

THE ROCKET INTO PLANETARY SPACE

by William Barton

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Over the past thirty-five years, William Barton has written numerous science fiction stories, including the award-winning novel *Acts of Conscience* (Warner Aspect, 1997) and several stories for *Asimov's*, most recently, "Down to the Earth Below" (October/ November 2006). Regarding "The Rocket into Planetary Space," he says, "I am, as the clever comedian once said, The Luckiest Boy in the World! I was seven years old when Sputnik 1 orbited the Earth, and only ten when Yuri Gagarin flew. I was fourteen when Mariner IV sent back those first magical photos of Mars, eighteen when Apollo 8 orbited the Moon and still eighteen when Eagle set down on the Sea of Tranquility. I was twenty-five when Viking 1 landed on Mars and twenty-seven when the two Voyagers left for the stars. When I was thirty, I stood just three miles from the launch pad and watched STS-1 Columbia climb heavenward on a column of fiery smoke. What followed was Challenger exploding when I was thirty-five, then the Endless Space Station of my forties, then my own *Columbia* falling to pieces over Texas when I was fifty-two, and I began to feel cheated. Cheated out of the universe Asimov, Heinlein, and all the others promised me when I was that little boy, breathless in front of the TV news. This story is about why I changed my mind, and why I feel so very lucky to have lived here and now, after all."

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On September 7, 2016, just three weeks before my sixty-sixth birthday, when I should've been retired and tucked safely away in a Geezer Storage Facility somewhere down on the Grand Strand of South Carolina, or living under a bridge somewhere if things had gone that badly, maybe even safely dead, I was strapped into a canvas bucket seat in front of the systems engineer's console in the forward cupola of the node we'd mounted to the front of *Excelsior*, our shiny new SpaceHab Apex 400 cargo module, watching the fat, flat Pacific roll by, five hundred clicks straight down.

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Excelsior. I remember how everyone razzed me about that when I proposed it. My wife Sarah'd said, Isn't that wood

shavings or something? True. But in Latin, it means *Higher*.

The world's a fairly featureless place from low equatorial orbit, which passes over Brazil and Congo and not much else. Most everything cool looking is in the northern hemisphere, or down around the south pole. Sure, the Andes are spectacular enough, and you can *see* Kilimanjaro sticks up part way, but what the hell. I thought they should've put the Bigelow Exodus orbital hotel in polar orbit, give folks something to look at, once they got tired of the novelty of a zero-gee honeymoon, but equatorial's the best place to toss inflatables from the Rocketplane Kistler K-1 site at

Woomera, easy to reach by Dragon from SpaceX's Falcon-9

pads on Kwajalein. Maybe when they get the second one built, and the launch site outside Vegas in a few years?

My pal Willy Gillooly was at the pilot's console, neatly bundled up in one of the used launch and entry suits we'd picked up cheap from Roskosmos, one hand on the rotational controller, watching his console clock count backward toward zero. He had the helmet open and thrown back onto the nape of his neck, and I always thought Willy looked like some old Dick Tracy character, um ... Flattop? That's one. Skinniest guy I ever met, face as bony as Michael Rennie playing

Klaatu. Nice as hell, though. And smart. Way smarter than me.

From the bulkhead speaker, Minnie, voice squeakier than usual, said, “CNN is starting its satellite feed. Turn on your TV.” Willy claims his wife got that name because her parents thought she looked like Minnie Pearl when she was a baby, but what newborn ever looks like anything but a space alien? You know damn well it was something to do with the Voice of the Mouse.

Minnie was going to ride out the burn in *Smaug*’s reentry module, sort of as a safety measure, and I suppose Sarah should’ve done the same with *Fafnir*,

but she wanted to sit at her astrogator's console with us, and here she was. Our two SpaceX

Dragons were hard-docked to the two y-axis ports on the node, and, theoretically at least, anything that might tear them loose would most likely kill us all. Still, you never know.

I hit the power button on the TV, and the CNN anchor's sharp voice proclaimed, "This is Chelsea Clanton, bringing you a Live Scoop, direct from the Bigelow Exodus, high above the Pacific Ocean!"

On the screen, what you could see was the broad curve of the Earth, mainly blue, with a complex swirl of white

clouds, Hawaii visible as a hazy bit of crud up by the northern limb. In the foreground was a little tiny thing looked like some kind of toy.

Willy said, “Jeez, we’re only ten klicks away! Don’t these guys know about telephoto lenses?”

All you could really see was the United Launch Alliance Delta V second stage, which we’d had launched out of Kourou without a payload, meaning most of the fuel for the six RL-10B engines had made it to orbit too. We’d sent up the Apex 400, both Dragons, and the three Xcor Prometheus methane/LOX propulsion modules on three separate Falcon 9S9 launches.

Turned out to be a lot harder than we expected, getting it all bolted together. On TV, Ms. Clanton was yammering, “You’re looking at *Excelsior*, the world’s first manned interplanetary expedition, developed and assembled in secret by a privately funded consortium of space scientists,” I heard Willy, conservative as Goldwater’s Ghost, snort as she went on, “Bound today for a secret destination, somewhere beyond the Moon!”

Behind me, I heard Sarah sing, “*Some-where*, beyond the Moooon...!”

It’d been hard to come up with the six hundred thirty million dollars for this,

and when we first thought of it ten years ago, it seemed like a ridiculous idea. Still, the Gates Foundation gives away that much and more every month, year in, year out, and one month in '09 we convinced them to give us a bit of a boost. Minnie said, "The CNN producer says you need to start the audio feed, Alan."

I hit that button too.

Sarah giggled and Willy snorted, then they both sobered up. Willy said, "Go for interplanetary injection. Thirty seconds."

I started paying attention to my console. Willy's main job is to hold the stick and

make sure the Delta V guidance package is doing what Sarah says it needs to do. Me? Well. I wrote *Excelsior*'s flight software, and I left myself in the loop. Willy said, "Ten seconds," and damn if his voice didn't sound tight.

"Ten, Willy. Astro?"

Sarah said, "Go."

"Rescue?"

Minnie said, "Go."

Willy said, "Five."

I was tempted to call "Guide-o," and then answer myself, in an attack of the

nervous sillies, but I said, “Valves open at tank-head idle.”

“Zero.”

I thumbed the switch. “Ignition.”

There was a slight tremor, igniters firing slightly out of synch. Willy said, “I show 2 percent thrust.”

I stole a look at the TV, ignoring Clanton’s color commentary. There was white light guttering around the RL-10B expansion bells. “Looks like a good burn.”

Not the way you usually start up rocket engines, but we figured better safe than

sorry.

Willy said, “Energize pumps. And watch the strain gauges.” If we lost the Dragons and lived, we’d probably still get home someday, but I suppose he didn’t want to lose Minnie.

There was a steady vibration now, and I felt my butt press down lightly on the canvas. “Pump idle, all six. Ten percent thrust.”

I heard Willy blow out a long breath. “Okay. Go with throttle-up.”

I’d gotten myself an old airliner throttle, though the computer and my software could handle all this, but, you know, I

wanted to feel it. Feel it under my own hand. When I slid the bouquet of levers forward along the slot, I suddenly got heavier, then heavier still.

And when I looked out the cupola dome, the Earth's curved horizon was, ever so slowly, starting to drop, with a beautiful yellow crescent Moon rising out of the haze over Peru.

* * * *

By the end of the work day, a few hours later, the Earth, shrunk to the apparent size of a basketball, had become a slim crescent due to our exit trajectory, and I floated in front of *Fafnir's* hatch window, picking out city lights with my

binoculars. You would not believe how much light comes from Japan, not to mention the enormous coastal cities of China. All those people crammed into that little bit of space, then the black expanse of Siberia and Central Asia beyond. It reminded me a little bit of making a night flight back from California to the east coast when I was a kid. You'd fly out of the solid light-flood of L.A., then it would be black, black, black all the way to the Mississippi, small towns along the river, then more black until you crossed the Appalachians, where the woods were lit up by dots of light, like a mirror held up to the midnight sky. Behind me, Sarah said, "Can you still see the Delta stage?"

I could hear the soft whisper of her getting undressed, getting ready for her first sponge-bath of the expedition.

I turned the binoculars toward where I thought it should be, then scanned along its trajectory, back and forth. It was just a little yellow thing, a bright rectangle far out in the black. “Barely.”

She said, “Twenty clicks maybe? Tumbling?”

“I don’t think so.”

ULA had agreed to monitor the stage and direct it to an impact on the Lunar farside to keep it from becoming a future navigation hazard out in deep space.

There's a Saturn S-IVB stage out there already that gets reported as a new asteroid every few years.

I took the binoculars down and looked out across the dark *Excelsior* assemblage, glad Willy and Minnie had turned out the cupola lights, but not gone into *Smaug* yet. If you looked close, you could see their shadows inside the little dome, close together, over by the pilot station.

We'd started rotisserie mode to keep skin heating more or less even, and just now, the sun was somewhere behind the Apex 400 body, leaving us in shadow. Just enough shadow to see a starry night sky, enough shadow to see the Milky

Way go all the way round and, crossing it, a faint silver haze of *gegenschein*. I whispered, “Damn...” All the millions of words I’ve churned out in my life and now, seeing this, I couldn’t come up with a damn thing. Sarah drifted up behind me, putting a hand on my shoulder to steady herself, then docking her head next to mine. “Wow!” she said. “Zodiacal light?”

I nodded, still speechless.

Softly, she said, “Alan, if you’d told me, when you sat down ten years ago to write that idiotic story ... well. I’d’ve sent for the nice young men in their clean white coats.”

I'd gotten the idea after looking at the websites of the six NASA Commercial Orbital Transportation System COTS contenders, had a good time writing it, and forgotten all about it while the usual year went by between sale and publication. A year, a couple of weeks, and then the phone rang.

I'd known Willy Gillooly for maybe twelve years by then, both of us busy with our lives and careers, acquaintances, maybe friends, because we both found time to write the occasional technostory, because both of us were good enough to get published. After telling me how much he liked the tale, he'd said, "I ran the numbers.

Looks like you did the arithmetic right for a change.”

I'd managed a dry, “Thanks.” That was our usual litany. My shaky math, his shaky people.

Then he'd said, “How much you think it'd cost to really do it?”

“I dunno. A billion?”

Willy ran a research lab many orders of magnitude bigger than my little software design bureau, but nowhere near *that* big. “Too bad,” he'd said. And that was that until, some months later, I found myself looking at the rules for submitting a proposal to the Gates Foundation. I'd

called him back, then called the PayPal guy and let him know what I was thinking. Turned out he'd liked the story too. The sun came around the Apex hull, lighting up the foreground, and Sarah said, "Hey, look! Willy and Minnie are necking!"

They were, floating under the cupola dome, faces pressed together, arms and legs wrapped around, holding them tightly together. "Still got their clothes on, anyway."

Sarah snickered, "If it was us ... well, Willy's too shy for that."

"Who's he think's watching? God?"

“Us, dummy.”

True. We’d had a damn good time on our orbital Second Honeymoon, and I suppose Willy and Minnie did too. Having a good time now, by the looks of it. Sarah said, “Did you know Minnie’s got a brother named Max?”

I turned away from the view and gave her a look. “Have they killed their parents yet?”

She laughed.

* * * *

Two days later, we flew behind the Moon. I remember, when I was a kid,

fresh out of high school, just shy of fifty years ago, listening to one of the Apollo 8

astronauts describe what it was like arriving in Lunar orbit. Because of when and where they were going, the limitations inherent in launching to the Moon from Florida, they'd arrived over the farside in darkness, the only sign of where they were a big black Something blotting out half the sky.

Our trajectory took us over a daylit farside, the four of us sitting in *Excelsior's* dome, looking out at a torn, hilly landscape, gray and brown dirt brilliantly floodlit yellow by the sun, gaping like hayseeds, bug-eyed in the big

city. Though I'd been studying Lunar maps for years, anticipating this moment, I couldn't spot a God-damned thing.

I said, "Man. It's a good thing we don't need to find a landing site down there."

Willy said, "Yep. It'd be up to Sarah."

Who, sitting at her astrogation console, said, "Hey! I see the Soyuz!"

She put it on our screens, but it wasn't much to see, a tiny green freckle arcing over the moonscape, higher than we were, in a free-return trajectory. If you looked close, you could spot the solar panels, like wings on a blackfly. Minnie said, "Can you get any closer?"

“That’s the best I can do in the spotting scope.”

Willy said, “Can you imagine being dumb enough to shell out all those bucks for that little ride?”

I shrugged. “Well, they’ve found four guys wanted to do it in the last three years.” It was the ultimate space joyride to date. The Russians would send two tourists along with a pilot up to ISS for a weeklong stay, then dock the Soyuz to a propulsion module and fling them around the Moon. For a hundred million dollars a seat.

Willy said, “Maybe now we’ve proved the Interplanetary Dragon works,

SpaceX will give it a try. You could do it with a 9S9 for half the money, with twice the seats.”

Minnie said, “I think they’ll wait to see how things turn out with the Moon Race.”

I said, “And tSpace.”

Sarah said, “*And* us.”

“Yeah.”

I guess there’s a Moon Race, though not much of one in public. The Russians have only got their little tourist enterprise, claiming they were putting most of their effort and money into a

long-range joint Mars program with ESA. Meanwhile, NASA's Orion capsule hadn't flown 'til 2014 after all, its ISS duties captured by SpaceX and RpK. All to the good, I guess, since now they were saying they'd be in Lunar orbit by late 2017, and would land the following year, two years ahead of dawdling Bush's original schedule.

Of course, the Chinese claimed they were going to put a little manned lab in Lunar orbit early next year, and would land as soon as may be after that. Does that make it a race?

I imagine the governments know what the Transform Space Consortium, tSpace, is up to in the Australian desert,

not far from the K-1 launch site, where
US

regulators chased them. I just don't
imagine they think it'll work. I'd visited
tSpace once during the workup for
Excelsior and been intrigued by their
planetary lander design, but had been
just as skeptical of the notion you could
do it without a big cargo launcher. Just
the idea of staging tankers along the
whole route, refueling on the *way* to the
Moon, again in Lunar orbit before
landing, then again afterward ... not to
mention flying back from the Moon in a
spaceship with no aerobraking
capability.

You know that old story too: either you incinerate in the Earth's atmosphere, or you fly on by and die some time later, out in the cold and dark. The tSpace guy giving us the tour had looked me in the eye, and said, "If you don't break the Outer Space Treaty, we will." Made me think about the little Standard ARM flag we'd had made up. That'll be fun.

There was a little beep-beep from the console, and Sarah said, "Coming up on phasing burn. Five minutes."

We were using the Moon mainly to twist our orbital inclination relative to the Sun, so one little burn and, UB(2009)/21 here we come ... Damn, I thought. I must be getting used to this....

* * * *

By the time another twenty-four hours had passed, Earth was a tiny blue marble in the sky, yellow-gray Moon a similar size off to one side. When I'd mentioned to Willy how the Moon seemed to be getting smaller faster, he'd given me a little smirk: It's *closer*, dummy. *Think!*

Oh, right.

So the sun was bright and the sky was black, and there wasn't much more to see. The brighter stars were managing to poke through the sun's glare, but most were lost in nothingness, here and there the steady, bright fireflies of the big

planets and close planets. Venus over there, Jupiter there, wan Saturn that way ... I looked for Mars but couldn't find it. Maybe...

Sarah was at the comm console, tracking the high-gain antenna this way and that, trying to find the CNN satellite again, muttering something about the published ephemerides, so I sat down at the astrogation station, pulled up the scope image, and started slewing along the ecliptic. There. Venus looked like a brilliant crescent moon, blinding against an intensely black backdrop.

Funny you can't see ... well, no, I guess not. No Earthlight to make the nightside visible on the edge of vision. No moon.

No nothing. Sarah said, “Hey. We’re on!” When I looked, Willy and Minnie were floating behind her chair, each holding on with one hand.

On the TV, there was another dark sky, indistinct, T-shaped thingy centered on the screen, while a woman’s vibrant voice said, “This is a view of *Excelsior* emerging from behind the Moon, taken from telescopes at Mauna Kea, Hawaii. The spaceship and its four-person crew are now on their way to near-earth asteroid UB(2009)/21, the first human beings to leave Earth’s orbit for a destination beyond the Moon. This is Chelsea Clanton, reporting live from Houston!”

Willy said, “Houston?”

Sarah said, “I think she’s at SpaceHab.”

“But that’s just our Apex 400 engineering telemetry!”

A shrug. “We didn’t exactly set up a Mission Control.”

The TV switched to CNN anchor Barney Frank in Atlanta, who said,

“Meanwhile, in other news...” His sweaty jowls were replaced by the hazy ruins of Damascus.

I slewed on from Venus, sticking to the ecliptic, unable to remember what planet

was next. Suddenly, Saturn was a pale pastel disk, rings steeply tilted down, like the brim of a rakishly worn hat. Imagine going there. Maybe, if I live long e... Christ. I never thought I'd live long enough, or get lucky enough, to be *here!*

Count your damned blessings and be glad, Burke the Jerk... Still. As always. Hoping against hope.

A little more than a year after we secured that Gates Grant, Willy and I were still trying to get our designs resolved, figure out what the best way to do *It* would be, disagreeing every step of the way. One day, we took a Wild Blue flight to the new AndrewsSpace

facility in the Nevada desert. I remember it was hot as hell that day, desert wind reeking like gunpowder, but it was nice and cool, cool and dim in the unexpectedly big hangar the pretty Chinese woman was showing us. Willy thought I was nuts of course, wasting our time like this. I mean, Andrews had been one of the COTS losers, though they'd fielded the biggest of the CEV proposals back in 2006, a ten-man Apollo-style capsule. Still, they had a lot of government contracts and were the primary subcontractor on the K-1. They had *something*. Something to show us.

When Willy saw what it was, he tripped over his own feet, staggering, almost

falling down.

I managed a little more *savoir faire*, stopping dead in my tracks, gasping, saying, “Well ... *Fuck!*”

The Chinese girl burst out in a full-throated laugh, startling in such a skinny little thing.

The object lying on its side in the big, cool hangar was another matter entirely. I'd call it every goofy SF dork's wet dream of a magic starship. Big as an airliner, maybe fifty meters, nose to tail, eight huge triangular metal vanes starting amidships and tapering toward the tail, ring of windows just behind the conical nose. I said, “Where are you going with

this? Tau Ceti?”

That got another big laugh.

“This is the Mini-Mag Orion, isn’t it?”

She said, “That’s right. We don’t call it that anymore, though. Not since NASA took the name Orion for the CEV.”

The original Orion had been a pulsed-fusion spaceship, sort of an interplanetary battleship, designed in the late 1950s. It would’ve worked, though the idea of riding full-sized H-bombs into the sky seemed ... lunatic, at best. This one, I knew, proposed to use a z-axis magnetic pinch engine design. But ... really *building* it?

“So what do you call it now?”

“The Project 8K11 Full-Scale Mockup.”

“Mockup.”

“It’ll be about five years before we build the battleship prototype.”

A battleship prototype is a working version of a design, built with no regard to weight requirements. Too heavy to fly, but you could run all the systems and see them work.

Willy said, “How much?”

Another big laugh. “You boys must have some real money!”

I said, “Our annual budget is...”

Willy snapped, “*Alan!*”

Oh, right. To some people, a hundred million a year is big bucks. Not to this girl, though.

She smiled. “We think we’re ten, maybe twelve years from space trials. When we sell them...? At least three billion USD twenty-ten. Adjusted for inflation, of course.”

“Of course. Can we see inside?”

The control room in the nose was pretty good. Spacious and bright, with three seats in front of instrument panels, the

other seven flat racks on the rear bulkhead, for passengers. I said, “It looks like your old CEV design.”

“It is. Still has the heat shield, too.”

Willy said, “This thing can’t land on a planet. Why...”

She said, “Just in case. It has minimal RCS, fuel cells and life support sufficient for one month. Call it an escape capsule.”

I said, “Or a lifeboat.”

“That too.”

The cylindrical compartment behind the

command module looked pretty much like the bottom deck of Skylab, with a head and galley, storage compartments, and a bunch of “zero-gee staterooms,” really not much more than closets. Two hatches led one level further aft, one to an airlock, the other to what she called “accessible life support.”

“You going to launch manned?”

She nodded. “It’s sized to take the place of an Ares V earth-departure stage. We plan to launch in a high arc from Canaveral, and use the fusion drive to make orbit.” You could see the faraway gleam in her eyes then, a fanatic pursuing a fantastic dream. “With a full fuel load,

she can make a round trip anywhere in the inner solar system except Mercury. We can get to Mars, Venus. The low-inclination asteroids. Even Callisto, though not the other Galileans.”

Willy whispered, “Callisto...” looking right at me.

“Too much radiation anyway,” she said.

Later, outside in the roasting gunpowder night, she said, “So where do you boys think you’re headed?”

Maybe she meant just tonight, and Willy said, “Vegas...”

But I pointed at a yellow diamond high

in the night sky. “You see Jupiter?”

Willy hissed, “*Alan ...*”

I ignored him, and slid my finger forward to a point sixty degrees along the ecliptic. “Right about there, I think.”

Her dropped jaw had a satisfyingly comical look. After a minute, face quite serious, she said, “If you can come up with enough dough, we might be able to cut you a deal on an early flight model.”

I said, “By 2020, maybe?”

“Probably a couple of years after that, I’m afraid.”

“Okay. We’ll be in touch.”

Sitting in the cool comfort of our Hybrid Grand Cherokee, Willy said,

“Why’d you tell her?”

I shrugged. “No one’s going to race us to the Fore-Trojans. You know that. And we’ve got easier fish to catch first.”

He nodded. “We’ll sure as hell have to *catch* those fish, if we want to scrape up that kind of cash!”

“Yeah. Meanwhile, we’ve got a flight to catch.” I tapped the dashboard clock.

“Our meeting with Musk and his team is

in ten hours.”

In the here and now, as Earth and Moon shrank slowly away, I finally managed to find Mars, a mottled red ball in the scope. You couldn't see much real terrain, just the ice caps and the four dark blotches of Olympus Mons and Tharsis ridge, but it *did* look like it had canals.

So many illusions. So little time.

Maybe I will stand there one time before I die.

Who knows?

* * * *

A month later, I sat watching my instruments, as Willy burped *Excelsior's* methane/LOX engine, matching orbits with UB(2009)/21. Though you could hear the pop of the RCS thrusters, the main engine was too smooth and too far away, the only sign of anything unusual happening the little surges of acceleration on my butt. From the astrogation console, Sarah called out. "That's it! Ten clicks."

When I looked up, having finished my checklist, Willy was yawing us around toward the asteroid. The sky was full of stars, of course, and for a moment I was disoriented. Okay. There's the perpetual noonday sun over there, same size as

seen from Earth and the Moon, not blinding only because of the photoreactive glass forming the base of the dome's UV-opaque quartz outer layer. "Mmmmmphhhh..."

Sarah, familiar with all my little grunts, said, "Look just over *Smaug's* high-gain antenna."

Earth was tiny and blue from eight million miles out, but still a visible disk, Moon a gray-brown speck off to one side. Suddenly, the sky was familiar, Orion's belt jumping out at me, then the Pleiades, Aldebaran, and the Hyades ... There. That fat, pale-orange spark is Jupiter, and...

I glanced at my own instruments, then tipped my head back so I could look straight up through the dome. “Hmh. I expected to *see* it.”

Willy said, “I did too. I guess, from almost five miles out, a rock smaller than a football stadium...”

Minnie released her harness and floated up toward the inner surface of the dome. “It’s big enough to see, big as your thumbnail, anyway. I guess the albedo is too low.”

Sarah said, “Hiding in the dark between the stars.”

I felt a sudden, hard pulse of atavistic

thrill at her words. *Look!* Look where you are!

I'd felt it a few times before, always unexpected, though you'd think by now I'd know the moments when it would come. Once when I sat in those sunny offices in Santa Barbara, California, sitting across the table from the famous PayPal guy, signing my name below Willy's on a contract said we agreed to buy three Falcon 9S9 rockets, complete with launch services, from Space Exploration Technologies, along with two complete manned-version Dragon space capsules, customized to our specs.

Again four years later, as the four of us lay on our backs along with one other

“honeymooning couple,” as I felt the hard, complex jolt as those nine Merlin engines lit, and the ground outside the porthole started to drop, taking us on our “practice flight” to the Bigelow Exodus.

A third time on the day we took delivery of *Excelsior* from SpaceHab, standing in a hangar just before they boxed it up for shipment to Kwajalein. I’d stood there, looking in through the dome at those four seats and instrument panels, and suddenly realized what I was going to do, where I was going to go. In the spotter scope image, UB(2009)/21 was just off the center crosshatch, wanly lit up by the sun, not quite a potato-shaped

lump. No, here was a fat charcoal-gray belly, with a smaller lobe on one end, making something that looked like a dirty snowman wearing a funeral shawl. A crippled snowman, perhaps?

I said, “Snow-hunchback,” not quite realizing I’d spoken. Minnie giggled and said, “That’s a pretty image! Too bad there’s already an asteroid named Victor Hugo...”

I said, “Is there one named Quasimodo?”

She kicked off from the dome and came to float behind me, holding onto the back of my seat. Then, in a dreaming sort of voice, she said, “All sorts of clues to the formation of this thing. Five, maybe six

distinct terrains. Craters all over the smaller binary, but near the contact point, you see they fade away...”

This was her pulse of joy, different from mine perhaps, but still the moment of a lifetime. I suddenly realized Minnie Gillooly was about to become only the second geologist to stand on the surface of another world, after Harrison Schmitt on the Moon, forty-four long years ago. What the hell *took* so long?

Damn fools in high places, of course.

Willy said, “I guess it’s time to prepare for landing. Guys?”

Sarah said, “We can still decide to bring

Excelsior in close.”

I shook my head. “Probably a good idea to stick with our plan, and leave *Excelsior* out here where nothing can happen to it.” It’d be a cramped ride home in *Smaug* and *Fafnir*, if we lost our mother ship. Willy said, “Okay. Let’s get to it.”

Another little thrill went up my spine.

* * * *

No more than an hour later, and I sat strapped in *Fafnir*’s pilot seat, looking out through the left forward docking window at *Excelsior*’s dimly lit cupola dome. Sarah had the MacDonald-

Detweiler MiniCanadarm unshipped from its mount on the little SpaceHab airlock/adaptor, and had reached forward to grapple its standard end effector to the fixture on *Excelsior*.

It's become the usual way spacecraft link up now. No more gentle forward movement, "parking in the garage," and gentle shudder of soft dock. Just fly within range of an RMS, or use your own, and swing on in to a Standard Berthing Mechanism.

Beyond *Excelsior*, I could see the windows of *Smaug* lit up yellow, could see the vague shapes and shadows of Willy and Minnie, doing their tasks, same as us. In my earphones, Willy's

voice, slightly crackly with interplanetary static, said, “Ready, gang?”

My mouth went dry, and I could feel my heart start to stutter. “All set.”

“Let’s do it.”

I took a deep breath and looked at Sarah, a few feet away in the flight engineer’s seat.

She smiled, and said, “Okay, Alan. Just like in the simulator.”

“I prefer to think of it as just like in a story, sweetling.”

More smile, then she looked down at her instruments, one hand in the RMS glove. “Say when.”

I remember the day I sat down to write that story. I'd never been much of a writer, but I'd kept it up over a long, long time, thirty-some-odd years producing a couple of dozen stories, a handful of novels, most of them published, in magazines, by New York publishers. Just a hobby, something fun to do when I wasn't making money, first as a marine machinery mechanic, then, when I got too old to be comfortable working outdoors on the coast of Maine, in the winter, at night, sitting in an office writing computer software.

I remember I sat down in my old green secretarial chair, in front of the aging HP 4550Z I set aside for writing, opened up a new file in WordStar 7.0a for DOS, the antiquated word processor I used only for stories. Wiggled my fingers above the keyboard to make the juices flow, then tappy-tap-tap, the words began forming on the screen.

The people in the story weren't afraid, didn't feel their hearts speed up like crazy, lived in the future, had seen it all, were used to it all, ho-hum. Then I thought, What if it was me? *Really* me? What if I had the money to buy a space capsule from one of the New Space

Entrepreneurs I was reading about, and go on my own *real* space adventure? How would I feel then?

So I wrote the story that way.

I was a hell of a lot more nervous now than the me in the story had been. But I said, “When.”

Sarah punched commands into her console, fingers chattering rapidly across the keyboard, and I felt a series of light jolts as the berthing latches let go, then a quiver as we came loose from *Excelsior*. “Berthing mechanism released,” she said. Then she put her arm in the glove, pushed the arm with one long smooth motion, then quickly

opened her fingers. Out the window, I could see *Excelsior* suddenly swing away, then recede as the RMS end effector let go of the grapple fixture. And Sarah said, “Grapple released.”

I watched *Excelsior* drift away as she swung the arm back in and clipped it to its rack on the adaptor. Beyond the mothership, I could see *Smaug* receding in the opposite direction, growing smaller, then smaller still. Little lights twinkled around the hull, and she stopped, hanging in space.

Okay, Burke the Jerk. Get busy. I nudged the hand controller, RCS jets popping and muttering through the hull, and *Excelsior* stopped going away too. In my

earphones, Willy's voice crackled, "Okay. I guess if it wanders off while we're gone, we've got plenty of fuel to go looking."

I took my eyes off the window, and looked down at the three flat panels of my IFR display, looking at radar, visual camera, and FLIR, columns of data down the left-hand edge of each screen, just the way I liked. Radar was all soft static, but for the bright beads of *Excelsior* and *Smaug* in the foreground. Visual showed nothing. But in FLIR, UB(2009)/21 was a bright sparkle, waiting against the dark sky.

I whispered, "Tally-ho..."

Willy said, "Time to go, boys and girls."

I wiped the sweat from my palms on the front of my coverall, then took hold of the rotational controller on the right, throttle on the left, twist, then gentle push... *Fafnir* swung around her y-axis, there was a gentle thud- *hiss* as the main engine lit, and we were on our way.

* * * *

At a relative velocity of only one meter per second, it took us almost three hours to cross the ten kilometer gap between *Excelsior* and the asteroid. Always the nap girl, Sarah tucked her hands into her safety harness, and was soon asleep, gentle buzz of a girlish snore soft and

serene.

Lucky, I thought.

But I wouldn't, or couldn't.

I sat in my seat, hands on the armrests, staring out at a fantastically starry night, watching UB(2009)/21 materialize out of the mist. Every once in a while, I'd glance to port, where I could see the windows and running lights of *Smaug* twinkling fifty meters away.

I bet Willy's heart isn't pounding.

Willy has a hard edge to him, volatile as me, yes, but somehow far away, self contained. Probably why we'd been able

to stay friends all these years, when so many other people were mad at us both, over what seemed like nothing. Burke the Jerk I'd been as a kid, jackass now to all those people I'd beaten in business deals, contracts I'd won when theirs were lost. Jealous? Or just me?

You could see our little asteroid now, lit up dim gray by the sun, a deformed peanut hanging against the black, slowly growing bigger, beginning to occlude stars now. I wondered again if Quasimodo was already taken. What the hell does that name mean? I'd taken Latin in school when I was a kid, much of it long forgotten, gone along with the French and Japanese I'd learned later. I

remembered *quasi* meant “as if” and *modo* was used the way we use only, merely, just ... So what the hell did Hugo mean? “Just as if?” Just as if what?

Probably, somewhere, there are learned articles about it, but I was never a learned man.

The asteroid was looking big now, subtending quite a bit of sky anyway, and when Sarah’s console beeped, she woke up all at once, like magic, like she’d never been asleep at all, blue eyes out the window, voice whispering, “*Wow...!*”

Growing large in the deep distance, it wasn’t so odd looking after all. From

this perspective, coming in perpendicular to its axis of rotation, sun more or less behind us...

Over my earphones, Minnie's voice, high, squeaky and full of tension, said,

“Here comes the B segment of the contact binary. Looks like...”

And there it was, peering over the limb, a new bulge, quite a bit darker than what was in the foreground, changing perspectives as we approached, asteroid elongating into something not quite like an egg shape, defying common sense somehow. Details without number seemed to proliferate across the surface in a maze of shifting shadow, while

Minnie chattered about bright ray systems and a carbon regolith.

Willy suddenly burst out, “Hey, that’s really *something*, huh?” Excited now, voice thick with some unknown emotion, showing he wasn’t quite the cartoon character I sometimes imagined.

Minnie said, “I’ve got a fix on the density. Figuring it as if it were rough spheres of one-eighty and one-thirty meters, it comes in at around 1.03 grams per cubic centimeter. Pretty light.”

From her place beside me, Sarah, whose world was mainly abstract numbers, said, “That’s a good sign, isn’t it?”

Not wanting Willy or Minnie to jump on me with a flood of corrective detail, I whispered, “If it’s almost half carbon compounds, I guess so...”

From the story. Straight from the goddam story!

In my earphones, Willy said, “I heard that!”

And, “Close enough,” came from Minnie.

Close enough. I don’t know if either one of them ever really believed in my story, which had been set in the Fore Trojan asteroids, but this ... *This!*

Real.

I had to readjust my idea of the thing's size continually. I'd thought of it as small, just a little bitty hill in space, but it was damned big, seen from close up, irregularities and empty outer space background screwing up my sense of scale. UB(2009)/21 continued to grow, filling the window with hundreds, then thousands of distinct features, cratered like the surface of the Moon. The true nature of the contact binary was apparent now, the slightly smaller secondary body come well out of eclipse, recreating that twisted snowman shape, Quasimodo the Snow Hunchback. Minnie said, "I see at least five distinct terrains here..."

The asteroid was turning to “ground” now, seeming to slant away because we were going to pass just to one side of the large, grayish component. Sarah said, “Time on target.”

I put my hands back on my controls, yawing *Fafnir* around to point the main engine toward our travel vector. I said, “Ready, Willy?”

He said, “Ready and ... three, two, one...”

I pulsed the main engine and suddenly we were hanging over a brief little world of dark gray stone. Motionless ... no, not quite. I could see the ground moving off to one side.

“Willy, I...”

Sarah said, “Radial velocity there, not us.”

Right. I forgot. *E pur si muove* as far as the eye can see. Willy said, “Are we seeing gravitational acceleration?”

“I almost can’t tell. Right on the edge of the Doppler radar’s sensitivity, I guess.”

I said, “Good enough, anyway.”

Willy said, “Hey, remember when people used to say, ‘Good enough for government work?’”

“Yup. Probably why government work

done by private contractors always sucked.”

Sarah said, “Guys? Not now.”

Right. Dumb. “So. Where should we land?” Since there was no way to get a telescopic view of something so small and far away, we’d never had any planning maps for UB(2009)/21. Now...

Minnie said, “It’s so strange. The albedo ranges are similar to some of the asteroids that’ve been investigated in main-belt Piazzi bodies. Aside from the steep upturn in the reflectance spectra above point-seven micrometers, it might as well be some old carbonaceous chondrite.”

“We’ll just have to go down and see,” said Willy. “How about we pick a point near the intermediate zone on A? We can take a look at those grooves. Maybe they’re the remains of that internal activity Alan had in his story!”

I felt an odd creepy feeling come and go. Willy believed in my story that much?

Sarah surprised me by saying, “More likely just a manifestation of broken rock from the collision that made this thing.”

I said, “What the hell. We have to start someplace.”

* * * *

It took us about an hour to get down, accelerating into a slow arc along the gray lobe, stopping over what was technically the south pole, as defined by rotational direction, then accelerating toward the ground while Sarah unshipped the MiniCanadarm and pulled the radio-controlled dexterous manipulator system from its mount on the airlock hull.

We'd talked about mounting landing legs on the Dragons, but it was expensive, and pretty much pointless, given the almost nonexistent gravity we were facing here. Christ, we won't even be able to *walk* on the surface! We'll need the compressed air maneuvering units

we bought just to keep from drifting away. Like the cosmonauts in my novel *Fellow Traveler*, Willy'd said when I brought it up a few years ago.

Yep. Like that.

Down we went, *Smaug* and *Fafnir* side by side, MiniCanadarms, each with a big hand now, splayed out in front, slowly, slowly, ever so slowly ... I tried to hold my breath while the ground reached up and grew more or less flat in front of us, but I kept running out of air, exhaling, inhaling again noisily. Just before contact, Willy snickered and said, "Jeez, Alan! Don't have a heart attack on me!"

The hand and arm flexed, cushioning our

impact, which I could hardly feel at all, no more than a faint surge against my harness. I took a look at the accelerometers and popped a couple of RCS jets very gently, while Sarah grabbed with the dexterous manipulator, digging into regolith. Maybe there was a bit of a bob, a tiny little sway, then...

Sarah said, “That’s it. *Fafnir* has landed.”

I heard Minnie say, “*Smaug*, too!”

I said, “Where away?”

“About fifty meters to your ... ummm ... west?”

“Fifty meters? That’s pretty close. Uh ... oh, wait. That puts you over the local horizon, doesn’t it?”

Willy said, “You know, I keep forgetting how little this place is!” I could swear he sounded dazed. There was a rustling in the earphones, then he said, “I’m up at the hatch window. I can see your main engine and a bit of propulsion module sticking up.”

I said, “Okay, I guess it’s time to...” I choked suddenly, unable to speak. Sarah said, “Time to suit up and go outside.”

Willy yelled something that sounded like, “Yee- *hah!*”

* * * *

I'd like to say I stepped out of the airlock hatch ten minutes later, stepped out and planted my spacesuit boots firmly in the charcoal dust, first man on Quasimodo, but what I really did was float out and hang suspended. I guess if I'd waited long enough, I'd've drifted on down, but what I did was puff the compressed air jets on my backpack, once to get started down, and again to keep from bouncing off. Then I just stood there, silent, trying not to move a muscle, not wanting to fly away into the sky on the strength of a twitch. We'd talked about Neal-Armstrongish first words and decided against them. First on the

Moon is a big damn deal. First on a little bitty rock, lost in the void between the worlds ... I dunno. Anyway, we'd decided against it.

Time for words later, when and if we decided we really would do the flag ceremony, planting the corporate banner of Standard ARM in the black dirt of UB(2009)/21 and staking our first mining claim.

We'd landed near the rotational pole, technically on the A lobe, so the immediate vicinity seemed level, a golden-black plain, featureless except for a random spray of little craters. In one direction, there was a nearly normal-looking moonscape, in the other,

a strange, stretched-out depression, constricted in the middle, almost like a valley, but it kept going downhill, all the way to the horizon. There's something funny about...

I had a sudden vivid memory of a long-gone day, back in 1985, not long after I quit the shipyard and was just getting started on my new career as a computer programmer. I'd gone to visit my high school friend Matt, who lived in a decaying old mansion his wife had inherited, sitting beside a lake outside a place called Shickshinny, Pennsylvania, somewhere near Wilkes-Barre. We'd gone for a walk that day, talking about old times, about his new wife, about the

pretty blonde I'd recently lost to another man, about the books and stories and magazine articles I was writing, about his similar aspirations, so far unrealized, when suddenly I'd come to a stop, sniffing against my allergies, looking around. He'd given me a strange glance, then looked around too. Damn! he'd said, You can't see anything but the hillside and sky! Like we're on a little bitty world, somewhere out in space.

This was like that now. It didn't *really* feel like the horizon was too close, or was right at our feet, the way it was portrayed in pre-Space Age science fiction stories. No, the ground just went out in a normal sort of way, and then

ended against sky, like there was some kind of cliff.

I tried to take a step forward, tipped to one side, and drifted off the ground. When I righted myself with the backpack, the ground had shifted under me, and the

“cliff edge” had moved on, exposing new level ground. It really was the horizon. And it really was close.

Sarah, floating outside the ship now, drifting toward me, looked disconcerted behind her faceplate. “Hmm. Strange,” was all she said.

* * * *

The four of us made rendezvous between the ships, in the confusing terrain where A and B overlapped into each other. It reminded me a little bit of the mess on Enceladus, black overlaying dark gray, rather than white, but you could see the gray was the real “bedrock” here.

Once we'd gotten away from the immediate area of the spacecraft, going further into the tarry black surface associated with B, Minnie and Willy moved closer together, and began hooking up cables. Although it was originally intended to be carried in the field by one hopefully young and fit geologist, with the instrument package on his back, display package on his

chest, holding the five-foot sensor boom in his hands, the GE GeoStrider wasn't really suited to our spacesuits, or zero gee.

Since our Russian-made suits had life support backpacks, with used ISS

maneuvering units clipped behind them, we'd split it up three ways. Willy had the instruments on his chest, Minnie the displays, I'd operate the boom, and Sarah would ride herd on the cables.

"Okay," said Willy. "Snakes it is."

I said, "Snakes'd be trying to get away. These bastards seem to *like* us!"

Sarah said, “Are you *sure* nobody else can hear us over the radio?”

I thought of reminding her we were recording everything, both voice and through our little helmet cams, but kept my mouth shut. “Any place in particular you want me to start?”

Minnie said, “Here is good.” I lowered the boom and started to flip the head, but Minnie said, “Don’t bother with the brush or rat yet,” so I lowered the sensor face to the ground and thumbed the switch.

Minnie said, “Um.”

There was a bit of silence, then Willy

said, “So? Anything?”

“Weellll ... It’s what we expected. This surface is composed of kerogen-like organics. Processed CHON grains, maybe. A little methane and ammonia mixed in by meteoritic gardening, processed by larger impacts and solar flux...”

I said, “This stuff comes off B, right? And B is some kind of processed cometary nucleus. A lot of the stuff that gets knocked off B has to wind up on A if it isn’t sent off into space. Maybe we should move up toward the top of the head?”

Willy said, “Tomorrow or the day after?”

We've got plenty of time. Min?"

She said, "Sure. Let's focus on the interface zone for now."

We moved off downslope in a bunch, following her lead. Oddly, though my eyes were telling me we were going down, some subtler clue, maybe from the tiny bit of gravity tickling my vestibular organs, seemed to say I was ascending a very shallow hill. A strange hill at that. My eyes kept wanting to see the valley as a bulbous black mountain, hanging over me like a mushroom cloud. Just one little shift of perspective, and we're flies climbing a vertical wall. Hmh. Scary? No. Flies can fly and so can we.

After about twenty minutes, taking readings here and there, sometimes using the brush and rat heads on the sampler, we stopped at the terminus of a long groove, looking down into a bare and shallow depression, half filled with shadow, dark and darker. The groove dwindled quickly in the distance, climbing up onto the gray hump of B.

Willy said, “Looks like a textbook graben, buried and softened by deep regolith.”

Minnie whispered something to herself, then said, “No signs of layering or endogenic activity. Probably just big cracks, I’m afraid.”

I said, “Crush two hard-boiled eggs together at their blunt ends and this is what you might get. Hard to say what it means for the interior.” And ever since we’d seen the reflectance spectra for UB(2009)/21, years ago now, the interior is what we’d talked about. And why the M in Standard ARM stood for Mining.

“Why,” asked Sarah, “do the cracks line up with both bodies?”

After a second, Minnie, voice thin and dreamlike said, “You know, that’s a damn good question...”

* * * *

The next day, we went out with the collapsible drill rig we'd brought. It'd begun life as a quarter-scale prototype of the rig being made for Project Constellation, and the company that made it had been quite reluctant to sell it to us, having been instructed to sell it for scrap by NASA. When we found out they were planning to sell the first *full-scale* test rig to tSpace, which planned to file *claim* to pieces of the Moon, we talked them into selling the prototype to us as a species of hush money. Willy and I were both good with machinery, so it didn't take much customizing to make it do what we wanted.

In between putting the damned thing

together and working over all the samples and sensor data we had, we even had time for our scheduled interview with CNN. I thought it was supposed to be taped, given there was a round trip signal delay of more than a minute, but Ms. Clanton said they were going out live. Gives them more time for color commentary, I guess. Anyway, she told us our little trip was causing quite a flap down there, with the Japanese media calling us

“space pirates,” French and Russian diplomats raising treaty issues in the UN

General Assembly, and the U.S. government ominously silent. Didn't seem much interested in what we thought

of the asteroid though. Just, show the tape of the EVA between blips of commentary, views of us floating in *Excelsior's* cupola. I heard later, the approach film we shot of UB(2009)/21 got shown over and over again on every news show in the world, and I even managed to slip in a reference to Quasimodo.

When we popped the hatch on *Fafnir*, struggling with all our junk, it was nighttime, Quasimodo's surface a blending of gray and black shadows, low hummocky rises here and there, details hardly visible. Overhead, the stars were like tiny needles of light.

I said, “Smauggies?”

Minnie’s voice was a bit staticky, punched through the asteroid’s surface layer. “Loud and clear.”

“Starting westward along the bary-equator now, toward your anticipated position.”

“Roger. See you there.”

I still felt a little funny, using old-timey radio jargon. Roger. Over and out. Ten-four ... A coordinated puff of compressed air and we began drifting away from the ship, surface just beneath our toes, moving slowly over a world of silvery dusk, and Sarah said, “You

know, despite what I know it *is*, it really seems like we're on a mountaintop here."

Sudden change of perspective. Right. World curving away in all directions, stars outlining the horizon. We'll walk to the edge and suddenly the black plains will spread out below, maybe the twinkling of city lights on the horizon, far far away ... Instead, on the edge of our little world, came first the milky ghost of the solar corona, then sunrise, preceded by a few tongues of blinding prominence flame. The landscape expanded all around us, the two worlds, A and B, growing together, shadows shortening, as the neck valley of the our

crippled snowman came out of eclipse.

We made rendezvous with Willy and Minnie a little farther on than we expected. They were “standing” on a bit of underhang, just on the edge of the neck of striated rubble that formed the last bit of the bridge onto A, festooned with as much hardware as we had, floating together, looking down at something. I heard Willy say, “So what the hell is *this?*”

Beyond them, amid the jumble of small craters and humps, there was a sudden change of color, a sinuous ridge of rusty brown material, like a snake under the regolith, spattered here and there with patches of black obviously blasted from

nearby craters.

Minnie whispered, “Um. That’s odd.”

“No kidding.”

I said, “So what is it?”

Minnie said, “Don’t know.” She started working on the fasteners holding her parts of the core sampler to her harness, the rest of us following suit because she was pretty much calling the shots when it came to this stuff. “It almost looks like something that’s bubbled out of the interior.”

“On a body this small?”

In a small voice, she said, “You wouldn’t think so...” I could see her head moving behind the helmet’s faceplate, as if looking around. “But the orientation of those linear features...”

It took almost two hours to set up the little drill rig, while the sun and stars went round and round. The biggest problem was driving the pitons to hold it down. We had an inertialess hammer, but it didn’t work at all well, twirling out of my grip when I triggered it, banging out to the end of its lanyard. Willy and Sarah finally held me down with continuous firing of their backpacks, Minnie steadying the rig while I swung our high-tech gizmo like

something from a hardware store.

Finally, we were ready, and I got behind Minie, holding her more or less steady, one hand on her life-support system mounting rack, the other on my maneuvering unit controller. In theory, I would be able to feel her shifting movements and puff my jets appropriately, keeping her more or less where she needed to be. I said, “Okay?”

“That’s fine, uh ... one moment...”

I could feel the core drill’s vibration, propagating through Minnie’s suit and into mine, while I wiggled the little thumb controller, trying to compensate. I said,

“Minnie, are you...”

“!?” She made an odd, wordless grunt.

Shove.

I felt myself going over backward, feet swinging up to the sky as Minnie’s LSS rack popped out of my hand, pulling away as if propelled by a runaway thruster.

Me: Dark ground whizzing by. Black sky. Dark ground, a little further away. Black sky...

“Jesus *Christ!*” Willy’s voice was almost a scream. I heard Minnie shout, “I can’t *see!* Where the hell *am* I?”

I watched the ground go by, then started toggling the controller this way and that, working against the spin, until I stabilized, facing away from the sample site, able to judge and kill what little bit of lateral movement I'd picked up. My heart was thundering like mad, lungs pumping, but ... good, good. Didn't panic. Very good. I caught my breath, and looked around. Minnie was up in the sky, maybe twenty meters off the surface, turning about her center of gravity, a spinning starfish, growing smaller as I watched. Her suit was somehow disfigured, almost as if misshapen, some kind of black splash on it, blending some of her edges against the sky, as if bites had been taken out by some space

monster.

And ... ?

A column of bubbling liquid, jetting, curling around itself, climbing off the surface of B, carrying the remains of our little drill rig with it. For just a moment, I couldn't really make myself see it for what it was. No. Nothing like that. Not *here*. I must be misunderstanding what I see. Familiar expectations, as if this were a world of *air* and... Minnie's voice said, "Where am I...?"

Sarah said, "You're about sixty meters up. Can you...?"

"I can't see anything. There's something

all over my faceplate.”

From not far away, I saw Willy rising off the surface, jetting in her direction. He said, “I’m coming after you. Hang on. Relax.” You could hear something like pride in his voice then. Proud of you, Minnie. Proud of myself. We’re not *really* heroes of the Space Age, bold astronauts with that fabled Right Stuff. Just a bunch of geezers with ... damn. The right stuff after all. Sarah said, “Should we...”

I said, “We need to stay here. If he can’t catch up to her, or they can’t get back, we’ll need to go after them in *Fafnir*.”

“They’re pretty far off, already. I guess

the rendezvous radar...”

I turned and looked back toward the brown column. It'd pinched off at its base and goo was slowly curling toward the surface, curling over the area we'd been sampling. The rest of it kept on climbing, hard to see against the dark sky, an independent body rising from the surface, losing its shape as it rose, as if some surface tension were...

Well. A liquid body. *Here?*

As I watched, it passed low over A's limb and receded toward the stars. Going. Going. Gone.

* * * *

It took us quite a while to make it back to *Excelsior*. Willy managed to retrieve Minnie, catching up to her, stopping her spin like an old EVA pro, though he was no Ox van Hoften for size, getting them both on their way back to the surface on a direct trajectory for *Smaug*'s landing site.

Once it was clear they were going to make it back, I'd said, "Okay. We'll head for *Fafnir*." I moved over to the fresh curl of brown solid on the surface, looking at odd, lumpy shapes glistening in the sun, like fresh roofing tar in a bucket.

"Want me to try for another sample before we go back? Maybe we can hack

off...”

Willy laughed, right on the edge of a hysterical giggle. “I think we have enough. Wait’ll you see Minnie’s suit!”

All the way back to the mother ship, Willy complained about the stink in *Smaug*. Though they sealed it in the airlock as soon as they could, the “sample” was outgassing, making their eyes burn and noses run. Sniffling away, and despite Willy’s loud objections, Minnie’d run the geo-sensor against it and taken some readings before slamming the hatch.

Then we heard her voice, squeaky with amazement: “Hydrocarbon contaminants!

Maybe we can become CHON miners after all...”

Willy, voice dry and amused now that he'd calmed down, now that the ship's filters were cleaning out the CM's air, said, “Well, there's our damn article, Alan. Hell, we oughta clear a couple of thousand bucks on that, easy!”

He'd ridden me about the unlikelihood of our little adventure paying off, whenever our funding sources couldn't hear.

Minnie said, “Huh. Mostly constructs of methane and ethane. And, uh ... some kind of propylated compound.”

Sarah said, “How dangerous is this? The suit’s still outgassing in your airlock, so how’re you going to get back aboard...?”

I said, “They can cycle the airlock once, then rush through, grabbing a sample on the way. The faceplate will come off easiest.”

* * * *

A couple of hours later, we met them in the docking segment below *Excelsior*

’s cupola, floating above the closed hatch that led down to the habitat we’d built in the Apex 400’s cargo bay.

Sarah, said, “Wow! That really stinks! I

hate to open up the hab and...”

Willy held up the suit faceplate he'd detached. “Outgassing's about over. We need to get this down to the lab ASAP.”

As I cranked the hatch's lock lever, I thought about the familiarity of the odd, ethery smell in the air. Not such a bad smell, though one most people wouldn't like. I'd always been partial to certain chemical smells, and this one ... I said, “Y'know, it kind of smells like an oxygenated synthetics plant.”

Minnie gave me an odd look, then we were inside, Minnie going head down in the instruments, while Willy put the sample in a vice, slipped his toes in foot

restrains and broke it up, faceplate and all.

Only one spare of everything, I thought. We'll need to be more careful... Sarah got out the camera equipment, while I settled myself in front of the infosys console, popping the old Logitech MiniView KVM switch we'd pulled out of my office, looking at various screens. I said, "Okay, guys. Everything's up and running."

Long silence. Then Minnie said, "Well..."

Watching the raw data scroll by, I thought, Good thing *one* of us knows about this stuff. Willy was trained as an

aerospace engineer, Sarah as a mathematician, and I was trained as nothing, just an old mechanic smart enough to think his way into the depths of software design.

Minnie said, “These are some *very* nice aliphatic hydrocarbons we’ve got here.”

Willy said, “What the ... look over there. Six-carbon ring, some double bonds, with nitrogen crap all over it...”

I felt old, old knowledge surface out of nowhere, things I’d forgotten I ever knew. My dad had been a geologist too, in the long ago and far away, and I’d taken quite a few organic chemistry courses before flunking out of my first

attempt at college, back at the tail end of the 1960s. Out of the blue, I said, “When it has the CH_3 and the two extra hydrogen radicals, it’s called toluene.”

Willy’s head jerked out of the binocular eyepieces, looking at me, astounded.

“And the nitrogen?”

Minnie’s giggle tinkled. “You need a refresher course in organics, don’t you?”

Think about what you’d call a cyclohydrocarbon compound with three NO_2 radicals sticking out of it like that!”

Must be nice, knowing stuff like that. I started typing notes for the article,

alongside the data flow. You never know.

Willy seemed to stutter. “Uh ... I guess these layered sheets of hex ring must be fragments of ... graphite?”

I choked suddenly, making them both look. “Not necessarily. You *could* crack it out as isomers of n-hexane and -heptane. I guess...”

Their mouths popped open in two little O's, making me laugh. Willy looked away, then, softly, said, “What a scientist you would've made if you'd been able to get a real education.”

I laughed again, nothing sensible to say

in response. “Explains the *smell*, don’t it?”

He said, “I guess so.” He looked back at the data flow, and said, “Hard to imagine this stuff just forming out here.”

I said, “Maybe little green zombies from the Phantom Planet left it for us?”

His turn to laugh.

Sarah said, “What the hell are you *talking* about?”

Before I could answer, Minnie said, “Quasimodo is surfaced with CHON material, meaning B must’ve had its final

processing out in the Kuiper belt, maybe even the Oort. Assume B is largely CHON, descended from your classic ‘dirty snowball.’ From its density, we know A has to be a stony-iron, formed close in.”

Willy said, “Carbon, hydrogen, oxygen, nitrogen. In a lot of old stories, I remember the authors assumed we’d be eating CHON someday.”

Minnie said, “Ghaak!”

I said, “What do you call a mess of aliphatic hydrocarbon sludge?” and waited.

Moment of silence, then I saw Sarah’s

eyes light up. “I know. Petroleum.”

Willy looked at her, suddenly respectful. “Well, yeah. And maybe a pool of it stuck between the two components of near-earth asteroid UB(2009)/21.”

Sarah said, “A pool.”

Minnie said, “I told you asking about the striated ridge linear orientation was a damned good question.”

Willy said, “How does it happen on Earth? Dead ferns are made of the same stuff as CHON, that’s why those old writers thought we’d be eating it one day. Then all you need is time, temperature, and pressure.”

I said, “Pretty cold out in the Oort.”

Minnie said, “Not to mention the Oort cloud. But A and B are two distinct entities with wildly different histories. Just because they went splat and stuck together way back when doesn’t mean they haven’t been in *slightly* different orbits, grinding away against each other for however long it’s been, converting orbital kinetic energy into thermal energy...”

It was left to Sarah to say, “And CHON particles into oil.”

* * * *

A day or so later, I sat strapped in my

flight engineer's seat, head tipped back, looking out through the cupola dome. From this perspective, Quasimodo seemed to have tumbled head first toward the Sun, light shining on its bald pate, and also on that bit of neck where we'd been, fresh little scar just barely visible next to the old, two rusty little flecks of tar, like scabs on a vampire's bite. I imagined the glob of asphalt sailing slowly away, in its own orbit now, and thought, There must be other ones out there as well, little spurts of paving material drifting around the Sun. Well. This is the only one with geological sampling tools stuck in it.

After a little argument, we'd decided it

was safe to move *Excelsior* in close to the asteroid, not really in orbit, more sort of co-orbital around the Sun. We don't have a drill-rig anymore, so it's not that likely to squirt oil or tar or whatever all over our main ride home.

For safety's sake, we'd gone down in one ship only, leaving the other one aloft for an added safety margin, knowing if anything went wrong on the surface, we could probably get back up on EVA jetpacks alone.

Buck Rogers? Well, no. Buck rode a coal mine into the future and wound up fighting the Chinamen from Outer Space. Still, you know what I mean. We'd taken more samples, brought down the little

Standard ARM pennon with its cute comet logo, read our statement about how we were claiming ownership of UB(2009)/21, Outer Space Treaty or no Outer Space Treaty. We did our best to take high definition photos with Willy's expensive digital camera, and had a hard time with the foursome shots, because it didn't occur to anyone the tripod wouldn't work so well in the near absence of gravity.

Back aboard ship, we'd chirped into the comsat system to get CNN's attention, gotten them to set up the secure link we'd arranged, then given another one of those long, halting interviews to Ms. Clanton. When we sent in the recordings,

there was a short break while she watched, then her next transmission began,

“There’ll be hell to pay over this, you know.”

But she was grinning all the same.

Hell to pay is money in the bank to a TV journalist.

About an hour after the interview was broadcast, CNN called again, reestablishing the secure link, and let us know they’d been asked to provide us with wireless broadband through their satellite, so we could get to our email accounts, among other things.

I'm sure they expected they'd be able to read the data flow, and they got what they expected. I let Willy and Sarah handle the government and media howling. I'd already figured what might happen, so I'd set up an Internet-based VPN interface with the hardware in the network at my business office. Not some commercial crap, either.

I do this for a living, and I doubt the Homeland Security hackers would even know there were extra packets going out over CNN's bandwidth. Maybe some geeks in Redmond would be able to get in, but only if it occurred to them to look. There were tens of thousands of messages waiting in the public

mailboxes of Alan Burke Enterprises, everybody under the sun wanting everything from a piece of the action to our hides nailed to the barn door. Sometimes both. But in the special accounts I'd set up, there were only six, and only one of those really mattered. I said, "Guys? ExxonMobil is offering ten billion USD for the rights to UB(2009)/21. They also want our prospecting data, so they can decide which other NEAs are worth looking at."

Sarah whistled. "I wouldn't have thought..."

Willy said, "Anybody else?"

“Not even in the ballpark.”

“Huh. That’s going to make it hard to negotiate the price up some. I mean a bidding war...”

Minnie said, “Oil is everything to our civilization.”

I said, “And our technology is geared to use it. Everything from rocket fuel to plastics feedstock. Until fusion power reactors running off helium-3 stop being a pipe dream, this stuff’s going to be worth its weight in ... oh, hell. Worth so much if there hadn’t been any here, they’d’ve had to ship it up by rocket.”

Willy said, “So what’ll we say?”

I said, “Yes, obviously, but meanwhile...” the keyboard rattled as I typed. Willy said, “Hey! We need to talk...”

I said, “Oh, I’m not emailing ExxonMobil yet. This is just a note to AndrewsSpace, putting down a deposit on one of those ships.”

That stopped them cold. After a minute, eyes very far away, he said, “I wonder if I’ll be in good enough shape for this, when the time comes...”

I laughed. “Willy, I’m ten years older right now than you’ll be in 2022! And if you think you’re going without me, guess again.”

Outside, Quasimodo tumbled in the sun, shining gray and black, and it was maybe another thirty seconds before where I was and what I'd just said grabbed my soul and flung it out to the stars. m

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Author's Note:

First of all, a word of appreciation for Michael Capobianco, who did substantial research on a much earlier version of this story, and for Kevin J. Anderson, who sent me a most amusing critique of that original tale. Thanks, guys! And Kevin, you'll notice I took your advice about not naming the two spaceships Hesperornis and

Rhamphorynchus ... Second?

EVERYTHING IN THIS STORY IS TRUE.

Not true in the sense that's it's already been done, but in the even more important sense that if you have a great big steaming wad of cash burning a hole in your pocket, there are real companies that already have every product and gizmo in the story not just in the form of imaginative viewgraphs, but in the design stage and beyond, many of them already under construction. There's no single item in the story that costs more than a few tens of millions of dollars, and if you've got the bucks, you can buy the

Buck Rogers.

In fact, the entire scenario played out in the story can be had for under a billion dollars. Admittedly, that's a lot of money for a business hacker like me, who missed out on the dotcom gravy train because he was writing science fiction stories instead of paying attention, but there are plenty of people who've got that much laying around, and more.

As to where...

Go to www.spacex.com and you'll see that Elon Musk and his employees at Space Exploration Technologies, Inc. have been awarded \$278 million by

NASA for the purposes of building the Dragon commercial manned spacecraft. That would be Fafnir and Smaug in the story. In just a couple years, I'm sure he'll be glad to sell you one, and launch it into space atop a Falcon 9 rocket. And yes, Elon Musk is indeed the PayPal guy, who was paying attention when I was not. Go to www.rocketplane.kistler.com and you'll find everything you want to know about the Kistler K-1 reusable two-stage-to-orbit launch vehicle. Kistler tried and failed to build the K-1 cargo rocket in the 1990s, and finally went bankrupt. For a while, it seemed like the end of the trail, until the remains were bought by Rocketplane Limited, and

resurrected to a new life. Now RpK, as it's called for short, has a \$207 million contract from NASA to get their rocket up and flying. And that's just the two winners of the government-sponsored COTS

competition for a Commercial Orbital Transportation System. There were losing competitors as well, and some of them intend to proceed, one way or another. Go to www.spacehab.com and you'll see that the company that makes the SpaceHab payload-bay cargo module for the Space Shuttle had a proposal to build a big cargo module called the Apex 400, which would fly interchangeably atop any of the

world's big launchers. It would be a useful thing to have, and I hope they still build it. In the story, it's called Excelsior, and I suspect if you showed up with money and an order, they'd consider building one for you. They already know how.

Go to www.bigelow aerospace.com and there you'll find a wealthy hotelier determined to set up an orbital hotel. Pipe dream? Not at all. The Genesis-1 test module is in orbit right now, and it worked so well the Genesis program will end with Genesis-2, which will have flown long before you read this. Next up, Sundancer, which will act as a prototype for the orbital hotel, and as a

target for America's Space Prize, \$50 million to anyone who can demonstrate the ability to get up there repeatedly, without taking any government money to do the job. In the story, I called the orbital honeymoon hotel Exodus. I think it's a damn fine name, and I hope Robert Bigelow will consider it, when the time comes. Need a methane/liquid oxygen main engine for your interplanetary spacecraft, even though NASA has decided it's too iffy for the Orion moonship? Go to www.xcor.com and there you'll see a company that's got smaller engines designed, built and tested. A larger methane/LOX engine is merely a matter of demand. If not, you still might find the Rocket Racing

League entertaining. This is just scratching the surface, of course. the tSpace consortium at www.transformspace.com didn't win either the COTS competition or the CEV

competition, but their designs are sound and innovative. The CXV air-launched manned spacecraft may well make it into orbit, and will certainly be cheaper to fly than anything except the Kistler K-1. And if it does? Well, their CEV design will make an ideal all-purpose planetary lander, not just for the Moon, but for Mars and beyond. We'll need it someday, one way or another. Finally, go to

space.com and take a good look. Especially take a look at the Mini-Mag Orion design. It's a practical, buildable fusion-drive interplanetary spacecraft waiting in the wings. It would take a pile of money and determination to bring something like that to fruition, but no more money than is already earmarked by Congress to fund the nation's long-delayed return to the Moon, and a whole lot less than has already been spent on the International Space Station. With it, you could get anywhere in the inner solar system, and a little beyond. If I had one, I'd stick a tSpace CEV on the nose, fly on out to Callisto, and make a landing.

I've written a number of stories about futures we lost due to stupidity, for example "Harvest Moon" (Asimov's, September 2005). And once upon a time, Michael Capobianco and I wrote a book called Fellow Traveler (Bantam Books, July 1991) about a splendidly possible future that crashed and burned away to nothing at all in the weeks and months following the book's publication. Politics and short-sightedness took those futures away before they could happen. This story is about the next such future, looming up before us with the promise of a bright new tomorrow.

Maybe this time, the dream will come

true. Either way, we'll soon know. Keep your fingers crossed. And if you happen to have a few hundred million dollars you don't need right away, I've got some cool ideas.... Copyright © 2007 William Barton