

GARY TARULLI



ORB



**Gary Tarulli**

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Thanks, Doc

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# Approach

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I WAS ATTEMPTING to escape the confines of the box I found myself in, the one I had spent the last forty-one years creating.

Watching Earth disappear from view, I wondered if I was taking my concept of self-improvement a bit too far.

My name is Kyle Lorenzo. On 10 August 2232, I found myself onboard the research vessel *Desio* heading outbound on an eight-hundred-trillion kilometer to a planet some galactic cartographer devoted of imagination designated as 231-P5.

In due course you will learn much about me, but you have been sufficiently forewarned: I am a writer. You know this because there were individuals in the scientific community who openly objected to my joining Desio's crew. Their accusation: I lacked a doctoral degree in any of the hard sciences which had served as the principal criterion for filling the complement of an exploratory mission. For this grievous offense I was tried in that ubiquitous and fickle court of public opinion known as the Cloud and summarily found guilty. The verdict, bereft the weight of law, enabled all sides to prevail: I managed to slip the bonds of Earth—only to be placed in solitary confinement, with crew, onboard ship.

In my defense, the decision to recruit someone other than a scientist or physician for an extrasolar expedition was long overdue. I just never believed that person would be me. Or any writer, the profession having been assailed—marginalized—by two-hundred-fifty-odd years of facile communication and virtual entertainment choices. Reading, regarded as too demanding on one's valuable time and energy, has fallen out of favor; the quaint phrase "I can read you like a book" morphing to mean "not at all." Commensurate with the precipitous decline in reading there has been a decline in writing. Can a writer subsist without a sympathetic audience?

A few persist. Fewer can afford the insurance, a "malpractice" policy indemnifying against charges of plagiarism that have become commonplace ever since an army of copyright lawyers began accessing the Cloud AI to cross-match that brave new novel with all that was ever written. The lawyers inform us that there's nothing new under the Sun. I hope to avoid the problem.

Where I'm heading there is a different sun.

They tell me it's blue.

Those inclined to mathematics may chose to characterize my recruitment in terms of numbers. Or, to be more precise, percentages. Sixty percent of qualified applicants, counseled on the physical and psychological demands of prolonged spaceflight, had the good sense to drop out. (I refused to be dissuaded.) Of the remainder, seventy percent were eliminated by an exhausting series of physical fitness tests. (I keep fit, thanks to swimming and other water-related activities.) A merciless battery of mental health/aptitude tests subtracted another eighty percent. (Weeks later, Bruce Thompson, the mission leader, claimed that if the psych scores had not been graded on a curve there would have been nobody, especially me, left to choose from.)

A host of other screening criteria were applied, some I'll never know, nor the reason why the

Crew Selection Committee was so intent on a writer joining the expedition. Whatever the underlying motive, when you do the math, five hundred applicants were distilled down to a select dozen.

Who proceeded to effectively eliminate themselves.

Two candidates, claiming bragging rights for making such an elite group, their egos inflated to the size of the destination planet, unexpectedly bowed out. I subsequently discovered they intended to co-author an account of their “ordeal.”

One candidate excused herself after coming to the realization that she could not endure the emotional traumas of being separated from family and friends. Conversely, there was one writer who was *deliberately* trying to evade people intruding his life. (A few hundred trillion kilometers and a wormhole work exceptionally well). He learned firsthand the meaning of cruel irony when his one-man protest against lack of government funding for the arts, together with any chance of recruitment, ended upon detention for income tax evasion.

Yet another hopeful said she had come to her senses and “no longer found romance in squandering seven months of life cooped up in a tin can hurtling through the abyss while being forced to consume recycled human waste products.” Or overworked verbiage to such edifying effect.

These eleventh hour defections (*twenty-third hour*, military time compels me to say) put me in serious contention, but it was an odd stroke of good fortune that came into play: The person selected ahead of me, awarded a government grant to study the effects of electronic media on the arts, removed himself from consideration at the last possible moment.

And so here I am, onboard a star-class vessel, assigned the responsibility of creating, “as accurately as is humanly possible, a written record of the significant events of what will certainly be a great and historic scientific voyage.”

As best I can recall, that was the Central Space Agency’s (CSA) attempt at visionary words. The elicited this response from me: “Accuracy requires total objectivity, an impossibility when inevitably the observations a person makes are selectively filtered through the senses before entering the brain, whereupon they suffer repeated collisions, lose momentum, only to emerge in some altered form, at some later date, with some ulterior motive.” With this qualifying statement (which somehow didn’t impede my appointment) I informed the CSA that I would gladly do my very best. I’d make every attempt to be as honest and, using their word, accurate as humanly possible.

I then proceeded to press my luck by adding one more caveat: *Humanly* (again, their word) may not suffice either, if, as was fervently hoped for, the expedition encounters an advanced alien life-form.

And because I am the first filter evaluating what is to follow (you being the second), a brief, but necessary, word about this “box” I created for myself and the reason I was trying to climb out.

One facet of the damn thing may be painfully obvious: I was having a tough time earning a living. I like to believe it’s because anything longer than two-thousand words is a tough sell. Perhaps the expedition to 231-P5, anticipated for the last two years by most of Earth’s population, would provide some desperately needed name recognition, a rocket boost to my flagging career. It might even provide a wellspring of inspiration.

Here’s another facet: I characterize myself as borderline antisocial. In practice this means I have a tendency to keep to myself and (with one notable exception which I will soon make apparent) rarely enter into permanent relationships. I’ll have little choice but to address that personality quirk as I spend “seven months hurtling through the abyss cooped up in a tin can” along with the crew of *Desio*

So I begin my exposition, but with a final word of caution: I am not a scientist. I will not be providing much in the way of scientific detail for what transpires. For such information I strongly encourage you to peruse the ship's extensive logs, compiled by the five other crew members: four scientists and a medical doctor, each one preeminently qualified in their respective fields.

Good luck reading *their* accounts.

Although a significant chunk of my life was to be spent on the *Desio*, yet I had no knowledge of the illustrious person lending her a name. I assumed she had not been named after someone presently living. That practice had repeatedly proven itself as far too risky, human behavior being prone to failings that, when examined in the bright light of day, often result in a positive reputation being subjected to negative revision. This vexing problem is somewhat less applicable to the dead, although even the character of the deceased can be assaulted by the exhumation of damning personal revelations or reevaluated to suit the sensibilities of the time. To this last point, I'd not be too surprised if Vlad the Impaler had or will have an edifice of some import named after him.

But what of *Desio*? With a minimum of research, I uncovered a full name and bio.

Ardito *Desio*. Born in 1897. Died 2001. Explorer, geographer, and geologist. Leader of more than twenty scientific expeditions to isolated and geologically diverse areas of the globe; organizer of the first team to reach the summit of K-2 after five prior attempts by others had failed; author of seven hundred scientific papers—in sum, an adventurer who consumed eighty of his one hundred and four years traversing Earth during that period of time when remote and mysterious lands awaited discovery. A remarkable individual who, along with his name, had been relegated to the back shelf of history with the passage of time.

He was long gone but apparently not completely forgotten. Somebody bestowed his good name upon our ship. I made a point of finding out who. The appellation was selected, as is presently customary, by the ship's commander, the aforementioned Bruce Thompson. The choice told me a little about Thompson. I would soon be finding out a whole lot more.

As for the *Desio* herself, form followed function: She was a sturdy, compact, and highly automated ship. I made her acquaintance during intensive training sessions when, along with the other members of his crew, Thompson instructed us in the function of everything from a recycling toilet to gravity compensator. By teaching us himself, he would never have to hear bitching, *would he*, that we were not adequately instructed.

The personal touch and thoroughness of our training was atypical. Each member of a starship crew is normally designated responsibility for only two specialized assignments. Thompson insisted this was pure nonsense; we were sufficiently intelligent (and don't let the remark go to your heads) to have a working knowledge of nearly all of *Desio*'s systems. His first objective was to rotate the crew through the tasks necessary for keeping his ship running at peak efficiency. Secondly, he firmly believed that the challenge of acquiring and utilizing multiple skills would help reduce boredom. If you needed a third reason, it was because he said so. During training I came to know and respect Thompson. For one thing, he definitely knew his ship. There was no question about her he could not answer. For another, I have a particular appreciation for his brand of sarcasm.

The intricacies of some of the ship's automated systems—propulsion, guidance, waste treatment, artificial gravity—I did not completely comprehend, nor was I required to. I did, however, learn enough to be amazed by their elegant and imaginative design, which approached an art form. I also came to appreciate just how dedicated mission engineers were to assuring the crew's physical *and*

psychological well-being.

One example was *Desio*'s optimized artificial gravity, set at 1.03E, where E=Earth. I asked the ship's physician, Kelly Takara, about this. She explained that P5s gravity was only 0.93E, meaning an individual weighing 75 kilograms onboard would instantly "lose" 7.5 kilograms once on the planet, thereby mitigating the deleterious effects of physical inactivity during the prolonged voyage. Nine days of exploratory work would be conducted with greater comfort and, more important to mission planners, with greater efficiency.

Then again, there was the sound-canceling technology designed to eliminate the persistent hum emanating from the various life-support systems. Unfortunately, the technology worked too well. On those occasions when canned music was not playing, the ship was haunted by a deathly quiet, as attested to by every member of the crew, save one—the ship's physicist. For the rest of us, the eerie silence heightened a pervasive feeling that lurking just beyond the ship's thin protective bulkhead was a kindred eternal silence—a troublesome reminder that we had become the most isolated humans in the history of humankind.

The sense of isolation we experienced and other psychological problems of prolonged space travel had been studied for years. So had the methods to counteract them. Still, what I did not anticipate were the sheer number of design elements that were planned to specifically address this problem. Early in the training regimen, when *Desio* was being outfitted, we were instructed to complete questionnaires regarding personal preferences in the arts—music, painting, sculpture, and the like. Assuming this was yet another psychological test, and to find out if anybody was truly paying attention, I volunteered Edvard Munch's *The Scream* as my favorite painting. Two days later, Thompson, vouchsafing for my sanity, had to patiently explain the joke to a concerned CSA psychologist. I thanked the mission commander for lying on my behalf, at the same time reminding him of the statement he made about lowering the psych profile standards for writers.

Later on I discovered that the questionnaire was actually used to help appoint the ship: Monet reproductions adorning the bulkheads; Mozart symphonies wafting over the sound system; mocha-colored paint gracing the cabin walls. All were attempts to keep the crew happy and well adjusted.

A word about compartment layout. There were six sleeping quarters, or cabins—one for each member of the crew. Space being at a premium, each was just large enough for a bed, a workstation, and a small enclosed area for toilet and personal hygiene. For privacy, since there was precious little elsewhere on the ship, the cabins were soundproofed. Each had a coded door lock, with Thompson having override capability.

Two of the crew, Paul Bertrand and Diana Gilmore, elected to share one of the six cabins. Never finding a reason to marry, their relationship had flourished during two decades of successful cohabitation—an enviable model for couples trying to beat the long odds. This fact didn't deter mission engineers from happily forging ahead, designing separate quarters for each of them "in case they elected to dissolve their arrangement." This did not sit well with Diana, who relentlessly chided the engineers for their inspirational vote of confidence.

Early in the outbound voyage, the ship's physician, with Thompson's permission, converted the extra cabin to a treatment room.

The common areas of the ship consisted mainly of four compartments, the largest being the mission room, forty meters square, used for meetings, meals, and socializing. Its two most notable features were a large composite worktable that occupied the center of the floor space and an oval viewport that dominated one wall. An adjoining compartment served as the science lab. Here lay the domain of the scientists, which I had little cause to invade. It housed built-in stations for conducting

experiments, an equipment storage area, and a secured zone for quarantine and retention of specimens. Centered above these compartments was a smaller level divided roughly in half by a command and control room, complete with seating and viewports, and *Desio*'s navigation, communication, and nerve center.

Above all was an enclosure housing a rotating turret equipped with a guided laser weapon system of modest capacity. There was an unconfirmed rumor that privateer ships were circling Earth, but the official justification for the system was the obliteration of space junk, a real and ever-present threat to ships in, or leaving, orbit.

The doors to all compartments and the laser turret were installed with high-tech security locks that could be activated at Thompson's discretion.

Outbound.

Three long months have elapsed. *Desio* and crew, quite uneventfully, have nearly completed the journey to 231-P5. I was not alone in my cabin. Angie was quietly sleeping in my bed, she being the notable exception, the one permanent attachment I previously alluded to. Her presence warrants an explanation.

Flash back four months. I was standing in front of the Crew Selection Committee with an unusual petition: Allow Angie to become the expedition's seventh. I had belatedly come to the realization that abandoning her on Earth was not an acceptable option. If need be, I would relinquish my seat on the *Desio* and a trained alternate would eagerly take my place.

And so I emphasized my companion's extraordinary attributes. There was no need for hyperbole. She was, after all, exceptionally bright, disciplined, well-trained, healthy and personable.

Unfortunately, there were more practical concerns which made Angie's inclusion a virtual impossibility. She represented excess mission weight. Oxygen and waste-processing requirements would have to be recalculated. There was the matter of her special dietary needs. And, as one committee member stated with a fair attempt at humor, "the ship already has, in Dr. Bertrand, a French crew member."

The committee was resolute, but for some reason agreed to defer their final decision. I remember one crewmate, Diana Gilmore, advising me not to give up hope.

She was prescient. Two days later, the committee relented. How could they not? Angie is a damn cute pooch, miniature poodle by breed, seven kilograms, black coat, a medium shaggy kennel clip, bright, clear eyes, and a sweet disposition. The crew, almost without exception, was delighted, welcoming her with open arms. In no time at all she became our little mascot.

If there was an onboard routine that Thompson enforced it was for the crew to convene the same exact time every morning. Considering herself an essential part of the crew, Angie rose, stretched, and leaped off my bed to follow me into the mission compartment. As she and I entered, Thompson greeted me with his usual friendly sarcasm.

"That dog follows you pretty much everywhere."

"Can you blame her?"

"Her ears are slightly asymmetrical; her tail was docked too long."

"Perhaps she wouldn't win best in show."

"Coincidentally, Kyle, neither would you."

"You and she have something in common," I said, "You both don't shed."

I was trying to redirect the spotlight onto Thompson's shiny shaved head. Like housepaint, the sheen could vary from matte to satin to gloss, depending on lighting and the closeness of shave. Today it was semigloss. Highlighting that feature had become my sworn duty, but it was by choice that Thompson kept his head shaved: He couldn't be bothered having a head of hair. A smooth head was simpler. Washing, combing, vanity, all neatly dispensed with. After three months, though, I was running out of bald jokes. Thompson's other features were relatively immune to criticism. As on most occasions, he got in the last word.

"Sit! Stay!" he barked, commanding me to an empty chair. "We're about to begin."

While I obeyed, Angie went sniffing about the floor searching for breakfast crumbs.

Seated at the conference table, consuming what passed for breakfast, were Commander Bruce Thompson, Ph.D., Geology, Engineering; Kelly Takara, M.D.; Diana Gilmore, Ph.D., Marine Biology, M.S., Astrobiology; and Paul Bertrand, Ph.D., Climatology.

The final member of the crew, Larry Melhaus, Ph.D., Physics, Mathematics, M.S., Chemistry, was, as usual, in his cabin, almost certainly in the throes of solving an advanced problem in mathematics or particle physics. A moment later he strode in, grabbed some coffee, and without uttering a word, sat at the far end of the long table.

Thompson couldn't let it pass. "Good of you to join us."

"Yes," Melhaus said without a trace of sarcasm. During the last three months we had all learned he was several orders of magnitude more proficient at solving equations than he was at interrelating with people.

"With your permission, Bruce, I'll start," said Paul.

Thompson nodded.

"We approach one million kilometers of P5, enabling partial verification of meteorological data collected during the abbreviated first expedition. The planet's elliptical orbit produces winter and summer seasons of nine-month duration. Transitional seasons, within close approximation, are six months each. I can reconfirm that the prior expedition had the bad luck to emerge from the wormhole and discover the planet at the most inopportune time, midwinter, thereby preempting a complete survey. Average surface temperatures were hovering—bad word—at minus thirty degrees Celsius. You might say conditions have improved. Long-range scans indicate midsummer temperatures are averaging a balmy *plus* thirty degrees. After we enter orbit I'll be better equipped to assess localized weather conditions. Within a few days of landing I'll have a detailed picture of extended climatology."

"Nothing further? You're only able to verify what the first mission previously surmised?"

Thompson was being blunt, not rude. We expected as much. It was his way of keeping us focused. The crew, all in their early forties, except Dr. Takara, who was thirty-five, were far too self-assured to be offended or put-off.

"I'm not finished," Paul said. "I have some preliminary readings on the ocean, which covers ninety-six percent of the planet's surface. The previous expedition encountered ocean ice three meters thick at the equator. That ice, except for the extreme poles, has completely melted. Given the planet's elliptical orbit, the melt was anticipated, but never considered a sure thing."

Paul's pronouncement elicited a buzz of excitement from the crew. The abundance of available water was an exciting development, dramatically increasing the probability of finding complex life-forms. Even Angie, having sensed the rapid change in mood, responded with a couple of delighted yips.

We were familiar with the reports compiled by the first expedition's scientists. Their typically

sterile technical language could not hide disappointment that life went undetected on the small islands dotting the planet's surface. Nevertheless, core samples of ocean ice were found to contain abundant numbers of frozen plankton-like organisms. This was the third time a life form had been discovered beyond our home world, and the most complex yet. Far more intriguing than the primitive microorganisms discovered on Mars and 106-P3.

"Larry, your comments?" Thompson asked.

The physicist, choosing to avoid eye contact, answered while staring into the 3-D images floating within the AI Device (AID) unrolled on the table in front of him.

"I've extrapolated existing data concerning the quantity of dead phytoplankton found per unit volume of ice. By estimating the organism's theoretical ability to produce oxygen during the planet's cyclical warm season, I have calculated that they are responsible for producing and, more important, *maintaining* P5's breathable oxygen atmosphere. As for Doctor Bertrand's report pointing out that the ocean ice has melted? That eventuality was predicted by the separate set of calculations I performed using orbit projections, availability of solar energy, atmosphere composition, and other factors."

Melhaus's certitude, his unflinching, self-assured phrasing, had me wondering: If he had not dutifully performed his calculations, would the ice have actually dared to melt?

"Let me know if your conclusions change," Thompson remarked.

"It is unlikely."

"Humor me. Presumably we'll soon have sufficient quantity of living phytoplankton to precisely measure their rate of oxygen production. And how about you, Diana? Anything to add to this discussion? Anything *new*, that is?"

"When's the last time any of you have had a wet dream?"

That *was* new, I thought. At least nobody volunteered an answer. Thompson, a bemused look on his face, waited her out.

"That long?" she said. "Pity. Well I'm having one now."

"Care to share with us?" Thompson said.

"OK. Just this once. Ninety days getting here. One day till we enter orbit. Awaiting us is the potential of discovering specialized life forms on an Earth-sized planet that is *covered* in water. Can you possibly imagine anything more apropos of a marine biologist's wet dream?"

"Do you always blurt out whatever pops into your head?" Thompson asked, amused.

"Why? Diana responded, "Doesn't everybody?"

"Has this verbal ejaculation reached a climax?"

"I'm sure it has."

Thompson had to laugh. Diana's outburst and other like-spirited remarks she made from time to time was somehow made even more diverting when you considered how out of place they were emanating from a person who had garnered a closet full of prestigious awards in the fields of marine and astrobiology. Yeah, she could sometimes be a bit of wiseass, but she certainly gave the word a fuller meaning.

The crew had need of her irreverent comments. Anything that could elevate our individual and collective moods was welcome. Months ago we were counseled to expect exploration this remote from Earth to be a tough business. At the time, we thought we were properly prepared. We were not. Not by a long shot. The extended period living in deep space had brought about mild bouts of depression and increasing feelings of isolation. This despite six people and my pooch sharing quarters not much bigger than a small-sized house.

As I was mulling this over, I looked across the table at Angie. Paws in the air, she was laying

stretched out on her back across Kelly's lap, happily getting her belly stroked. It's quite possible Angie did more than any one person or thing to keep us entertained. She had become a favorite of the crew. I had the additional benefit of receiving from her unconditional affection. Glancing up from her to Kelly's smiling face, I found myself wishing that human interaction was as simple and easy to understand. Kelly and I occasionally shared a cabin. Our relationship, starting as friendship during mission training, had developed into something more. How much more was a question I was finding difficult to answer.

Thompson broke my reverie by asking her a question.

"And, doctor, your report on the physical condition of the crew?"

Thompson wasn't just looking for generalities here. Given the closeness of quarters, and how interdependent we were for survival, there was necessarily no doctor-patient privilege. An exception to the rule could be invoked by Kelly, and even then she was not permitted to withhold patient information from Thompson. Once medical information was in his hands he had sole discretion as to whether the crew needed to be apprised.

"Under the circumstances," Kelly began, "we are in good health. Larry was complaining of mild insomnia. Since he wasn't responding to non-pharmaceutical alternatives, I issued him a mild sleep aid. Time-released liposome capsules with a short warning label. You know the type: Do not take if you are nursing, pregnant, might be pregnant, want to become pregnant, know someone who is possibly pregnant..." her voice trailed off.

"What if you inflect a sentence with a pregnant pause?" the writer in me asked.

"Is it working?" Thompson asked, ignoring me.

"Too soon ... to tell," Melhaus answered. His timing was pretty good. He had paused mid-sentence to get an easy laugh. I was glad to see he could, on rare occasion, interact with the crew.

"We haven't heard from you, B.A.," Thompson said, centering his attention on me.

"B.A.?" I inquired. I should have known better.

"Bachelor of Arts. The rest of us have useful science degrees."

I had taken up writing as a career a dozen years ago. My educational background, as the crew well knew, was in communications. I had also completed some limited coursework in psychology.

"Somebody," I answered back, "has to rein in you mad scientists."

"And just how do you propose to do that?" Thompson inquired.

I considered for a brief moment. "Shall I entertain you with a short story?"

"You have the ultimate captive audience," Thompson replied. "Make the most of it."

"I intend to. Have you heard the tragic tale of the *Mars Climate Orbiter*?"

"Can't say I have," Thompson said.

"Good, because it's the only pertinent nonfiction story I know. By way of introduction—minus some slight literary embellishments I've added to help hold your interest—this story was passed on to me by an old college communications professor."

"I love a good story," Diana said. "Any sex?"

"No. A long time ago, in a land far away ... Earth ... humankind explored the nearby planets using unmanned spacecraft. One of these craft was *Mars Climate Orbiter*. In a moment you'll appreciate why it was a very good thing it was unmanned.

"The objective was to journey to the Red Planet, enter into orbit, then collect and transmit climate data back to a waiting Earth. The brightest scientists and engineers labored years designing and building the mission and the cost was, forgive the pun, astronomical. On launch day all involved watched the intrepid little spacecraft as it ascended through the clouds to speed off on its year-long,

seven-hundred-million-kilometer journey. Can imagine the excitement, the nervous anticipation when twelve months later, it finally approached Mars? When all that remained before obtaining a treasure trove of information was an orbital maneuver? As planned, there was a short engine burn and the *Orbiter* passed behind the planet. I ask you to picture hundreds of scientists and engineers on the edge of their seats waiting for the craft to signal its reappearance.”

I paused briefly. For effect.

“Only the signal never came! All contact was lost!”

“Saw that coming,” Diana interrupted.

“The scientists were devastated. ‘We must have answers,’ they cried.

“What, you may want to ask, could cause such a calamity? Computer glitch or thruster failure? Breakdown of complicated electronic components?”

“Micrometeor?” Paul suggested.

“Good guess, but no. It was a gross misapplication of thruster force that sent the *Orbiter* closer to the planet than intended—near enough to become compromised by the planet’s atmosphere and send crashing to the surface. And here is where the tale gets interesting.”

“I was wondering when,” Diana said.

“The misapplication of thruster force had nothing to do with computer or equipment failure. It was human error. The team who designed the computer-operated thrusters had programmed them to *receive* commands in the metric system, specifically in Newtons. A second, independent, team of scientists had programmed software to *send* commands to the spacecraft thrusters in the old English system, pounds of force. It doesn’t take a rocket scientist to know that won’t work, that a fourfold misapplication of thruster force was the *technical* reason for mission failure.

“Blatant incompetence,” Melhaus commented, a bit irritated. “Your point being?”

“I’m getting to that. The Space Agency conducted a thorough investigation. Their report stated that blame, if you want to word it as such, could be shared by several of the scientists and engineers involved in the mission. The report emphasized that the crucial navigational commands had been handled by two separate teams and it was their *failure to communicate* which was ultimately responsible for the *Orbiter*’s destruction. And that, boys and girls, is why my professor told this story.”

I didn’t expect a standing ovation and I didn’t get one. Then again, it didn’t look like I put anyone to sleep either.

Thompson, who had listened with an impassive expression, chose to speak up.

“Interesting story,” he said. “Really brought us scientists back to Earth.”

I couldn’t tell if he was being serious or sarcastic. Sometimes he was real good at being both at the same time.

AFTER THE MORNING meeting and the informal discussions that followed, I headed back to my cabin to record my thoughts. Naturally I was accompanied by Angie. Sporting what can only be described as a happy face, she had unilaterally decided it was playtime, whipping her head back and forth to throttle her stuffed toy duck, and then ceremoniously dropping it at my feet.

There was no denying her. Sitting on the floor, my back to the bulkhead, I threw the toy out the open cabin door and into the corridor. Anticipating, she emitted a short, excited yip, ran, caught the duck in her mouth, throttled it anew, then trotted back to dump it in front of me. Jubilant, eyes glistening, she gazed up expectantly. Long ago I learned that this sequence could be repeated three times or three hundred, all depending on her mood. Funny thing is neither of us tired of this game, simple as it was.

She and I were an unbreakable pair, discovering each other three years ago when I decided to take on the responsibility, not to be taken lightly, of caring for a puppy. And so I headed to a reputable breeder who had a litter of miniature poodles that were somewhat larger and sturdier than most—exactly what I wanted, since I had no intention of raising a lap dog.

I had been forewarned by an acquaintance, a veterinarian, that a puppy displaying an overtly aggressive temperament would be harder to raise. One puppy frolicking in the litter stood out as being a bit more playful; rambunctious, but not belligerent. I snatched her out of the pen to play with and we connected. What happened next I didn't see coming, but probably should have. The breeder subjected me to an extensive battery of questions that, in retrospect, was good preparation for the psych profile testing I endured at the hands of the Crew Selection Committee. Long story short, with the help of Angie vouching for my character, and with a significant damage to my dwindling bank account, I was allowed to take her home.

Of course neither of us suspected what would come to pass, the environs that would masquerade as a home. Nevertheless, she had adjusted well.

After nearly an hour of bolting back and forth, and no indication that she was tired except a sloppy wet tongue hanging loosely from the side of her mouth, Angie decided it was time to quit playing. I was just about to settle at my workstation when I heard a quiet rap on the door. An obligatory bark from Angie told me she was on alert.

Kelly.

“Would you like company?” she asked from the doorway.

“What do you have in mind?” I said, pretending I didn't know.

“You're way overdue for a routine physical exam,” she responded, pushing inside and closing the door behind her.

“So you're making house calls now?”

“Lie down,” she ordered, shoving me backward onto the bed. “Try to relax. This won't hurt ... much.”

“Maybe I want it to hurt,” I responded. There was a better than even chance that I was going to respond a good deal more: Somehow I was flat on my back, straddled, with a shirt being pulled over

my head. Damn, she was quick.

“Good muscle tone,” she breathed, skilled hands moving slowly over my bare shoulders and onto my chest and stomach. “Shall we proceed?”

“Let’s.”

“Ears,” she said, gently biting my earlobe, then tugging slightly. “Normal.”

“This is your *routine* exam?” I asked, caressing the small of her back.

“Eyes,” she answered, kissing each lid. “Normal.”

“I don’t have medical coverage...”

“Mouth,” she said, kissing me softly, then hard. “Normal. Now open.” Her tongue touched mine.

I began unbuttoning her clothes. “Doctor,” I managed to say, “I have these two lumps ... one’s in my throat, the other, lower, much bigger...”

Trying hard not to laugh, continuing the game’s pretense, she flattened her body against mine and pressed a delicate ear against my chest. A tumble of long, straight, silky jet black hair cascaded onto my bare skin.

“Hmm. I detect an elevated heart rate,” she said. “Perhaps you are a bit anxious, afraid of doctors.” Clasp my hand, she slid it slowly down her stomach, slipping it below the unbuttoned waist of her pants to where she was wet and warm.

Her hand was resting on top of mine, but I reversed the positions, my hoarse voice urging self-examination. She locked our fingers together as her hips rose. A silvery sheen glistened her skin. A hazy, faraway, look came into her eyes, and I heard a low, throaty, expression of passion, not at all sure if it was hers or mine.

Afterward, we rested, having slipped into the security between sleep and wakefulness where the only sensation is that of floating above and away from the physical part of oneself. But the fleeting feeling receded, disturbing thoughts intruded, and I was forced to open my eyes and accept where I was; that surrounding me was an uncompromising emptiness, the stark and deadening silence of space.

Struggling to fight off a feeling of isolation and loneliness, I found myself staring at Kelly, who lay on her side, unguardedly naked, eyes still closed. Her lips, the deepest red, formed a slightly suggestive smile as if she was aware of being completely exposed and vulnerable. Did she realize how achingly beautiful I thought she was? I had yet to tell her in any but a casual, guarded way.

Her smile widened as I slowly traced a path on warm skin, one finger delicately traversing the contour of her leg, pausing at the inviting curvature of her hip. Her eyes, with their alluring Asian arc, fluttered open. For the first time I noticed their deep black irises were infused with tiny flecks of gold.

“I felt your stare,” she said, stretching luxuriously, her expression growing more provocative. Reaching down, she twisted the bed sheet into something resembling a thick rope and seductively wrapped it between her legs and up and over one breast.

I wanted to express how much I cared for her, but couldn’t find the right words. Ludicrous when you consider my chosen profession. My lame excuse: Language is inadequate to communicate the depth and subtlety of human emotion. The right words, if they exist at all, often evoke feelings other than those intended; the commonest words, so carelessly bandied about, become all too commonplace, completely losing their meaning. Words such as “soul” and “god” and “love.”

Best to avoid these words.

Only thing is my logic was flawed. I was merely rationalizing my own shortcomings. There are quarter-million words in the English language. A staggering number of word and punctuation combinations. Making it a damn good possibility that if I opened my mouth to speak, one or more of

those combinations would do magnificently well right now. Perhaps my hesitation to do so was more symptom of indiscriminately applying a lack of faith in people in general to one person in particular.

Whatever the cause, I was letting an opportune moment to speak slip away. Recalling that Kelly was born and raised in Japan, and that Japanese was her native language, I hedged my emotional bets asking, "How do you say 'I need you' in Japanese?"

Hesitating, she afforded me a strange look, and then answered, "*Aishiteru.*"

"*Aishiteru,*" I repeated to her.

"*Aishiteru mo,*" she replied, a bright smile lighting her face.

Neither of us spoke as she slipped into her clothing.

Feigning jealousy, I said, "You don't give this complete a physical to the entire crew?" When I didn't get an immediate response I widened my eyes with a pretend look of shock and added, "*Do you?*"

"You idiot," was her response.

"I'll take that for a 'no.'"

I let Angie leap back on the bed. Kelly had become her second favorite human.

Admittedly, I had a small advantage by dispensing Angie's food supply: A dwindling supply of treats was one way to keep her occupied within *Desio's* restrictive confines. One game was to place her in a 'sit-stay' while I discovered new and clever places (including the crew's cabins if their doors were open) to hide dry kernels of food. She never failed to find each and every one. My crewmates (a right, maybe not Melhaus) found this entertaining, welcoming Angie's inquisitive visits.

Another diverting trick I taught her was to sneak into Thompson's cabin, snatch a T-shirt off his bed, and scamper back to me for a waiting morsel. What made this antic more enjoyable were the profanities hurled in our direction from down the corridor. I don't think Thompson really minded the temporary abduction of a shirt. Why else would he consistently leave one in the same exact location?

To amuse Kelly, I had Angie sit in rapt attention while I held out two closed hands, a treat hidden in one of them. A gentle paw was placed on the hand with the treat, followed by the weighty stare of two beady little eyes. "Good Angie," I said, chuckling as she gently plucked the morsel off my open palm.

"You love Angie," Kelly said matter-of-factly, watching us interact.

"You could say that," I responded.

An odd look of bemusement came to Kelly's face. "I do, too," she said, and was about to say something more, reconsidered, then began scratching the base of Angie's tail. The exact best spot, you could tell, because it sent Angie drifting narcotically into space, snout pointed upward, her abbreviated tail cocked so far to one side it almost appeared broken.

Rapture.

Kelly and I had ours. Angie was entitled to her own.

I decided to use the opportunity of being out of earshot from the crew to get Kelly's opinion on how the crew was faring during the long outbound voyage. Specifically, I wondered if she had observed, as I had, behavioral changes too insignificant to bother Thompson with.

She was the right person to ask. Graduating near the top of her class and completing her residency training, she had gone on to fulfill her life-long ambition of opening a family medicine practice. Daily contact with a diverse patient population had honed an innate talent to read people, both by what they said and, more often, by what they failed to say. I sometimes wondered to what

extent she applied that particular skill to me.

~~I had an ulterior motive for inquiring about my crewmates. Examining my own feelings of isolation (always present, but voyage-accentuated) I discovered a potential cause applicable to all. My primary concern was Melhaus. I didn't say as much to Kelly. Singling him out might, in some subconscious way, influence her opinion. Instead, I couched my question in the form of a generalization.~~

“Overall,” I asked, “do you see any subtle changes in the crew’s mental health?”

Kelly’s reply was immediate.

“Shall I assume you mean Doctor Melhaus?” Seeing my surprise, she laughed, then added, “I thought so.”

“Meaning what? You believe there’s a problem?”

“No, not necessarily. But it makes good sense to think of him first, given that at this morning’s meeting you became aware of the sleep medication I prescribed for him. It’s not unusual for sleep patterns to be disrupted during extended periods of space travel, even when taking into account that the ship’s lighting was adjusted to help maintain circadian rhythm.”

“Did he come to you?”

“No. Some careful questioning during a routine examination revealed the insomnia. He was reluctant to take any medication. That is why I made that little joking comment about it. You inadvertently helped with your remark. I took it as a positive that he could respond with humor.”

“He was testy at the end of the meeting.”

“True, but I think whatever you are seeing in his behavior is Larry being Larry. He closely fits the classic stereotype of the genius who concentrates on work to the detriment of social skills. To the detriment of almost all else, for that matter.”

“You don’t see anything troubling in his behavior?”

“Not presently. With the crucial part of the expedition at hand, we’ll all be subjected to greater pressure. I will tell you that Thompson gave me a specific order to report any signs of abnormal behavior in the crew. Without delay, he said. And he included himself.”

“That’s interesting.”

“Mildly. Why the sudden, if it is sudden, interest in Larry? Does delving into our personalities help with your work, your writing? After all, he is a bit of a character.”

“The mood of the crew is of interest. Our vulnerability to aberrant behavior—and Larry seems most on edge—has the potential to not only jeopardize the success of the mission, but our safety. Besides, nothing exciting has happened ... yet.”

Upon uttering those last words, I knew I’d be called to task. It didn’t take long.

“And, so, *Kyle*,” Kelly said, accusing me with a wry smile, “our little romps in bed? *They* haven’t been exciting?”

“Uh huh,” I answered, somewhat sheepishly, certain I would be greeted with the next logical question.

“Well...?” she asked.

I didn’t need it spelled out. Addressing the sensitive issue had become unavoidable. Kelly had the right to know if details of our intimate physical relationship were being incorporated into my work, into the mission record for the whole world to eventually see. I had no choice but to confess.

“I am writing about us. How could I not? I’ll use some discretion, of course, but unless our relationship is in no way pertinent to what transpires during the expedition, the intimate details will very likely remain in my work.”

I had answered truthfully. Now I was hoping it wouldn't be an issue that came between us.

~~She thought for a long moment and said, "I respect your professional judgment. And *nothing* we do together, in or out of bed, could ever embarrass me."~~

Then, without allowing me time to respond (which was a good thing since I was a little choked up by her faith in me) she half-smiled and turned to leave. I stopped her at the door, spun her around to face me, stared into her eyes and kissed her.

No additional words exchanged. They didn't need to be.

Once again I was alone, or should I say deprived of human company, for Angie was present. I've acknowledged that relating to her was simple and easy. What concerned me was why human relationships were, for me, so hard. Returning to my workstation to write, I began to wonder if there was something affecting my relationship with Kelly that I wasn't fully conscious of; an outside influence that, together with my own emotional baggage, would explain why I would want to hold back my feelings for her.

An answer suggested itself in the manner by which the crew is forced to conduct day to day life.

Despite her being a well-appointed ship, our lives onboard are defined by an artificial environment, a veritable prison of our own choosing where time is served with no hope of escape. Of course, we have any number of AI-generated distractions at our fingertips. For a short while they seemed to be enough. But how terribly distant we are from the sight of wide open sky, the touch of a warm breeze on skin, the sound of a summer songbird. Isolated, not only from nature, but from the solace of hearth and home. From everybody and everything that makes us feel human. Even the harshest of Earth's prisons can no longer deny *all* these simple pleasures, and for those that are denied, a small measure of comfort can be derived from the knowledge that they exist nearby. Perhaps only meters away.

For the crew of *Desio* they are trillions of kilometers remote.

Distant to a point where we have begun to doubt, in our darker moments, that they exist at all. By comparison, the scores of people traversing the solar system could at least *see* Earth, are able to communicate with Earth. We are deprived of even those comforts.

Consider how this deprivation might foster the bonding of two people when such closeness would not normally exist. Is not the all too human response to hold onto somebody, almost anybody, to help fill the emotional void? Are Kelly and I deluding ourselves (if we believed) that back on Earth we could continue our relationship? If that is the unlikely future, is it not presently unfair to be placing expectations on one another?

Despite all my strained logic to the contrary, the biggest part of me said the emotional risk was well worth taking, that Kelly was, *is*, the best woman to come along in my life. The rest of me said shut up and be thankful for the temporary solace we gave each other.

But what of Paul, Diana, Thompson and Melhaus? How were they coping?

Diana Gilmore and Paul Bertrand are a pair, a partnership cemented several years ago on Earth's firm footing. They seemed to be doing well onboard, especially Diana. Short, red hair, fiery and profane: Her demonstrative enthusiasm for the mission was infectious. In some ways she acted more like fourteen than forty-one. I once saw Thompson use this to his best advantage during the only time I saw them in a heated argument. When her complaint (I don't recall what) deteriorated from reason to accusation he abruptly changed tact, ever so calmly stating that if she didn't behave herself she'd be sent to her cabin without any supper. Few things are as satisfying as witnessing a raging argument

doused by a good laugh.

~~Paul, on the other hand, is just a bit reserved, possibly because Diana has enough excited energy for both of them. As she sets fires, he sits back with a bemused look on his face and takes it all in. If she is effervescent champagne, Paul could be labeled vin ordinaire, an analogy he'd likely take umbrage to, he being of French nationality. He is very much devoted to Diana. As the mission planners had found out, they were, in fact, inseparable. During the outbound voyage, they were taking great comfort from each other's company.~~

And what of Thompson? Although it may appear he has nobody to care for, that isn't quite true: He has his ship and the entire crew. We are, after all, his primary responsibility and he takes it seriously, despite the sarcasm he doles out on a routine basis. We're five mature (except, maybe, Diana) children to watch over, each with our own peculiar personality quirks and problems. You could say that to him we're one big adopted and sometimes dysfunctional family. I'll have to remember to call him stepdad.

Melhaus represents a totally different case. What comfort, if any, he derives from the company others is difficult to say—our most intimate (and woefully incomplete) knowledge of him had been obtained indirectly, and somewhat indiscreetly, through CSA psychologists. He can be a hard person to read because he reveals little of his inner self. On the exterior, that which we see, he appears quite content to keep his emotions hidden away. It helps to know that he is smart. Scary smart. While attending Imperial College in London (he happened to be fifteen at the time) he scored 178 on an IQ test. His mental skills developed so rapidly, and at so an early age, that his social skills suffered. Eventually he came to believe that personal relationships were something he could never be proficient at. As a consequence, he withdrew from most unnecessary contact, not wishing to suffer a potential blow to his ego by trying to relate, and failing. He wasn't very accepting of failure. He wasn't used to it. Not in the arenas of academia and science.

Our reaction: During the three-month outbound voyage the physicist has been prodded, coerced and cajoled to come out of his shell and take part in our little group. This was sometimes accomplished by Thompson's sarcasm, other times by Diana's enthusiasm. Even Angie occasionally got into the act by dropping the stuffed duck at Melhaus's feet and looking up at him with that expectant, silly look of hers. Now, whether or not Melhaus appreciated the efforts routinely made on his behalf, who can say. These thoughts, if he has them, he keeps to himself.

As I ponder these observations and attempt to make them coherent, I feel Angie's soft pink tongue licking the back of my hand. Out of nowhere I begin to think there is something vaguely sensual about the act. Now *there's* a thought, innocuous as it is, best kept to oneself. Remarkable, is it not, that just like Melhaus, we humans hide much from each other and some things even from ourselves. Perhaps the quality and extent of this mental editing is as good a signpost as any as to how well an individual fits into society.

As we neared P5, I wondered if an alien civilization, if they understood us at all, would be startled, even afraid, of how extraordinarily selective and inhibited our thought processes can be.

THE NEXT MORNING I entered the mission room and was immediately greeted by an astonishing and beautiful sight. P5, which yesterday had been a fuzzy, golf ball-sized glow, now loomed large below us, filling a significant portion of *Desio*'s main observation window.

What I was seeing for the first time, in crystal clarity and without teloptic augmentation, was the shimmering surface of a silver-blue, planet-sized droplet of water suspended in the ultimate blackness of space. The surreal size and scope of this fantastic image had my mind fighting a battle between the irrational fear of being inescapably drawn down toward the planet with the overwhelming urge not to look away.

As I stared, Diana and Paul entered the room and at the same time I heard Thompson say something purposefully irreverent, something like, "an entire planet of ocean and I left my fishing poles and tackle at home."

I don't know if it was Thompson's remark, or the expression of amazement etched on Diana's face, or both, but Kelly, who was already a fixture at the viewing port when I arrived, laughed, and then, in jest said, "Give me a moment, Bruce, I'll get Diana's sedative ready."

Diana, with Paul standing close by her side, appeared transfixed by the image in the viewport; you could tell she was having trouble working through and expressing her emotions. Her response was late in coming, but it was still typical Diana.

"Yesterday I was excited, but today, Kelly ... you need scientific notation to quantify the orgasm I'm having today."

We all offered our comments, but it was Paul, forgetting that the onboard language was English, who expressed himself most eloquently when he spontaneously blurted out, "*Il est presque aussi belle que vous, mon amour!*"

Diana, caught unawares, looked up at Paul and affectionately squeezed his arm. She seemed more than a little pleased.

"Care to translate?" I asked.

Feeling very much self-satisfied, she was more than happy to oblige. "It is almost as beautiful as you, my love."

"Ah, you have a way with words, Paul," I said. "Maybe you should be the person chronicling this voyage." Before Thompson expounded on *that* observation, which I could see he was eager to do, I faced him and added, "Just saving you the trouble of pointing that out."

"Much appreciated," he replied.

I was relieved and pleased to hear my crewmates' first ebullient reactions at seeing the planet, especially in light of how previous glimpses out this same port only exacerbated the feeling of isolation I have already described. The crew was experiencing a renewal of purpose. Even Angie, softly whining at the viewport, seemed enthralled by the planet. I was compelled to issue a "quiet" command, though I completely understood how spending three months holed up on a small ship was, to her, a lifetime. All she was trying to tell me is she desired a place to run and sniff and play and that the big glowing ball offered the best opportunity.

The ball grew even larger as *Desio* accelerated into a semi-synchronous orbit that placed us approximately 17,000 kilometers above the planet. Our orbital speed was double the rotational speed of the planet and we would be experiencing one full planet day (twenty-six Earth hours) in a little under half that time. Soon we would be enveloped in darkness as the planet and *Desio*, albeit at different velocities, rotated away from the massive blue sun.

Meanwhile, as we continued to gaze ‘down’ at the planet, the eye and mind became more adept at resolving and assimilating smaller and smaller details, of which we took great pleasure pointing out to each other.

The most prominent feature was, of course, the imposing ocean: A slightly iridescent blue-gray with minor variations attributable to (so speculated) the upwelling of colder water by ocean currents, changeable winds across the water’s surface, and the relative distribution of phyto-plankton. The number and intensity of bright flashes of light, called sun glints, radiating out into space suggested that the ocean was extraordinarily calm. This, together with consistency in coloration, imparted a polished, shiny look to the planet.

Occupying the extreme poles there were identically sized (and nearly circular) ice caps—crystalline plateaus criss-crossed by an intricate web of cracks and fissures. Clearly visible along the jagged fringes were hundreds of islands created by the calving off of giant chunks of the fractured ice. These ice islands, in turn, appeared to be dividing and diminishing as they made their way into the warmer waters now encompassing most of the planet.

Tiny puff balls of cirrocumulus clouds, too numerous to count, dotted the colder regions bordering the ice shelves. Closer to the equator, bands of cirrus clouds thinned and stretched themselves into twisted shapes like white whiffs of smoke while elsewhere they coalesced into dense patches resembling tufts pulled from a cone of cotton candy. The atmosphere was not lacking more dynamic weather systems, though in comparison to Earth’s they were, despite our expectation, less common and more benign. Rarely did clouds congregate into dark disturbances, and rarer still did flashes of lightning brighten the clouds from within.

Great land masses were noticeably absent, replaced by tiny islands strewn like so many brown, tan, yellow and gold-colored pebbles across the planet’s one vast sea.

Putting all I saw together, I learned from Paul how the absence of continental masses was radically affecting the formation of planetary weather; of how, ultimately, the meteorological data we obtained here could reveal much about Earth’s climate.

While each of us enjoyed and commented on the planet’s visual treats, the ship’s daunting array of scientific instruments tirelessly performed their job of collecting and storing massive amounts of data. Only a fraction of that information would be evaluated in the near term. The far greater portion, and in far greater detail, would be analyzed during the return voyage and in the months, and probably years, subsequent to our return home.

As I previously remarked, I was interested in the crew’s behavior, and none more so than Doctor Melhaus’s. When at last he entered the mission room he displayed no sign of excitement and I wondered if he had taken the time to appreciate the planet’s beauty. Before I could ask he exclaimed, to no one in particular: “We have a lot of work to accomplish in a relatively short time, don’t you think we should get started?”

Kelly and I glanced at each other, but it was Thompson who answered him, saying, “We’ll get to it soon enough. I appreciate your work ethic, Doctor. There is, however, one item of business we can

discuss as a group. You're aware, I take it, that we have prior permission to name the planet. I want to hear suggestions."

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"I see no reason whatsoever to change it from the star map coordinates logically assigned."

"You know, Doctor..." began Thompson, considered, and then deliberately let himself be interrupted by Diana.

"We can name it *anything*?" she asked.

"Just about," Thompson responded, then, reflecting on the little trap that she had set for him, looked at me and added, "Uh oh."

"So, we could name the planet 'Larry' if we wanted?" Diana asked.

"As far as I am aware, there are no other planets named Larry," Thompson replied, willing to play along.

Although Diana, with all good intention, had hoped to elicit a positive reaction from Melhaus, there was none forthcoming. He had deliberately parked himself in one corner of the room looking down at a screen full of Greek, Roman, and other far more inscrutable symbols that few people in the world would recognize, let alone decipher. This was *his* language, and he was fluent in it.

"Anybody have a better name?" Diana said. She was a little put-off by Melhaus's behavior, but apparently didn't want to say anything that would dampen our spirits.

"Can I make a suggestion?" volunteered Kelly, throwing a glance my way. "Kyle is creative with words. I'm positive he can come up with something."

"I like the idea," responded Thompson. "Kyle?"

"Sure. But I'll need to give it careful consideration. Don't want to rush into naming an entire planet, you understand. The biggest thing I ever put a name on was a compilation of short stories."

"And how did that turn out?" asked Thompson.

"Nobody reads anymore. Apparently even short stories are too long."

Thompson let the opening pass. He'd find a more opportune time to explore my questionable career moves. There was work at hand, and plenty of it, and he was responsible for giving us direction.

"Listen up," he said. "Use the next few hours to decipher those sensor readings most pertinent to getting our butts safely on the planet. We'll meet again at 1200 hours for a working lunch. The plan is to set down on P5 tomorrow, early morning. And I do mean early. I'll need from you, Paul, with as much accuracy as possible, a projection of weather at the potential landing sites. I'll provide you the locations once I finish preliminary mapping. Diana, I appreciate that your real work begins on the surface. Concentrate on reviewing the biochemical data we're accumulating on the atmosphere. I'd prefer not to have any nasty surprises. The first expedition confirmed the air is breathable, but that was winter. Larry, listen up. You and I need to make a final ready check on *Ixodes*. Kyle, you'll assist Paul; Kelly, you assist Diana."

*Ixodes*, it should be mentioned, was the name Diana gave to the squat, ovoid-shaped submersible probe that clung like a tick to the ventral side of *Desio*. For the last three months the probe had been out of sight, but not out of mind, having been repeatedly inspected and upgraded via a host of remote communication links. Engineered to operate at maximum submerged depth of ten thousand meters, tomorrow it would be detached and sent plunging into the planet's ocean. Once underwater it would immediately commence gathering and transmitting data on ocean currents, temperature, and chemistry. The sub's engineering team boasted that if any life-form inhabited that first ten thousand meters (a *huge* technical and scientific compromise there, since the ocean approached an incredible twenty thousand meters in many locations) then that life-form would assuredly be detected. If the organism were small enough, it would be sucked into a collection chamber and eventually brought to

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