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Ineluctable
by Robert J. Sawyer
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What to do? What to do?

Darren Hamasaki blew out air, trying to calm down, but his heart kept pounding, a metronome on amphetamines.

This was big. This was huge.

There had to be procedures in place. Surely someone had thought this through, had come up with a -- a protocol, that was the word.

Darren left the observatory shed in his backyard and trudged through the snow. He stepped up onto the wooden deck and entered his house through the sliding-glass rear doors. He hit the light switch, the halogen glow from the torchiere by the desk stinging his dark-adapted eyes.

Darren took off his boots, gloves, tuque, and parka, then crossed the room, sitting down at his computer. He clicked on the Netscape Navigator icon. Oh, he had Microsoft Explorer, too -- it had come preinstalled on his Pentium IV -- but Darren always favored the underdog. His current search engine of choice, which changed as frequently as the current favorite CD in his stereo, was also an underdog: HotBot. He logged on to it and stared at the dialog box, trying to think of what keywords to type.

Protocol was indeed appropriate, but as for the rest --

He shrugged a little, conceding the magnitude of what he was about to enter. And then he pecked out three more words: contact, extraterrestrial, and intelligence.

He'd expected to have to go spelunking, and, indeed, there were over thirteen hundred hits, but the very first one turned out to be what he was looking for: "Declaration of Principles Concerning Activities Following the Detection of Extraterrestrial Intelligence," a document on the SETI League web site. Darren scanned it, his eyes skittering across the screen like a puck across ice. As he did so, he rolled his index finger back and forth on his mouse's knurled wheel.

"We, the institutions and individuals participating in the search for extraterrestrial intelligence..." _

Darren frowned. No one had sought his opinion, but, then again, he hadn't actually been looking for aliens.

"... inspired by the profound significance for mankind of detecting evidence..." _

Seemed to Darren that "mankind" was probably a sexist term; just how old was this document?

"The discoverer should seek to verify that the most plausible explanation is the existence of extraterrestrial intelligence rather than some

other natural or anthropogenic phenomenon..." _

Well, there was no doubt about it. No natural phenomenon was likely to generate the squares of one, two, three, and four over and over again, and the source was in the direction of Groombridge 1618, a star 15.9 light-years from Earth; Groombridge 1618 was in Ursa Major, nowhere near the plane of the ecliptic into which almost every Earth-made space probe and vessel had been launched. It had to be extraterrestrial.

"... should inform the Secretary General of the United Nations in accordance with Article XI of the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space..." _

Darren's eyebrows went up. Somehow he doubted that the switchboard at the UN would put his call through to the secretary-general -- was it still Kofi Annan? -- if he said he was ringing him up to advise him that contact had been made with aliens. Besides, it was 2:00 a.m. here in Ontario, and UN headquarters were in New York; the same time zone. Surely the secretary-general would be at home asleep right now anyway.

"The discoverer should inform observers throughout the world through the Central Bureau for Astronomical Telegrams of the International Astronomical Union..." _

Good God, is it still possible to send a telegram? Is Western Union even still in business? Surely the submission could be made by E-mail...

HotBot quickly yielded the URL for the bureau, which still used the word "telegrams" in its name, but one could indeed fill out an online form on their home page to send a report. Too bad, in a way: Darren had been enjoying composing a telegram in his head, something he'd never done before: "Major news stop alien signal received from Groombridge 1618 stop..."

The brief instructions accompanying the form only talked about reporting comets, novae, supernovae, and outbursts of unusual variable stars (and there were warnings not to bother the bureau with trivial matters, such as the sighting of meteors or the discovery of new asteroids). Nary a word about submitting news of the receipt of an alien signal.

Regardless, Darren composed a brief message and sent it. Then he clicked his browser's back button several times to return to the Declaration of Principles, and skimmed it some more. Ah, now that was more like it: "The discoverer should have the privilege of making the first public announcement..." _

Very well, then. Very well.

* * * *

There was nothing to do now but wait and see if the beings living on the third planet were going to reply. Palm-Up-Middle-Fingers-Splayed expected they indeed would, but it would take time: time for the laser flashes to reach their destination, and an equal time for any response the inhabitants of that watery globe might wish to send -- plus, of course, whatever time they took deciding whether to answer.

There were many things Palm-Up-Middle-Fingers-Splayed could do to while away the time: read, watch a video, inhale a landscape. And, well, had it been any other time, he probably would have contented himself with one of those. The landscape was particularly appealing: he had a full molecular map of the air in early spring from his world's eastern continent, a heady blending of yellowshoot blossoms, clumpweed pollens, pondskins, skyleaper pheromones, and the tang of ozone from the vernal storms. Nothing relaxed him more.

He'd been afraid at first to access that molecular map, afraid the homesickness would be too much. After all, their ship, the Ineluctable, had been traveling for many years now, visiting seven other star systems before coming here. And there were still three more stars -- and several years of travel -- after this stop before Palm-Up-Middle-Fingers-Splayed would really get to inhale the joyous scents of his homeland again. Fortunately, though, it had turned out that he could enjoy the simulation without his tail twitching too much in sadness.

Still, this was not any other time; this was the period when, had they

been back home, all three moons would have risen simultaneously, the harmonics of their vastly different orbital radii briefly synchronizing their movements. This was the time when the tides would be at their highest, when the jewelbugs would be taking to the air -- and when the females of Palm-Up-Middle-Fingers-Splayed's kind would be in estrus.

Even aboard ship, the estrus cycle continued, never losing track of its schedule. Yes, despite his race's hopes, even shielding females from the light and gravitational effects of the moons did nothing to end the recurring march. The cycle was so ingrained in <hand-sign-naming-his-species> physiology that it maintained its precision even in the absence of the stimuli that must surely have originally set its cadence.

Palm-Up-Middle-Fingers-Splayed took one last look out his window at the distant yellow star. The planet they'd signaled was invisible without a telescope, although two of the gas giants -- the fifth and sixth worlds -- shone brightly enough to be seen with naked eyes, despite presenting only crescent faces from this distance.

The ship's computer would flash a signal to alert Palm-Up-Middle-Fingers-Splayed, of course, if any response were received. He set out to find his mate, to find his dear Fist-Held-Sideways.

* * * *

Fist-Held-Sideways was in the forward mess hall when Palm-Up-Middle-Fingers-Splayed caught up with her. Now that the _Ineluctable_'s great fusion motors were quiescent, the false sense of gravity had disappeared. Fist-Held-Sideways was floating freely, her gray tail with its blue mottling sticking up above her in a most appealing way.

Palm-Up-Middle-Fingers-Splayed hovered in the doorway, not moving, just watching her as she ate. Her chest opened vertically, revealing the inside of her torso, the polished pointed tips of her ribs moving apart as she split herself wider and wider. Fist-Held-Sideways used the arm coming out of the left side of her head to swat a large melon that had been floating by, directing it into her belly. Palm-Up-Middle-Fingers-Splayed watched as the tips of her ribs came together, crushing the melon, a few spherical drops of juice floating out of Fist-Held-Sideways's torso before she closed the feeding slit. A small mechanical cleaner, moving about the room with the aid of a propeller, sucked the juice out of the air and then demurely retreated.

It wasn't easy getting another <hand-sign-naming-his-species>'s attention in zero gravity. On a planet's surface, one might slap one's tail against the floor hard enough so that the other would feel the vibrations through his or her own tail and feet. But when floating freely, that didn't work; indeed, slapping a tail like that would send you shooting up toward the ceiling, banging your head.

Palm-Up-Middle-Fingers-Splayed used the hand coming out of the right side of his head to push against the doorframe, propelling himself into the mess hall. As soon as he came within Fist-Held-Sideways's field of view, she flared her nasal slits in greeting, welcoming his scent, then used both her hands to make signs. "Palm-Up-Middle-Fingers-Splayed!" she exclaimed, hyperextending her fingers after finishing his namesign to convey her pleasant surprise. "Good to see you! No reply from the aliens yet?"

Palm-Up-Middle-Fingers-Splayed balled his left hand in negation. "It's still much too early. So far, I've just sent them one, four, nine, and sixteen over and over again; sort of a general hello, one sentient race to another. It'll be some time before we receive any response." He paused, seeing if his mate would pick up the hint.

And, of course, she did; Palm-Up-Middle-Fingers-Splayed had heard from Palm-Down-Thumb-Extended, who had been Fist-Held-Sideways's mate last breeding season, that she was wonderfully intuitive and empathetic -- unusual, but very desirable, traits in a female. "Your quarters or mine?" signed Fist-Held-Sideways.

"Yours," Palm-Up-Middle-Fingers-Splayed signed back, flexing his wrist wryly. "Too many breakables in mine."

* * * *

The sex, as always, was athletic. Palm-Up-Middle-Fingers-Splayed enjoyed the exercise, enjoyed the tumbling in zero-g, enjoyed the physical contact with Fist-Held-Sideways. But it was the actual consummation, of course, that he was waiting for. Palm-Up-Middle-Fingers-Splayed was a biologist and, although he had indeed repeatedly taught students the precise biochemistry involved, it still fascinated the intellectual part of him every time it happened: when a male's semen finally reached the female's hexagon of egg-cells, a chemical reaction occurred producing a neurotransmitter that brought intense pleasure to both the female and the male, just as --

Yes, yes! Contact! The sensation washed over him, his tail going rigid in excitement, his twin hearts pounding out of synch, his rib points clamping together, as he was overcome by the joy, the joy, _the joy_...

Palm-Up-Middle-Fingers-Splayed was a considerate enough lover to take additional pleasure from the writhing of Fist-Held-Sideways's body. He squeezed her tighter, and they both relished the simultaneous climax of their intercourse. As they relaxed, floating in the room, the warm afterglow of the neurotransmitter washing over them, Palm-Up-Middle-Fingers-Splayed thought that the Five Gods had indeed been wise. Only together could males and females experience such joy, and -- oh, the gods had indeed been brilliant! -- it happened _simultaneously_, compounds from his body mixing with chemicals from hers, producing the neurotransmitter. The simultaneity, the shared experience, was wonderful.

Of course, as usual, it would be a problem figuring out what to do with the new children. His race had been saddened indeed when it discovered that any process or barrier that prevented conception also prevented orgasm, and that, because of the neurological interdependence of the fetuses and their host, to terminate a pregnancy would kill the mother.

No, the only method to keep new children from being born was to avoid copulation altogether. And, well, when a female was in estrus, her pheromones -- those wonderful, wonderful pheromones -- were completely irresistible.

The <hand-sign-naming-his-species> had no choice. With an ever-expanding population, they had to find new worlds to colonize.

* * * *

Darren's next-door neighbor's brother-in-law worked for Newsworld, the CBC's all-news cable channel. He'd met the guy a couple of times at parties at Bernie's place. Darren couldn't recall exactly what the guy did. Director? Switcher? Some behind-the-scenes function, anyway; they'd had a fairly empty conversation last time, with Darren asking him if Wendy Mesley was as cute in real life as she looked on TV. Of course, at this time of night, he didn't want to call Bernie and wake him up -- "next door" was a bit of a misnomer; Bernie's place was the better part of a kilometer up the country road.

But at that last party Bernie had held -- back in June, it must have been -- Bernie's brother-in-law had had to leave early, to get down to Toronto and go to work. So he pulled the night shift at least some of the time, meaning there was a chance he might be at the CBC right now. But what the heck was the guy's name? Carson? Carstone? Carstairs? Something like that...

Well, nothing to be lost by trying. He got the CBC number from Toronto directory assistance, dialed it, and was greeted by a bilingual computerized receptionist, which gave him the option of spelling out the last name of the person he wanted to speak to on his touch-tone phone. Fortunately, the system recognized the name by the time Darren had pressed the key corresponding to the fourth letter -- the last name, as the system informed him, was in fact Carstairs, and the first name was Rory. Darren was transferred to the correct extension and, miracle of miracles, the actual, living Rory Carstairs answered the phone.

“Overnight,” said the voice. "Carstairs."

"Hi, Rory. This is Darren Hamasaki -- remember me? I live down the street from your brother-in-law Bernie. We met at a couple of his parties." The words of the automated attendant echoed in Darren's mind: _Continue until

recognized_. "I've got one of those beards that a lot of people call a goatee, but it's really a Vandyke, and -- "

"Oh, sure," said Carstairs. "The space buff, right? You were pointing out constellations to us in Bernie's backyard. Say, nothing's happened to Bernie, has it?"

"No, he's fine -- at least, as far as I know. But -- but I've got some news to report, and, well, I didn't know who else to call."

"I'm listening," said Carstairs.

* * * *

The carefully devised Declaration of Principles Concerning Activities Following the Detection of Extraterrestrial Intelligence, issued by the International Academy of Astronautics in 1989, had been based on the assumption that governments would control access to the alien signals, that giant, multi-million-dollar radio telescopes would be required to pick up the messages.

But the signal Darren had detected was optical. Anyone with a decent backyard telescope had been able to pick it out, once he'd made known the celestial coordinates. And in all the places on Earth from which Groombridge 1618 could be seen at night, people were doing just that. Sales of telescopes were at an all-time high, exceeding even the boom during Halley's last visit.

Darren Hamasaki became a media celebrity, interviewed by TV programs from around the world. Of course, all the usual SETI pundits -- Seth Shostak and Paul Shuch in the U.S., Robert Garrison in Canada, and Jun Jugaku in Japan -- were also constantly being asked for comment. But when the mayor of Las Vegas decided to do something about the alien signal, it was indeed Darren that he called.

Darren had taken to letting his answering machine screen his calls; the phone rang incessantly now. He was leaning back in a leather chair, fingers interlaced behind his head, listening absently to the words coming from the machine's tinny speaker: "Shoot, I'd hoped to catch you in. Mr. Hamasaki, my name is Rodney Rivers, and I'm the mayor of Las Vegas, Nevada. I've got an idea that -- "

Intrigued, Darren picked up the phone's handset. "Hello?"

"Mr. Hamasaki, is that you?"

"Speaking."

"Well, looks like I hit the jackpot. Mr. Hamasaki, I'm the mayor of Las Vegas, and I'd like to have you come down here and join us for a little project we got in mind."

"What's that?"

"You ever been to Vegas, son?"

"No."

"Seen pictures?"

"Of course."

"We're one brightly lit city at night, Mr. Hamasaki. So bright, the shuttle astronauts say they can easily see us from orbit. And, well, this is our off-season, you know -- the time between Thanksgiving and Christmas. Don't get enough tourist traffic, and it's the tourists that drive our economy, sure enough. So me and some of the boys here, we had an idea."

"Yes?"

"We're goin' to flash the lights of Las Vegas -- every dang light in the blessed city -- on and off in unison. Send a reply to them there aliens you found."

Darren was momentarily stunned. "Really? Is that -- I mean, can you do that? Are you allowed to?"

"This is the U.S. of A, son -- freedom of speech and all that. Of course we're allowed to."

"What are you going to say?"

"That's why I'm callin' you, Mr. Hamasaki. We want you to help us work out what the reply should be. Any chance I could entice you down here with a free trip to Vegas? We'll put you up at -- "

"At the Hilton. Isn't that the one with Star Trek: The Experience?"
The mayor laughed. "If that's what you'd like. How soon could you get down here?"

* * * *

Mayor Rivers was certainly savvy. Over one hundred thousand extra tourists came to Las Vegas to be part of the great signaling event; it was the best early-December business the city had ever had.

Darren Hamasaki's first inclination had been to send a simple message in response. The aliens -- whoever they might be -- had signaled one flash, four flashes, nine flashes, and sixteen flashes, over and over again; those were the squares of one, two, three, and four. Darren thought the logical reply might be the cubes of the first four integers: one, eight, twenty-seven, and sixty-four. Not only would it make clear that the people of Earth understood the original message -- which simply parroting it back wouldn't necessarily have conveyed -- but it would also indicate that they were ready for something more complex.

But Las Vegas was a city of spectacles; being that prosaic wouldn't do. Darren spent a week devising a more content-rich message, using the form Frank Drake had worked out for Earth's first attempt at communicating with aliens, back in 1974: an image made of a string of on/off bits, the length of the string being the product of two prime numbers -- in this case 59 and 29.

Arranging the bits as a grid of 59 rows each 29 columns wide produced a crude picture. Darren coded in a simple diagram of a human being, and, because ever since he'd read Lilly in college, he'd believed dolphins were intelligent, a simple diagram of a bottle-nosed dolphin, too. He then put binary numbers underneath, expressing the total populations of the two species, and a crude diagram of the western hemisphere of the Earth, showing that the humans lived on the land and the dolphins in the ocean.

Media from all over the world came to cover the event. Mayor Rivers and Darren were invited to the master control room of the Clark County Power Authority. The entire power grid could be controlled from a single computer there. And, at precisely 10:00 p.m., the mayor pushed the key to start the program running. It began -- and would end -- with one solid minute of darkness, then a solid minute of light, and then another of darkness, to frame the message. Then the glowing marquee at Caesars Palace winked at the night sky, the floodlights at Luxor strobed against the blackness, the neon tubes at the MGM Grand flickered off and on. All along the Las Vegas strip, and in all the surrounding streets, the lights blinked the 1,711 bits of Darren's reply.

Out front of Bally's, surrounded by a huge crowd, a giant grid of lights -- specially powered by gas generators -- filled in with the pixels of the message, one after the other, line by line, from upper left to lower right, painting it as it was transmitted. The crowd cheered when the human figure was finished, thousands of people raising their right arms in the same salute of greeting portrayed in the message.

After the message had been completed, the mayor took to the podium and addressed the assembled mass, thanking them for their orderly conduct. Then His Honor invited Darren to say a few words.

Darren felt the need to put it all in perspective. "Of course, Groombridge 1618 is almost sixteen light-years from Earth," he said into the mike, his voice reverberating off the canyon of hotels surrounding him. "That means it will take sixteen years for our signal to reach the aliens there, and another sixteen before any reply they might send could be received." This being Las Vegas, there were already betting pools about what date the aliens might reply on, and what the content of their next message might be.

Darren refrained from remarking about how exceedingly unlikely it would be that the aliens would be able to detect one blinking city against the glare of Earth's sun behind it; if humanity ever really wanted to seriously respond, it would likely need to build a massive laser to do so.

"Still," said Darren, summing up, "we've had a lot of fun tonight, and we've certainly made history: humanity's first response to an alien signal."

Let's hope that if a reply does come, thirty-odd years from now, we'll have made new friends."

The head of the power authority had the final words for the evening; the crowd was already dispersing by this point -- heading back to the casinos, or the hotels, or the late Lance Burton show during which his assistants were topless, or any of the hundreds of other diversions Las Vegas offered at night.

Darren felt a twinge of sadness. He'd enjoyed his fifteen minutes of fame -- but now, of course, the story would slip from public consciousness, and he'd go back to his quiet life in rural Ontario.

Or so he'd thought.

* * * *

Palm-Up-Middle-Fingers-Splayed had spent the entire night in Fist-Held-Sideways's quarters but had left by the time ship's morning had rolled around. He was one of ten males aboard the Ineluctable, and she, one of ten females. As on the homeworld, though, females were loners, while males -- who in ancient times had watched over the clutches of six eggs laid then abandoned by each female -- lived communally. The Ineluctable's habitat was shaped like a giant wheel, with ten spokes, each one leading to a different female's lair; the males lived together in the hub.

It was shortly after the fifth daypart when the computer turned on a bright light to get Palm-Up-Middle-Fingers-Splayed's attention. The digitized blue hands on the monitor screen signed the words with precise, unemotional movements. "A response has been received from the third planet."

Palm-Up-Middle-Fingers-Splayed gave himself a three-point launch down the corridor, pushing off the bulkhead with both feet and his broad, flat tail. He barreled into the communications room. Waiting there were three other males, plus one female, Captain Curling-Sixth-Finger herself, who had come into the hub from her command module at the end of spoke one.

"I see we've made contact," signed Palm-Up-Middle-Fingers-Splayed. "Has the reply been deciphered yet?"

"It seems pretty straightforward," said Palm-Down-Thumb-Extended. "It's a standard message grid, just like the ones we were planning to use for our later messages." He made a couple of signs at the camera eye on the computer console, and a screen came to life, showing the message.

"The one on the left is the terrestrial form," continued Palm-Down-Thumb-Extended. "The one on the right, the aquatic form. It was the terrestrial form that sent the message. See those strings beneath the character figures? We think those might be population tallies -- meaning there are far, far more of the terrestrial form than of the aquatic one."

"Interesting that a technological race is still subject to heavy predation or infant mortality," signed Palm-Up-Middle-Fingers-Splayed. "But it looks as though only a tiny fraction survive to metamorphose into the adult aquatic form."

"That's my reading of it, too," said Palm-Down-Thumb-Extended. His hands moved delicately, wistfully. There had been a time, of course, when the <hand-sign-naming-his-species> had faced the same sort of thing, when six offspring were needed in every clutch, and a countless clutches were needed in a female's lifetime, just in hopes of getting two children to live to adulthood. So many had fallen prey to gnawbeasts and skyswoopers and bloodvines --

But now --

But now.

Now almost all offspring survived to maturity. There was no choice but to find new worlds on which to live. It was a difficult task: no world was suitable for habitation unless it already had an established biosphere; only the action of life could produce the carbon dioxide and oxygen needed to make a breathable atmosphere. And so the Ineluctable traveled from star to star, looking for worlds that were fecund but not yet overcrowded with their own native life forms.

"Maybe they do it on purpose," signed Captain Curling-Sixth-Finger. Palm-Up-Middle-Fingers-Splayed was grateful for the zero gravity; if they'd been on a planet's surface, Curling-Sixth-Finger would have towered over him, just as most adult females towered over most males. But here, with them both floating freely, the difference in size was much less intimidating.

"Do what?" signed Palm-Up-Middle-Fingers-Splayed.

"Maybe they cultivate their own predators," replied Curling-Sixth-Finger, "specifically to keep their population in check. There are -- what?" She peered at the binary numbers beneath the blocky drawings. "Six billion of the terrestrial forms? But only a few million of the aquatic adults."

"So it would seem," said Palm-Up-Middle-Fingers-Splayed. "It's interesting that their adult form returns to the water; on the world of that last star we visited, the larvae were aquatic and the adults were land-dwellers." He paused, then pointed at the right-hand figure's horizontally flattened tail. "They resemble the ancestral aquatic forms of our own kind from millions of years ago -- even down to the horizontal tail fin."

Curling-Sixth-Finger spread her fingers in agreement. "Interesting. But, enough chat; there are important questions we have to ask these aliens."

* * * *

Darren Hamasaki had just checked in at the Air Canada booth at the Las Vegas airport and was on his way to the Star Alliance lounge -- his trip last year to see the eclipse in Europe had got him enough points to earn entry privileges -- when Karyn Jones, one of Mayor Rivers's assistants, caught up with him.

"Darren!" she wheezed, touching his arm, and buying herself a few seconds to catch her breath.

"What is it?" said Darren, raising his eyebrows. "Did I forget something?"

"No, no, no," said Karyn, still breathing raggedly. "There's been a _reply_."

"Already?" asked Darren. "But that's not possible. Groombridge 1618 is 4.9 parsecs away."

Karyn looked at him as though he were speaking a foreign language. After a moment, she simply repeated, "There's been a reply."

Darren glanced down at his boarding pass. Karyn must have detected his concern. "Don't worry," she said. "We'll get you another flight." She touched his forearm again. "Come on!"

* * * *

Of course, many observatories now routinely watched Groombridge 1618; it was under twenty-four hour surveillance from ground stations, and was frequently examined by Hubble, as well -- not that a reply was expected soon, but there was always the possibility that the aliens would send another message of their own volition, prior to receiving a response from Earth. Even so, few in the astronomical community seriously believed the Groombridgeans would ever see the Las Vegas light show, and the United Nations was still debating whether to build a big laser to send an official reply.

And so, Darren saw the alien's response the same way most of the world did: on CNN.

And a _response_ it surely was, for in layout and design it precisely matched the message Mayor Rivers had arranged to be sent. The aliens were bipedal, with broad, flat tails like those of beavers; _Tailiens_ was a word the CNN commentator was already using to describe them. Their heads sported V-shaped mouths, and arms projected from either side of the head. There was something strange about their abdomens, though: a single column of zero bits -- blank pixels -- ran down the length of the chest; what it signified, Darren had no idea.

CNN took away the graphic of the message and replaced it with the anchor's face. "Do you have it on videotape?" asked Darren. "I want to examine the message in detail."

"No," said Karyn. "But it's on the CNN web site." She pointed to an iMac sitting across the room; sure enough, the graphic was displayed on its screen. Darren bounded over to it. He was still trying to take it all in, trying to discern whatever details he could. In the background, he could hear the CNN anchor talking to a female biologist: "As you can see," the scientist said, "the aliens presumably evolved from an aquatic ancestor, not unlike our own fishy forebears. Our limbs are positioned where they are because those were the locations of the pectoral and pelvic fins of the lobe-finned fish we evolved from. This creature's ancestors presumably had its front pair of fins further forward, which is why the arms ended up growing out of the base of the head, instead of the shoulders, and..."

Darren tried to shut out the chatter. His attention was caught by the string of pixels beneath the alien figure.

The very long string of pixels...

* * * *

The crew of the Ineluctable hadn't bothered to send an image of a juvenile of their kind alongside the adult; unlike the strange beings they were now communicating with, they had no larval form -- babies looked just like miniature adults.

Palm-Up-Middle-Fingers-Splayed and the others didn't wait for another reply from the denizens of the third planet before flashing a series of additional pictures at them. These were standard images, already prepared, showing details of hand-sign-naming-his-species physiology at a much higher resolution than that used for the earlier message. The aliens, after all, had seemed willing to reveal their own body form -- or forms, given the two lifestages depicted in their first missive. Perhaps they would respond with more details about their own kind.

And then they could determine whether these people and the members of hand-sign-naming-his-species would be able to share a world together.

* * * *

"They're not at Groombridge 1618," Darren said to Mayor Rivers, when His Honor arrived shortly after midnight; the mayor's toupee had been hastily perched and now sat somewhat askew atop his head. "They can't be. Assuming they responded immediately upon receipt of our message, they're only a few light-hours away -- about the distance Pluto is from the Earth, although, of course, they're well above the plane of the solar system." Darren frowned. "They must be in a spaceship, but ... but, no, no, that can't be right. Every observatory on Earth has been taking the spectra of the laser flashes, and they're dead on the Dlsodium line, which can't be a coincidence. The senders are using a line that's weak in their home star but very strong in our own sun's spectrum to signal us. But, like I said, it's dead on that line, meaning there's no Doppler shift. But if the ship was coming towards us, the light from the laser would be blue-shifted, and -- "

"And if it were a-flyin' away from us," said Mayor Rivers, "it would be red-shifted."

Darren looked at His Honor, surprised. Rivers lifted his shoulders a bit. "Hey, we're not all hicks down here, you know."

Darren smiled. "But if the light isn't undergoing a Doppler shift, then -- "

"Then," said Rivers, "the starship must be holdin' station, somewhere out there near the edge of the solar system."

Darren nodded. "I wonder why they don't come closer?"

* * * *

The next night, Darren found himself flipping channels in his hotel room -- they'd put him back in the Hilton. Letterman did a top-ten list of people who would make the best ambassadors to visit the aliens ("Number four: Robert Downey, Jr., because he's been damn near that high already" . And Leno did a "Jay Walking" segment, asking people on the street basic questions about space; Darren was appalled that one person said the sun revolved around the Earth, and that another declared that Mars was "millions of light-years" away.

After that, though, he switched to Nightline, which had some more-serious discussion of the aliens. Ted Koppel was interviewing a guy named Quentin Fawcett, who was billed as an "astrobiologist."

"I've been studying the anatomical charts that the Tailiens sent us," said Fawcett, whose long hair was tied into a ponytail. "I think I've figured out why they don't use radio."

Koppel played the stooge well. "You figured that out from anatomical charts? What's anatomy got to do with it?"

"Can we have the first slide?" asked Fawcett. A graphic appeared on the monitor between Koppel and Fawcett, and, a second later, the image on Hamasaki's hotel-room TV filled with the same image, as the director cut to it. "Look at this," said Fawcett's voice.

"That's the one they're calling three-dash-eleven, isn't it?" said Koppel. "The eleventh picture from the third group of signals the Tailiens sent."

"That's right. Now, what do you see?"

The TV image changed back to a two-shot of Koppel and Fawcett, both looking at their own monitor. "It's the Tailien head," said Koppel. And indeed it was, drawn out like an alligator's.

"Look carefully at the mouth," said Fawcett.

Koppel shook his head. "I'm sorry; I'm not getting it."

"That's not a picture of the head, you know. It's a picture of the Tailien cranium -- the skull."

"Yes?"

"It's all one bone," said Fawcett triumphantly. "There's no separate mandible, no movable jaw. The mouth is just a boomerang-shaped opening in a solid head."

Koppel frowned. "So you're saying they couldn't articulate? I guess it would be hard to talk without a hinged jaw." He nodded. "No talking, no radio."

"No, it's not the ability to make sounds that depends on the advent of jaws. It's the ability to hear sounds, or, at least, to hear them clearly and distinctly."

Koppel waited for Fawcett to go on. "I've got TMJ -- temporomandibular-joint syndrome," said Fawcett, tapping his temple. "Discomfort where the jaw articulates with the temporal bone; it's pretty common. Well, last winter, I had an infection in my ear canal -- 'swimmer's ear,' they called it. Except I didn't know it for the longest time; I thought the pain was from my TMJ. Why? Because our ears are located right over our jaw joints -- and that's no coincidence. The small bones in our inner ear -- the hammer, the anvil, and the stirrup -- make our acute hearing possible, and they exist precisely because the skull splits there into the cranium and the jaw. Our earliest vertebrate ancestors were jawless fish -- fish with heads very much like the Tailiens still seem to have, consisting of one solid piece of bone."

Koppel was coming up to speed. "So ... so, what? They take in soft food through permanently open mouths? No chewing?"

"Perhaps," said Fawcett. "Or maybe that slit that runs down their torsos is a feeding orifice. But, either way, I'm willing to bet that they don't depend on sound for communication."

* * * *

Darren worked with an illustrator from the Las Vegas Review-Journal and a doctor from the UNLV Medical Center coding a series of human-anatomy diagrams, but no one quite knew how to send them. It would take more than a day of flashing the city's lights on and off -- the power could only be cycled so quickly -- to send even one of these high-resolution images, and the casinos wouldn't stand for it. Every minute the power was off cost them tens of thousands of dollars in betting revenues.

But, before they'd figured out how to reply, a new set of messages -- batch number four -- arrived from the Tailiens.

* * * *

Palm-Up-Middle-Fingers-Splayed personally supervised the sending of the next messages, since he'd been the one who had coded them. They were designed to convey a series of simple multiple-choice questions. The messages consisted of 23 rows of 79 columns, much smaller than the anatomical charts. Fist-Held-Sideways had opined that bandwidth might be a problem for the third planet in sending similar messages, which is presumably why no response had yet been received.

The top part of each message showed a simple math problem, and the bottom part showed three possible answers, one of which was correct. The boxes containing these answers were labeled, from left to right, with one pixel, two pixels, and three pixels respectively in their upper right-hand corners.

Palm-Up-Middle-Fingers-Splayed, Fist-Held-Sideways, and the rest awaited the answers from the third planet; nothing less than a perfect score on the test would be morally acceptable before they asked the most important question of all.

* * * *

The aliens seemed to have no trouble reading the flashing of Las Vegas's lights, and so the responses to the math problems were sent by that city winking itself on and off. Many of the hundred thousand people who had come to Nevada to be part of the first signaling effort were still in town, thrilled that an actual dialogue between humans and aliens seemed to be opening up.

Fortunately for the croupiers and pit bosses, the math problems only took seconds to reply to; all that had to be sent was the number of the box containing the correct answer: one flash, two flashes, or three flashes.

* * * *

"There's no doubt," signed Palm-Up-Middle-Fingers-Splayed to Captain Curling-Sixth-Finger, "that the aliens understand our syntax. They clearly know how to give the correct response to a multiple-choice question -- and they got all the answers right, even the one about division by zero."

"Very well," said Curling-Sixth-Finger, her fingers moving slowly, deliberately. She clearly was steeling herself, in case she had to repeat the action she'd been forced to take at the last star system. "Ask them the big one."

* * * *

The next message was, in the words of Larry King, who had Darren Hamasaki on his show to talk about it, "a real poser."

"It looks," said King, leaning forward on his desk, his red suspenders straining as he did so, "like they're asking us something about DNA, isn't that right, Mr. Hamasaki?"

"That does seem to be the case," said Darren.

"Now, I don't know much about genetics," said King, and he looked briefly into the camera, as if to make clear that he was speaking on behalf of his viewing audience in confessing this ignorance, "but in USA Today this morning there was an article saying that it didn't make sense that the aliens were talking to us about DNA. I mean, DNA is what life on Earth is based on, but it isn't necessarily what alien life will be based on, no? Aren't there other ways to make life?"

"Oh, there might very well indeed be," said Darren, "although, you know, try as we might, no one has come up with a good computer model for any other form of self-replicating biochemistry. But I don't think it matters. Life didn't begin on Earth, after all. It was imported here, and -- "

"It was?" King's eyebrows shot up toward his widow's peak. "Who says so?"

"Lots of biologists -- more and more each day. You know, the initial problem with Darwin's theory of evolution was this: it was clear that the process of natural selection would take a long time to develop complex life forms -- but there was no evidence that the Earth was particularly old; we didn't have any proof that it was old until the discovery of radioactivity.

Then, when we found that Earth was billions of years old, it seemed that there was plenty of time for evolution. But now we've run into another not-enough-time problem: the oldest known fossils are 4.0 billion years old, and they're reasonably complex, which means if life were indigenous to Earth, the first self-replicating molecules would have had to appear only a few hundred million years after the solar system was born, 4.5 billion years ago."

"We're going to get letters, I know it," said King, "from people disputing those age claims. But go on."

"Well, that early on, Earth was still being bombarded by meteors and comets; extinction-level events would have been common. Earth simply wouldn't have presented a stable environment for life."

"So you think life came here from outer space?"

"Almost certainly. Some biologists believe that it arose first on Mars -- Mars was much drier than Earth, even back then. A comet or asteroid impact has a much greater destabilizing effect on the climate if it hits water than it does if it hits dry land. But the original DNA on Earth could have also come from outside the solar system -- meaning, in fact, that these Tailiens might be our distant, distant relatives. All life in this part of the galaxy might share a common ancestor, if you go back far enough."

"Fascinating," said King. "Now, what about this latest message from the Tailiens? Can you take us through that?"

"Well, the top picture shows what looks to be a snippet of DNA, three codons long."

"Codons?"

"Sorry. Words in the DNA language. We read the language a letter at a time: A, C, G, or T. And since A and T always bond together, and G always bonds with C, we can just read the letters off one half of the DNA ladder and know automatically what the letters down the other side will be."

King nodded.

"Well," continued Darren, "each group of three letters -- ACG, say, or TAT -- is a word, specifying one amino acid, and amino acids are the building blocks of life. What we have in the first picture is a snippet of DNA consisting of nine letters, or three words. Next to that, there's space for another snippet of DNA the same length, see? As if you were supposed to place one of the strings from the lower section up here beside this one."

"And how do we choose which one should go there?"

Darren frowned. "That's a very good question, Larry." It was cool getting to call him Larry. He looked at his cheat-sheet on the desktop. "The sequence in the top part of the message is CAC, TCA, and GTC, which codes, at least here on Earth, for the amino acids histidine, serine, and valine."

"Okay," said King.

"And the three possible replies are below. Two of them are strings of DNA. The first one -- in answer box one -- is a string of DNA very similar to the one above. It reads as CAC -- the same as before; TTA -- which is one nucleotide different from the string on the top, so it codes for, umm, let me see, for leucine instead of serine; and then there's GTC again, which is valine, just as before."

"So it differs by only one-ninth from the specimen at the top," said Larry. "A close relative, you might say."

Darren nodded. "Exactly. And that brings us to the second possible response. Like the first possible response, it consists of nine codons, but here the codons don't match at all -- the sequence is completely different from the one above. And, if you look carefully, you'll see it's not just frameshifted out of synch from the sample above; it really has nothing in common with it. Nor could it be a possible match for the other side of the DNA ladder, because it doesn't have the same pattern of duplicated letters."

"So that second string of DNA represents a distant relative -- if it's a relative at all," said King. "Would that be right?"

"It's as good a guess as any," said Darren.

"And the third possible answer?" asked King.

"That's the puzzler," said Darren. "The third answer box is empty; blank. There's nothing in it except three pixels in the upper right, which just indicate that it is the third possible answer."

"Have we ever seen an empty box like that before in one of the Tailiens' messages?" asked King.

"Yes," said Darren. "It was in message four-dash-twelve, one of the math problems. They asked us what the correct answer to six divided by zero is. The possible answers they gave us were six, one, and a blank box."

"And -- wait a second, wait a second -- you can't divide by zero, can you?"

"That's right; it's a meaningless concept: how many times does nothing go into something? So, in that case, we chose the empty box as our answer."

"And what's the correct answer this time?" asked King.

Darren spread his arms, just as he'd seen dozens of other people -- including many working scientists, rather than hobbyists like him -- do today on other talk shows when asked the same question. "I haven't the slightest idea."

* * * *

Everybody had hoped that other messages would continue to come from the Tailiens. Just as they had gone on to send the math problems after receiving no reply to the anatomy diagrams, humanity hoped that they would continue sending questions or information before a reply was sent.

But the Tailiens didn't. They seemed to be intent on waiting for a response to the DNA puzzle.

And, finally, the United Nations decided that one should indeed be sent. By this point, Darren was pretty much out of the spotlight -- and glad of it. The United Nations secretary-general himself was coming to Las Vegas to initiate the blinking of the city's lights. That was fine with Darren; he wasn't sure that the UN scientists had come up with the right answer, and he didn't want sending an incorrect reply to be on his head.

The answer the UN had decided to go with was number one: the DNA that was similar, but not identical, to the sample string. There were various rationales offered for supposing that it was the correct response. Some said it was obvious: the aliens were moving us beyond questions of absolute truth, the kind of clear right or wrong that went with mathematical expressions; this new message was designed to test our ability to think in terms of similarity, of soft relationships. Although none of the three choices matched the sample string, the first one was the most similar.

Another interpretation was that it was a test of our knowledge of evolution. Did new species (the blank space to the right of the sample string) emerge by gradual changes (answer one, with its single nucleotide difference); by complete genetic redesign (answer two, with its totally dissimilar DNA); or out of nothing -- that is, through creationist processes?

Some of the fundamentalists at the UN argued that the third answer was therefore the proper one: the aliens were testing our righteousness before deciding whether to admit us to the galactic club. But others argued that everything the aliens had presented so far was scientific -- mathematics, anatomical charts, DNA -- and that the scientific answer was the only one to give: new species arose by incremental changes from old ones.

Regardless of whether it was a question about inexact relationships or about the principles of evolution, answer one would be the correct response. And so the lights of Las Vegas were turned off one last time in a single, knowing wink at the heavens.

* * * *

Palm-Up-Middle-Fingers-Splayed happened to be in the communications room when the response was received from the third planet. Of course, regardless of what answer they'd chosen, it would begin with one stretch of darkness, so Palm-Up-Middle-Fingers-Splayed waited ... and waited ... and waited for a second and third.

But more darkness never came. Palm-Up-Middle-Fingers-Splayed's tail

twitched.

He had to tell Captain Curling-Sixth-Finger, of course; indeed, the computer had probably already informed her that a response was being received, and she was presumably even now making her way down the spoke from her command module, and --

And there she was now: twice Palm-Up-Middle-Fingers-Splayed's size, and capable of the kind of fierceness only a female could muster.

"What is the response?" demanded Curling-Sixth-Finger as she floated into the room.

"One," signed Palm-Up-Middle-Fingers-Splayed with restrained, sad movements. "They chose answer one."

Curling-Sixth-Finger's feeding slit momentarily opened, exposing slick pink tissue within. "So be it," she signed with her left hand, and "So be it" she repeated with her right.

Palm-Up-Middle-Fingers-Splayed whipped his tail back and forth in frustration. It was such a straightforward question: when seeking other life forms to associate with, do you choose (1) the being most closely related to you genetically; (2) the being least related to you genetically; or (3) is it impossible to answer this question based on genetics?

Answer three, of course, was the morally right answer; any advanced being must know that. Oh, it was true that primitive animals sought to protect and favor those with whom they shared many genes, but the very definition of civilization was recognizing that nepotism was not the engine that should drive relationships.

Perhaps, reflected Palm-Up-Middle-Fingers-Splayed, such enlightenment had come more easily to his people, for with partners changing every mating season, genetic relationships were complex and diffuse. The race inhabiting the second planet of the star they had last visited had chosen the wrong answer, too; they'd also picked the first choice.

And they'd paid the price for that.

If nepotism drives you as a species, if protecting those who are most closely related to you is paramount, if forming allegiances based on familial lines is at the core of your society, then how can you ever be trusted in relationships with beings that are alien to you? Yes, it seemed all life, at least in this neighborhood of the galaxy, was based on DNA, and therefore was quite possibly related in its distant, distant past. But, then again, all creatures on any given world also share a common ancestor. And yet --

And yet these benighted souls of the third planet still chose genetic favoritism; indeed, they were so convinced of its righteousness, convinced that it was the proper order of things, that they didn't even attempt to disguise it by giving a false answer. Those poor creatures, prisoners of their own biology...

Curling-Sixth-Finger was already on the intercom, calling down to the propulsion room, telling Fist-Held-Sideways to engage the fusion motors. Palm-Up-Middle-Fingers-Splayed felt an invisible hand pressing down upon him, driving him to the floor, as the great engines came to life. As he and Curling-Sixth-Finger settled to deck plates, Palm-Up-Middle-Fingers-Splayed looked up at her.

"I've got no choice," she signed. "A species driven by selfish genes is too dangerous to be allowed to live."

Palm-Up-Middle-Fingers-Splayed slowly, sadly spread his fingers in agreement. The Ineluctable would dive down into the plane of the solar system, into the cometary belt just past the orbit of the eighth planet, and it would launch a series of comets on trajectories that would send them sailing in for eventual rendezvous with the third planet.

Oh, it would take time -- thousands of years -- before the impacts. But eventually they would strike, and two skyswoopers would be felled with a single rock: the galaxy would have one less selfish species to worry about, and, with most of its native life wiped out, there would be room -- a whole new world! -- to move billions and billions of members

of<hand-sign-naming-his-species> to.

Palm-Up-Middle-Fingers-Splayed was glad that Fist-Held-Sideways and the other females were no longer in estrus. He didn't feel like making love, didn't feel like making babies.

Not now. Not right now.

But, of course, he would want to do that again the next time the females came into heat. He, too, he reflected, was a prisoner of biology -- and for one brief moment, that shared reality made him feel a bond with the aliens that now, sadly, he would never meet.

-- END --

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