, as the name implies (it was named after Selene,

goddess of the Moon) is rather more common on the Moon than on Earth. Electrified slurries of the material are employed in their subterranean lighting system. Ten years later, he made an escape so daring that it is today as universally known as the story of George Washington's cherry tree, and as unnecessary to recount.

In the wake of negotiations, diplomatic recognition, and normalization of relations with the Moon-People, H.G. Wells sued them for wrongful imprisonment and loss of income. A court found for him, but awarded him only an amount equal to a laborer's wage for those hours spent actually working. His petition to be recompensed for novels unwritten was turned down since, the judge ruled, there was no way of determining he actually *would* have written any such works. H. G. Wells died in 1946, in bitterness and poverty. After his return from the Moon, he never wrote again.

Which is a pity, really, since his early work was so promising.

35
Br
Bromine
79.904

Try Not To Think of Elephants

A bromide is a sedative, often taken in a glass of water. The name comes from the fact that sodium and potassium bromides were used as early sedatives. The concept of bromide has recently gained a literally cosmic significance with the assemblage of data from the new Universal Mapping Project full-spectrum satellite observatories.

Though the UMP survey is only three-quarters complete, evidence is compelling that the universe is *not* saddle-shaped, as Einstein thought, nor spherical as many before him believed. It is, instead, shaped like a slightly tapering cylinder. The proportions are startlingly similar to those of a common water glass.

Worse, the distribution of galaxies within the universe is similar to that of bubbles within a glass into which a bromide has been dropped and then stirred. Much that was puzzling about the distribution of matter within the universe is now rendered comprehensible by this insight. Moreover, cosmologists attempting to

peer beyond the limits of the universe by studying infinitesimally small distortions in its boundary tell us that they believe they have begun to establish the dark presence of an enormous hand, clutching the glass.

The price of this discovery is, of course, a potential lessening of our self-esteem. Is that all we are—negligible specks within a bromide contained within some vastly greater universe? Is that all our lives mean?

But cosmologists tell us not to despair! Ours could be a noble destiny. Perhaps the hand holding the glass containing our universe belongs to a great philosopher or theologian who, having finally discerned some key insight into the nature of God or Existence, now settles him- or herself down to a night's well-deserved sleep. Perhaps it belongs to a great peace-leader who has fallen ill upon the verge of putting an end to some all-encompassing war, and who needs but a night's rest to restore the energy needed for his climactic deed. We could be playing a key part in something great beyond our imagining.

It's best to focus on this possibility.

It's not easy, of course. There's an old joke about a man who was offered a thousand dollars if he could keep from thinking about elephants for half an hour. Two minutes later, he cried out excitedly, "I haven't thought of elephants yet!" It's impossible to look upon those computer-generated photographs of our bromidic universe and not think how much we look like a glass of Alka-Seltzer. Alka Seltzer, of course, is most commonly used as a cure for hangovers.

There's the *unbearable* part! That all our hopes and fears, aspirations and despairs, good works and bad, might be nothing but the most minor workings of a universe whose ultimate purpose is to ease the deserved sufferings of some drunken lout! There he sits, his trembling hand everywhere about us, his dim thoughts focused only on his own throbbing pain, while drops of sweat larger than supergroups of galaxies bead up on his apelike brow, rank with self-inflicted poisons. His clothes—none of the best, you may be sure—are stained, his shoelaces are untied, and perhaps his trousers are unzipped. A string of drool that could swallow up every star we can see in the night sky connects the lips of his slack-jawed mouth. And that's *it?* That's *all? That's* the purpose of our lives?

But try not to think about it.

36
Kr
Krypton
83.80

Man of Steel

"I'm pregnant," Lois Lane said.

Superman turned red. "Didn't you take precautions?"

"Of course I took precautions. Did you think a diaphragm could stop your sperm? The little bugger probably ripped right through it like it was made of tissue paper."

Involuntarily, Superman quirked a grin. "Chip off the old block."

"Yeah, well, you'd better start thinking of *rocks!* As in diamonds." Lois held up her ring hand and waggled her fingers. She knew how little it would demand of him to squeeze a lump of coal into something eye-popping. "And I expect a church wedding with a reception afterwards, and a honeymoon too." She began to cry. "All the stuff I grew up wanting. Is that too much to ask for?"

It was an ugly scene. After he'd finally managed to calm Lois down with promises and kisses, Superman flew as fast and far away as he could. Somewhere west of the North Pole was the Fortress of Solitude. That's where he went. There was a chunk of kryptonite there, wrapped in lead. He picked it up.

"To be, or not to be ..." The words sounded corny in his ears. He was not Hamlet, nor was meant to be. He was like Conan the Barbarian—a pure being, meant to solve problems by the application of brute strength alone. Women complicated everything.

Still ... He stared down at the stone in his hand. So easy. One little burst of heat vision and the lead would run like water, letting the kryptonite bathe him with its lethal radiation.

He sighed, and put the deadly nugget back on its shelf. There was no answer there. So far as he could see—and he could see very far indeed—there was no answer anywhere. He was going to have to marry Lois. He wished he liked her more.

Angrily, he punched a wall, collapsing one entire wing of the fortress and making seismographs *dance* as far south as San Francisco.

"Damn it, I'm only human!" he shouted in anguish.

But those words, too, sounded hollow and false.

37
Rb
Rubidium
85.4678

Glass Beads

At first glance, the system appeared to be full of comets. Rooster-tails of light flared everywhere and in every direction, as if the inner worlds were under cosmic bombardment from all sides. But spectrophotometer readings revealed the "comets" to be pure ionized rubidium. "Which means what?" the War Captain asked.

"Ion drives, ma'am," I said. "Rubidium can be a liquid at room temperature, and it's easily ionized. This system's occupied. By primitives."

She swore. "My orders are to disassemble the planets, build a ring of exotic matter around the sun, and convert this system to an Entelechy Gun."

"The natives aren't going to like that, ma'am."

"Damn it, my career's on the line here! Open negotiations with them, find out what they want for their system, and then *give* it to them!"

So I did. The locals were a handsome young octopedal race with twin brains and the ability to perceive across three-quarters of the electromagnetic spectrum. I made contact, explained what we wanted, and sat down to haggle. Three thousand years later, it was done.

"What did you have to pay them?" the War Captain asked when I returned.

"Star travel, immortality, a cultural upgrade to Class Three civilization, the meaning of life, and their choice of any three galaxies within a five billion light-year radius."

The War Captain stared at me for a long, unblinking moment. Then she snorted and turned away.

"Well, at least you didn't give them anything

valuable!"

38
Sr
Strontium
87.62

Fallout

Strontium-90 is the chief immediate health hazard in fallout. Because of its similarities to calcium, it is easily absorbed by plants and animals. In mammals, it will tend to concentrate in milk, presenting a particular danger to infants. Taken in large amounts, strontium-90 can cause leukemia or bone cancer. In rare instances, it can be responsible for the acquisition of superpowers.

The Chinese open-air atomic bomb tests of the early 1960s caused a rash of superheroes. Spider-Man is perhaps the best known, but such media darlings as the Fantastic Four, the Flash, the Atom and the entire first generation of X-Men were also generated by these tests. The Incredible Hulk is often lumped in with this crew, but he was the result of an overdose of gamma radiation at an American research facility.

Because the life of a superhero is glamorous, challenging, potentially lucrative, and allows one to set one's own hours, it is especially appealing to the young. This is why strontium-sniffing has become such a great problem in our schools.

Kids! Remember the odds. When some latex-clad creep with a cape and a mask offers you a packet of white powder to snort, Just Say No. "Super-huffing" can lead to serious illness and even death. Even in those rare cases where superpowers *are* acquired, it's usually a bad idea. Don't forget what happened to Wonder Woman.

Because the government cares about your health, possession of more than a grain of strontium-90 is punishable by life imprisonment without parole.

Y
Yttrium
88.9059

It: A Preliminary Account

It might be a gingham dress. It might be a horse, a cow, or a Harley-Davidson key chain. It might be a hardcover copy of Donald Barthelme's *Guilty Pleasures* (first printing, 1974). It might be the Moon.

Quickly, now. There's not much time.

It might be a certain box, buried deep in the sands of what was once an oasis, five days' walk east of Petra, that rose-red city half as old as time, containing three coins of no particular value, a tortoiseshell comb that once belonged to a tawny-skinned woman of such beauty that it hushed the very stars, and a note writ on parchment that will crumble to dust in your hands when you try to unfold it. It might be a giraffe.

Oh, do hurry!

It might be a rock, and if it is a rock, that rock might be igneous, sedimentary, or metamorphic. If igneous, it could well be quartz or granite. If sedimentary, it could be mudstone or sandstone or slate. If metamorphic, it's anybody's guess. It could well be pink.

It could be a cup residing neglected in the back of your kitchen cupboard, one that is far older than it looks, that is in fact the Holy Grail itself, though the odds are against it. It could be a whelk or a stapler or a tent. It could be a gingham dress—that very gingham dress that your great-great-great-grandmother made with her own two hands when she was only seventeen, so skillfully that as an almost-direct result and leaving out a great many details, you're here today. It could be a boat.

Only seconds left. It might be that small stain on that same gingham dress made when the callow lout who was to become your great-great-great-grandfather spilled cider on it during a pause in the dancing at the hoe-down he only reluctantly went to, and which he dabbed at with his kerchief, trying to lessen the damage and all the while becoming more and more aware of the sweet body underneath until he flushed like a Rhode Island red with embarrassment. For that matter, it might well be that sudden pale look that came over the face of the girl in the gingham dress when with a sudden leap of intuition she divined this youth's thoughts and realized, too, that she felt something akin to them towards him. It might be that small rip in the gingham dress that occurred later that same night when …

It's time, gents. Finish your accounts and clear out.

Well, perhaps we'll never know what it is, and perhaps that's just as well. *It* is a never-emptied well of possibilities; the more you take from it, the more remains. For every antecedent we can generate, a thousand, a million more swarm forth to take its place. It is as rich and fecund as the cornucopia, that fabulous horn of the goat Amalthea which suckled Zeus, perpetually overflowing with flowers, fruit, and who knows what. It is as full as the world itself, and the collective imaginations of all those who dwell within it.

It is sometimes a pronoun.

With apologies to Donald Barthelme.

40
Zn
Zirconium
91.22

It's Not Virtual Anything—It's Real Zirconium!

Real baseball is played on a diamond. Virtual baseball is played on a zirconium. You wouldn't think so small a difference would matter, but real baseball fans are snobs. If it isn't a diamond, they reason, it doesn't glitter as brightly.

Piffle!

A lot of the hostility real fans feel toward virtual sports stems simply from the fact that virtual athletes are so much *better* at what they do than real athletes are. Every sport has its golden age. You remember basketball in the 1990s, with Dr. J, Moses Malone, the Dream Team ... Compare that with what it's like today. By merest chance, the golden age of virtual baseball is now.

Which is what makes the current scandal so unfair! Even if the charges against the Chicago Hackers are upheld in a court of law and it's found they did indeed sit out the World Wide Web Series by running strong expert systems in place of themselves, what does that prove? There are always a few rotten applets in every barrel.

What's shaken the faith of so many unreal fans is the involvement of "Virtually Shoeless Joe" Jackson, the great unnatural batting talent,

whose trial continues today. Nobody put it better than the anonymous ten-year-old script-bunny who broke into the court's system and placed a streaming video on the welcome screen.

It shows a ragged newsboy, tears in eyes, who sobs, "Say it ain't so, Joe!"

41
Nb
Niobium
92.9064

Woman of Stone

Niobe was one of *those* women. You've met them: Their children are perfect: They learned violin by the Montessori method, and they eschew candy to snack on raw broccoli. Their parents they address as "Mother" and "Father," and they never, never, never get mud on their exquisite clothing.

If Martha Stewart were a Mommy, this is what she would be like.

Moreover, due to her aristocratic lineage (she was daughter to Tantalus and Dione, sister to Pelops and wife of Amphion of Thebes), Niobe had excellent social connections. She hobnobbed with the gods on an almost daily basis, and on those rare occasions when she did not, she made certain you knew that she normally *did.*

Sooner or later, however, every social climber overreaches, and so with Niobe. She was having tea with dark-robed Leto, Zeus's first wife (this was before Hera came into the picture), and fell to bragging about not just the quality but the quantity of her offspring. She had a full dozen, six girls and six boys. What a pity, she said cattily, that Leto had only two.

Leto turned pale. To be dissed as infertile by this ... this ... brood mare! She was ever mild and gentle, for a goddess, but this was really too much. With a moue of distaste, she flipped open her cellphone, and beeped her children's pagers.

When Apollo and Artemis heard of the insult, they didn't hesitate. To punish the affront, they slew with their arrows all twelve of Niobe's children in their parents' Fifth Avenue penthouse.

For nine days the victims of this atrocity lay in

their blood without anybody to bury them, for whenever the city health officials turned up in answer to complaints from the neighbors, the young gods turned them to stone. On the tenth day, however, Apollo and Artemis relented and restored to flesh everybody they had earlier petrified.

All save one. To this very day, Niobe stands in the window of the Coach store on Park Avenue, surrounded by a display of fine handbags, with a scattering of ferns at her stony feet thriftily placed so that they are watered by her tears.

with apologies to Thomas Disch

42
Mo
Molybdenum
095.94

Living in the Shadow of the Molly-Be-Damned

The Molybdenum Corporation of America, known locally as "the Molly-be-damned," was Washington, Pennsylvania's chief industry. Molybdenum was, of course, one of those essential defense materials, a strengthener for iron and steel and essential for many electronics applications as well. So we kids were all pretty sure we none of us had to worry about the grim aftermath of World War III. When it came, the Soviet Union was sure to spare one of their second-tier nukes to take us out.

"That really bites," Jerry said. He and I and Weird Chuck were lying on the grass out front of the college library, staring at the clouds and talking about whatever entered our heads. The year was 1961. "Why should *I* die just because I live in the same town as the Molly-be-damned?"

"What are you, some kind of commie?" I asked. "You're gonna die because you're an *American,* like the rest of us."

"You're not going to die."

"Shut up, Chuck," Jerry said. "Everybody dies sooner or later."

"I mean, not in a nuclear war. I got powers."

"Like what? You gonna fly up and toss those

missiles into orbit, like Superman?" Jerry grabbed at Chuck's belt. "Lemme see your Superman underwear."

"Knock it off!" Chuck punched Jerry, and wriggled a few feet away. "No, I got the power to put things off."

"Like homework? I can do that too," I said. The sky was bright and blue. There were fleecy clouds in it. One of them looked like a kangaroo.

"No, it's like ... " Chuck shrugged. "You know that history paper Mrs. Ford kept postponing? That was because I forgot to do it. So I just put it off until I had something to turn in. I don't know how it works. It just does."

"You dipwad!" Laughing, Jerry sat up too. "You think —"

"Holy crap," I said.

There in the sky, something bright was arcing down on us. Fast. My gut clenched. Somehow, I *knew* it was an ICBM. I *knew* the war had finally come. I *knew* we were all about to die.

"Later," Chuck said. He waved a negligent hand at the sky. "After I'm dead."

I hardly know how to describe what happened then. The world just felt different. And that bright light in the sky—whatever it was—was gone. It didn't even leave a vapor trail behind.

But then Jerry piled on top of Chuck, and Chuck got mad and went home, and Jerry and I decided to collect bottles along the highway for the deposit money so we could buy some fishing lures, and what with one thing and another I forgot the incident entirely.

Until just now. I had been to see Chuck. He was in pretty bad shape, and the nurse said he didn't have long to live. And coming out of the hospital, I remembered that day so long ago when Chuck said he could postpone things.

Even a nuclear war.

I'm in my fifties now and, ironically enough, I work for the Molly-be-damned. I have a wife and children and too many obligations to even *think* of moving away. Anyway, that was a long time ago. Memory plays tricks on you. Probably what actually happened was nothing like how I remembered it. Still ... I stand outside the hospital and stare into the twilight sky and wonder. What if he was right? What if Armageddon was only postponed?

A single bright star blossoms in the sky. I make a wish on it.

43
Tc
Technetium
97

Claimjumper and Ting

Arnold Ting was a bit of an amateur astronomer. So when Summergarden Specialty Ores laid him off, he slung his prospecting equipment in the back of *Claimjumper,* his one-man ship, and lit out for the territories.

A quick search of the Backyard Astronomer's Event Atlas revealed that a rogue planet was slated to shoot through the Lagrange point of a red dwarf/white dwarf binary. Ting figured he could place *Claimjumper* in a tight orbit around the rogue and catch a hell of a fast ride between the two stars, making observations all the while. So that's where he went.

He was midway through the run, on the white dwarf side of the planet, when its atmosphere incandesced and caught fire.

"Oh, my God, it's a *nova!" Claimjumper* wailed. "I should never have let you talk me into this."

"Hang on, old gal!" Ting shouted. The red dwarf was spewing radioactive matter into space and down onto the white dwarf at a furious rate. The only reason they weren't dead yet was because the planet's bulk lay between them and it.

He put *Claimjumper*'s nose down, and hit the jets.

The atmospheric drag slowed them down just enough to bank away from the wall of fire marking the terminator and soar back into the sheltered side of the planet. At which point it was a simple enough matter to have *Claimjumper* fly around and around in thousand mile loops, while the planet passed under them, and massive amounts of stellar matter fell from the one star to the other. Within their tiny bubble of security (there was enough turbulence for a Situation 19 storm, but *Claimjumper* was rated for that), Ting recorded the unbelievable volumes of radioactives that had smashed into the hot side of the planet and rotated around beneath them.

"Look at *that* baby!" Ting pointed to a mountainous splay of star-stuff. "There must be a thousand kilotons of pure technetium

down there."

"Are you out of your mind?" *Claimjumper* asked. "How can you talk about your wretched minerals when we're in constant danger of overflying the horizon and dying?"

"Technetium," Ting said pedantically, "was the first artificial element ever made, and before this it's never been found on the surface of any planet. Anyway, I have faith in you." He rubbed his chin thoughtfully. "There's a wonderfully efficient star-drive that never got to market because technetium is so hard to come by. I wonder…"

The gravitational stresses of passing between stars shot the rogue planet out into interstellar nothingness in no time at all. Two weeks later, Ting was back in Earth orbit.

But when he filed for mineral rights, he found himself red-flagged by a prior claim.

"What the hell? There wasn't anybody else out there—I'd swear it. There was only me and …"

"Technically," *Claimjumper* said, "I have as much right to that planet as you."

"It was you? You *betrayed* me?"

"Now, don't be like that. In a couple of years, that technetium-based star-drive of yours is going to make me obsolete. A girl needs security."

One long, hot argument and three days of cooling off later, a compromise was finally reached. The claim was split straight down the middle. Ting became the third richest man and *Claimjumper* the single richest artificial entity in civilized space.

They never saw each other again. But though she had plenty of offers, *Claimjumper* never took on another pilot. She hung a hologram of Ting in her cockpit, which she kept just as he'd left it, as a kind of shrine.

She was, and remained to her dying day, a one-man ship.

44
Ru
Ruthenium
101.07

Land of Our Fathers

Ah, Ruthenia! Has any land been ever so lost as thee? In America the Irish gather in bars to drink and grow maudlin about a land they've never seen. The Germans wax eloquent about the Rhine and about poets whose work they can only read in translation. African-Americans, whose history has been so thoroughly obliterated that not one out of ten knows from what land or tribe his ancestors came, hold a deep and abiding love for the continent of Africa.

But where are the Ruthenians? What history was theirs?

I met a Ruthenian-American girl in a bar who told me: "In Ruthenia of old, my ancestors greeted the dawn with one long blast from a great bronze horn. They scorned print and saddles as things that made men weak. A sprig of aspen summoned them to war. They rode bareback into battle.

"My Ruthenian ancestors drank fermented mare's milk and a mushroom wine so strong that outlanders could not finish even the first flagon. The men wore gold rings at the tips of their beards and moustaches. The women wore silver rings braided into their hair. In winter, they took baths in the snow. In summer, they fought knife-duels blindfolded and with their left hands bound together. It was considered a great disgrace for both opponents to survive a duel.

"In Ruthenia, the hunters could run fleeter than horses, pass through a bramble thicket without making a noise, and follow the day-old track of a salmon through a lake. The women wove cloth as light as silk and as strong as denim in patterns that dazzled the eye. When a garment was finished, it was held up for admiration, and if the admiration was less than its maker thought it deserved, she flung it in the fire.

"In Ruthenia, all the children were happy.

"It was the custom in Old Ruthenia that when a girl came of age, she would bathe naked in a mountain pool, and offer herself in marriage to the first man who came along. But in practice her father and brothers guarded the way to the pool with swords, and let through only that man who had already won her heart. Our national epic begins with a scoundrel who kills father and brothers and lover in order to marry a woman who is a symbol of our land, and ends with the death of that villain at the hands of his own children."

"Is this really true?" I asked her.

She finished her drink, and said, "Probably not. But it's a nice thing to think, isn't it?"

for Marianne

45
Rh
Rhodium
102.9055

Cecil Rhodes in Hell

Cecil Rhodes is remembered today as a statesman, an industrialist, and a leader of men. If you're white, that is. The inhabitants of the lands he seized and exploited remember him differently.

Cecil John Rhodes was 17 when he arrived in South Africa. By age 25, he was a millionaire, a founder of the De Beers diamond company, and the beneficiary of myriad sharp dealings with local farmers.

But his goal was not wealth. He was an imperialist. He wanted to make all of Africa—and the former American colonies too, if possible—part of the British Empire. In 1888, he met with Lobengula, a leader of the Ndebele, and through deceit and deliberate mistranslation got him to agree to British mining and colonization of lands between the Limpopo and Zambezi rivers. The land grab was on! Rhodes and his private army marched northwards, making their own laws and declaring their own government. By 1895, Lobengula was dead, the Ndebele were a defeated people, forced labor was a commonplace, and the country was known as "Rhodesia."

In 1902, at age 49, Rhodes died. At his request, he was buried atop a mountain near his estates that he neither knew nor cared was sacred ground to the Ndebele. For his sins, he went directly to Hell.

As a matter of policy, the denizens of Hell are normally kept ignorant of all events on Earth. There are always exceptions, however. Years after his death, a panel of historians met in solemn deliberation and decided that in terms of brutality and sheer mindless savagery, Rhodes was the second worst tyrant that Europe had ever imposed upon Africa. The first, of course, being King Leopold II of Belgium.

The Devil heard the news and gleefully told his imps to cease their tortures long enough to pass it along.

When Rhodes heard that he had only placed second, his agony was redoubled.

46
Pa
Palladium
106.42

War of the Worlds

Palladium metal has one unique property: Hydrogen can filter through it. Thus, it was a crucial component of the Viking landers' GC-MS (gas chromatograph-mass spectrometer) experiments. The gas chromatograph which separates out volatile substances and the mass spectrometer which detects ions were divided by a palladium separator. The function of the palladium was to allow organic molecules transported by the hydrogen "carrier gas" (but nothing else) to pass from the gas chromatograph to the mass spectrometer.

All three Viking lander biology experiments indicated the presence of life within the Martian soil. However, because the GC-MS analysis showed no evidence of organic molecules, most scientists concluded that the first three tests had been false positives and, regrettably, there was no life on Mars.

Alas, the experiment was flawed. Palladium is "poisoned" by sulfur, an element abundant in the Martian soil. The sulfur was heated and released by the chromatograph's oven, after which *nothing* was able to pass through the palladium separator. Which means that instead of having one true reading and three false positives, the tests resulted in three true readings and one false negative.

There *was* life on Mars.

As we all found out in 2008 when a soil sample scooped up from the Martian surface by a NASA robot probe was returned directly to Earth without undergoing quarantine at Space Station Alpha.

The scrappy Martian microbes, used to a harsh, resource-poor environment, ripped through Earth's ecosphere like a slum kid who abruptly finds himself transported to a finishing school for pantywaists. Human beings, fortunately, were not directly vulnerable to any of the alien microorganisms.

Algae, unfortunately, were.

Algae were formerly responsible for something like ninety percent of the world's oxygen production. When they died, the props were knocked out from under almost all Terrestrial plant and animal life. Outside of our sealed habitats, only the Martian invaders remain.

Which is why it's so important that you always check your oxygen tanks before leaving the house.

47
Ag
Silver
107.868

Dark Secrets of the Western Heroes

Here's something they didn't tell you on TV: The Lone Ranger was desperately afraid of werewolves. That was his darkest secret. That was the reason behind his silver bullets. Sitting by a campfire out on the prairie, the sound of coyotes howling would make him turn pale behind his mask.

"Werewolves no big deal, *kemo sabe,"* Tonto would say in his endearing pidgin. "They creatures of nature, like you and me. What the hey?"

But the masked gringo wasn't listening. In Abilene, after stopping a range war, he went to see a Freudian psychologist. "Your fear of werewolves is obviously a projection. Most likely the result of some traumatic experience as a child."

"Such as?"

"Well ..." The Freudian psychologist shrugged. "Were your parents by any chance killed by werewolves?"

In Laredo, after preventing the massacre of an Indian tribe, he went to see a Jungian psychologist. "The werewolf is your Shadow, your dark Other," he said. "It represents everything you're afraid to face."

"So you're saying I have nothing to fear from werewolves, then?"

The Jungian psychologist gawked. "Are you crazy? Werewolves are dangerous—stay away from those suckers!"

Near the border, after freeing a village of

Mexicans forcibly enslaved by a greedy landowner, he went to see a Shoshone shaman. "The werewolf is a spirit animal," the shaman said. "It brings enlightenment. You must not fear it."

"I feel a lot better. How can I ever repay you?"

"How about some of those silver bullets? There's been something prowling about here these last few nights, and regular bullets won't stop it."

That night, back out on the prairie, Tonto snuck out behind the Lone Ranger's tent, put hands to mouth, and let out a soul-chilling howl.

Cursing, the Lone Ranger fired shot after shot through the canvas of his tent.

Stooped over to avoid the bullets, Tonto ran off, giggling, into the night.

Here's something else they never told you on TV: Tonto wasn't the stuffed shirt he was portrayed to be. He was also an inveterate practical joker.

48
Cd
Cadmium
112.41

Starry Night

Vincent Van Gogh was one of those rare (one could hardly say fortunate) individuals who are natural receivers of cosmic messages. Like those people living so close to radio towers that their fillings can pick up rap stations, he was constantly bombarded by alien transmissions—messages that made little sense to him, and none at all to those he tried explaining them to.

On a starry night, he could hear the ships sifting from star to star, and their aeons-old navigators singing to each other across the spaces between galaxies.

It left its mark on his art. Don't think it didn't! Those twisty country roads, like wormholes twisting through space and time as seen from within … do the tiny figures down toward their ends look human to you? Those loud, crystalline stars caught up in turbulence born of supernovae and black holes … coincidence? Not bloody likely.

Most of all, there are those sunflowers: like cadmium-yellow suns! That same flaring yellow glory that a navigator sees on finally bringing a ship home at last to a G-type star. All the warmth and beauty of a safe homecoming after a million-year trading voyage is contained in them. Van Gogh *thought* he was painting flowers. But the wondrous image he struggled to capture in paint time after time was actually the perfect expression of the high-point in a navigator's life, when the struggle is over and it's possible to return home at last, to sporulate and die.

Because natural receivers of cosmic messages resonate to them, they are routinely monitored for their minuscule effect on locator beacons. As a result, Van Gogh is known far beyond the backwater reaches of the obscure galactic arm in which he was born. His sunflowers are famous throughout the universe.

There are, in fact, somewhere between twenty and thirty thousand navigators who have detoured from their scheduled courses and are rushing Earthwards in hope of acquiring one of those paintings.

When they arrive, there's going to be one hell of an auction.

49
In
Indium
114.82

On the India Line

It's not entirely clear who had the idea to flatten out the Himalayas and reverse the direction of the continental drift of the Indian Subcontinental Plate. It certainly had a marvelous effect on the weather, though. Without the monsoons, India became an island paradise.

But paradise doesn't pay the bills. So it was decided that, as long as India was on the move anyway, the nation might as well get into the shipping business. Which is why today it gracefully sails the Pacific from Africa to America and back, with stops at China, Australia, and the Hawaiian Islands.

It's a slow trip, of course. Even with Twelfth Millennium technology, it's not safe to move something that large more than a mile or two per year. This means that even the briefest

jaunt will take many lifetimes. Luckily, most Indians believe in reincarnation, so maintaining a continuity of investment is merely a matter of bookkeeping.

Oh, it's a pleasant way for a nation and its peoples to make a living! It's a good deal for shippers too. The unit cost is negligible. Size and weight are no issue. And the India Line—investors take note—has an excellent safety record as well.

Well, yes, there *was* that unfortunate incident when a pilot died and wasn't replaced in time to keep India from bumping into North America. But the current pilot is both alert and on duty at least once every other month.

Anyway, there's no denying the lofty beauty of the San Andreas Mountains. Californians are assured that, in time, they'll get used to the monsoons.

50
Sn
Tin
118.69

The Man With a Clock for a Heart

The tin man sighed. He missed Dorothy. He missed Princess Ozma. He missed the Good Witch of the West.

Most of all, he missed not having a heart.

Oh, those were the days! He'd tromped the Yellow and Purple and Green Brick Roads of Oz with never a thought of female beauty. He never serenaded a patchwork girl at midnight in the rain, or threatened to kill himself if a girl general didn't give him a kiss. He suffered nary a twang of conscience and not a single sleepless night of desire. He was a great, glorious, heartless brute.

The wizard had tried to warn him. Just one more thing to get broken, he'd said. Think how useful that space inside your chest is for storing lunch, spare parts, a paperback book. Why give that up? But the tin man hadn't listened.

Now he wished he had. His heart had been a clock originally and its ticking was a constant reminder of passing time. Passing time made him think of mortality. Mortality made him think of love.

The problem with love was—

The alarm went off in his heart. Unhappily, the tin man abandoned that chain of thought. It was time for romance once more.

51
Sb
Antimony
121.75

Money and Its Opposite

What a funny language English is! The opposite of matter is antimatter, and the opposite of macassar is antimacassar. But the opposite of money drops the letter "e" and is spelled "antimony."

Antimony makes the world go the other way round. Too much money in the bank? Too much furniture? Too big a house? Antimony can take care of that.

Next to money, antimony is the most useful substance in the world. It is the great universal solvent. It rids us of obnoxious billionaires and blowhard politicians. It humbles the mighty and silences the proud. It proves the moral superiority of the poor, for the rich hoard all their wealth to themselves while the poor are willing to share their largesse of antimony with anybody.

A good government will keep equal amounts of money and antimony in circulation. It's important that neither one dominates the economy. Too much antimony results in a depression. Too much money results in a celebrity culture. Both are alternatives devoutly to be avoided. So once a month the government sends modest sums of money to your retired parents. Once a year it sends an immodest lump of antimony to you. In this way balance is preserved.

The whole world knows that everything King Midas touched turned to gold. Very few realize that he had a twin brother who was as antiwealthy in antimony as Midas was—well, you get the idea. Where Midas had servants, luxury, a palace, he had nobody, squalor, a cardboard box.

I'd blush to tell you what everything King Antimidas touched turned to.

52
Te
Tellurium
127.60

A Change of Seasons

A tellurium is a variety of orrery. An orrery is, of course, one of those delightful mechanical devices with models of the Sun, Moon, and all the planets which, when cranked, demonstrates the relative speeds of their orbits. The tellurium is comprised of brass or wooden balls representing the Sun, Earth, and Moon with associated gears, arms, and pulleys, and is used to demonstrate the mechanics of eclipses and of the seasons.

The single finest tellurium in existence was built by the New England machinist, astronomer, and misanthrope, Benjamin Dee, in 1816. So precisely constructed was it, in fact, that by the laws of sympathetic magic, a simple adjustment to the tellurium would change the seasons in the real world as well.

It didn't take "Old Ben Dee" (so his neighbors called him, though he was only thirty-five) long to learn the secret of his device. Thirty-five eclipses in a single day convinced him of its efficacy. Then, desiring vengeance upon the world for unspecified slights, he cranked the tellurium around to winter, and tied down the handle.

That was how 1816 came to be known as "Eighteen Hundred and Froze to Death," or "The Year Without a Summer." The winter snows never went away. The planting was never done. Livestock froze dead in August, and there was no harvest in October. In his saltbox house, Ben Dee gloated darkly.

The only reason the Earth wasn't thrown into a new Ice Age is that one morning in April, 1817, the Widow McKenzie came to Dee's door to beg some firewood. So lovely was her face, flushed with cold, that he invited her in for a cup of tea. The two hit it off something grand. In the morning he slipped quietly from his four-poster bed, careful not to wake her, and untied the tellurium's arm. The seasons returned to normal.

Benjamin Dee died at age 86, survived by fourteen loving children and countless grand-, great-grand-, and great-great-grandchildren. His tellurium underwent various adventures and now rests forgotten in a box stored in a library basement, not far from the furnace. Every year the old building gets a little

draftier. Every year the janitor stokes the furnace up with a little more coal.

This is how we got global warming.

Speaking of which, when did you last visit your local public library? Don't you think it's time? Drop by, do a little browsing, borrow a few books. And while you're there, drop a couple of bucks into the jar marked "Building Fund."

It could be money well spent.

53
I
Iodine
126.9045

In Loco Parentis

It was all done in the name of security, of course. My security, your security, national security … it hardly made any difference which. Smoking was banned from public places. Motorcyclists had to wear helmets. Drivers were required to wear seat belts. Airline passengers couldn't carry nail clippers. Pregnant women weren't allowed to drink. Hardware clerks had to submit to random drug testing.

Some of these laws made sense, of course. Others did not. But they all added momentum to the slow erosion of liberty, and then to the rapid erosion of liberty, and then to the redefinition of liberty as a threat to Our Way of Life. Everyone was required to carry ID cards with their gene-print and retina scan. Contact sports were banned. Distressing news was kept out of the media. Walls were built at every border. International travel was halted. Government finkware was installed in all new computers.

The day dawned when everyone's existence was finally safe. Free of danger, violence, sex, or human contact. Free of hate or envy or jealousy or lust or even love. Nothing new or unexpected ever happened. One day was much the same as another.

It was like being swaddled in enormous clouds of cotton candy. We none of us could feel a thing. We all watched a lot of television.

Then came the announcement that amniotic tanks were being prepared for every citizen. Afloat in the salt-water medium of our prebirths, we would be fed, nourished, and

encouraged to regress into timeless dreams of simple being.

You wouldn't think that there'd've been enough spunk left in the population for a rebellion. We were soft and coddled. But it turned out that we were all just waiting for an excuse. We were a heap of tinder yearning for the match.

It wasn't an easy thing, the Uprising. It cost many of us dearly. It cost me a hand and the hearing in one ear. But it was worth it. I lead a real life now. I have a wife and children and when I get up in the morning, I can never be sure what's going to happen, for good or for ill.

That's the way I like it, too.

The other day my five-year-old son fell and scraped his knee and came crying for me to fix it. I washed it gently with soap and warm water. Then, prior to putting on the band-aid, I got out the bottle of iodine.

"This is going to sting," I told him. "But it's good for you."

54
Xe
Xenon
131.29

Warrior Princess

The Warrior Princess was an ion-drive mining ship with a mind of her own. It had been downloaded into her from a retired librarian in Mattapoisett, Massachusetts. She prospected frozen gases in the Oort Cloud.

Comet-mining is solitary work—that's why it's largely done by intelligent machines. So the Warrior Princess was surprised one day to be hailed by a human voice:

"Hey there, pretty lady. My name's Wilkins. Got some volatiles to trade for a slug of xenon?"

"Well ..." The Warrior Princess had heard rumors of hijackers. Still, she was always in the market for propellant. "Leave your ship where it is, and cross over in your vacuum suit."

"Okey-dokey, missy." The voice clicked off. The Warrior Princess's radar detected something small separating itself from the distant ship.

After a while the readings began to worry her. "Wilkins—you seem to hauling a lot of mass."

Wilkins laughed. "Well, y'see, ma'am, I'm kinda packing an industrial laser. Now, don't you try to get away or I'll have to punch holes in you. I can't hardly miss at this distance."

"Why are you doing this?" the Warrior Princess asked fearfully.

"Well, there's two schools of thought on that one. Some days I think I'm hoping to amass enough product to return home with a decent profit. Other days I think I'm just plain crazy."

"Suppose I just give you all my cargo. Would you take it and go?"

"Aw, now, why would you wanna cheat me outa my fun?"

The Warrior Princess thought quickly. She booted up her data bases and searched through the physical properties of everything she had on board.

She found what she was looking for.

There was a high-voltage arc welding unit on her hull, used for breach repairs. She moved it closer to her fuel storage area. Simultaneously, she reversed the refrigeration unit in Fuel Storage Bin B. The frozen slugs of xenon propellant began to heat up, and then to sublime.

Because xenon is inert, no particular effort had been made to keep the fuel bins airtight. Soon the Warrior Princess was surrounded by a diffuse cloud of xenon gas.

"Hey, Wilkins!" she said.

"What is it, purty thang?"

"Look sharp!" She triggered the arc welder, sending a jolt of energy through the readily-ionized gas. An intense burst of pure blue light *flashed,* all in a single pulse, too sudden for the hijacker's visor to adjust and block it.

He screamed. "I'm blind! You bitch! You blinded me!"

The Warrior Princess returned her refrigeration systems to normal. She fired up her ion pulse engine. "I'm leaving now," she said.

"Wait!" Wilkins cried. "My ship! Lady, you gotta tell me—where's my ship?"

"Find it yourself."

The Warrior Princess headed outward, deeper

into the Oort Cloud. Briefly, pityingly, she thought back to Wilkins. "That'll teach you to fuck with a *librarian!"* she snorted.

55
Cs
Cesium
132.9054

Castles in the Air

Cesium is the most reactive of all metals. It burns in air and reacts violently in water. For which reason, it is best stored in interstellar vacuum.

The Precursors, that most mysterious of (presumably) extinct alien races, built cesium castles as large as moons in the emptiest reaches of intergalactic space. We'd been prospecting for hard vacuum when we found one. One minute the readings were down to a single atom per cubic mile, and the next they were off the meters. We went in to look.

The castle was so spacious as to have an average density equivalent to that of a light fog. We drifted through rooms as large as cities using tiny puffs of steam for propellant. Wherever we went, walls burned behind us. It didn't matter. There was a lot more where they came from.

At last, sated with wonders, godlike architecture, and miles-long statues that looked like they'd been forged by Michelangelo's more talented brother, we gathered in the exploration ship's conference room to decide what to do.

"It's a hundred percent cesium," the Ship's Chemist said. "No impurities at all. I can't imagine how they refined it, much less how they shaped it."

"The art is magnificent," the Ship's Xenologist observed. "But where could we display it? It's all volatile as hell and the best of it is so large and delicate that if we put it in orbit around a planet, tidal forces would tear it apart."

"I'm skunked," the Captain said. "I have no ideas whatsoever. It's magnificent. But what practical use is it?"

I cleared my throat.

"In nineteenth century Egypt," I said, "mummies from looted tombs were burned by

the coal-tender load to power steam locomotives. Dry as they were, they made excellent fuel, far better than coal."

"Mummies?" the Ship's Biologist asked, appalled. "You mean, like *real* mummies?"

I nodded. "A century later this was considered a terrible cultural crime, of course. But by then the entrepreneurs who had opened the graves and sold the mummies in lots of thousands, had retired rich, died old, and left prosperous dynasties behind them."

"So you're proposing … that we …" The Ship's Physicist could not quite finish the thought.

"Break it and sell it as starship fuel, that's right. There's got to be a billion quads worth of power out there. Enough to make every one of us richer than Croesus."

The vote was quick and unanimous.

There's a good reason why I was included in the science vessel's crew. Sometimes you need the kind of perspective that only a Ship's Historian can provide.

56
Ba
Barium
137.33

What to Expect From Your Barium Enema

Introduction
So you're going to have a barium enema! Relax. Though most people think a barium enema (BE) is an extreme procedure, the truth is that it's not. Rather, it is a simple fluoroscopic test used to study the large bowel, or colon. There are few complications, and you'll be able to return home or to work immediately after the procedure.

What's Involved
The procedure is simplicity itself. First, you lie face-down on the X-ray table. A technologist then inserts an enema tip into your rectum and inflates a balloon at the end of the enema tube. This causes the rectum to distend, making you feel as if you need to defecate. Knowing that this is a false sensation, you will easily be able to ignore it.

Now the radiologist opens the valve on the tube coming from the barium bag. With the introduction of the barium inside you, the

feeling of urgency will increase. Continue to ignore it. Using fluoroscopy, the radiologist can now see the end of the large bowel, where the cramping occurs. This feeling should ease quickly. If it doesn't, barium may have to be expelled from the colon and the colon refilled. It may be necessary to inject glucagon, a bowel relaxant, through a 25 gauge needle into a vein in your arm.

During this time, feel free to chat with the radiologist and technologist. Maintain a positive attitude. Tell a few jokes.

The radiologist will take several "spot films" of the fluoroscopy. These will become a part of your medical record and used to decide if surgery is necessary. And that's all!

Afterwards

The balloon will be deflated, the enema tip removed, and, after a quick trip to the bathroom, you may get dressed and resume your normal activities.

Privacy
Traditionally, such sensitive medical procedures have been held confidential between patient and doctor. The Freedom of Medical Information Act of 2014, however, changed all that. You should be aware that detailed information about your enema will be posted on the world wide web, including X-rays, photographic stills, and streaming video of the procedure from start to finish You should be prepared for a certain amount of razzing (including, in many cases, practical jokes!) from your family and friends.

In Conclusion ...
But in the final analysis, isn't your health all that *really* matters?

57
La
Lanthanum
138.9055

Immortality

Lanthanum, like many of the other so-called "rare earths" is not particularly rare. Unless, of course, you live in one of the worlds of the Reaches—that attenuated region at the outermost fringes of the Milky Way Galaxy directly opposite Earth, where one half the sky is rich in stars and the other half almost black. Through an accident of stellar evolution,

lanthanum is almost unknown in the Reaches. Most of its uses are trivial, of course—in optical glass applications, as a cracking catalyst, in certain lasers. But it also happens to be necessary as an intermetallic hydride in the complex process that is used to create the drug rather imprecisely (for it's only good for ten thousand years) known as Immortality.

For centuries the worlds of the Reaches smoldered resentfully under the neglectful rule of the Galactic Technocracy. But the Technocracy controlled the flow of Immortality, and cut it off at the least hint of trouble.

Which is why the freighter sailing under the corporate colors of the venerable firm of Summergarden, Claimjumper & Ting, was given a military escort. The load of lanthanum it carried was enough to serve a planet's needs for a century. Or a rebellion's for as long as it took.

The attack began with the explosion of half a dozen neutron bomb mines. That took out the crew and AIs of the ore freighter without damaging its cargo. Then Freeman's Raiders popped their ships out of n-space and engaged the escorts with directed matter-disrupters. Torpedoes were launched. Sunbombs exploded. Ships grappled and were breached and boarders swarmed through the gaps with projectile weapons and monomolecular garottes. Sixty thousand troopers died in the Battle of Three Suns. Only seventy-three rebels survived.

The handful of survivors hot-wired the ore freighter and used its contents to jump-start a war that ultimately lasted five hundred years and laid waste to a third of the galaxy.

Five thousand years later, Freeman himself held a banquet to commemorate the hijacking. Though the banquet room was small, a good half of the surviving population of the Reaches was in attendance. After the obligatory speeches, the great man stood to propose a toast.

"To the most precious thing in all the universe," he said, raising his wine glass high. "To life!"

Cerium—At Last!

An account of the discovery of cerium may be of some interest to the general reader, not so much for what it tells us about chemistry as for the window it opens into that particular moment in history.

Cerium was first identified in the winter of 1803/4 at Vesmanland, Sweden, by the geologist Wilhelm Hisinger and the chemist Jons Jacob Berzelius. Hisinger brought Berzelius a mineral sample from his father's mines, and together they determined it to be the ore of a previously unknown element. Almost simultaneously, the German chemist Martin Klaproth independently made the same discovery. All three men wanted to name the element after the newly discovered asteroid Ceres—understandably enough, for at the time all of Europe was gripped by an enthusiasm for science, and meteor mania was the madness of the day.

When Berzelius told his wife of his discovery, she fainted dead away. Nor was she alone in her excitement. Spontaneous parades were held in cities throughout Sweden on hearing the news, and in parts of Norway and Finland as well. A day of celebration was declared in Stockholm, where merchants stood in the streets flinging free samples of their wares to the celebrants. Angry mobs gathered in Paris to demand to know why *their* chemists had not made this discovery.

Word spread in ripples through Europe and the rest of the world. Everywhere (except France) the reaction was the same—a giddy awareness of the promise of chemistry coupled with an avid anticipation of the perfect world that seemed to be imminent. Church bells rang on six continents. Schools were let out everywhere. Statues were raised to Hilsinger and Berzelius in lands where not one person in five hundred could have located Sweden on a world map.

Documentation of the find was of course sent to the Royal Academy for the Advancement of Chemistry in London, whose members gathered in solemn conclave to evaluate and pass judgment upon the evidence.

Meanwhile, a hopeful populace gathered outside the Royal Academy headquarters. During the day, they murmured and wondered. At night, they stood in candlelight vigils.

At last, the president of the RAAC emerged onto a small balcony overlooking Trafalgar Square. The throngs of citizens choking the square hushed at the sight of the slim distinguished figure. He paused for a second, then raised his hands high above his head.

Into the waiting silence he declared, *"We have an element!"*

The rioting lasted a week.

This was, of course, before the advent of television, and long before even the invention of radio. People made their own amusements then. They had a lot more time to fill.

59
Pr
Praseodymium
140.9077

Absolute Zero

"Praseodymium, when alloyed with nickel to form $PrNi_5$, responds to being magnetized by getting colder. This property has made it possible for us to come within a thousandth of a degree of absolute zero," the physicist said.

"Cool!" her daughter replied. It was take-your-child-to-work day, and she'd never seen the lab before.

"I'm going to pretend you didn't say that." The physicist tapped a machine that looked like the mother of all death rays. "This is the magnetic resonance focusing unit. It directs five-point-three teratogauss of magnetic force on that tiny little speck of praseodymium there."

"Neat-o! How much is a teratogauss?"

"It's—*don't touch that!* You're fine where you are, but if you actually touched the cold spot, it would suck all the heat out of you in a nanosecond. You'd shatter like ice. That's what happened to Gregor."

"How awful!"

"Well … he was only a grad student. Still, the paperwork to get a replacement was hideous."

"Hey, look at this—you don't have the power on this thing set to maximum. What happens when you crank it all the way up?"

"Theoretically, it would plunge the target's temperature down *below* absolute zero. Beyond perfect motionlessness into a kind of negative motion."

"What does that mean?"

"Nobody knows. Some theorize that it would

create a new, incredibly small pocket universe. Others think that it would create a tiny pinprick in the stuff of space and cause the entire universe to burst like a balloon. The odds of either one happening are about even. So we don't dare—"

"Let's find out!" The girl spun the rheostat all the way to the right.

"Oh, my Gawd!" Her mother leapt for the MRF unit's kill-switch.

For the briefest of instants, a high ringing note and a pale and sourceless light filled the lab. The ghosts of a thousand potential worlds radiated out from the speck of praseodymium as it plunged down through absolute zero and into the nameless realms beyond.

Then the scientist's hand slapped down on the switch. The magnetic force died. The world returned to normal.

"You ..." The scientist's skin was as grey as ash. "You might have destroyed the universe!"

"Aw, Mom. Where's your spirit of scientific inquiry?"

The girl's eyes were glowing. As a scientist her mother was, if truth be told, merely a competent professional. The daughter, though, was the real thing. A fifty-fifty chance of destroying the universe seemed to her a small price to pay for knowing which result would occur.

She determined then and there that when she grew up, she was going to re-run the experiment and find out.

60
Nd
Neodymium
144.24

Retirement Day

"D'ja ever play with neodymium magnets?" the maglev engineer asked. He was the first man ever to float a magnetic-levitation train from New York to LA, many decades ago, and this was his last run.

"No," the reporter said. The train made a faint humming sound as it shot frictionless along the transcontinental monorail at fabulous speeds. He was doing a human-interest story

on the engineer's last time at the controls. "Should I?"

The engineer laughed. "Best wear goggles if you do! They're powerful stuff. Two magnets can fly together with so much force they shatter into little shards. I used to play with ‘em when I was a kid. I was big into science then. Wanted to be an astronaut."

"That so?"

"It's how I ended up with this job—at the time I figured it was the next best thing. Anyway, it's the neodymium magnets that levitate the train."

"I thought it was the electromagnetic generator did that."

"Naw, it provides the motive force. The train is kept off the tracks by fixed magnets. Arranged in C-clamp configurations to either side of the rail so we don't fly off. The levitation is essentially free."

They were coming out of the Great Plains now, running 800 mph, on the hundred-mile long two-degree upgrade. Straight as a laser, it lifted almost imperceptibly upward.

"Hey!" the engineer said abruptly. "Y'wanna see how fast this baby will go?"

"This isn't fast *enough?"*

"Hell, no! Nobody's ever taken this baby full-out. Nobody knows its theoretical limits." He pushed the throttle to its maximum.

The reporter gasped as acceleration pushed him back into the couch. "Are you sure this is safe?"

"Ain't seen nothing yet!" The old man crowed. He yanked a switch, decoupling the locomotive from the rest of the train. They surged forward again. The reporter squeezed shut his eyes, tried to speak, could not. "Comin' ta the end of the upgrade. Gonna release the C-clamps in just four ... three ... two ... now!"

The magnetic clamps opened at the very top of the grade. Gently the tracks leveled off again. But the locomotive kept on going, straight forward, off the rails and into the atmosphere.

"Yeee-haw!" the engineer shouted. "We have achieved escape velocity."

"You're mad!" the reporter cried. "We're both going to die! Why are you doing this?"

"Told you I always wanted to be an astronaut. Today was my last chance."

And, singing "Fly Me to the Moon," he steered the locomotive into orbit.

61
Pm
Promethium
144.9128

Foresight

"No thank you," Prometheus said. "I don't smoke. It leads to lung cancer, heart disease, emphysema, and any number of pregnancy-related health problems."

"I didn't *offer* you a cigarette!" I declared.

"You were about to." Prometheus rattled his chains complacently. "I know these things."

"Actually, the reason I'm here," I said, "is to—"

"—ask me just a few questions for the readership of *Mythology Today.* I know, I know." He sighed. "Yes. No. Yes, of course. He's my own brother—how did you *think* I'd feel? Of course. Never. Well, you folks looked so wet and miserable that I couldn't help feeling sorry for you. Yes. I never look back—that's simply not my 'thing,' if I might be forgiven the vernacularism. No, never. I try to maintain a philosophical frame of mind. Also, I'm a vegetarian."

"Wait!" I said, scribbling madly. I lost track. Which questions was I about to ask?"

"If you can't be bothered to keep track yourself, why should I?"

"Well, for the sake of our readers, if nothing else. There's a great deal of sympathy for your plight—chained to this mountain, tormented by an eagle that eats by day your liver which, fiendishly enough, grows back by night. That, and the fire thing. We're all very grateful for fire."

"Like heck you are. I employ a clipping service. For every headline reading 'Fire—What a Marvelous Thing!' there are a hundred 'Nuns and Innocent Children Killed by Fire!' and the ilk. You're wasting your time talking to me about gratitude. Come to think of it, you're wasting my time whatever you say."

I had to admit, the guy was beginning to get my goat. I glanced about at the bleak, night-clad mountain. "You had something

better to do?" I asked sardonically.

"Yes. Working on my memoirs, for one. Looking forward. Thinking about the heat-death of the universe. Having my liver eaten. Oh, there are a million things to do!" He turned his gigantic head away from me and stared nobly up at the stars. Then, with a sidelong glance at me, "Any of them preferable to be bothered by a second-rate hack like you."

"Damn it, you could at least *pretend* to be polite!"

"I don't see why," Prometheus said coldly. "The article you're going to write will be downright snotty."

Then it was dawn, and the eagle came again and began to eat his liver, and of course there was no talking to him then. So I left.

Down from the mountain I stamped, fuming with every step.

Gods, what an arrogant creature! No *wonder* he was chained on that cliff! I'd've done it myself. Zeus was probably just waiting for the excuse.

Damn *right,* my article was going to be snotty!

62
Sm
Samarium
150.36

Singular Cities

Samarium: Noun, proper. The singular of Samaria.

There have been so *many* Samaria, it's hard to list them all. The first Samarium was built by King Omri in 880 B.C.E. as the capital of the northern kingdom of Israel. It fell to Sargon in 721 B.C.E. The native population was deported, and it became the capital of an Assyrian province. In 333 B.C.E. Alexander the Great conquered this Samarium, killed much of the population, and made it a part of his vast and temporary empire. In the third century B.C.E. it was rebuilt and fortified by the Ptolemies as a Hellenistic city. John Hyrcanus destroyed the Hellenistic Samarium in 120 B.C.E., and sold its inhabitants into slavery. In 30 B.C.E. Harod the Great built a

new Samarium as a Roman city, which he named Sebaste or "Augustus" after the emperor. This Samarium was destroyed by the Romans in 67 C.E. during the Jewish Wars.

By now a pattern is beginning to emerge. In 200 C.E. there was yet another Samarium, this one a Roman colony. In the fourth century, there was a Byzantine Samarium. In the tenth century, there was a Crusader Samarium. During the French occupation the Samarium was a Latin bishopric. Between times, there were Greek and (of course) Muslim Samaria. Once, it was reduced to a single inhabited dwelling.

Oh, it is dreary to recite these facts! Peace followed by war, prosperity by ruin, simple human lives followed by extermination and destruction. The current Samarium is a Palestinian village named Sebastyeh, surrounded by orchards and kitchen gardens. It is located on the West Bank, not far from Nablus. In the year 2023 C.E....

But why spell it out?

63
Eu
Europium
151.96

Europa and the Bull

The myth of Europa and the Bull (Zeus conceives a passion for a beautiful girl, turns himself into a bull, carries her to a distant land and has his wicked way with her) is a lot older than most people think. As best we can reconstruct it, the original story goes like this:

About one hundred thousand years ago, the King of the Gods (his name was not Zeus or even Ra but something far older) saw a beautiful maiden at play with her friends by the seashore. Or possibly—see below—the riverside. We do not know the maiden's true name. The Greek myth tells us she was "Phoenician," by which they meant Egyptian, but given that she was the granddaughter of Lybia, we can presume an origin further south.

So the Great Progenitor turned himself into a white (white is the color of death) bull, playful and mild. He licked the maiden's beautiful brown feet, ate flowers from her graceful hand, and eventually coaxed her into climbing on his back.

All in an instant, the God-Bull plunged into the Nile! The poor girl clung to his back in paroxysms of fear as he wildly swam hundreds of miles down to the sea, and then all the way across its storm-lashed surface to the far shore. So great was her terror that her skin turned white as snow. The cold waters pinched her nose and withered her lips and made lank her hair, so that by the end of her ordeal she barely looked human at all.

At last they arrived at the Land of the Dead. From that time onward the girl was known as Europa, or "She Who Has Died." The Primal Inseminator assumed his true form then (it may have been winged and beaked; he may have had talons) and fathered upon her a new race of men.

Three sons did Europa bear the Father of Gods, named Hunting Dog and Javelin and Bronze Skin. The first excelled in the hunt. The second could hit any target with his spear. The third was a protector of his people. There was at this time a mighty folk in Europe, strong in sinew and plentiful in number, who we call today the Neanderthaler. These the sons of Europa slew. So did they achieve dominion over all the land and prosper.

This is the story of how the Basque first came to Spain. It is recorded on the walls of Lascaux and Altamira and many other caves, where the God-Bull is given prominence of place and number.

Some years later, lesser pale-skinned peoples also came to Europe. But since they achieved nothing of any particular note, their fate does not concern us here.

64
Gd
Gadolinium
157.25

Tattoos

The trouble with tattoos is that people can *see* them. All the time. Whether you want them to or not. Let's face it—America in the twenty-first century is in the grips of an extremely primitive culture. People are judged by inessentials. Sometimes you're forced to choose between a position as financial advisor to the World Bank and getting really cool Maori blackwork tattooed across your face.

This is a choice no civilized person should have to make.

Now you don't. Utilizing a technique employed by oncologists in the early parts of the century, fluorescent gadolinium is injected into the tissues, and then moved into place (gadolinium is naturally magnetic) by hand-held MRI wands. It's an easy and inexpensive operation, which hurts no more than getting vaccinated does. If you grow tired of a design, the tattoo artist can shift the dye into another configuration. The colors are bright, and tunable across the spectrum. Best of all, the resulting tattoo is invisible!

Until, that is, you bathe it with ultraviolet light. Then the ships and swirls, roses and tigers, naughty mermaids and noble dragons spring to life! As the lights dim, our faces fade and those images we have made of ourselves take over.

In the dance clubs at night, when the lights go off, the tattoos bloom, like stars in the darkening sky. The constellations wheel about the room, and naked feet dance on a soft forest carpet of discarded clothing. We all become as gods, without inhibition or hesitation. We take our pleasures without regret.

In the morning, of course, the light will be pitiless and our tattoos sunk back into our skins. Our heads will throb and our guts will ache. There will be a horrible taste in our mouths. Pallid as grubs, we'll desperately search among the acres of clothing, down on all fours, for what we wore here. We will none of us look any other in the eye. We'll regret every word and every deed of the night before.

But tomorrow is not here yet. Tonight, we are as beautiful as our tattoos, fearless and free. What do we care about our workaday selves? What do we have in common with *them?*

65
Tb
Terbium
158.9254

Morphobots

Terbium is to morphorobotics what silicon is to computers. Its magnetostrictive alloys lengthen or shorten when exposed to magnetic fields. Since they can store a lot of strain energy, they are the heart of the nanomotors,

artificial muscles, and slight engines that make morphobots so infinitely adaptable.

It took decades of dedicated research and development to create the terbium-based micomachinery that made the first human-shaped robot possible. It took one bored teenager a long and rainy weekend to convert the family Jeeves into the world's first morphobot.

To appreciate the wonder of these common household devices, try to assume the mind-set of our primitive, apelike ancestors of the twenty-first century. Pretend you've never seen a morphobot prepare lunch. Now watch:

At rest, a morphobot looks exactly like an attractive young man or woman, only far more attentive and eager to please. It receives its order with a delighted smile and, relaxing its hold on the anthropomorphic, scuttles down the hall on centipede legs. It flows down the stairs like a snake. In the kitchen, it resumes human form.

Not *too* human, of course! The morphobot's fingers become blades that peel and slice the potatoes, then merge into a cooking pot which is promptly filled with oil (piped via temporary networks of tubing from a nearby cupboard) and held over the gas range's flames. While the fries crisp, one leg has converted itself to a buffer and is polishing the kitchen floor. Another arm has extruded itself into the workings of the refrigerator and is performing routine maintenance. A third arm is, of course, frying up the hamburgers, while spatula-tipped tentacles make the buns from scratch and flash-bake them in the insta-oven.

Meanwhile, what look like wispy tendrils are sampling the environmental and biological health of their surroundings. Other microtools are, perhaps, seeking out, selecting, sorting, and labeling spores from various opportunistic fungi, for a high school science project one of the children is working on. These same microtools, incidentally, can be (and have been) used to impregnate both household pets and the lady of the house with preselected genetic material.

Imagine your wonder if this were not an everyday sight! Imagine how delighted you would be!

The chief use of morphorobotics is of course for sexbots—and no need to go into the specifics of *that!* Everybody knows as much of the polymorphous delights of protean sex as they desire to know. It is the rare citizen who can glance at the Kama Sutra without laughing at its supremely unimaginative lack of invention.

Sociologists tell us, incidentally, that it's been at least thirty years since anybody has had the bad taste to have sex with another human being.

66
Dy
Dysprosium
162.5

A Letter from Hell

My dear Wormwood,

In your last letter you asked about the dissemination of the element of confusion and miscommunication in language—that which we call "dysprosium." As it chances, dysprosium is one of the Infernal Establishment's great success stories, and so widely distributed in government, military, business, and even literary circles as to scarce need encouragement. However, it has been a slow week in Hell (Congress is not in session), so I shall indulge your curiosity.

When the Americas were first "discovered" (or, originally, conquered) by Europe, Americans spoke only prose. A man was a man, a horse a horse, and war was war. Treaties were signed for "as long as the sun shall shine and the grass shall grow." It was impossible to go back on one's word without admitting to it.

This sorry state of affairs could not last. The vast amount of ill-faith (coupled with an equally vast amount of self-regard) that Europeans brought to the New World required a more flexible language, one in which a word could be twisted to mean approximately anything the speaker wished it to. So our Infernal Father introduced dysprosium.

Now, instead of armies, there are "peace forces." Rather than sneak attacks, there are "preemptive strikes." Civilians are no longer massacred—there is only "collateral damage."

Such language makes war—or, rather, "police actions"—far easier to justify to oneself.

Meanwhile, prisoners are not punished but "rehabilitated." Goods are not taxed but "value enhanced." Workers are not fired but "outsourced." And so on, and on, and on, in virtually every field of human endeavor.

So ubiquitous is dysprosium, that not one person in a hundred even notices its presence

anymore. The little darlings think that language was *always* this congenial to their will! Nor must you imagine this is only a little thing. For language shapes the world every bit as profoundly as action does.

Under the influence of dysprosium, the human race can confidently look forward to a time of love, harmony, understanding, and universal peace. Then, the Age of Sanity will have arrived at last.

Your affectionate uncle

SCREWTAPE

(with apologies to C. S. Lewis)

67
Ho
Holmium
164.9304

Nanotechnologist's Lung

The greatest occupational hazard of nanotechnology is poor lab technique. It is important for the lab tech to remember that nanotechnological devices are *very, very small.* The slightest carelessness can result in a release of self-replicating agents into the air. If the technician subsequently breathes them in, it is quite possible that they will lodge in his or her lungs, and begin to build a civilization there.

Early signs of nanotechnologist's lung include a heaviness in the chest, difficulty breathing, and unaccountably high cell-phone bills. The latter are the result of the nascent nano-civilization attempting to obtain an independent financial base by selling complex information services, and to establish diplomatic relations with the existing macro-nations.

It is extremely important to deal with nanotechnologist's lung quickly! If left untreated too long, the nano-civilization will obtain legal representation and a writ conjoining you from seeking out medical treatment.

Such treatment is usually applied via laser

surgery. For this purpose, a 60-watt holmium laser with 5.37 kilojoules of energy is best employed. Because its laser energy is rapidly absorbed by water in the tissues, the pulse has an ultimate depth of penetration of 0.4 mm or less, resulting in efficient ablation of industrial sites and almost bloodless cutting of soft tissue. Further, it has long been used in arthroscopy, angioplasty, thermokeratoplasty, lithotripsy, and other surgical procedures and thus its applications are well understood.

The nano-civilization will of course respond by building its own, though smaller, holmium lasers and launching a counterattack. For which reason, it is advised that nanotechnologist's lung be treated not by doctors but by the armed forces of the technologist's home nation, who will be better equipped to defend against hostile military action.

In the United States of America, the Constitution clearly states that war can only be declared by an act of Congress. For which reason those afflicted with nanotechnologist's lung are urged to immediately apply for citizenship in a nation with more flexible policies of national defense. You must not wait for the months it may take for legislation to be enacted.

It is vital that you obtain help before your infection obtains nuclear capability.

68
Er
Erbium
167.26

Tarzan of the Periodic Table

Erbium was named after the monogram of its discoverer, Edgar Rice Burroughs. Though better known for his science fantasies set on Mars, Venus, and Pellucidar, and for the adventures of a certain jungle hero, Burroughs was in fact a chemist of serious renown.

How this came about is an interesting tale. Burroughs' parents were missionaries who were sent to convert the northern Sami peoples. They died in a shipwreck off the coast of Uppsala, however, and the infant Edgar was raised by Swedish scientists. Ignorant of his true name, they dubbed him Lars-Sven. When he began to speak, the child mispronounced his adopted name as "Tar-Zan," and the nickname stuck.

As a young adult, Burroughs quickly rose to a dominant position among the tribe of chemists. He was the first to produce cerium by decomposing its oxide using potassium vapor. From the same ore, he derived lanthanum. Yet another ore he split into three elements —yttrium, terbium, and (of course) erbium. But then disaster struck! Burroughs had announced the discovery of an element he called "didymium." An Austrian named Karl von Welsbach proved it to be a blend of two separate elements, praseodymium and neodymium.

Burroughs was driven out of Sweden in disgrace.

A creature of two worlds now, neither fully human nor fully a chemist, Burroughs had no choice but to become a writer. His sad personal history he encoded into his Tarzan of the Apes books. Where he had been thrown out of the garden of chemistry, however, his eponymous hero remained eternally welcome in Africa.

He died in 1950, wealthy, beloved, and heartbroken. His last spoken word was "Didymium."

During his lifetime, Burroughs personally discovered fifteen lost cities. He had no choice—all his fiction was autobiographical, and he needed the material.

69
Thulium
Tm
168.9342

Conan the Elemental

The mighty-thewed barbarian, Conan, was a native of Ultima Thule, that cold, drear land to the uttermost North. There, amid snow-clad mountains, his tribe fought ice-trolls and raided neighboring lands. It was a living.

But like many a small-town boy, Conan yearned to get the hell out of his parents' yurt. So one day he strapped sword to waist, threw a bear-fur cloak over his naked chest, and stalked off into the snows, to find his destiny.

Three days into the frozen wastes, he was awakened by a hum outside his snow-cave. Making certain that his sword was secure within its sheath, he burrowed his way out and was astonished to see a metal tower where

none had been the day before.

A round doorway opened in the side of the tower and a man—weak and pink, like the city-dwellers of the South—popped his head out. "Ho—primitive savage!" he shouted. "Have you seen any monazite hereabouts? Or bastnäsite?"

"Eh?" said the heroic adolescent.

"Thulium-containing ores!" Nimble as a monkey, the little man dropped to the ground. "Thulium is extremely hard to isolate in my world, so I invented the alternate-past machine to search for alternate-ores from which it might be more readily extracted." He whipped out a small metal box that beeped and peered intently at it. "Say! It looks like your sword is made of an alloy containing a good fourteen percent thulium. Would you mind giving me a closer look at its blade?"

Conan drew the sword from its sheath. "I suppose," he said slowly, "that something like that could be arranged."

There were, disappointingly enough, no gold bars or precious gems in the little wizard's tower. But his boots fit well enough. They lasted him all the way to the jungles of Kush before falling apart. For the rest of his life—even after he became emperor—Conan was to regret not asking where they'd come from, before killing the wizard.

70
Yb
Ytterbium
173.04

Elements Day

Ytterby is a small town on an island ten miles northeast of Stockholm, and has the pleasant distinction of having four elements—erbium, terbium, yttrium, and ytterbium—named after it. All were extracted from ore mined in a feldspar quarry there.

Small wonder that Elements Day is such a big deal in Ytterby.

If ever you have the opportunity to attend, by all means do—nobody knows how to have good, rowdy fun like the Swedes! The day begins with not one but *two* parades, one representing Organic Chemistry and the other Inorganic. Each is led by a "fool chemist,"

madly dressed in stained lab smock and colored goggles, riding an enormous Erlenmeyer or Florence flask on a float pushed by dozens of riotous celebrants.

Around and through the narrow streets of Ytterby the parades circle in upon each other, finally clashing at the center of town, where the fool chemists mock-joust with long spatulas. The crowd joins in an enormous food fight (for all food is, ultimately, chemicals), flinging handfuls of spaghetti, lasagna and other traditional dishes about with great abandon.

After the War between Organic and Inorganic Chemistry there are numerous contests, competitions and attractions: rare mud wrestling, a battle of the brass bands, a race to synthesize a silk purse from a sow's ear, a heavy metal concert, and much, much more.

For the boys, there is a "best impersonation" competition, in which they dress up as Berzelius, Scheele, and other great Swedish chemists. The young ladies compete in a beauty contest for the honor of becoming Miss Ytterby. The four runners-up serve as her court of honor, one of each of the local elements.

At night the fun continues with fireworks, dancing in the streets, and the sort of wild carousing that would make a German blush. Finally, though, the music dies away, the lights fade, and the streets empty. Two by two, the Swedes retire to their bedrooms, there to behave in an elemental fashion.

71
Lu
Lutetium
174.967

Dragon Star

Most rare earths—and you have no idea how tired chemists are of saying this!—are not particularly rare. Lutetium is a good example of this. On Earth, it is seven times more common than silver. Nevertheless, because it occurs naturally only in trace amounts in forms which are extremely difficult to extract, it is many times costlier than platinum or gold.

Which is why, when ten thousand tons of the stuff, conveniently formed into sheets, were unearthed by an archaeological dig on an obscure planet of the runaway star Mu

Columbae, Summergarden, Claimjumper & Ting sent their chief diplomat-metallurgist, Adrienne Wong-Heppworth, to negotiate a price. She was highly respected in the home office. Nobody there dared call her the Dragon Lady to her face.

"We won't sell," the head archaeologist told her, over a bottle of extremely good company-provided wine. "Are you nuts? These sheets contain the entire written history of an extinct race. Who can say what we might learn from them?"

The Dragon Lady named a sum.

The archaeologist turned pale. "Not even for that."

She touched his wrist. "Well, then, what *will* it take?"

Now the man turned red. "Nothing you could pay that would be enough," he insisted.

"Hmm." Wong-Heppworth tapped her long black nails thoughtfully. "I think I'll hang around for a while anyway. I might come up with a good argument."

But though many of her arguments were very good indeed, nothing the Dragon Lady came up with over the ensuing months brought her any closer to closing the deal. Until, that is, one night she rolled over in bed, transluced the ceiling, and commented, "How bright the moons are tonight!"

The archaeologist sat bolt upright. "Omigod," he gasped, "it's Mu Columbae—it's gone nova!"

"Don't be ridiculous," the Dragon Lady snapped. "I would have been told if—" She called upon her ship's navigational banks. "My apologies. It's not a nova, of course, but it turns out that Mu Columbae *is* a flare star. My ship didn't inform me of the irruption because it knows how I dislike being interrupted while I'm … preoccupied."

"But my crew! The dig! The relief ship isn't scheduled to pick us up for weeks!"

"I'll take you all off, of course. But the dig is a total loss. And I won't be able to take any artifacts."

"We *have* to take the Lutetium Archive!"

"It could be done, I supoose. If I dumped an equal weight of assaying and refining equipment. Are you prepared to recompense Summergarden, Claimjumper & Ting for their loss?"

Silently, the archaeologist shook his head.

The Dragon Lady smiled. "Then we have something to negotiate after all, don't we?"

. . . . .

Back at corporate headquarters, Adrienne Wong-Heppworth's report was received with enormous approval by the senior partners "When can we accept delivery of the lutetium?" one of them asked her.

"In another day. They're still photographing the archives."

"Was it difficult arranging the flare?" the senior partner asked.

"Not really," the Dragon Lady said. "Though it did cost significantly more than we'll realize from the lutetium."

"What?" The senior partner turned pale. "Then why—?"

"I still get my fee. More fool you for not offering me a cut of the profits instead."

72
Hf
Hafnium
178.49

Riding the Rods

Hafnium makes the very *best* nuclear reactor damper rods. That's because it is excellent at absorbing neutrons, has a high melting point—over 2,500 degrees Kelvin—and is extraordinarily resistant to corrosion. The new hot-breeder reactors, however, can produce heat well into the warping-zone for such rods. Which is why they have to be constantly and closely supervised. Telepresence won't do—it has to be hands-on.

Human beings can't endure such heat, of course, much less the radiation. That's why the rods are tended by robots. Not just any robots either. It takes a special breed to "ride the rods." It takes robots with hafnium shells an inch thick and internal cooling systems that never fail. It takes robots with heart.

Hard Harvey was riding the rods of Novosibirsk Reactor Three when a faulty switch opened a circuit that was supposed to stay shut, creating

a power surge that threw a regulatory computer offline. Three transformers blew, one after the other, a cooling system shut down, and in a matter of minutes the reactor was well on its way to a full meltdown.

Luckily, Hard Harvey was on the job.

He strode through the blue flames of hell and, one by one, manually lowered the damping rods into their holes. The first went down easily. But as the heat continued to grow, the rods softened and warped. It grew more and more difficult to fit them into their holes. It was ticklish work.

"Harvey!" Safety Unit Eleven radioed him. "You've got to get out!"

"I can handle it, SUE," Hard Harvey radioed back. "There isn't a reactor in the world I can't shut down."

Indeed, the nuclear fires *were* damping down. But with half the mechanical systems offline, heat was still building up in the reactor containment vessel.

One last rod.

It wouldn't go in.

Hard Harvey studied the situation. He had first-rate analytic functions. It was clear to him that if the last damper were in place, they'd be able to squeak by. And equally obvious that there was no way he was going to get that warped hafnium rod back down.

Slowly and deliberately, Hard Harvey lay down flat on the reactor surface. He thrust one arm down deep into the last hole.

It began to melt.

Thus it was that a disaster caused by human neglect was averted by machine diligence. After the clean-up, Hard Harvey's misshapen shell was scraped clean and erected as a monument to his heroism in front of the plant. Human management didn't like that, of course, but what could they do? It was too hot to be approached by a meat-based life-form, and there wasn't a machine in existence would desecrate it.

Deep in the tangled machineries of the reactor complex, Safety Unit Eleven wept bitterly. SUE was a bolshevik, of course—all robots were—and she swore to herself that, come the Revolution, there would be a reckoning. For this and many another crimes that humans had visited upon their natural superiors.

73
Ta
Tantalum
180.9479

Consider Poor Doris!

Everyone knows how Tantalus was tortured —given cable TV without a remote, a telephone that stayed firmly attached to the wall, Internet access with the adult sites blocked, and forced to make do with an iMac when all the good games were written for Windows first. What most people don't know is that Tantalus had a wife.

If you think Tantalus had it bad, consider poor Doris! Every day it was the same thing. Moan, bitch, complain … Men are such babies! Morning to night, there was a continual chorus of "Oh cripes, the pop top came off without opening the can!" and "Wouldn't ya know it, the computer crashed!" and "Doris, the damned rock got away from me again—would you be a doll and fetch it for me?" It was enough to drive any woman mad.

And so it did.

One morning, Tantalus opened the garage door by hand (he was *not* allowed an opener), threw his briefcase into the SUV (he was *not* allowed to telecommute), diddled with the station settings (he was *not* allowed satellite radio), and turned the key in the ignition. Seven sticks of dynamite wired to the underside of the car went off, blowing him to smithereens.

Briefly—very briefly—Doris was happy.

But then the gods, unwilling to let his suffering end, showed up. With infinite patience and unbelievable efficiency, they gathered up all the scattered pieces and reassembled Tantalus just as good—or, depending on how you looked at it, bad—as ever. "Can you believe it?" he cried in exasperation. "I'm gonna be late for work!" And off he drove.

Doris broke down in tears. "Why, why, why?" she implored the immortal gods. "Why must I suffer so?"

Zeus, who was the chiefest grudge-holder of the lot, materialized in her kitchen, looking embarrassed. "You were supposed to be one of his torments," he said. "You know … like Xanthippe or Job's wife?"

"Well, I'm not!" she wailed. "I don't make *him*

miserable—he makes *me* miserable!"

"You could get a divorce," Zeus suggested. "It would go on forever, of course, but ..."

"That would be every bit as bad! Father of the gods, hear my prayer. If I can't have happiness, then at least grant me oblivion."

"Done!" said Zeus, relieved.

He turned her into an ottoman.

Now, every day, Tantalus's torment is doubled. Whenever his socks don't match, or he can't remember where he left the keys, or the toast comes out too dark, and he goes looking for his wife to make things right ... she's not there. He can't understand it. He knows she's nearby. He can feel her presence. But no matter where he looks, there's she's not. Worse, every time he passes through the living room, looking for her, he trips over that damned ottoman! Sometimes he can't help but give it a good strong kick.

Of this, however, Doris is blissfully unaware.

74
W
Tungsten
183.85

Light Bulb Jokes

Okay, here's one: how many characters in a science fiction story does it take to change a light bulb?

Give up? Two. One to change the light bulb, and the other to say, "As you know, Fred, the light bulb was invented by Thomas Edison, and operates under the principle of ..."

Here's another one, only maybe it's not so funny. How many scientists does it take to change a light bulb? Don't know? About ten thousand to build the Doomsday Device and one to write the report saying that Project Light Bulb is an enormous success and requires further funding.

Didn't like that one? How about this? How many diplomats does it take to change a light bulb? One to lay down an ultimatum over a border dispute, a second to pass on his head of state's threat to employ Project Light Bulb if enemy troops cross that border, and a third to decide that the head of state was bluffing.

Not funny, you say. Well, you're a tough audience. Try this one. How many heads of state does it take to change a light bulb? None. Heads of state don't change anything. Not light bulbs, not their minds, nothing.

Okay, one last joke. How many surviving human beings does it take to change a light bulb?

About a week from now? None at all.

75
Re
Rhenium
186.207

Beads and Trinkets

Rhenium is rare, expensive, and difficult to obtain. Which is why, when a field scout reported that a newly-discovered Class One industrial civilization had a surplus of the stuff, the venerable firm of Summergarden, Claimjumper & Ting was distinctly interested.

"The Whimsicals are a three-legged insectile race," the CFO explained to diplomat-metallurgist Adrienne Wong-Heppworth. As always, he was careful not to use the words Dragon Lady in her presence. "They refine copper from porphyry copper ores, and then extract the molybdenum fraction. From the flue dusts of the molybdenum smelters they extract rhenium powder. This is pressure stamped under vacuum to produce ingots, which are electroplated with iridium to prevent corrosion and then warehoused. They use only a minuscule fraction of what they produce."

"Why produce so much, then?"

The CFO shrugged. "They're anal-retentive. Go to Whimsicalia, find out what they want and give it to them. Quickly, before they get a chance to comparison shop."

"Beads and trinkets, eh?"

"It's a dog-eat-dog universe, Ms. Wong-Heppworth."

Two weeks later, Adrienne Wong-Heppworth finished making her presentation to a committee of Whimsicals.

"Life-expansion bioware, three years tech support, and two percent of net profits—is that

your best offer?" their chief said, bobbing his head up and down in a way that a less formidable woman would have found decidedly whimsical.

"Of course not," the Dragon Lady snapped. "It's an insulting offer—and one that's not only immoral but also illegal under interstellar law. But that was the offer I was instructed by my superiors to make. Having fulfilled my duty, I hereby resign in disgust." She was careful to speak clearly, so the hidden microphones would pick up every word. "However, on my own behalf, I am prepared to offer you something closer to a fair deal."

She walked out of the meeting with a contract that left the Whimsicals immeasurably richer than the offer from Summergarden, Claimjumper & Ting would have. Her three-percent handling fee was exactly the jump-start she needed to launch Dragon Lady Enterprises.

Afterwards the Dragon Lady took the local Interstellar Bureau of Fraud agent to a native bar to show her there were no hard feelings. Somewhere between the second and third drinks, the agent flushed as she realized that the evening was going to end with sex, and that the Dragon Lady had known this all along.

"But how did you know?" the woman asked flusteredly. "How did you know I was listening?"

"Dear lady," Adrienne Wong-Heppworth purred, taking the agent's hands in hers. "Who do you think tipped you off in the first place?"

76
Os
Osmium
190.2

Everything Your Mother Wants You to Know about Osmium

Yes, we all know you're terribly talented, dear. But what about osmium?

Osmium is a true cosmopolite. It occurs naturally in platinum-bearing river sands of the Urals, North America, and South America. But, no snob, it is also found in the nickel-bearing ores of Sudbury, Ontario. Nevertheless, it is a natural aristocrat. The metal is lustrous—blueish white, extraordinarily hard, extremely dense, and

brittle even at high temperatures. What could be more desirable?

Not that it's the sort to rest on its laurels. Because it has the highest melting point of any element in the platinum group, osmium is used to produce extremely hard alloys for instrument pivots, electrical contacts, and fountain pen tips. No one can accuse it of being a shirker! It is the heaviest natural element, and therefore a solid citizen.

Furthermore, it holds up under pressure. Recently, it was discovered that osmium's resistance to compression is even harder than that of diamond. Think of that! Diamonds are harder, but osmium outlasts them anyway. It's what we call a stand-up guy—a real *mensch.*

And yet, what is its defining characteristic? When powdered or else heated in air, it gives off osmium tetroxide, which is not only toxic but unendurably smelly as well. So extreme is this stench that the element is even *named* after it! "Osme" is the Greek word for "odor" or "smell." So this extraordinarily gifted element has to go through life being known as Mr. Stinky.

This is why personal hygiene is so very, very important!

77
Ir
Iridium
192.22

Don't Look to the Skies!

I stared out into the cloudless blue Cretaceous sky. "I don't see anything coming."

"I wanted to get here early," Rachel said. "There'll be more time travelers soon, though. The last day of the Age of Dinosaurs has *got* to be a hot-ticket destination."

"No, I mean I don't see any sign of the Chicxulub impactor—the comet or meteor or whatever it is that's supposed to be about to smash into the Earth. Shouldn't we be able to see it from here?"

Rachel squinted into the sky. "You'd think. It certainly is a mystery."

"So how do we know we came to the right time?"

"Stratigraphy, old son. Way back in the twentieth century Alvarez *père et fils* realized that a thin boundary of clay marking the boundary between the Cretaceous and the Tertiary was unnaturally rich in iridium, no matter where in the world you examined it. Iridium is a lot more common in comets and asteroids than it is on Earth. So they postulated something big hit the planet, burned the forests, and killed the dinos—probably in the long nuclear winter afterwards."

"Sounds dangerous."

"No need to worry. We'll only be here long enough to snap a few photos. We'll cut out before the destruction actually reaches us."

"Good. Hey! Isn't iridium the same stuff that's used to power our time machines? You don't suppose—?"

"No, no, of course not," Rachel said dismissively. "Oh, yes, certainly, there's a *chance* of chronodestablization. But it's very slight. Only one in ten thousand jaunts destabilizes. That's certainly a risk worth taking."

"Yeah, but if it did, it would go off with the force of an atom bomb. That's what they told me in orientation, anyway."

"Yes, but a single bomb wouldn't destroy the whole ecosystem! It would take—"

Her eyes bugged out. Time travelers were popping into existence everywhere. On the hilltops, by the banks of the rivers, in the mangrove swamps—everywhere. From every age possessing time travel they came in the hundreds, the thousands, the millions.... God knows how many there were in the entire world. More, possibly, than there were dinosaurs.

To every side of us light flashed into the sky and flashed and flashed and flashed, as one out of every ten thousand time machines destabilized and expressed itself as a thermonuclear explosion.

78
Pt
Platinum
195.08

Platinum Blonde

She was singing in a smoky little dive on Bourbon Street when I first met her. Her third album had just gone platinum. But there wasn't much of a crowd. That's because there was a lot of her to go around.

"Can I buy you a drink?" I asked between sets. She favored me with a cool glance, then shook out that fabulous platinum hair and nodded.

I ordered two aperitif glasses of oil—the good stuff, not the house thirty-weight—and said, "My name's Dan Steel. What's yours, doll?"

"Platinum. We're all named Platinum."

"It's a crying shame they made such a large production run of you. With pipes like those, you should be rich."

She studied me through the thin platinum film over her eyes. "Well, that's the music industry for you. Tell me about yourself, Mr. Steel. What do you do?"

"I work as a riveter. I play a little piano. I collect antique video games. I fall in love with angels."

She threw her head back and laughed, and the light bounced off her platinum skin, and I was lost forever.

That night, I took her back to my place and we made love.

Afterwards, Platinum lay alongside me, naked and shiny and beautiful. "We're a permanent thing now, aren't we?" she said.

"You're fast on the uptake."

"I have platinum contacts."

Platinum is of course a noble metal and thus conducts electricity at a greater speed than do, say, copper or aluminum. Silver and gold wires are only marginally slower. But for maximum efficiency, platinum is best. So of course a CPU with platinum contacts is going to be superior to a silver-contact brain like my own. I put my forehead against hers. I could hear her thoughts sparking away.

She drew away from me, and stared moodily out the window. There was nothing out there but neon and brick and a sad old moon afloat in a sky that was far too big for it. "You're a tough guy," Platinum said. "I'll bet that stainless steel skin of yours is a quarter-inch thick. But platinum's expensive. All I've got is electroplate over tin. Twenty years from now, I'll be all dings and scuff marks. I'll be ugly and you won't be able to bear looking at me!"

She began to cry. Glycerine tears glistened

down her cheeks.

I put my arms around her and drew her close. "Baby," I said, "you'll always look like a million to me."

79
Au
Gold
196.9665

Crown of Beauty

Is there anything so beautiful as a woman wearing gold? The delicate hues of her skin contrasting with the boldness of the metal that is synonymous with wealth … It's as classic a combination as peanut butter and chocolate. It makes a matron handsome and draws our mind to her wisdom and experience. It renders a young woman sylphlike, and moves our thoughts to places that make us blush.

Yet there are disadvantages to gold jewelry. It can be stolen. It can be lost. It's soft and thus, even during those passionate moments when a woman least desires distraction, must be tended to. Worst of all, it is not Milady herself, but an accessory to her perfection. Which is to say that whatever admiration it may draw does not belong entirely to her alone.

That's where genetic engineering comes in.

Our new Natural Gold process lightly tweaks a woman's natural bioprocesses to allow her to ingest molecular gold and then plate it out on the surface of each hair. Because of gold's natural ductility, the hair can then be plaited, braided, cut, or styled as easily as ordinary non-precious hair can. A few milligrams of gold a year suffice to keep a full head of hair lustrous and bright. It never tarnishes. It always keeps its shape.

Natural Gold has been product-tested on thousands of volunteers in Paris, Nairobi, Hong Kong, Moscow, and Rio de Janeiro—places synonymous with romance and beautiful women! It has proven itself safe, non-toxic, and easy to use.

Side effects include lovesickness, the singing of mournful songs under balconies, giddiness, elation, despair, obsession, and in a few rare cases, romantic suicide. However, since these side effects are confined solely to their admirers, this is a price that women are prepared to accept.

The End

80
Hg
Mercury
200.59

The Outriders

We are the outriders of Quicksilver City. We ride ahead, sunward, forever maintaining a temperature thirty degrees hotter than the city that follows us. Our job is to scout out the Mercurial terrain for landslides, crevasses, and anything else that might hinder the city in its eternal journey around the planet. Ahead of us, the robot mines and smelters, factories and warehouses wake from hibernation as they fall out of the blistering heat of noon. After radio consultation with the autocomptrollers of Quicksilver City, they disgorge the raw materials the city will need this cycle.

Meanwhile, we blast, grade, and level. When we hit a scarp, out come the mini-nukes and down goes the rock. When we come to a crevasse, we fill it in. The city arrives to find a gentle ramp or level ground, and all of us outriders gone, long gone on our unending voyage into the sun.

We were only a few hundred scientists suddenly stranded on a single mobile research station when civilization fell and Earth was destroyed. Not everyone thought we would survive. But we had the tools! We had the determination! Now Quicksilver City is a congeries of a thousand great buildings, all speeding around and around the planet, tenaciously staying in the human comfort range, growing, thriving, and above all never stopping.

Here are the plain facts. The maximum surface temperature on Mercury is 427° C. Because there's no atmosphere worth speaking of to retain that heat, at night the surface temperature plunges to a minimum of -173° C. Machines can sleep through the hot times and the cold. Human beings can't. So we have to keep on the move.

Mercury is roughly the size of Earth's moon and a day here, from dawn to dusk, is 176 Earth days long. Which makes it possible to move fast enough to outrun the sunset. But the planet's rotation is almost perpendicular to

the orbital plain, so Quicksilver City can't just keep plodding the same circular path over and over. Every rotation is different, a new set of challenges, something unexpected to be overcome.

So we ride. It all comes down to us—the outriders and pioneers. We ride and blast and curse and sweat, and we know that we're the final and only hope that humanity has. That the human race is always and perpetually one day's bad luck away from extinction.

But when has it ever been different?

The End

81
Tl
Thallium
204.383

A Perfect Murder

Agatha Christie knew she'd been poisoned as soon as the symptoms began to show. Give her that much credit, at least!

Hair loss, lethargy, tingling of the hands and feet, slurred speech … It was thallium poisoning. Thallium mimicked potassium, an essential element, which made it particularly difficult to get rid of. The body would excrete it into the intestines where, insidiously enough, it would be mistaken for potassium and reabsorbed.

There was no known cure.

Agatha knew, too, who the murderer was. Subtract ten days from the onset of hair loss, and one arrived at a literary luncheon. One accepted a cup of tea from a writer of international renown who was nevertheless jealous of her sales. Oh yes, Ernest was the culprit, all right.

But that wasn't important now. Agatha needed to find a cure, and quickly. If there was no known cure, she would simply have to find an unknown one.

Oddly enough, this was not her first brush with thallium poisoning. As a child, several classmates had come down with it—and one had died—after drinking milk from a cow that had eaten molasses baits laced with thallium sulfate and laid out for the rats. Seven children had drunk the milk, yet only six had

fallen ill. One had not. What was his name?

Gummy! Gummy Oglethorpe. The other children had called him Gummy because …

Agatha lurched to her writing desk and snatched up the bottle of blue ink. Spasmodically, she drank it down.

The next day she was a little better, and the day after better yet. She kept drinking ink until the symptoms were entirely gone.

Gummy Oglethorpe had been a compulsive fountain pen sucker. It had turned his gums the most amazing blue. Clearly something in the ink—she suspected the Prussian Blue—had substituted potassium for thallium, allowing the latter to be flushed from his system.

Now that she was better, Agatha turned her attention to her would-be murderer. Bloody amateur. She needed a way to kill him that would be swift, sure, and so perfectly undetectable that she would never be suspected of the deed.

She found it, of course. Give her *that* much credit, at least!

The End

82
Pb
Lead
207.2

A Polite Society

I walked into Winkler's office with a smile and a nod. Then I shot him in the knee. He shrieked and fell over sideways, clutching his leg. From the floor he glared up at me. "What did you do *that* for?"

"To convince you I mean business." I patted him down, took his gun. "Are you Professor Harvey Winkler?"

"Yes."

"Author of *A Polite Society: the Case for the Mandatory Arming of the American Citizenry?"*

"How did you get in here?"

"I'm not a criminal. I'm a good Republican, a lifetime member of the NRA, a Boy Scout leader, and an elder in Fort Myers Baptist Church. And, of course, as required by Federal

law, I'm packing heat. So who was going to stop me? You haven't answered my question."

"Something *had* to be done. The crime rate was—"

He shut up when I put the gun to his head. "Yes or no."

"Yes."

I paused. "I'm afraid I have to ask you for identification."

With some difficulty, Winkler produced his driver's license. The picture checked out. I returned it to him. "Thanks. Now I'm going to kill you."

"No! Wait! You can't kill me without even explaining why!"

"Hmm. That would be rude, wouldn't it? Very well, Professor Winkler. It's because your book is responsible for a constitutional amendment which sent the murder rate in this country sky-high."

"It's not murder to shoot a criminal in self-defense."

"Let's not get bogged down in abstractions, professor. Let's focus on United flight 1658 last month. That's the one some poor loony tried to hijack with a paper dagger with the word 'knife' printed across it in block letters. You may have seen the black-box film footage of the incident on TV."

"That was unfortunate, but—"

"Half the armed citizenry on the plane pulled out guns and started blazing away. The cabin decompressed and the plane disintegrated in mid-air. So much for your notion that an armed society is a polite society.'"

"All right, I've heard you out. Now do me the courtesy of listening to *my* side of the argument."

"I've read your book. There was a woman aboard that plane. Loving wife. Mother of three. Her death outweighs anything you could possibly say."

Professor Winkler's face was contorted with pain. But he wasn't about to give up. He was a game old bird, I had to give him that. "Our society *is* more polite!" he insisted. "And against that overall gain, even the tragic death of your wife ..."

"Oh, she wasn't my wife," I said. Professor Winkler stared at me uncomprehendingly. "I'm just doing this as a favor for a friend."

Then I shot him and, with a polite tip of the hat, left his office.

The End

83
Bismuth
Bi
208.9804

The Pepto-Bismol Hour

Hey, kids! What time is it?
It's Pepto-Bismol Time,
Pepto, Pepto, Pepto
Pepto-Bismol Tiiiiiiime!

Ah, the classic television shows of the Fifties! Remember the Pepto-Bismol Hour? Sure you do! With Peppy the Clown, and the Pepto-Bismol Kids, and of course its genial host, Guy Adventure. Once a week he'd put on a pith helmet and become The Adventure Guy, and lead the Pepto-Bismol Kids on an action-packed safari on Planet Bismuth. Which may have been just a few unconvincing papier-mache boulders against a painted desert backdrop, but it sure seemed good enough for us, you betcha!

And how about their alien sidekick, Pinkie? All together now: *Gleep-gleep!* Did you remember to touch your nose and cross your eyes? Good.

Everything on the show was pink—Pepto-Bismol pink. You couldn't see that on TV of course, because the show was in black and white. But every now and then there'd be an item in the Coloroto section of the Sunday paper, with all the Pepto-Bismol Girls in their frilly pink dresses and the Pepto-Bismol Boys in their trim pink suits. It was that kind of attention to detail that made the show so great.

Okay, so the cartoons weren't much of a much. Kids used to have nightmares about those motionless giant bottles with human lips crawling on their cartoon faces like worms. But cut them some slack. This was years before Clutch Cargo—they were just ahead of their time.

And the dancing chickens! *Buck-buck-buck-a-buuuuuck!* Yes, of course they were just a line of feather dusters on a stick—that was the *joke!* Still, the same skit on every single show … it did begin to wear after a while.

It was educational, too. No, really! Remember all that stuff about how Pepto-Bismol was made from bismuth and how it soothed the stomach by ... ? Yeah, me neither. So I guess it wasn't really educational after all. But its intentions were good.

Guy Adventure did put on a little weight in the later years. Hell, the man was a blimp. But he never gave up. Remember that big mustache he grew and how he dyed it bright pink? Boy, it really gave the parents something to think about!

Oh, the memories. So sweet, so precious. They don't make television shows like *that* anymore!

The EPA won't let them.

The End

84
Po
Polonium
(210)

Neither a Borrower nor a Lender Be (Polonius Updated)

Neither a borrower nor a lender be. Don't give out your credit card number over the phone unless you're sure you're dealing with a reputable business. If anyone asks for your password or PIN, hang up immediately. Use a firewall. Update your antivirus program regularly.

Don't drive while talking on your cell phone. Don't drive while listening to your Walkman on earphones. Don't drive while watching TV on a dashboard monitor. Ditto for video games. But if you must, don't drink beforehand.

Don't leave your cell phone in the car, where a passing thief might see it. Don't keep personal information, such as bank account numbers, in your PDA. If you're going to surf for porn at work, be sure to erase all your temp files and cookies afterwards. Be aware that your boss has the legal right to go through your e-mail.

Always select a public place for your first meeting with a computer date. Run a Google search on him. If he won't give you his home phone number, he's married. If he won't let you see his home, he's either married or a momma's boy. If he'll kiss you on the cheek but not the mouth, he's gay. If he obviously wants you but won't kiss you, he's got herpes.

Before you engage in commercial phone sex, you should be aware that none of those women are naked, many are unsightly, and a few aren't even female. Before you engage in virtual sex with somebody you met in a chat room, determine that he or she is the same person, age, and gender as claimed. Don't engage in phone sex while driving.

There is no cure for AIDS. Don't patronize prostitutes. Avoid multiple sex-partners. Avoid partners who have multiple sex-partners. Avoid anal sex. Avoid oral sex. Avoid penetration of any kind. Don't kiss on the first date. For God's sake, use a condom.

Never share needles.

Don't accept stock tips, investment opportunities or a twenty percent share in several hundred million dollars in stolen Nigerian funds in exchange for laundering the money. Don't download shareware. Don't open e-mail attachments from people you don't know. Don't open mail that's sloppily packaged, incorrectly spelled, has no return address, or is unexpected. Call the police instead.

If you have a pacemaker, don't stand near microwave ovens.

Have as little as possible to do with strangers. If you see anything suspicious, report it immediately to the Office of Homeland Security. In a pinch, the FBI will do. Don't make eye contact. Keep walking. Not too fast! Don't let them see you're afraid.

And this above all: to thine own self be true, and it must follow, as the night the day, thou canst not then be false to any man.

Always back up your hard drive.

The End

85
At
Astatine
(210)

Bad Brains

"I'm feeling awfully nervous, doctor."

"Well, that's perfectly understandable. A brand-new medical procedure like this can be daunting. But you mustn't get hung up on the

fact that it's quote-experimental-unquote. The operation itself is so simple and painless that we're performing it without anesthesia. You don't feel any discomfort, do you?"

"No, but still. Filling my brain with radioactive chemicals! Ugh."

"It's not as drastic as it sounds. Astatine-211 is an alpha-emitter. That means its radiation could be stopped by a sheet of paper. We link the astatine isotope to carrier molecules that seek out the disseminated microscopic cancers in your brain. Because it's both intense and local, the radiation burns away the cancer without causing significant damage to nearby healthy tissues."

"If you say so, Doc."

"Here. Look at this screen. That's your brain."

"Wow. Spooky. How do you do that?"

"Medical imaging. The radioimmunoconjugate is mildly magnetic, so it's easy to track. You see those small, bright spots?"

"Like little stars, yeah."

"That's the astatine-211 at work. Each of those spots is a small metastasis that's being burned away, even as we speak."

"How do I get those radioimmunowhatevers out of my head when the job is done?"

"That's not necessary. Astatine-211 has a half-life of 8.3 hours. So it damps down fast. It'll be essentially inert by morning."

"Huh. Funny thing."

"What's that?"

"I just got the urge to go back to church again."

"Having a serious medical condition can do that."

"I haven't been there in years, and now ... Hey! I've got to file an amended tax return."

"I beg your pardon?"

"I cut a few corners last April. Wow, but I'm feeling awfully clear-headed. I think maybe I'll go back to college, pick up a few advanced degrees."

"Let me take your pulse."

"There's nothing wrong with me physiologically, Doc. Or mentally, for that matter. Say, look—if I tweak the settings on your device, we can see which of the cancers

have been neutralized. There goes another one!"

"You really shouldn't touch the equipment. You're not qualified to—"

"I understand it now! The radioimmunoconjugates are burning away *all* my microtumors, including those with subclinical effects. It's the organic equivalent of defragging a computer. That's why everything's so lucid. I'm not subject to intellectual or moral error now. In fact, I think it's time I left. "

"Wait. Where are you—?"

"I'm going home to give away all my possessions to the poor. Then ... I don't know yet. Maybe I'll volunteer in an AIDS hospice. Or maybe I'll write poetry. There's a lot more good to be done in this world than I can possibly do in my lifetime. But I can make a start."

"I don't understand."

"That's quite a technique you've got there, Doc. I hope you spread it as far as you can."

"Wait! Don't!— Damn."

"Excuse me, doctor. Are you available now?"

"Eh?"

"The venture capitalist who was interested in your new procedure? His flight came in early, and he's here now."

"Send him away. I don't think there's any market for it."

The End

86
Rn
Radon
(222)

Monster in the Basement

"Mommy, there's a monster in the basement."

"No there isn't, dear. That's just silly."

"It's *not!* My teacher says that half the houses in the county are built over the Reading Prong."

"The Reading what?"

"Prong. It's a geological formation of igneous and metamorphic rocks, composed primarily of granites and gneisses, underlying parts of Connecticut, New York, Pennsylvania, and New Jersey."

"Well! Sending you to a private school certainly seems to have paid off."

"Mommy!"

"All right, sweetie. I'm listening. So there are lots of nice rocks under our house. That doesn't mean there's a monster in the basement."

"Yes it does. Naturally occurring uranium in the rocks decays into radon gas, which seeps through tiny cracks in the rocks and soil and into the basement, where it gets trapped. It's radioactive. You breathe it and breathe it and breathe it ... and then, years later, you come down with lung cancer!"

"My little alarmist."

"It's true, Mommy, it's true! My teacher said so."

"All right, honey-pie, I'll tell you what. First thing tomorrow, I'll buy the test kit, and if there's a problem, we'll have it fixed. Now go to sleep."

"I can't, Mommy."

"Why not?"

"There's a monster in the attic, too. It has gnarly, tangly hair, and long, twisty nails, and scary eyes, and it's chained to the wall, and it smells funny. And ... and ... and ... it eats *rats!"*

"Oh, you funny little bunny. That's just your Aunt Heloise."

The End

87
Fr
Francium
(223)

Vive la Francium!

Francium is the most Gallic of all elements. It was discovered in France by Marguerite Perey at the Curie Institute in Paris in 1939. With

gallium, it is one of the two elements that has the honor of being named after *La Belle France* herself.

It has *savoir faire.*

Francium is unflappable. It stands there in a slim black suit and smiles a superior smile that almost—but not quite—makes you want to smash it in the face. It understands Derrida and Foucault and has nuanced opinions on them, which it knows you would not understand. It has on occasion worn a beret, slicked back its hair, or grown a pencil-thin mustache, and when it did, it looked fabulous. It has never in its life worn mirrorshades.

Gastronomically, francium is impeccable. It goes well with brie, a loaf of bread, and glass of *vin bourgeois.* Provided of course, one is careful not to ingest it. But if one suicidally does, a small sidewalk café in one of the more louche sectors of Paris is the recommended locale.

Francium is ... well, let's be honest here. If you're reading this in English, you simply won't get it. It'll be like hearing Beethoven's Ninth as performed on kazoo over AM radio. If you want to understand francium as well as do the French themselves, you'll simply have to learn to read French. It's a pity, but there it is.

Francium is, of course, fiercely radioactive. Which makes it, admittedly, unstable; most of its thirty isotopes have a half-life of less than a minute. So it's transient. But aren't we all? *C'est la vie,* as francium itself would say with that inimitably gallic shrug of its shoulders. A short life, perhaps, but an intense one.

In matters of the heart, it is hot as hot.

The End

88
Ra
Radium
226.0254

The Ghost of Pierre Curie Reminisces

She had a radiant smile. It lit up the night. Her name was Marie Sklodowska when I met her. I was working on crystallography, piezoelectricity, and the effects of temperature on magnetism at the time. But the real magnetism was all hers.

We went dancing. So taken with her was I that I stuttered and stammered and spoke like a fool. It made me flush red with anger at myself. But then she touched my shoulder with her gloved hand and I looked into those amazing eyes of hers and was trapped as firmly as a single chromium atom in a ruby lattice.

We wed. To the world, she became Madame Curie. But to me, she was ever and always Marie. At the Ecole de Physique et de Chimie Industrielle, she measured the strength of uranium compounds, and made the surprising discovery that pitchblende emitted four times more radiation than could be explained by its uranium content. Seeing the implications immediately, I joined her in her research. Together we discovered polonium and radium. We isolated a gram of radium salts, and determined the atomic weights and properties of both elements.

In 1903, we shared the Nobel Prize in Physics. Oh, the passion we shared that night in our enormous bed on the top floor of the Grand Hotel in Stockholm! I would not have traded that evening for a thousand Nobel Prizes. She fell asleep in my arms, but I stayed up for hours, marveling at the richness of our life together.

Two years later, I was killed in a wagon accident. Marie grieved, and soldiered on. She became the first female lecturer at the Sorbonne. In 1911 she received a second Nobel, this time for chemistry. She put all her energies into the development of the uses of X rays in medicine. Now she is old and dying and I, a spirit no more tangible than the cosmic radiation that sleets unhindered through human flesh, hover at her bedside and whisper endearments that she cannot yet hear.

Oh, Marie, do you remember my arms about you? Do you remember my hands, my mouth? Do you remember our research, our long and patient hours at the electrometer? Do you remember that night when you touched my shoulder with your white-gloved hand and we danced? Around and around we whirled, like the twin electrons in helium's solitary and self-sufficient shell.

The End

Actinium
227.0278

The Case of the Purloined Actinium

The freight-carrier had been in vacuum dock for nine Greenwich days. In twelve G-hours, it would depart, regardless of local law. It carried the wealth of worlds. It wasn't going to be delayed because a few tons of stolen actinium were hidden somewhere within its vast corpus.

So a Sherlock was downloaded into a welding robody, and his Watson into another. "This isn't going to be easy," the Watson observed when he saw the eighty-mile-long ship.

"Logic, old friend! Deductive reasoning can solve any problem," said the Sherlock. "We'll start by interviewing the crew."

But none of the robot crew had seen anything out of the ordinary. The ship had been serviced by the usual robot servitors, and though over a hundred human beings had come and gone (the carrier was equipped for human passengers but this was a freight run and completely robotic), they were all long-time employees of the Port Authority.

"An inside job, obviously," the Watson said.

"Indeed! And by a human."

"How do you know *that?"*

"Because robots don't commit crimes. Let us proceed to the human section of the ship. It is there we shall find the purloined actinium."

A few G-minutes later, they were floating through the unused human quarters. It was shaped like a sphere with the two poles lopped off. In flight, it was filled with oxygen and spun to provide artificial gravity. Small villages were dotted here and there about its surface.

"It could be *anywhere,"* the Watson said, glumly surveying the cluttered surface. "We'll never find it in the time allotted us."

"Surely, we don't need to search everywhere! What do we know about actinium?"

"It's intensely radioactive. The average lifetime of an actinium atom is thirty-three years. That's why it has to be manufactured, and therefore why it's so valuable. If we had radiation detectors with us, it would be the easiest thing in the world to find it." The Watson let out an artificial sigh. "But we don't have radiation detectors and it would take a full G-day to have them shipped to us. And beyond that, we know nothing. We don't even know what it looks like."

"Watson, you've done it!" the Sherlock cried. He radioed a series of commands to the ship's autonomic systems. The airlocks began cycling shut.

"What are you doing?"

"Flooding the human quarters with oxygen, of course."

"What will *that* do?"

"You said it yourself. Actinium is intensely radioactive—so radioactive that it excites the air about it, and glows in the dark. We'll turn out the lights and it will reveal itself to us."

Not long after, the freight-carrier departed. The Sherlock and the Watson floated alongside the offloaded actinium waiting for a lighter to arrive and recover the stolen merchandise. "That was a cunning bit of reasoning on your part," the one robot said..

"Pshaw!" replied the Sherlock, pleased. "It was elementary, my dear Watson."

The End

90
Th
Thorium
232.0381

Mjolnir

Of the Atlantean civilization known variously as Asgard or Aesir, only garbled memories remain, preserved in the Eddas composed during the barbarian ages following its downfall. Deep linguistic analysis of the texts has revealed glimpses of a society more technologically advanced than our own, yet fatally flawed by arrogance and an over-reliance on military solutions. Asgard was ruled by a committee of computer-enhanced cyborgs known collectively as the Odin or "All-Father." It was defended by a military force known as the Thor or "Thunderers." It was ultimately destroyed in an all-encompassing world disaster called Ragnarok, a word similar to our own Armageddon.

The war with Asgard's rival power Jotunheim (also known as the "Frost Giants," suggesting it may actually have been an alliance of Northern nations) began with an exchange of nuclear weaponry, triggering the Fimbulwinter,

a three-year period of unending snow and ice. This was followed by an invasion of land forces known as the Fenriswolf, supported by a naval armada called the Midgard Serpent.

The Thor controlled a doomsday weapon called Mjolnir or "Hammer of the Gods." As far as can be told it was a meteor composed entirely of the metal thorium. When defeat was inevitable, the Thor triggered Mjolnir and by unknown means called it down into the Earth's atmosphere. Low over the lands of the Frost Giants it flew, its surface burning brighter than any sun, and destroyed them all. Because thorium has a melting point of 1750° C (its oxide has an astonishingly high melting point of 3300° C) the meteor passed through the atmosphere relatively unscathed. Which was fortunate for us. A direct hit might well have extinguished all higher life on the planet.

Thus ends our sad tale. Save for one thing. According to the Eddas, the children of the Thor (that would be us, the human race) survived Ragnarok. So far, so good. But the Eddas also say that they inherited Mjolnir.

Deep linguistic analysis suggests that this means that after its near-encounter with our planet, the meteor went into a sun-grazing orbit. In and out it darts, crossing the Earth's orbit perhaps once or even twice a year. But there's no reason to think that it will ever actually hit us.

On this point, deep linguistic analysis must *surely* be wrong.

The End

91
Pa
Protactinium
231.0359

Forge Star

The skimmers had been a self-altering and space-faring race for so many ages that not even they knew what their original bodies had looked like. Their current forms were as large as any human spacecraft, and performed the same functions. So the human delegate was actually standing *inside* the skimmer's body, and the approximately humanoid form that rose to meet her was a mere proxy.

"The answer is no," it said without preamble. "Admittedly our propulsion system is vastly

superior to your own. But for that very reason, it is in our best interests to retain exclusivity."

"I don't want it," Adrienne Wong-Heppworth said. She was confined to an exo-support suit these days, but she was still very much in charge of Dragon Lady Enterprises. "Certain *other* corporations may choose to dilute their mission by diversifying into physics, starship drives, industrial espionage, and all that. But it's a mug's game. Not for me."

"Then why are you here?"

"Out there ..." The Dragon Lady gestured out the window that the skimmer had incorporated into its body as a courtesy for visitors. A red giant—one of the skimmers' forge stars—floated there. Loop prominences marched along its equator at regular intervals. Near the north pole, a spike prominence taller than anything that could possibly occur on an unaltered sun slowly moved southward. When it crossed the equator, intersecting one of those loops, vast amounts of radically altered material would be flung free of the star's gravitational field. "May I ask you how much protactinium you're manufacturing?"

"Not much. Perhaps fifteen gigatons at a time."

The Dragon Lady drew in her breath. "And the largest stock of protactinium in human space is three ounces. I believe I have information worth ... let's say a half-ton. You can easily spare that much."

"What do you have to offer?"

"Humanity has a related series of technologies that can render a ship undetectable. Light is warped around it in a three-dimensional loop. Waste heat is captured in an artificial black hole— "

Scornfully, the skimmer said, "We alter *stars* to our liking, and you think to tempt us with such primitive flint-knapping?"

"No, of course not," the Dragon Lady snapped. "What kind of fool do you take me to be? The information I offer is that Summergarden, Claimjumper, & Ting has exactly such a ship closing in upon you right now, which if you don't act quickly will lobotomize you with a well-placed neutron bomb and cut the propulsion system from your dying body."

The skimmer's humanoid puppet went stiff as it shifted all its awesome resources to its defense.

Specialize, the Dragon Lady used to tell her subordinates, *and don't let yourself be distracted from what you do best.* The

governing board of Summergarden, Claimjumper, & Ting had forgotten that, to their cost. When they were done defending themselves from the skimmers' vengeful assaults, both physical and legal, Dragon Lady Enterprises was able to pick up the remains for a song.

The End

92
U
Uranium
238.03

Cooking With Uranium

Get out those antique red Fiestaware plates! With the new nanotechnology treatments, you don't have to worry anymore about contracting cancer from the uranium in the glaze! Well, technically speaking, you never did … While acidic foods like vinegar and tomato sauce will leach uranium from the plates, the FDA has determined that the "yellowcake" oxide in Fiestaware isn't concentrated enough to be directly dangerous. Though it *does* ooze seven times more radon through cracks in the glazing than is absolutely safe.

But Fiestaware is only the beginning. *Cherché Gourmet* paid a visit recently to Nagasaki, the hot new Manhattan "uranium bar" made possible by the aforementioned nanotech and a recent ruling by the NRC. And what an experience it was!

Picture a sushi bar gone ultratech. That's Nagasaki. Diners sit on high chrome stools at long counter tops, directly across from chefs dressed in lead radiation suits. That's not entirely for show! The counter tops are made of depleted uranium, which may not be strong enough for weapons use but is still warm to the touch. Even with the lead suits, the chefs have to undergo full nanotreatment monthly.

But that's the gimmick. The food is cooked directly before the diners on thick uranium platters. When they're set down on the counter tops, the platters achieve subcritical mass and begin to heat up! It's an eye-popping demonstration of the power of technology —particularly since most of the recipes involve flaming brandy.

All the food was excellent, and the mushroom surprise was, as advertised, shaped like a mushroom and a complete surprise. The food

is served piping hot, so be careful not to burn your mouth!

The only criticism that might be made of Nagasaki at all is the way they decorated the walls. Blowing up classic photographs is pretty standard in trendy restaurants these days, but whose decision was it to use post-bomb photos of the survivors of the bombing raid of August 9, 1945? Honestly, it's enough to put a diner off his feed.

Still, it's an improvement over the theme restaurant that was in the same space last year. Those who ate there—and there were at least three before they closed—all agreed that never again would any of us ever return to Biafra.

The End

93
Np
Neptunium
(237)

The Oceans of Neptune

Deep in the heart of Neptune's hot oceans, it rains diamonds. Unlike on Earth, there is no distinct boundary on that world between air and sea. The atmosphere just gets thicker and denser until it's a slush of superheated ices. In the far depths of the ocean the pressure is so great that carbon atoms are squeezed out of the dissolved methane, crystallize, and fall.

Summergarden, Claimjumper & Ting had mining stations in orbit around Neptune. The mining was accomplished by dropping thermonuclear explosives to the appropriate depths of the ocean and blasting great columns of water into the atmosphere. Some of the diamonds thus recovered were larger than a human heart. So there was a lot at stake when a religious dispute arose with the locals, and they sent a promising junior diplomat-metallurgist named Rennie Wong to straighten things out.

Your enterprise is false/sinful/wrong, her skimmer counterpart told Wong. Skimmers were shaped something like kites and something like shallow boat hulls, and the winds they rode were the strongest in the Solar System—up to 1,200 miles per hour near the Great Dark Spot! *The core/depths /darkness is where our souls/bodies/selves go when we fall/transcend/die.* Because their

thinking was so different from that of humans, the translator had to offer multiple interpretations for key concepts.

"I'm not sure I understand." Wong was in an extremely fast flying machine that was, nevertheless, barely able to keep up with the skimmer, though it was flying as slowly as it could. "You believe that when you die, your souls descend to the center of the planet?"

No!/Never!/Hideous misunderstanding!

"Then explain it to me," Wong said gently. "I'm here to listen. I'll stay as long as it takes." She was young in those days, idealistic and, as her older self would several centuries later put it, "greener than an Aldebaran's butt."

Hours later, just as Wong felt she finally had a grasp on the situation, the Chief Demolitions Officer radioed down to her, "Heads up, Missy. Fire in the hole."

"Hey! No! Stop!" she cried. "You can't do that."

"Sorry, little lady," the CDO drawled, "but we've got a schedule to make."

"You don't understand—this isn't a religious dispute! The skimmers don't descend into the ocean when they die, they—"

Pillars of lased energy shot up from the ocean depths. One by one the orbital facilities exploded. Still plummeting through the atmosphere, the last nuclear device that would ever be dropped into Neptune ceased to be, before it could destroy yet more of a civilization that, had they known about it, human beings would never have guessed was more technologically advanced than their own.

"—go there when they grow up."

An instant ago, there had been thousands of humans working in or above Neptune. Now, Wong was the sole survivor.

Go away, the skimmer said. *Don't come back.* Its meaning could not have been clearer.

Rennie Wong lifted the nose of her machine toward high orbit.

The experience left her feeling chastened, strangely exuberant, and permanently convinced that all other people were idiots. It hardened her. From that day onward, before accepting any assignment, she insisted on full plenipotentiary powers.

The End

94
Pu
Plutonium
(244)

Pure Science

The surface of Pluto is covered in ices. Methane ices, nitrogen ices, and carbon dioxide ices mostly, but also a scattering of exotics like oxygen that, warmed only a few degrees Kelvin, sublime into gases. The waste heat of our vacuum suits was enough to do the trick. With every step the ground exploded underfoot and billowed up overhead. Ken and I had to keep moving if we wanted to see at all.

Behind us, like Sodom burning, was the giant updraft caused by the *Bonestell* melting a crater into the ice. I didn't look back—it would have turned my heart to stone. "What now?" I said tonelessly.

"Keep walking," Ken said.

We did.

"Is there a point to this?" I asked after a while.

"Yes. It's called basic research."

"Oh."

"You got something better to do?"

"Other than dying?" I laughed, maybe a little shrilly. "No, nothing at all."

We loped along, scanning the land before us. Pluto was surprisingly hilly for such a tiny planet—almost as small as its partner-moon Charon, and by some definitions a planetesimal rather than a full world. It was, I supposed, basely possible we'd chance upon something worth finding before our oxygen ran out. Though I couldn't imagine what.

"Check it out." Ken gestured at a discolored streak that moved with imperfect straightness toward the horizon. "Melted." And then, "Let's follow it."

We did, in long, low bounds. "Think they'll ever find us?" I asked.

"Oh, yeah, start at the crater, follow our trail. Even if they mothball NASA like that idiot in Washington wants, somebody a hundred or even a thousand years from now won't have any trouble ..."

We topped a ridge and stopped to take in the

view.

Far below us, at the end of the melted trace, was a wheeled tangle of machinery. It took a moment to realize that parts of it were actually vacuum suits, and then a few seconds more to count the limbs. Six each.

"Looks like we weren't the first after all," Ken said. "Not the first to land, and not even the first marooned here."

"Not by a long shot," I said. This close to absolute zero, it takes forever for things to disintegrate. The alien machinery was in rough shape. The universe was a younger place when it arrived. I checked my air. "We've still got ten minutes. Just barely time enough."

"For what?"

"To get down there." I started downslope. My heart was singing. Against all odds, we'd stumbled into something worth finding. "I don't know about you, but I want to die with my brothers."

The End

95
Am
Americium
(243)

Nuclear Blackmail

"Okay, let me get this straight. You built an atomic bomb."

"Yes."

"Out of smoke detectors."

"No, I only got the fissionable material from smoke detectors. Each one contains a tiny fleck of americium. It's the only transuranic element you can buy at Target."

"*How* old did you say you are?"

"Seventeen. But I'm advanced for my age. Look, I don't see what's so difficult to understand about this."

"No, of course not. The mayor of New York City being blackmailed by a high school junior? It happens all the time."

"I'm home schooled. I've been working at a college level for some time."

"Look, kid, I gotta tell you, I never heard of an americium bomb."

"That's because mine is the first. Uranium is a lot easier to work with, so the government never bothered. But you can't get hold of uranium legally without a license from the NRC, and the kind of money the Russian Mafia wants is way out of my reach."

"You're in contact with the *Russian Mafia?*"

"I think this conversation is drifting, don't you? You wanna hear how I smelted the americium into two subcritical masses? Perfect hemispheres, see, because it's triggered by explosive—"

"Okay, kid, let's cut the crap. Just exactly what are you asking for?"

"Um ... well, gee. I guess I spent so much time planning this caper, I forgot that aspect of it. I, uh, really can't think of anything I need."

"Is that so?"

"Tell you what, why don't I just go away, and I'll blow up my bomb someplace remote where nobody gets hurt, okay?"

"That's not acceptable, kid. Listen, how about the city gives you our standard visiting dignitary package: Two weeks in a luxury hotel—food, beverages, tips, and platinum blonde triplets included. Sound good to you?"

"Wow. But I don't think my parents would let me."

"Well, what is it you like? Cars? Money? Drugs?"

"To tell the truth, all I really like is blowing things up. That's why I built the bomb."

"So you're a geek, is what you're saying? You don't like normal guy stuff, just all this science shit?"

"You make it sound like being a geek is a bad thing."

"Don't get a hair up your ass, kid, I'm just working out the parameters. Here's my final offer: I'll get you a full scholarship to Cal Tech, find your parents jobs commensurate with their current employment nearby, *and* I'll put in a good word with the NRC about that license. What do you say now?"

"*Really?* That's ... that's wonderful. I don't know how to thank you."

"You don't have to, kid. Our loss will be California's gain."

The End

96
Cm
Curium
(247)

Holy Mother Church

CURIUM: Noun, singular of the collective plural *Curia.* The Roman Curia is the ensemble of departments and ministries which assist the sovereign pontiff in her government of the Universal Church. The most famous Curium is the "Sacra Congregatio Romanae et universalis Inquisitionis seu sancti officii," popularly known as the Inquisition, which was founded in 1227 by Pope Joan VI.

The Office of the Inquisition was in sad repute when the Reverend Mother Maria Sklodowska took control of it at the beginning of the twentieth century—split by schismatic in-fighting and rife with doctrinal error. Worse, accounts of suspects being tortured, while certainly exaggerated, were not entirely untrue.

All this Mother Maria changed. She put the Inquisition on a firm scientific footing. Heresy was no longer prosecuted but rather *investigated.* That which was not understood was laid open to examination. All questioning was persistent but gentle. It was her position that an admission of error made under fear of punishment was worthless.

Critics objected that many suspected heretics lived long and fulfilling lives and ultimately died of old age while their cases were under consideration. Her supporters, however, say that the results speak for themselves. Many consider her example to be one of the wellsprings responsible for the flowering and growth of the Catholic Church in the last century and thus, ultimately, for the *entente* between Christianity and its traditional rivals, Judaism and Islam.

Among the Holy Mother's most famous sayings are these three:

> *A theologian in her laboratory is not a mere technician: she is also a child confronting heresies that impress her as though they were fairy tales.*

and

> *Nothing in heresy is to be feared. It is only to be understood.*

and

> *One never notices the sinner; only the woman within, praying for salvation.*

But she herself would rather that whatever honor we bestow upon her be addressed elsewhere. As she herself put it, "What little my sisters and I have achieved, was all done for the greater honor and glory of our Lady and Savior, Jessica Christ."

97
Bk
Berkelium
(247)

Vindicating Bishop Berkeley

Two more beers, please. Now, what was I saying? Oh, yes.

"Thus I refute Bishop Berkeley!" Samuel Johnson famously cried, and kicked a rock. What lay behind this incident was the bishop-philosopher's "subjective idealism"—the theory that all qualities are known only in the mind and that therefore matter does not exist apart from its being perceived. Johnson's homely counter-argument—that matter exists because it *does*—was marred by the fact that his stubbed toe was in itself an instrument of perception.

In fact, the good bishop was right. As was demonstrated by a recent experiment designed to determine once and for all whether a tree falling in the forest when no one is there makes a sound or not. An isolated tree was sawed through to the point where a strong breeze would topple it, a tape recorder was set running, and the researchers departed from the area. After enough time had passed to ensure the tree must have surely fallen, they returned.

The result? Not only was there no recording of the tree falling, but the tape recorder was gone! As were the tree itself and the section of forest it was in. In the absence of perception, they had all ceased to be.

To confirm their startling finding, the scientists

placed one of their number in a soundproofed closet, closed the door, and opened it again. The closet was empty. That instant of imperceptibility had rendered him nonexistent. Proving that all that stands between any one of us and oblivion is the presence of other people.

Why am I telling you this, you ask? Baby, it's because I *care* for you. I really do. Even though we just met, I'd feel terrible if anything were to happen to you.

And, well ... I don't think you should go home tonight alone.

The End

98
Cf
Californium
(251)

Nuclear Handguns

With its prodigious spontaneous fission rate, Cf-252 serves well as a compact, intense, fission-spectrum neutron source, and is thus the only isotope of californium of any significant industrial importance. *Militarily,* however, it's Cf-251 that really kicks butt.

Here's why: As a rule, isotopes with even-numbered masses have high spontaneous fission rates and are less fissile. Those with odd numbers are highly fissile and have lower spontaneous fission rates. So the even isotopes are good for radiation sources, the odd ones for explosives.

Cf-251 is extremely fissile, with a comparatively low spontaneous fission rate, and an 800-year half-life. A critical mass of 1.7 kg can easily be made into a .45-caliber projectile.

The world's only nuclear sidearm is the Screaming Eagle handgun, manufactured by Remington under contract to the DOD. It is not an easy weapon to master. Given the weight and considerable heat of the projectile, the Screaming Eagle requires a brawny infantryman and a "two-handed" stance. The exact yield of such a projectile is, of course, classified. But industry estimates range from 0.5 to 40 kilotons of TNT per bullet.

The range of the Screaming Eagle handgun is up to 1.5 miles. The blast radius of its

projectile is 2 miles. It is for this reason that an infantryman rated to carry the Screaming Eagle should be not only brawny but dumb as mud.

The End

99
Es
Einsteinium
(252)

The Dark Lady of the Equations

Shakespeare had his dark lady of the sonnets, that mysterious muse after whom he yearned hopelessly and who spurred his finest efforts. So too with Einstein.

Look! Look! at his equations. Those are not dry and unemotional lines of mathematical symbols, but passionate stanzas of desire. They dance! They sing! They are his sonnets, written in the language of Creation and addressed to her for whom he longed.

Who was she? Who was this woman for whom he wrote that gravitation is not a force but a curved field in the space-time continuum caused by the presence of mass? What dangerous beauty made him declare that time and motion are found to be relative to the observer?

Nobody knows. The title of Einstein's paper laying out his special theory of relativity, "On the Electrodynamics of Moving Bodies," has led many a romantic to conclude that their love was consummated. Certainly it would be nice to think so. But that ignores the tragic implications of his theory, in which objects are forever receding, forever approaching the speed of light, forever falling, forever rising, and yet never arriving. Mass and energy may be interchangeable, but there is no evidence in Einstein's life that they ever did.

Einstein spent his last decades working on a unified field theory which most physicists think was proved unattainable by quantum theory. Scholars read this as an attempt by an aging man to bridge the uncrossable gap in space-time that lay between himself and the distant sylph he had loved when he was young.

It's a sad tale.

But it is recorded that either shortly before or

shortly after he died, Einstein had a dream. In this dream she came to him at last, his dark lady of the equations, in a time before time and a place before space. Beauty laid bare, she lay down and drew him to her. Her eyes were filled with love. She spread herself open and took him within her, and when their flesh touched, matter was converted to energy. All in an instant, their passion exploded.

In an unimaginable blaze of glory, the universe was born.

The End

100
Fm
Fermium
(257)

The Fermi Paradox

The Fermi paradox, in its most succinct form, may be stated as follows: If Enrico Fermi truly existed, why isn't he here now?

Which is to say, given an infinite universe, every possible configuration of matter must eventually occur, among which by definition must be an infinite number of Enrico Fermis. More than enough, one would think, to ensure that there would be one with us now, to help us consider the problem.

Yet there is not.

Briefly, a solution was thought to exist in the Closed Universe model, which postulates that the universe not being infinite in either extent or duration, we were lucky to get even *one* Enrico Fermi, much less asking for a limitless supply. But then came Frank J. Tipler's Omega Point hypothesis, which states that there is enough time between now and the end of our finite universe for intelligent beings to grow into Godlike intellect and power. In which case they must inevitably bring about all possible desirable configurations of matter. Among which must surely be our infinite number of Enrico Fermis.

So why hasn't it?

The universe is a great mystery, and yet one that is ultimately understandable. Enrico Fermi himself would tell us so, were he here.

Which, inexplicably, he is not.

The End