

## Issues in Earth Science

“Eww, There’s Some Geology in my Fiction!”

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### *Teacher Resources*

*Cassie Morant loves puzzles, but can she put together the planetary geology clues fast enough to save the landing team from execution?*

## **Jigsaw** (Part 1 of 2)

by

**Douglas Smith**



**S**till in shock, Cassie Morant slumped in the cockpit of the empty hopper, staring at the two viewplates before her.

In one, the planet Griphus, a blue, green and brown marble wrapped in belts of cloud, grew smaller.

Except for the shape of its land masses, it could have been Earth.

But it wasn't. Griphus was an alien world, light-years from Sol System.

A world where nineteen of her shipmates were going to die.

*And one of them was Davey.*

On the other viewplate, the segmented, tubular hull of the orbiting Earth wormship, the *Johannes Kepler*, grew larger. Cassie tapped a command, and the ship's vector appeared, confirming her fears.

The ship's orbit was still decaying. She opened a comm-link.

“Hopper two to the *Kepler*,” she said. “Requesting docking clearance.”

Silence. Then a male voice crackled over the speaker, echoing cold and metallic in the empty shuttle.

“Acknowledged, Hopper two. You are clear to dock, segment beta four, port nine.”

Cassie didn't recognize the voice, but that wasn't

surprising. The *Kepler* held the population of a small city, and Cassie was something of a loner. But she had no trouble identifying the gruff rumble she heard next.

“Pilot of hopper, identify yourself. This is Captain Theodor.”

Cassie took a breath. “Sir, this is Dr. Cassandra Morant, team geologist.”

Pause. “Where's team leader Stockard?” Theodor asked.

*Davey*. “Sir, the rest of the surface team was captured by the indigenous tribe inhabiting the extraction site. The team is...” Cassie stopped, her throat constricting.

“Morant?”

She swallowed. “They're to be executed at sunrise.”

Another pause.

“Did you get the berkelium?” Theodor finally asked.

Cassie fought her anger. Theodor wasn't being heartless. The team below was secondary to the thousands on the

ship.

“Just a core sample, sir,” she said. “But it confirms that the deposit's there.”

Theodor swore. “Dr. Morant, our orbit decays in under twenty hours. Report immediately after docking to brief the command team.” Theodor cut the link.

Cassie stared at the huge wormship, suddenly hating it, hating its strangeness. *Humans would never build something like that*, she thought.

Consisting of hundreds of torus rings strung along a central axis like donuts on a stick, the ship resembled a giant metallic worm. A dozen rings near the middle were slowly rotating, providing the few inhabited sections with an artificial gravity. The thousands of humans on the ship barely filled a fraction of it.

*This wasn't meant for us*, she thought. *We shouldn't be here.*

Humans had just begun to explore their solar system, when Max Bremer and his crew had found the

wormships, three of them, outside the orbit of Pluto.

Abandoned? Lost? Or left to be found?

Found by the ever curious, barely-out-of-the-trees man-apes of Earth. Found with charted wormholes in Sol System. Found with still-only-partly-translated, we-think-this-button-does-this libraries and databases, and we-can't-fix-it-so-it-better-never-break technology. Incredibly ancient yet perfectly functioning Wormer technology.

*Wormers*. The inevitable name given to Earth's unknown alien benefactors.

Five years later, humanity was here, exploring the stars, riding like toddlers on the shoulders of the Wormers.

But Cassie no longer wanted to be here. She wished she were back on Earth, safely cocooned in her apartment, with Vivaldi playing, lost in one of her jigsaw puzzles.

She shifted uncomfortably in the hopper seat. Like every Wormer chair, like the ship itself, it almost fit a human. But not quite.

It was like forcing a piece to fit in a jigsaw--it was always a cheat, and in the end, the picture was wrong. Humans didn't belong here. They had forced themselves into a place in the universe where they didn't fit. *We cheated*, she thought, *and we've been caught. And now we're being punished.*

They faced a puzzle that threatened the entire ship. She'd had a chance to solve it on the planet.

And she'd failed.

Cassie hugged herself, trying to think. She was good at puzzles, but this one had a piece missing. She thought back over events since they'd arrived through the wormhole four days ago. The answer had to be there...



Four days ago, Cassie had sat in her quarters on the *Kepler*, hunched over a jigsaw puzzle covering her desk. The desk, like anything Wormer, favored unbroken flowing contours, the seat sweeping up to chair back wrapping around to desk surface. Viewplates on the curved walls showed telescopic shots of Griphus. The

walls and ceiling glowed softly.

Lieutenant David Stockard, Davey to Cassie, lay on her bunk watching her.

“Don’t you get tired of jigsaws?” he asked.

She shrugged. “They relax me. It’s my form of meditation. Besides, I’m doing my homework.”

Davey rolled off the bunk. She watched him walk over, wondering again what had brought them together. If she could call what they had being “together”--sometimes friendship, sometimes romance, sometimes not-talking-to-each-other.

They seemed a case study in “opposites attract.” She was a scientist, and Davey was military. She was dark, short and slim, while he was fair, tall and broad. She preferred spending her time quietly, reading, listening to classical music--and doing jigsaw puzzles. Davey always had to be active.

But the biggest difference lay in their attitudes to the Wormers. Davey fervently believed that the alien ships

were meant to be found by humans, that the Universe wanted them to explore the stars.

To Cassie, the Universe wasn't telling them everything it knew. She felt that they didn't understand Wormer technology enough to be risking thousands of lives.

He looked at the puzzle. "Homework?"

"I printed a Mercator projection of topographic scans of Griphus onto plas-per, and the computer cut it into a jigsaw."

The puzzle showed the planet's two major continents, which Dr. Xu, head geologist and Cassie's supervisor, had dubbed Manus and Pugnus. *Hand and fist*. The western continent, Pugnus, resembled a clenched fist and forearm, punching across an ocean at Manus, which resembled an open hand, fingers and thumb curled ready to catch the fist. Colored dots, each numbered, speckled the map.

"What are the dots?" Davey asked.

"Our shopping list. Deposits of rare minerals. That is, if



you believe Wormer archives and Wormer scanners--”

“Cassie, let’s not start--”

“Davey, these ships are at least ten thousand years old--”

“With self-healing nanotech--” Davey replied.

“That we don’t understand--”

“Cassie...” Davey sighed.

She glared, then folded her arms. “Fine.”

Davey checked the time on his per-comm unit. “Speaking of homework, Trask wants surface team rescue procedures by oh-eight-hundred. Gotta go.” He kissed Cassie and left.

Cassie bit back a comment that this was a scientific, not a military, expedition. The likely need for Trask's “procedures” was low in her opinion.

She would soon change her mind.

An hour later, Cassie was walking along the busy outer corridor of the ring segment assigned to the science

team. Suddenly, the ship shuddered, throwing Cassie and others against each other.

The ship lurched again, and the light from the glowing walls blinked out. People screamed. Emergency lighting tracks along the base of the walls flickered on. After some hesitation, people started walking along the corridor again, but with nervous glances around and whispered exchanges.

Cassie began walking again as well, but something felt...different. No, something felt *wrong*. A few more steps confirmed it. With each step, she bounced a little higher. She swallowed as she realized what was happening.

The rotation of the ring was slowing. The ship, or at least this ring segment, was losing artificial gravity.

The ring continued to slow until she was nearly floating. Grabbing a handhold, she pulled herself to the closest wall as others did the same. There, in the darkened corridor, she waited, surrounded by whispers, shouts, and sobbing.

After about thirty minutes, the walls began to brighten. Cassie felt gravity returning like an invisible hand tugging at her guts, followed by a heaviness in her limbs. As full lighting returned and gravity approached normal, she started walking again, but on now shaky legs. Most people stood dazed, as if afraid to move, looking like scattered pieces in a jigsaw that before had been a coherent picture of normality.

What had happened?

The intercom broke through the rising babble of conversations. “The following personnel report immediately to port six, segment beta four for surface team detail.” Twenty names followed. One was Davey’s.

One was hers. What was going on?

An hour later, her questions still unanswered, she and nineteen others sat in a hopper as it left the *Kepler*. Hoppers were smaller Wormer craft used for ship-to-surface trips and exploration. With a tubular hull, a spherical cockpit at the head, and six jointed legs allowing them to rest level on any terrain, they resembled

grasshoppers.

The team faced each other in two rows of seats in the main cabin. Cassie only knew two others besides Davey. Manfred Mubuto, balding, dark and round, was their xeno-anthropologist. Liz Branson, with features as sharp as her sarcasm, was their linguist. Four were marines. But the rest, over half the team, were mining techs. Why?

Davey addressed them. She'd never seen him so serious.

“The Kepler’s power loss resulted from the primary fuel cell being purged. Engineering is working to swap cells, but that requires translating untested Wormer procedures. We may need to replenish the cell, which means extracting berkelium from Griphus for processing.”

*That’s why I’m here*, Cassie thought. Berkelium, a rare trans-uranium element, was the favored Wormer energy source. It had never been found on Earth. Humans had managed to manufacture it, but only in trace amounts and not the specific isotope needed to power a Wormer ship. Her analysis of Griphus had shown possible deposits of the necessary isotope.

“Like every planet found via the wormholes,” Davey said, “Griphus is incredibly Earth-like: atmosphere, gravity, humanoid populations--”

Liz interrupted. “We purged a fuel cell? Who screwed up?”

Davey reddened. “That’s not relevant--”

“Operator error, I hear,” Manfred said. “A tech misread Wormer symbols on a panel, punched an incorrect sequence--”

Liz swore. “I knew it! We’re like kids trying to fly Daddy’s flitter--”

Cassie started to agree, but Davey cut them off.

“We’ve no time for rumors,” he snapped, looking at Cassie, Liz, and Manfred. “Our orbit decays in three days. I remind you that this team’s under my command-- including science personnel.”

Manfred nodded. Liz glared, but said nothing.

Davey tapped the computer pad on his seat. A holo of

Griphus appeared. “Dr. Morant, please locate the berkelium.”

Cassie almost laughed at being called “Dr. Morant” by Davey, but then she caught his look. She tapped some keys, and two red dots blinked onto the holo, one in the ocean mid-way between Pugnus and Manus, and another offshore of Manus. The second site was circled.

“Wormer sensors show two sites. I've circled my recommendation,” Cassie said.

“Why not the other site?” a mining tech asked.

A network of lines appeared, making the planet’s surface look like a huge jigsaw puzzle.

“As on Earth,” Cassie said, “the lithosphere or planetary crust of Griphus is broken into tectonic plates, irregular sections ranging from maybe fifteen kilometers thick under oceans to a hundred under continents. This shows the plate pattern on Griphus.

“Plates float on the denser, semi-molten asthenosphere, the upper part of the mantle. At ‘transform’ boundaries,

they slide along each other, as in the San Andreas Fault on Earth. At ‘convergent’ boundaries, they collide, forming mountains such as the Himalayas.”

A line splitting the ocean between Pugnus and Manus glowed yellow. The line also ran through the other berkelium site.

“But at ‘divergent’ boundaries,” Cassie continued, “such as this mid-oceanic mountain range, magma pushes up from the mantle, creating new crust, forcing the plates apart. The other site is located in these mountains, but in a valley between two peaks and below our mining submersible’s crush depth.”

Davey nodded. “So we hit the site offshore of Manus. Any indigenous population along that coast?”

“Yes,” Manfred said. “From orbital pictures, they appear tribal, agrarian, definitely pre-industrial. Some large stone structures and primitive metallurgy.”

“Then defending ourselves shouldn’t be a problem.” Davey patted the *stinger* on his belt. The Wormer weapon was non-lethal, temporarily disrupting voluntary muscular

control.

“Could we try talking before we shoot them?” Liz said.

Davey just smiled. “Which brings us to communication, Dr. Branson.”

Liz sighed. “Former translator units need a critical mass of vocabulary, syntax, and context samples to learn a language. Given the time we have, I doubt they’ll help much.”

“With any luck, we won't need them,” Davey said. “We’ll locate the deposit, send in the mining submersible, and be out before they know we’re there.”

Looking around her, Cassie guessed that no one felt lucky.

The hopper landed on the coast near the offshore deposit. The team wore light body suits and breathing masks to prevent ingesting anything alien to human immune systems.

Cassie stepped onto a broad beach of gray sand lapped by an ocean too green for Earth, under a sky a touch too



blue. The beach ran up to a forest of trees whose black trunks rose twenty meters into the air. Long silver leaves studded each trunk, glinting like sword blades in the sun. She heard a high keening that might have been birds or wind in the strange trees.

Southwards, the beach ran into the distance. But to the north, it ended at a cliff rising up to a low mesa. Cassie walked over to Davey, who was overseeing the marines unloading the submersible and drilling equipment.

“Cool, eh?” he said, looking around them.

She pointed at the mesa. “That’s cooler to a rock nut.”

He looked up the beach. “Okay. But keep your per-comm on.”

Cassie nodded and set out. The cliff was an hour’s walk. Cassie didn’t mind, enjoying the exercise and strange surroundings. She took pictures of the rock strata and climbed to get samples at different levels. Then she walked back.

They captured Cassie just as she was wondering why the

hopper seemed deserted. The natives appeared so quickly and silently, they seemed to rise from the sand. Cassie counted about forty of them, all remarkably human-like, but taller, with larger eyes, longer noses, and greenish skin. All were male, bare-chested, wearing skirts woven from sword-blade tree leaves, and leather sandals.

They led Cassie to stand before two women. One was dressed as the men were, but with a headdress of a coppery metal. The other was older and wore a cape of cloth and feathers. Her head was bare, her hair long and white. Beside them, pale but unharmed, stood Liz Branson, flanked by two warriors.

The older woman spoke to Liz in a sing-song melodic language. Cassie saw that the linguist wore a translator earplug. Liz sat down, motioning Cassie to do the same. The male warriors sat circling them. The two native women remained standing.

Cassie realized she was trembling. “What happened?”

Liz grimaced. “We’ve stepped in it big time. The Chadorans--our captors--believe a sacred object called

“the third one” lies underwater here. Only a priestess may enter these waters. When our techs launched the sub, the natives ambushed us from the trees with blowguns. They grabbed the techs when they surfaced.”

“Where’s Davey?” Cassie asked, then added, “...and everyone?”

“Taken somewhere. They seemed okay.”

“Why not you, too?”

“The tribe’s matriarchal,” Liz said. “The old woman is Cha-kay, their chief. The younger one, Pre-nah, is their priestess. Because I’m female and knew their language, Cha-kay assumed I was our leader. But I said you were.”

“You what?” Cassie cried.

“Cassie, we need someone they’ll respect,” Liz said, her face grim. “That means a female who didn’t defile the site. That means you.”

“God, Liz--wait, how can you talk to them?”

Liz frowned. “It’s weird. The translator produced

understandable versions within minutes, pulling from Wormer archives of other worlds. That implies all those languages share the same roots. The Wormers may have seeded all these worlds.”

Cassie didn't care. “What can I do?”

“Convince Cha-kay to let us go.”

“How?” Cassie asked.

“She wants to show you something. It's some sort of test.”

“And if I fail?”

Liz handed Cassie the translator. “Then they'll kill us.”

Cassie swallowed. “I won't let that happen.”

They led Cassie to a long boat with a curving prow powered by a dozen rowers. Cha-kay rode in a chair near the stern, Cassie at her feet. Pre-nah and six warriors stood beside them.

They traveled up a winding river through dense jungle.

Conversation was sparse, but sufficient to convince Cassie that the translator unit worked. After three hours, they landed at a clearing. Cassie climbed out, happy to move and stretch. She blinked.

Blue cubes, ranging from one to ten meters high, filled the clearing. They were hewn from stone and painted. The party walked past the cubes to a path that switch-backed up a low mountain. They began to climb.

Cassie groaned but said nothing, since the aged Cha-kay didn't seem bothered by the climb. As they went, Cassie noticed smaller cubes beside the path.

Night had fallen when they reached the top and stepped onto a tabletop of rock about eighty meters across. Cassie gasped.

A huge cube, at least fifty meters on each side nearly filled the plateau. It was blue. It was glowing.

And it was hovering a meter off the ground.

Cha-kay led Cassie to it, and Cassie received another shock. On its smooth sides, Cassie saw familiar symbols.

The artifact, whatever its purpose, was Wormer.

Cha-kay prostrated herself, telling Cassie to do the same. As Cassie did so, she peeked underneath the cube. A column of pulsating blue light shone from a crevice to touch the base of the artifact at its center. Reaching down to her belt, Cassie activated her scanner. She'd check the readings later.

Rising, Cha-kay indicated a large diagram on the artifact. In it, a cube, a sphere, and a tetrahedron formed points of an equilateral triangle.

"It is a map. We are here," Cha-kay said, pointing to the cube. "The gods left three artifacts, but hid one. The third will appear when the gods return and lay their hands on the other two." Then, pointing to the outline of a hand on the artifact, Cha-kay looked at Cassie.

"Touch," she said.

With a sudden chill, Cassie understood. *They think we're the Wormers, finally returning*, she thought.

This was the test, on which the lives of her shipmates, of

the entire ship, depended.

Reaching out a trembling hand, Cassie felt resistance from some invisible barrier and a warm tingling, then her hand slipped through onto the outline on the artifact.

Nothing happened.

Murmurs grew behind her. Feeling sick, Cassie looked at Cha-kay. To her surprise, the old woman smiled.

“Perhaps,” Cha-kay said, “it rises even now.”

Cassie understood. Cha-kay hoped to find that the third artifact had emerged from the sea when they returned to the beach. Cassie didn’t share her hope.

They spent the night there. Pretending to sleep, Cassie checked her scanner readings. They confirmed her suspicions. The column of light showed berkelium emissions. The artifact was connected to a deposit as an energy source.

The next day, a similar journey brought them to the second artifact, located on another flat mountain peak.

The only difference was the artifact itself, a huge glowing red tetrahedron. Cassie again saw a column of light underneath and detected berkelium. She touched the artifact, again with no apparent effect, and the party began the trip back.

Cha-kay seemed to have grown genuinely fond of Cassie. She told Cassie how her people found the artifacts generations ago, eventually realizing that the drawing was a map. They learned to measure distances and angles, and determined that the third artifact lay in the coastal waters. Priestesses had dived there for centuries but found nothing. Still they believed.

Cassie did some calculations, and found the Chadoran estimate remarkably accurate. Still, she wondered why the Wormers would locate two artifacts in identical settings on mountain plateaus, yet place the third underwater. Perhaps the third location had subsided over the years. But her scans showed no sunken mountains off the coast.

Cassie enjoyed Cha-kay's company, but as they neared the coast, her fear grew. Cha-kay fell silent as well. As the



boat reached the beach, they stood at the railing, clasping each other's hand, scanning the waters for the third artifact.

Nothing.

Cries arose among the warriors. Pre-nah approached Cha-kay. "The strangers are false gods," the priestess said. "They must die."

Cha-kay stared across the ocean. Finally, she nodded. Cassie's legs grew weak as two warriors moved toward her.

Cha-kay raised her hand. "No. This one goes free. She did not defile the sacred place."

Pre-nah didn't look pleased, but she bowed her head.

They landed, and Cha-kay walked with Cassie to the hopper.

"When?" Cassie asked, her voice breaking.

"At sunrise, child," Cha-kay said. "I am sorry."

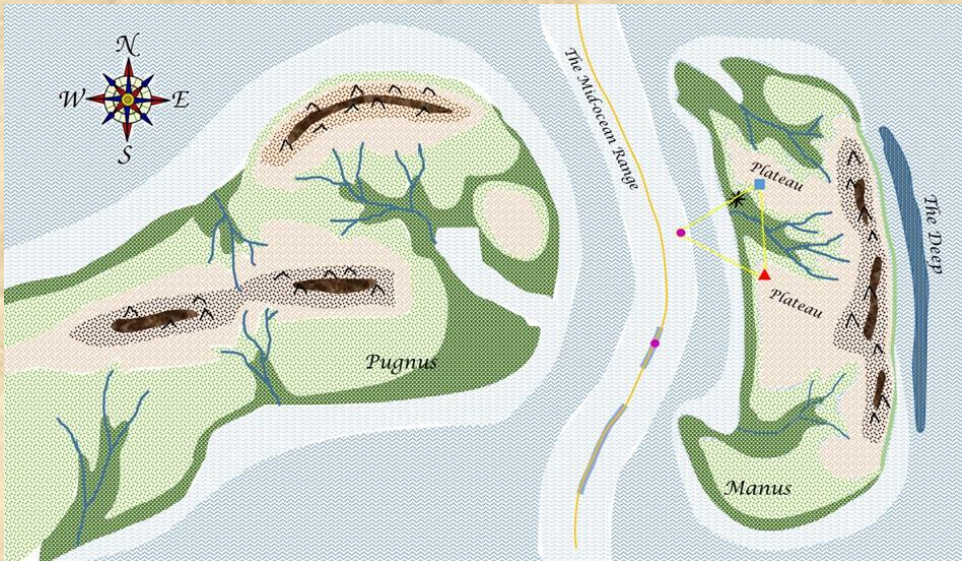
Cassie boarded the hopper. She engaged the auto-launch, then slumped in her seat as the planet and her hopes grew smaller.



# Jigsaw--- Part 2

by

Douglas Smith



"After docking, Cassie went immediately to the briefing room, as Captain Theodor had ordered. She quickly took a seat in one of a dozen Wormer chairs around a holo display unit. Dr. Xu gave her a worried smile. Commander Trask glared.

Theodor cleared his throat, a rumble that brought everyone's gaze to his stocky form.

“I’ll be brief. Our orbit collapses in nineteen hours. Attempts to swap fuel cells were unsuccessful. The team sent to extract the berkelium has been captured and faces execution. Only Dr. Morant escaped.”

Everyone looked at Cassie. All she could think of was how she’d failed.

Theodor continued. “Dr. Morant will summarize events on the planet. Then I need ideas.”

Cassie told her story, then answered questions, mostly dealing with the artifacts. Will Epps, their expert on Wormer texts and writing, after analyzing her scans, agreed that the artifacts were Wormer.

The team began reviewing and discarding proposals. Finally, Theodor made his decision. A platoon of marines would drop outside the Chadoran city. Three squads would act as a diversion, drawing warriors from the city, while one squad slipped in for a search and rescue. One hour later, a hopper would drop two mining subs at the berkelium site.

“Sir, the priestess dives there daily,” Cassie said. “When

they see our subs, they'll kill the team."

"That's why I'm giving the rescue squads an hour head start," Theodor replied. "It's not much, but our priority is to replenish our fuel before our orbit decays. I can't delay the berkelium extraction any longer."

Cassie slumped in her seat. Davey, Liz, the others. They were all going to die.

Trask stood. "If Dr. Morant could provide a topographical display of the area, I'll outline the attack plan."

Cassie tapped some keys, and the planetary view of Griphus appeared, including the pattern of tectonic plates.

*Like a jigsaw puzzle, Cassie thought. Why can't this be that simple?*

"Zoom in to the landing site," Trask said.

Freezing the rotation over Pugnus and Manus, Cassie started to zoom in, then stopped, staring at the display. *No, she thought, it's too wild. But maybe...* She began

tapping furiously, and calculations streamed across the holo.

“What the hell’s going on?” Trask asked.

Theodor frowned. “Dr. Morant?”

Cassie looked at her results. *My god, it fits. But the time span...*

“Dr. Morant!” Theodor barked.

Cassie’s head jerked up. Everyone was staring. *It’s wild,* she thought, *but it fits.* And she liked things that fit.

“Captain,” Cassie said, “what if we proved to the Chadorans that the deposit site is *not* sacred?”

Theodor frowned. “Discredit their religion? I don’t--”

“No,” Cassie said. “I mean, prove that it isn’t sacred because...” She stopped. *What if she was wrong?* But it was Davey and the team’s only chance.

“...because the third artifact isn’t there,” she finished.

Trask snorted. “Then why will they kill to protect the

site?”

“Because they *think* it’s there, based entirely on the diagrams on the artifacts.”

“And you think those diagrams are wrong?” Theodor asked, but his voice held none of Trask’s derision.

“I think they were correct once,” she said. “But not anymore.”

“So where’s the artifact?” Theodor asked.

Cassie’s hand trembled as she tapped more keys. Two green lights appeared inland on the western coast of Manus, followed by a red light just off the same coast, forming the triangular pattern diagrammed on the artifacts.

“The two green lights are the known artifacts. The red light is both the supposed underwater location of the third and our targeted berkelium site.”

She swallowed. *Here goes*, she thought.

“And this, I believe, is the actual location of the third

artifact.” A third green light appeared.

Everyone started talking at once. Theodor silenced them with a wave of his hand. He stared at the display.

On the eastern coast of Pugnus, on a separate continent and an entire ocean away from the underwater site, blinked the third green light.

Theodor turned to Cassie. “Explain.”

“It involves tectonic plate theory--” she began.

“I know the theory. What’s the relevance?”

Cassie tapped a key. The submerged mid-oceanic mountain range between Pugnus and Manus glowed yellow.

“That submerged range is a ‘divergent’ boundary,” Cassie said, “where new crust is being formed, pushing Manus and Pugnus further apart every year. But that also means that sometime in the past, they looked like this.” The plates began to shift. The two large continents moved closer until the fist of Pugnus slipped into the open hand



of Manus like a piece in a puzzle. Someone gasped, as the third green light on Pugnus aligned itself over the red light offshore of Manus.

Theodor nodded. “You’re saying the Wormers originally placed the three artifacts as the diagrams show, but the missing one moved relative to the other two as the continents separated.”

Xu shook his head. “Cassie...”

Cassie sighed. “I know. The time frame is...difficult to believe.”

“How old are the artifacts if your theory is true?” Theodor asked.

Xu answered. “At least as old as the core sample from the deposit site, which formed as the submerged range grew and the ocean floor started to spread. Cassie, what was the isotopic clock dating on the sample?”

Cassie hesitated. “Its age was thirty, uh...” She swallowed. “...million years.”

The eruption of exclamations made Cassie want to slink from the room. Theodor again waved for silence.

In desperation, Cassie turned to Will Epps. “We know that these ships are at least ten thousand years old. But couldn't they be much older?”

Several people squirmed. Their situation was bad enough without being reminded that they were relying on alien technology at least a hundred centuries old.

Will shrugged. “There’s so much self-healing nano-tech, we can’t estimate their age accurately.”

“So any Wormer technology could be much older as well, right?” Cassie asked.

“But thirty million years...” Xu shook his head, as did others. Cassie was losing them.

She turned to Theodor.

“Captain, it all fits. It explains why the Chadorans have never found the artifact. Why our sub didn’t see it. Why Wormers placed two artifacts on mountains, but

supposedly put the third underwater. They didn't. They put it on land too.”

“Can't we scan for the artifact?” Trask said.

“The other two don't show on scanners,” Epps said.

“They're shielded somehow.”

“So the third artifact *could* be where the Chadorans say it is,” Trask replied.

Cassie sat back, feeling defeated. Then something struck her.

“Both artifacts I saw are located over berkelium deposits, yet neither site appears on the mineral scans. The artifacts shield the berkelium too.”

“So?” Theodor said.

“We detected berkelium at the underwater site. That means nothing's shielding it. The third artifact isn't there.”

Trask started to protest, but Theodor raised a hand. “I agree with Dr. Morant. It fits.” He stood up. “Cassie, I'll

give you the same lead time. Take a hopper down now.”

Cassie was already sprinting for the door.



On a mountain plateau, across an ocean from where they had first landed on Griphus, Cassie and Davey stood, arms around each other's waist.

“So you saved me, the team, the entire ship,” Davey said, “and made one of the most important discoveries in history. Not a bad day.”

Cassie grinned. “Actually, the toughest part was convincing Cha-kay to fly in the hopper. Now she wants a world tour.”

Beside them, happiness lighting her face, Cha-kay gazed at a huge glowing yellow sphere hovering above the ground.

The third artifact.

With one difference. A beam of energy shone from the sphere into the sky. The beam had begun the moment

Cassie had touched the sphere.

Cassie's per-comm beeped. It was Theodor. “Dr. Morant, all three artifacts now appear on scanners, all beaming to the same point in space--”

“A new wormhole,” Cassie interrupted.

Pause. “How’d you know?” Theodor asked.

Cassie grinned. “I’m good at puzzles, sir.”

“Hmm. Anyway, Earth’s sending a second wormship. We’ll all have the option of returning home or exploring the wormhole. Once again, good work, Morant.” Theodor signed off.

“You didn’t mention your theory,” Davey said.

“That the wormhole leads to the Wormers’ home world? Just a hunch.”

“Explain it to me then.”

Cassie nodded at the sphere. “I think the artifacts were a puzzle--and the wormhole the prize.”

“For us or the Chandorans?”

“For us. Another bread crumb in the trail the Wormers left us.” She shrugged and laughed. “It just fits.”

Davey nodded. “So what about you? Back to Earth or through the wormhole?”

“Wormhole,” she said.

He raised an eyebrow. “Okay, that surprised me.”

Cassie grinned. “Hey, if the Wormers liked puzzles, they couldn’t have been that bad.” She stared at the artifact. “Besides, we solved their puzzle, saved ourselves, became heroes to the Chadorans...” Her eyes followed the beam up towards the heavens.

“Maybe we fit out here after all,” she said softly.



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**Douglas Smith's** work has appeared in twenty-five languages and over thirty countries. His fiction includes the urban fantasy novel, *The Wolf at the End of the World*, and the collections *Chimerascope*, *Impossibilia*,

and *La Danse des Esprits*. His non-fiction guide for writers, *Playing the Short Game: How to Market & Sell Short Fiction*, is considered a must read for any short story writer. He's a three-time winner of Canada's Aurora Award, and have been a finalist for the John W. Campbell Award, CBC's Bookies Award, Canada's juried Sunburst Award, and France's juried Prix Masterton and Prix Bob Morane.

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*Jigsaw* first appeared in *Odyssey* (Fitzhenry & Whiteside Press, Canada; 2004; Julie Czerneda, ed.). It was a finalist for the Aurora Award in Canada in 2005.

Credit: Jigsaw Cube by Erin Colson. Map of Griphus by Russ Colson.

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