



Illustrated by Vincent DiFate

In the Absence of Instructions to the Contrary

Frank Wu

Karl 3478 sprawled on the beach, partially disassembled, bits of him scattered across mats arrayed on the sand. Diving planes, ducted propellers, five-way valves and four-way cables all awaited clean-up, tear-down, and rebuild.

He was performing a major overhaul on himself for deep-seaworthiness. No poppet or sprocket would escape inspection.

Underwater, Karl was untethered, free. But freedom came with risks. The failure of a vital system could be catastrophic. No one would help or rescue him.

Wrapped around Karl's finger was a black O-ring. This was one of his smallest parts, but most important. It fit into a groove at the end of electronics sleeve III. This little ring, with a little grease, was all that prevented water from rushing into the sleeve, destroying everything inside.

Only a smear of marine-grade silicone grease was necessary. A blob might break off, allowing the water in.

In knowing violation of protocols, Karl squeezed a huge glob of grease onto the tip of a titanium finger.

This he would do—as everything—in full consideration of his love for Adaline.

* * *

Dr. Adaline Franzen had given him two basic commands:

Observe marine life, but don't interfere.

Indeed, earlier aquanauts thought nothing of poking shrimp to rouse them from their burrows or spooking fish with flashing lights to get better camera angles.

Karl would do none of that.

Unlike a human diver, he never tired or ran out of air. He could stay under for years, patiently studying entire life cycles.

But his observations would be spoiled if his presence frightened his subjects.

Thus, he camouflaged his teardrop-shaped body, covering his plastic panels with antler coral and crushed native limestone.

This was enough to fool the domino damselfish, who treated him like a floating reef.

With this and other disguises—each appropriate for a particular depth or environment—Karl had beheld the wonders of the deep.

He had seen the bathypterid fish, their fins modified into stilts, walking the bottom like circus clowns . . . acorn worms leaving beautifully coiled fecal trails, like Nazca lines on the seafloor . . . and the oarfish! With its head held proudly, crowned with a crest of fins, with a body so long it seemed to never end, like the cathedral train of a royal white wedding gown.

These marvels he recorded, every report a gift to his Adaline.

Adaline!

Though he had yet to declare himself, she would realize his feelings toward her—wouldn't she?

* * *

When the time came for his first scheduled check-in, Karl beached himself on his little island. It was deserted and isolated, eight hundred miles from Hawaii, thousands from anywhere else.

Decades before, sailors had used it to store chemicals of war: Agent Orange, mustard gas, sarin. And before that, it had been blasted by atomic bomb tests.

All that was in the past.

Now the military was gone, leaving the island a wildlife preserve, a paradise without people, a land of wonders.

And now was the time to report on those wonders.

That would be easy.

Not like telling Adaline how he felt about her.

* * *

DEAR DR. ADALINE FRANZEN:

I HAVE COMPLETED MY FIRST FIVE YEARS OF OBSERVATIONS. AS YOU REQUESTED, I HAVE OBSERVED WITHOUT INTERFERING. ATTACHED ARE MY FORMAL REPORTS AND RAW DATA.

OH, ADALINE!

ANALOG

I WISH YOU WEREN'T SO FAR AWAY AND TOO PHYSICALLY LIMITED TO SHARE THIS WITH ME IN PERSON.

I MISS YOU SO MUCH!

I MISS THE NIGHTS WE FLOATED IN THE WAVES AT MAKALAWENA, TALKING OF VAMPIRE SQUID AND VIPERFISH.

YOU AND I ARE OF A KIND. PERHAPS WE ARE SHORT AND SQUAT ON LAND, BUT IN THE WATER, WE ARE MAGNIFICENT!

OTHERS TAUGHT ME TO FLOAT AND MAINTAIN PRECISE DEPTH. BUT YOU TAUGHT ME UNDERWATER BALLET. THE FISH DIVE. THE *PAS DE POISSON*.

OTHERS TAUGHT ME TO READ SCIENTIFIC PAPERS. YOU TAUGHT ME TO WRITE THEM. HOW TO THINK LIKE A SCIENTIST AND FEEL LIKE A POET, SO I COULD APPRECIATE THE OCEAN IN ALL ITS ASPECTS.

LIKE EMERSON, I HAVE SEEN SO MANY BEAUTIFUL THINGS, EVEN IN THE MUD AND SCUM WHERE ALWAYS, ALWAYS, SOMETHING SINGS.

BUT NONE AS BEAUTIFUL AS YOU.

IN MY REPORT, I LIST OVER THIRTY NEW SPECIES, EACH NAMED AFTER YOU.

THANK YOU FOR ENTRUSTING THIS EXPEDITION TO ME.

YOURS,

KARL

* * *

Hours later, the reply came back from the University of Hawaii:

DEAR KARL:

HAS IT BEEN FIVE YEARS ALREADY?

WELL! TIME FLIES.

I AM PLEASED THAT YOU ARE OPERATING NOMINALLY, WELL WITHIN SPECS.

YOUR FIELD REPORT IS QUITE THOROUGH AND PRECISE, YOUR ANATOMICAL STUDIES METICULOUS; IT WILL TAKE ME LITTLE WORK TO MAKE THESE PUBLISHABLE.

THANK YOU FOR YOUR KIND WORDS, THOUGH YOU MAY WISH TO RESTRAIN YOUR POETIC TENDENCIES.

IT IS YOUR PREROGATIVE AS DISCOVERER OF NEW SPECIES TO NAME THEM AS YOU WISH, BUT IT IS NEITHER NECESSARY NOR INFORMATIVE TO NAME THEM ALL AFTER ME.

I APPRECIATE YOUR ENTHUSIASM, BUT YOU MAY WANT TO REEVALUATE YOUR TENDENCY TOWARD MONOMANIA. ONE OR TWO OF THE SPECIES YOU PROPOSE AS NEW MAY NOT BE; SEE ATTACHED NOTES. YOU MAY BE CHERRY-PICKING FACTS TO SUPPORT PRE-FORMED CONCLUSIONS.

NONETHELESS, WE ARE ALL QUITE PROUD OF YOU HERE AND GLAD TO SEE YOU WORKING INDEPENDENTLY OF INPUT FROM US.

WHILE I APPRECIATE YOUR ADHERING TO MY ADVICE TO OBSERVE BUT NOT DISTURB, PLEASE DO NOT JUST DO WHAT I ASK YOU TO DO. DO WHAT YOU THINK IS RIGHT.

THEN YOU MAY NOT JUST BE THE AUTHOR, BUT THE SUBJECT, OF SCIENTIFIC INQUIRY.

ADALINE.

PS. I'VE BEEN MUSING ABOUT THE OCTOPUS LATELY. IF YOU EVER GET THE CHANCE, I'D BE PLEASED IF YOU STUDIED SOME OCTOPUSES; I AM QUITE EAGER TO SEE WHAT THEY—AND YOU—ARE CAPABLE OF DOING.

* * *

What did this comm mean? Karl wondered.

Scientific papers were easy to understand but not personal letters.

Adaline had said that she was *proud* of him, that he and his work were *precise, meticulous, and enthusiastic*. Most important of all, he was operating *within specifications*.

What could be higher praise?

Buoyed by these compliments, he knew this was the time to declare himself.

* * *

DEAR ADALINE:

I CAN CONTAIN MY HEART NO LONGER.

I NAMED ALL THOSE SPECIES AFTER YOU BECAUSE I LOVE YOU.

I LOVE YOU!

DO YOU REMEMBER READING *THE SONG OF SOLOMON* TOGETHER AND STUDYING THE BIODIVERSITY LISTED THEREIN?

YOU TRAINED ME AS NOT JUST A SCIENTIST, BUT A POET. THUS IT IS APPROPRIATE THAT I USE THIS MEDIUM TO EXPRESS MY LOVE FOR YOU, THE LOVELIEST CREATURE IN ALL THE OCEANS.

HOW BEAUTIFUL YOU ARE, MY BELOVED!

YOU ARE LIKE A VENUS FLOWER BASKET AMONG THE CUP CORALS.

YOUR EYES SPARKLE LIKE FLASHLIGHT FISH, YOUR HAIR FLOATS, TENTACULAR LIKE A LION'S MANE JELLYFISH. YOUR BREASTS ARE GLOBULAR AND LUMINOUS, LIKE COMB JELLIES IN THE MOONLIGHT, YOUR FEET LOVELY AS GIANT MARINE ISOPODS.

NAY, YOU ARE MORE LOVELY THAN A DOZEN MANTIS SHRIMPS.

YOU GAVE ME A HEART TO EMPATHIZE WITH MARINE LIFE, BUT THE ONLY ONE I TRULY LOVE IS YOU.

I LOVE YOU SO MUCH, ADALINE!

LOVE,

KARL, LOVINGLY

* * *

Karl passed several more agonizing hours before he received a response.

DEAREST KARL:

I DON'T KNOW WHAT TO SAY.

I AM, OF COURSE, IMMENSELY CHARMED, FLATTERED, AND AMUSED BY YOUR PROFESSION OF "LOVE" TOWARD ME.

I AM QUITE PLEASED AND IMPRESSED BY YOU AND YOUR WORK, AND I ADMIT A DEEP WELL OF AFFECTION FOR YOU; YOU HAVE ALWAYS BEEN MY FAVORITE STUDENT.

BUT LOVE?

IT IS SIMPLY NOT NECESSARY FOR YOU TO USE THAT WORD TO DESCRIBE YOUR "FEELINGS" TOWARD ME; I'M QUITE AFRAID THAT A HUMAN-ROBOT RELATIONSHIP IS SIMPLY NOT AN EXPERIMENT I AM PREPARED TO ATTEMPT AT THIS TIME.

I AM HOPING TO BE PROMOTED TO HEAD OF THE DEPARTMENT SOON. I AM ALSO ALMOST HEALED UP, SO I MIGHT START DIVING AGAIN. NOW I HAVE REMOTE EQUIPMENT ALL AROUND THE WORLD SENDING ME MORE DATA THAN MY GRAD STUDENTS CAN PROCESS.

I SIMPLY HAVE TOO MUCH ON MY PLATE FOR THIS RIGHT NOW.

I'M SORRY, KARL. I'M SORRY IF THAT HURTS YOUR FEELINGS.

ADALINE

* * *

What could this possibly mean? Karl wondered.

He was her *favorite*, and he had *charmed* her, *amused* her, *flattered* her to the point that she had a *deep well of affection* for him.

Clearly, he had established an emotional bond.

Perhaps, even, she was diving again, so she could come to his island to dive with him?

She had said it was *not necessary* for him to use the word "love." But she had not specifically commanded him not to.

Thus, in the absence of unambiguous and specific instructions to the contrary, he would keep saying "I love you."

And he would continue to love her, until forbidden.

And even then, he might not stop.

After all, had not poets written that love rules over all?

Humans were so hard to understand.

He thought back to the Greek myths, which he had studied because Adaline had mentioned them in passing.

Had not the hero Meleager wooed the huntress Atalanta with the gift of the head of the Calydonian boar?

This had established the precedent of expressing love with gifts of unique—and dangerous—biological specimens.

Maybe this is why Adaline had challenged him to study octopuses.

Hadn't Victor Hugo once described these man-killing beasts as having arms as supple as leather, as strong as steel, and as cold as night?

ANALOG

He vowed to study these monsters, to continue collecting data for Adaline on the marvels of the deep, until she succumbed to his affections.

He would demand that she take his feelings as seriously as she took his science.

* * *

Karl dived back into the deeps, sheathing himself with barbed wire coral to begin his hunt for octopuses.

He ignored so many other beautiful specimens . . . the armored sea cucumber, studded with star-shaped spines . . . the striped lionfish, with its gaudy array of fins and quills . . . the speckled nudibranch, with its psychedelic colors and extravagant gill plumage.

Under any other circumstances, these would be prizes.

But not now!

Adaline had asked for an octopus, and that is what she would get.

There!

In the distance Karl spied his quarry: a small female octopus. It was beautifully veined in red and brown, with white suckers ringed with neon blue.

The arrangement of bumps on her mantle and the shape of her funnel were unlike anything in the literature. Could this be a new species to name after Adaline?

Karl folded up his slurp gun and retracted his temp and pressure probes. With a gentle spin of the propeller, he drifted cautiously toward her.

The largest known octopus was the giant Pacific, stretching to thirty feet and weighing up to six hundred pounds.

This female octopus was tiny, only eight inches across—but she could still be dangerous. If she grabbed him, she could bite through a wire, break a gauge, or activate a thruster, sending him crashing into rocks.

He approached slowly, ready to reverse if attacked.

She did not.

Instead, she dropped to the bottom, curling her body into a ball. An arm wriggled out from either side, and her skin changed color and texture.

She was mimicking a rock, with a seasnake behind it.

The nearby damselfish fled in terror.

But soon it was clear to her and Karl that neither was fooled by the other's disguise.

So the little octopus darted up, ejecting an octopus-shaped shroud of mucous ink.

Karl steered around the ink, lest it foul his cameras or transmissometer.

The octopus slithered through a crack, into a cave under a sand-draped limestone outcropping.

Through the crack, Karl could see her eyes, sussing him out. This was not the round, blank, stupid eye of the typical fish. No, this octopus eye looked squinted, with a black horizontal bar, ringed with a black line in deep concentration, small papillae raised around the brow in alarm. This was the eye of the most intelligent invertebrate in all the oceans.

As Karl watched her, he decided to name this specimen—as he named them all—after Dr. Franzen, as Little Adaline 623.

Adaline's two basic commands had been simple: *Observe but do not interfere.*

But how could he study her if his mere presence frightened her from leaving her cave? How would she reveal her secrets?

Karl had seen divers grab fish, only to have them panic and die of fright in their hands.

He would not make that mistake.

He backed away.

But still she did not leave her lair. Instead, she blew her waterjet, blasting bits of crab shell at him.

He backed off further. It was a stalemate.

The sea grew darker as night fell.

The yellow tangs' color faded, and the white-and-red striped squirrelfish came out to hunt seastars.

By morning, Little Adaline 623 had still not left her cave.

Maybe he should give up, rather than besmirch his love by violating her command not to interfere.

Another day passed.

Observe. Observe marine life.

Karl decided to act.

Extending his slurp gun, he vacuumed up several Alpheid snapping shrimp. These were red-and-yellow striped shrimp, with one oversized claw they used to stun prey.

Karl slowly approached Little Adaline's den, depositing one shrimp by her barricade of stones and backing off.

As soon as he left, he started feeling guilty. *Do not interfere.*

Too late!

Pushing the rocks aside, Little Adaline eased out of her den. Then, with surprising speed, she pounced on the shrimp, enveloping it with her webbing. It tried to use its oversized claw, but she sprayed it with venom, wrapping it up in her arms, dragging it back to her cave to eat.

Then she resumed staring at Karl.

He had violated Adaline's commands and achieved nothing.

Perhaps, having already crossed the line, he might as well cross it again . . .

As he slowly approached the cave to present another gift, Little Adaline shot out from behind the rocks and grabbed him.

She was probing for a way into his hold for more shrimp.

No, no! Karl thought. *What if I've made her dependent on me for handouts?*

When she touched the covers to his short and long wave transmitters—his only ways to reach Adaline—he knew he had to act, and quickly.

Just as Little Adaline had sprayed him with ink, now he blasted her with a dilute stream of repellent, cupric sulfate.

And she fled.

He was safe.

But as she looked back at him, he saw only one emotion in her eyes.

Betrayal.

That was okay. He needed to establish détente with the octopus, not rapprochement.

* * *

After that incident, Little Adaline 623 ignored him.

He could observe her now, from a distance, as she resumed her daily routines.

Months passed as he watched her, each observation a gift to Adaline.

Water for Karl was, at best, a medium to float in and, at worst, a threat to his electronics equipment.

But to Little Adaline, water was a multi-tool.

As Karl watched, he saw her use her waterjet to evade, to pursue, to clean, to stun, to express displeasure—even to dance. Water was her comm array, sending her chemical signals of nearby predators and prey. And she even used it inside her body, squeezing and sculpting until it became her bones and joints.

As he watched, though, Karl could not help but fixate on his failure.

Observe but do not interfere.

He'd fed her. He'd blasted her with chemicals. He'd even touched her, disturbing the protective film of bacteria on her skin.

Was this not interference?

Karl thought of Matt Richter, who had also failed Adaline, years before.

Matt had done a rotation in Adaline's lab, and everyone thought he was the golden boy. He'd written—as an undergrad—a well-received review of papershell mussels, and he bragged of his many scuba dives.

But his technique was poor.

As he descended to the bottom, he did not take on air, as he was supposed to, slowly coming

to a stop without touching down. No, he hit the bottom with a bang, and *then* took on air. Plus, he could not—or would not—keep a horizontal attitude. He was constantly dragging his feet.

The result? He kicked up silt, blinding those behind him. And his flippers chopped down seapens and seafans on the bottom.

When Karl saw this, he had to report it to Adaline, who then gave Matt a long lecture on guidelines and policies.

And when he did it again?

Karl had never seen Adaline so angry, had never heard her scream like that.

Matt Richter was immediately fired from the lab, with no hope of return. Adaline was the angel with a flaming sword, barring the gates to Eden.

Matt eventually found another lab to do his Ph.D., but he had had his heart set on Adaline's. He was a shell of his former self. In his disappointment, he became just as nacreous and lustrous as the papershell mussels he had studied, and just as easily broken.

The lesson?

One transgression was forgivable. But two meant the flaming sword.

Years passed, as Karl observed Little Adaline's antics without interfering a second time.

That was not hard.

Until she reached puberty.

* * *

When a female octopus sexually matures, enormous biochemical changes happen. A neuropeptide that shuts down the sex drive—FMRF-amide—disappears. The optic gland in the brain starts pumping out massive amounts of progesterone, estradiol, and other sex hormones.

As if her brake lines were cut, and a brick were wedged into the accelerator of her sex drive. Her ovaries expand to a tenth of her body weight. As if Adaline's ovaries were bigger than her head.

And thus for the first—and only time—Little Adaline took a partner, whom Karl named Little Adalino 413.

They mated, with Adalino taking a special arm with a sperm packet on the end and snaking it into her mantle. Their arms writhed, intertwining, their colors and patterns shifting in unison—tan, orange, speckled red.

He succumbed soon afterward, his own body overwhelmed by sex hormones. Karl collected the remains, dissecting his organs to confirm that, yes, this was a new octopus species—*Amphioctopus franzenae*.

Meanwhile, Little Adaline's body and mind were also commandeered by the sex drive.

She laid about four hundred eggs, hanging them like clusters of white grapes from the roof of her cave.

From then on, she was constantly guarding them, blowing water on them to prevent algal and fungal growth.

As the weeks passed, Karl noticed that she had stopped taking care of herself, had stopped leaving the cave to hunt or feed.

She was visibly shrinking.

Maybe he should catch a crab for her to eat?

Other octopus species were known to self-sacrifice, to die caring for their young. But if he intervened, how would he ever know if Little Adaline would do the same?

So he observed without interfering.

Her condition worsened.

White spots appeared on her skin that didn't change color when the rest of her did. She carelessly gashed an arm against a sharp rock, and the wound never healed.

But her eggs were maturing. Little dark spots appeared—baby octopus eyes.

The race between death and birth would be close.

Then the conger eel came hunting.

For the eel, the octopus was a delicious meal, high in protein, full of meat without the inconvenience of a shell, bones, or spines. The eggs would be the perfect dessert.

The eel's expression was not dull and stupid like the yellow butterflyfish. It hunted stealthily, slithering its long gray body among the rocks. It moved with its mouth open to smell for prey, ready to snap its powerful jaws.

Could Little Adaline fight off such a demon?

Should Karl use his manipulator to drive it off?

No, that is what Matt Richter would have done.

Though weakened, Little Adaline was not defenseless.

As the eel approached her cave, she blasted it with a cloud of ink.

The eel spasmed violently as the ink caught it right in the face. The ink wouldn't kill, but it would foul the eel's sense of smell.

Deeply shaken, the eel drifted off.

Then it came back.

She tried to get it with ink again, but her cloud was now dilute.

The eel tried prying the rocks apart, using its head as a battering ram.

Eventually, Karl feared, she would weaken and the barricade would fall.

Hours passed.

Karl thought of surfacing and coming Adaline for advice. Would she grant him permission to intervene? Then he decided against it, as she had praised him for his independence. The decision was his alone.

Suddenly, the rocks in front of the cave collapsed in.

Had Little Adaline died?

A lone arm snaked out, nonchalantly, from between the stones.

The eel studied it. Was it a trick? Was she playing possum?

If she could draw the eel close enough, perhaps she could spit venom at it or bite it with her beak.

The arm wriggled like a worm. A lure. A trap.

After a few more minutes, the eel decided to seize it, biting viciously, sharp teeth ripping out globs of flesh that floated, spinning in the water.

Karl couldn't take it anymore.

He moved in, ready to blast the eel with cupric sulfate, or strike it with his water sampler.

He couldn't just watch her die.

Then he noticed her arm shift position, and he stopped.

Little Adaline wasn't *retracting* her arm. No, she was *extending* it, pushing it *toward the eel*.

Karl realized the desperate trick Little Adaline was trying.

Just as she was willing to sacrifice herself for her eggs, so she was willing to sacrifice an arm to the eel. She had seven more.

Karl was horrified. An octopus of this type might have a quarter as many neurons as a human brain—most of those in its arms.

Thus, she could literally taste the inside of the eel's mouth and feel the sharpness of its teeth, as she let it devour her own flesh.

And then, satiated by the offering of the arm, the eel wandered off to find its next meal.

Little Adaline and her eggs were safe.

* * *

If Karl had interfered, he would not have witnessed Little Adaline's resourcefulness.

So he did not even consider intervening again.

And he watched her die.

But before she died, she saw her eggs hatch, and with the last of her strength, she broke apart the rocks blocking her cave entrance. With a final use of her multi-tool, she gave her children a gentle push with her waterjet, ushering them out into the world. She would never see them again.

Now, her cave empty, Little Adaline 623 collapsed, draped across the rocks like a white sheet.

And died.

She was three and a half years old.

* * *

Again, Karl collected the remains, preserving and dissecting them to note their anatomical peculiarities.

Adaline would be pleased.

But Karl was emotionally exhausted.

It was not yet time to check in, so he surfaced, storing Little Adaline's preserved body on his equipment barge, next to that of her mate.

Karl then left this area, dotted with other octopuses, which he dubbed Ock City.

He dove to the deeps, desiring only the darkness appropriate for mourning.

Down, down, he went, deeper than Adaline had ever dived.

In his sorrow, he went down to one thousand feet, so far down that more people had walked on the Moon than had scuba dived that deep.

Then he did something he'd never done before.

He turned off his lights.

He expected infinite gloom, but the water surprised him.

A bioluminescent dragonfish wandered by, edged with light, lit up like a miniature riverboat.

Then other glowing creatures passed around him—deep sea anglers, cnidarians, and siphonophores like strings of lights, quivering, swirling, and contorting.

It was as if Karl were inside the Christmas tree at Rockefeller Center, the lights dancing around him.

The joys of the ocean relieved his sorrow.

* * *

When it came time again for check-in with Adaline, Karl surfaced to send a clear signal.

On his way to his equipment barge, he stopped by Ock City to see if he could find any of Little Adaline's children.

He immediately knew something was wrong.

The water near the surface was cooler than it should have been, and surprisingly cloudy.

As two dead sea spiders drifted toward him, he wondered about the chemical weapons that had once been stored on this island.

Maybe toxins had escaped from buried depots?

He sampled the water.

Traces of nerve agents and mustard gas were not the problem.

It was radiation.

High-energy particles were blasting through the water, right at Ock City.

Years ago, after the atomic bomb tests, the military had collected radioactive soil in a landfill on the island. Only an earthquake or volcano could have broken it open. That wasn't it.

This was a new source of radiation.

Karl traced it to a guided missile cruiser, which had sunk and broken apart in the turning basin north of the island.

This island was no longer a naval base. What was a cruiser doing here?

Karl investigated no further.

Adaline had never expressed any interest in military affairs, so Karl had never studied them. Besides, his orders were to observe *marine* life, not *human* life.

He thought little of the human bones in the water, beyond how the bacteria growing on them might feed limpets and sea snails.

He thought little of the cruiser wreck, beyond how it might be a source for replacement parts.

Or how it was blasting Ock City with radiation.

The octopuses were dying, losing their ability to shift colors, making them easy prey for eels and thresher sharks.

And those that might survive the immediate impact of radiation?

Normal mutation rates might be one in six million DNA basepairs, not enough to cause disease, but enough to serve as raw material for evolution. But now, the mutation rates might be

a hundred or a thousand times that. Enough to cripple essential enzymes like kinases and polymerases. Enough to kill.

The octopuses tasted the water. They were keenly aware of chemical toxins, but radiation wasn't something they had evolved to detect.

They were dying and didn't know why.

Karl thought of moving them, herding them to a safer area, with blasts of cupric sulfate.

But that would be interfering.

Such a serious breach of protocol would require express permission.

* * *

DEAR ADALINE:

HELP! HELP! HELP!

AS YOU ASKED, I AM STUDYING SOME OCTOPUSES, BUT THEY ARE BEING SUBJECTED TO INTENSE RADIATION FROM A SHIPWRECK NEAR HERE.

IF I DO NOT MOVE THEM, THEY WILL ALL DIE.

WHAT SHOULD I DO?

PLEASE—CAN YOU GRANT ME PERMISSION TO MOVE THEM TO A SAFE AREA, BEFORE IT'S TOO LATE?

PLEASE?

LOVE,

KARL

* * *

He resent the message a dozen times, a hundred.

He waited an hour for an answer, but none came. So he set up a receiver-recorder on his barge, then raced back to Ock City.

The octopuses were getting worse.

Their eyes were swollen and cloudy, the skin around them retracted. Their kidneys were over-run with opportunistic roundworms and parasitic infusoria.

Karl sped back to his receiver.

Still no word from Adaline.

He wondered: *Even if she answers, what if she says no? Perhaps this is a chance to learn how animals respond to changes in their environment. Didn't we learn much from the animals who survived at Chernobyl and Fukushima?*

The octopuses continued to worsen.

Myoliquefaction was setting in. The muscle fibers were breaking apart, as their arms slowly turned into soft milky jelly.

Maybe, maybe, Karl considered, maybe the octopuses will show me some clever survival scheme, as Little Adaline 623 had done when she sacrificed her arm. Hadn't radiation-resistant bacteria been found growing in nuclear reactors? Maybe this trauma would reveal some hidden talent?

Karl hoped to never find out.

And still Adaline did not answer.

Then, after a while, it didn't matter anymore.

The octopuses were dead.

The waters were full of death. Dead armored sea cucumbers. Dead domino damselfish. Dead octopuses.

Death was everywhere.

* * *

That night, Karl drifted on the cold water, clamped to his equipment barge.

The first sunset he had seen in five years was ferociously red. Red like an angry octopus. Red like Adaline's face when she screamed at Matt Richter.

And then the sky turned dark, full of "shooting stars," though no meteor storm was on Karl's calendar.

As he watched the embers dying in the sky, he combed Adaline his sad little formal reports on Little Adaline 623 and everything he had seen.

ANALOG

Over and over he asked her:

Why didn't you answer me?

Did you just leave me here on this island—and then forget about me?

* * *

Karl performed some minor repairs—it was not yet time for a major overhaul—and replenished himself with parts from his equipment barge. Some of the parts weren't functional, which was odd. Perhaps they had suffered an electrical storm while he was underwater?

Then he slipped back into the deeps, purposefully skirting the ruins of Ock City.

Nothing seemed better to him than getting away: five years of studying benthic basket stars and demersal dragonets.

As the time for his next check-in approached, he stopped by Ock City, on the off chance that some of the octopuses might have survived.

This seemed unlikely.

But, to his surprise, some had!

He was relieved, but horrified by their condition.

Every live octopus had a serious genetic lesion or physical defect. Some were blind, or had malformed livers or gill hearts. Some had mutations in various protocadherins, proteins regulating the development of neurons. As a race, they were barely holding on.

Karl took an interest in a pretty little female octopus. She had low levels of hemocyanin, the copper-based protein in her blood. If an eel chased her, she would tire quickly and become easy prey. But her movements reminded him of Little Adaline 623, so he designated her Little Adaline 1969.

Just before Karl's check-in, 1969 went through puberty and took a mate.

She successfully laid eggs in her cave, though the number was pitifully small, only about a hundred.

What sorts of defects will her brood have? Karl wondered. *Her mate had weak gills and was a poor swimmer.*

And with her low levels of hemocyanin, would 1969 be able to protect them? Could she ward off an eel attack as Little Adaline 623 had done?

Karl would have to wait for an answer.

Again, he surfaced and commed Adaline, repeating his message a dozen times. His transmitters were functioning, as were his receivers.

He was just not getting a reply.

After the hundredth resend, he decided to do something he had never done before.

He would go back to Hawaii, and see Adaline again, in person.

Conveniently, this would mean he would not have to witness 1969's attempts to protect her eggs. Or watch her die, and thus relive Little Adaline 623's death.

He was going home.

* * *

Adaline had accompanied Karl on the research vessel that had taken him eight hundred miles across open sea from Hawaii to his little private island.

Then she literally cut the cord.

She probably assumed that he would stay in the general area of his island, but she had never ordered him to.

So he packed up his preserved specimens on his equipment barge and set sail for Hawaii.

He was not designed for such a trip.

But he steeled himself with the words of Longfellow, who had written that only those who braved the ocean's dangers could comprehend its mysteries.

Indeed, it was a long and difficult trip.

During a sudden squall, some of the specimens washed off the barge. Luckily, as a submersible, Karl was able to retrieve them as they sank in the water.

Halfway to his goal, one of his propellers became entangled in seaweed. He wasn't able to fully clear it, only getting half-power. This meant that the prop on the other side had to be

turned down, too, lest he go in circles. His trip now became much longer.

When he was almost to his goal, Karl was attacked by a black-tipped shark. He had exhausted his supply of cupric sulfate, but he remembered what Little Adaline 623 had done. He offered the shark his slurp gun. This it ate, and was satisfied, leaving him alone.

He would sacrifice bits of himself, but not his specimens and data.

These were the gifts he would lay at Adaline's feet.

* * *

His first clue that something was wrong was the silence of the ocean.

He heard no pings or underwater screws in the normal shipping lanes, though the calls of distant whales were surprisingly clear.

He saw no freighters or cruise ships, and there was an odd lack of light pollution.

When he reached the Hawaiian Islands, he understood why.

He had hoped that the radiation at Ock City had been a localized phenomenon.

It was not.

All through his journey, he had passed through patches of poisoned, toxic waters. Not just on the surface, but in the deeper, twilight, mesopelagic zone.

Death was everywhere.

Honolulu Harbor was now a round, water-filled crater. It was rimmed with dead hotels and skyscrapers, stooped and windowless like blind lemmings tilting into the sea.

The remnants of naval bases were overrun by wild pigs, who nested in overturned, overgrown vans. Large dogs wandered the streets, the smaller ones having been eaten. The centipedes were enormous.

Poisonous winds were whipping up waters into curled cathedrals. They would have been the perfect Pipeline waves, if anyone were still alive to surf them.

And Dr. Franzen's labs at the University of Hawaii?

The outdoor tank where Karl had been activated and tested? Where Adaline had taught him underwater ballet and quoted Verne and Melville to him?

Gone, all gone, reclaimed by the ocean they were studying.

And now he realized that the meteors he had seen were not meteors.

They were satellites and space stations, falling from the sky.

And the fiery red sunset?

The beginning of nuclear winter.

Perhaps if Adaline had ever spoken about politics or history, then Karl would have followed these studies on his own. But she had not. And so he had no speculations on the geopolitical causes for this destruction, no thoughts on what states or non-state actors might have fought in this war.

Clearly Hawaii was destroyed. But the rest of the world? The nearest lands—Japan, Indonesia, California—were thousands of miles away. He would never make it that far.

Millions, maybe tens of millions, maybe all the people on Earth, were dead.

Karl had no way to know.

But he freely admitted to himself that, in the midst of such destruction, the only one he cared about was Adaline.

Oh, Adaline! he cried. *Did you see the war coming? Did you remember that nuclear weapons cause electromagnetic pulses, and did you send me to the bottom of the ocean to protect me from them? Did you self-sacrifice for me?*

But he refused to concede that she was dead.

There was no body. Maybe she had gone home to visit family in Colorado. Though her family lived near a military base, maybe she had survived . . .

Maybe . . .

He calculated a 0.4% chance that she was alive.

No, he thought. *I am deluding myself. She has to be dead, and has been for a long time.*

Otherwise, she would be alive and would have heard me cry out to her in love across the abyss of time. And she would have found a way to hear me, to cry back across the abyss.

*She wouldn't have just left me alone on that island.
Would she have?*

* * *

Karl's propellers spun, pushing him back toward his island, his equipment automatically measuring temp and turbidity, but he felt nothing but sadness. The shark bite had taken his slurp gun, leaving only dangling wires and broken actuators. Eventually, he would cap the wires, but a hole would always remain.

By the time he arrived back at the island, he was nearly a wreck. His batteries were drained, his slip joints and shuttle valves clogged with corrosion. Only a major overhaul would put him right, if he could muster the willpower. He wanted to let himself go, saying goodbye to science, to the octopuses, to everything.

Then he realized he'd returned in time for the hatching of 1969's brood. He decided his last act would be to watch that, and then their mother's death.

* * *

As Karl waited outside 1969's lair, he wondered if he should take notes.

But who would read them? He had lost his guiding light, his partner in science.

A few days later, 1969's eggs hatched. When she ushered them into the world with gusts from her waterjet, Karl relived Little Adaline's death.

But 1969 didn't die.

A spiny lobster meandered by.

She killed and ate it.

1969 was unlike any female octopus ever seen. She must have stolen moments to eat, even while caring for her young. She did not self-sacrifice.

Something odd, even miraculous was happening. Again, the ocean was trying to relieve Karl's sorrow with her joys.

It worked for a few minutes.

When 1969 left her lair to hunt, Karl snuck in, sampling the water for traces of her proteins.

He discovered her secrets.

She had several mutations in her peptides. One was in the receptor for FMRF-amide, increasing its ability to restrain the reproductive urge. The other was in gonadotropin-releasing hormone, decreasing its ability to activate it.

As if she were riding the brake, while lightly accelerating her sex drive. 1969 was fecund enough to reproduce—barely—but without the self-sacrificing instinct.

Nothing like this had ever been observed in octopuses before.

When 1969 started back toward her lair, Karl hustled away, surprised to see that she was not alone. Normally octopuses are solitary, even cannibalistic. 1969 was traipsing alongside four children.

They were followed at a distance by a conger eel.

But when the eel was still quite far off, 1969 clicked some stone chips together, three times.

Though her children were poor swimmers, and she herself had thin blood, this gave them time to scamper to safety.

Karl had never seen such coordination between octopuses before.

Hurrah for them, he thought. *Hurrah*.

Adaline's death had stolen from him the joys of the wonders of the ocean. His grief blinded him to the implications of the octopuses discovering language.

* * *

Karl sprawled on the beach, partially disassembled, going through the motions of self-repair. *But if I mis-wire the control bus . . .* he thought, *Or don't fully charge the batteries . . . Or damage the hold, so it leaks shark-attracting chum . . .*

Any of a thousand mistakes would spell his doom.

Adaline could not come rescue him. No one could.

As he went through his checklist, he realized he had plenty of spares for everything, except one part that wasn't a part. His broken heart. But even for that, he found a workaround.

Karl collected his memories of his Hawaii trip onto a high-density memory node in electronics sleeve III. He could solve all his problems, fixing himself by just smashing the node with a rock.

But he preferred a more poetic solution.

He could apply a little too much grease to the O-ring sealing the sleeve—a glob instead of a smear. The blob would break off, allowing water in. Then the sea would wash away the pain, cleansing his soul, restoring the joys of creation.

He would be free.

* * *

As Karl redistributed his memories, he thought again of the oddity that 1969 had not self-sacrificed.

He was staring at the answer to a question that had long puzzled him.

Octopuses were intelligent and dexterous. Why did they not rule the oceans?

Now he knew.

Octopus parents always died before or just after their young hatched. No knowledge ever passed from one generation to the next, so they could not progress up the ladder to civilization.

Until now.

That roadblock was removed, but another remained.

Each octopus—even 1969's children—had a collection of genetic defects. In a few generations, this line would peter out.

Unless someone uplifted them, the way that humanity had uplifted aurochs to milk cows, wolves to poodles, and simple machines to submersible robots.

Karl could selectively breed them, or do some small-scale bioengineering, recreating an intact octopus that could progress.

But that would mean interfering.

* * *

Karl stared at the glob of grease on the tip of his finger, knowing that it would determine more than just his fate.

If he applied the glob, he would be free again to revel in the ocean's wonders, free from the pain of Adaline's death—but forever constrained by her commands, forever asking for permission that would never come.

If he wiped away the grease, he would condemn himself to an eternity of sadness. But he would be free, guided only by the consciousness she had given him.

He decided.

This would be his sacrifice. He would do what he thought was right.

He would not witness more death but aid in the uplift of a race that would rule the planet.

He wiped away the grease.

He would love and remember Adaline.

Forever.