THE DARK FOREST

BY CIXIN LIU

THE THREE-BODY PROBLEM TRILOGY

The Three-Body Problem

The Dark Forest

Death's End

OTHER FICTION

Ball Lightning

The Supernova Era

Of Ants and Dinosaurs

The Wandering Earth

Hold Up the Sky

The Collected Short Stories

NON-FICTION

A View from the Stars

THE DARK FOREST



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LIST OF CHARACTERS

ORGANIZATIONS

ETO	Earth-Trisolaris Organization
PDC	Planetary Defense Council
SFJC	Solar Fleet Joint Conference

CAST OF CHARACTERS

Chinese names are written with surname first.

Luo Ji	Astronomer and sociologist
Ye Wenjie	Astrophysicist
Mike Evans	ETO financial backer and key leader
Wu Yue	Captain in the PLA Navy
Zhang Beihai	Political commissar in the PLA Navy; Space Force officer
Chang Weisi	General in the PLA; Space Force commander
George Fitzroy	US general; coordinator at the Planetary Defense Council; military liaison to Hubble II project
Albert Ringier	Hubble II astronomer
Zhang Yuanchao	Recently retired chemical plant worker in Beijing
Yang Jinwen	Retired middle school teacher in Beijing
Miao Fuquan	Shanxi coal boss; neighbor to Zhang and Yang
Shi Qiang	PDC security department officer, nicknamed Da Shi

Shi Xiaoming	Shi Qiang's son
Kent	Liaison to the PDC
Secretary General Say	Secretary general of the UN
Frederick Tyler	Former US secretary of defense
Manuel Rey Diaz	Former president of Venezuela
Bill Hines	English neuroscientist; former president of the EU
Keiko Yamasuki	Neuroscientist; Hines's wife
Garanin	PDC rotating chair
Ding Yi	Theoretical physicist
Zhuang Yan	Graduate of the Central Academy of Fine Arts
Ben Jonathan	Fleet Joint Conference special commissioner
Dongfang Yanxu	Captain of *Natural Selection*
Major Xizi	Science officer of *Quantum*

PROLOGUE

The brown ant had already forgotten its home. To the twilight Earth and the stars that were just coming out, the span of time may have been negligible, but, for the ant, it was eons. In days now forgotten, its world had been overturned. Soil had taken flight, leaving a broad and deep chasm, and then soil had come crashing down to fill it back in. At one end of the disturbed earth stood a lone black formation. Such things happened frequently throughout this vast domain, the soil flying away and returning, chasms opening up and being filled, and rock formations appearing like visible markers of each catastrophic change. Under the setting sun, the ant and hundreds of its brethren had carried off the surviving queen to establish a new empire. Its return visit was only a chance passing while searching for food.

The ant arrived at the foot of the formation, sensing its indomitable presence with its feelers. Noting that the surface was hard and slippery, yet still climbable, up it went, with no purpose in mind but the random turbulence of its simple neural network. Turbulence was everywhere, within every blade of grass, every drop of dew on a leaf, every cloud in the sky, and every star beyond. The turbulence was purposeless, but in huge quantities of purposeless turbulence, purpose took shape.

The ant sensed vibrations in the ground and knew from how they intensified that another giant presence was approaching from somewhere on the ground. Paying it no mind, the ant continued its climb up the formation. At the right angle where the foot of the

formation met the ground, there was a spider web. This, the ant knew. It carefully detoured around the sticky hanging strands, passing by the spider lying in wait, its legs extended to feel for vibrations in the threads. Each knew of the other's presence but—as it had been for eons—there was no communication.

The vibrations crescendoed and then stopped. The giant being had reached the formation. It was far taller than the ant and blotted out most of the sky. The ant was not unfamiliar with beings of this sort. It knew that they were alive, that they frequently appeared in this region, and that their appearances were closely related to the swiftly disappearing chasms and multiplying formations.

The ant continued its climb, knowing that the beings were not a threat, with a few exceptions. Down below, the spider encountered one such exception when the being, which had evidently noticed its web reaching between the formation and the ground, whisked away the spider and web with the stems of a bundle of flowers it held in one limb, causing them to land broken in a pile of weeds. Then the being gently placed the flowers in front of the formation.

Then another vibration, weak but intensifying, told the ant that a second living being of the same sort was moving toward the formation. At the same time, the ant encountered a long trough, a depression in the surface of the formation with a rougher texture and different color: off-white. It followed the trough, for its roughness made for a far easier climb. At each end was a short, thinner trough: a horizontal base from which the main trough rose, and an upper trough that extended at an angle. By the time the ant climbed back out onto the slick black surface, it had gained an overall impression of the shape of the troughs: "1."

Then the height of the being in front of the formation was cut in half, so it was roughly even with the formation. Evidently it had dropped to its knees, revealing a patch of dim blue sky where the stars had begun to come out behind it. The being's eyes gazed at the top of the formation, causing the ant to hesitate momentarily while deciding whether it ought to intrude into his line of sight. Instead, it changed direction and started crawling parallel with the

ground, quickly reaching another trough and lingering in its rough depression as it savored the pleasant sensation of the crawl. The color was reminiscent of the eggs that surrounded its queen. With no hesitation, the ant followed the trough downward, and after a while, the layout become more complicated, a curve extended beneath a complete circle. It reminded the ant of the process of searching out scent information and eventually stumbling across the way home. A pattern was established in its neural network: "9."

Then the being kneeling before the formation made a sound, a series of sounds that far exceeded the ant's capacity to comprehend: "It's a wonder to be alive. If you don't understand that, how can you search for anything deeper?"

The being made a sound like a gust of wind blowing across the grass—a sigh—and then stood up.

The ant continued to crawl parallel to the ground and entered a third trough, one that was nearly vertical until it turned, like this: "7." The ant didn't like this shape. A sharp, sudden turn usually meant danger or battle.

The first being's voice had obscured the vibrations, so it was only now that the ant realized that the second being had reached the formation. Shorter and frailer, the second being had white hair that stood out against the dark blue background of the sky, bobbing silver in the wind, connected somehow to the increasing number of stars.

The first being stood up to welcome her. "Dr. Ye, is it?"

"You're . . . Xiao Luo?"[1]

"Luo Ji. I went to high school with Yang Dong. Why are you . . . here?"

"It's a nice place, and easy to get to by bus. Lately, I've been coming here to take walks fairly often."

"My condolences, Dr. Ye."

"That's all in the past. . . ."

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1 *Translator's Note: Xiǎo* is a diminutive meaning "little" or "young" and is used before a surname when addressing children or to show affection.

Down on the formation, the ant wanted to turn toward the sky, but then discovered another trough ahead of it, identical to the "9"-shaped trough it had crawled through before the "7." So it continued horizontally through the "9," which it found better than both the "7" and the "1," although it could not say exactly why. Its aesthetic sense was primitive and single-celled. The indistinct pleasure it had felt upon crawling through the "9" intensified. A primitive, single-celled state of happiness. These two spiritual monocells, aesthetics and pleasure had never evolved. They had been the same a billion years ago, and would be the same a billion years hence.

"Xiao Luo, Dong Dong often spoke of you. She said you're in . . . astronomy?"

"I used to be. I teach college sociology now. At your school, actually, although you had already retired when I got there."

"Sociology? That's a pretty big leap."

"Yeah. Yang Dong always said my mind wasn't focused."

"She wasn't kidding when she said you're smart."

"Just clever. Nothing like your daughter's level. I just felt astronomy was an undrillable chunk of iron. Sociology is a plank of wood, and there's bound to be someplace thin enough to punch through. It's easier to get by."

In the hope of reaching another "9," the ant continued its horizontal advance, but the next thing it encountered was a perfectly straight horizontal like the first trough, except longer than the "1" and turned on its side. And no smaller troughs at the ends. A "–" shape.

"You shouldn't put it like that. It's a normal person's life. Not everyone can be Dong Dong."

"I really don't have that kind of ambition. I drift."

"I've got a suggestion. Why don't you study cosmic sociology?"

"Cosmic sociology?"

"A name chosen at random. Suppose a vast number of civilizations are distributed throughout the universe, on the order of the number of detectable stars. Lots and lots of them. Those

civilizations make up the body of a cosmic society. Cosmic sociology is the study of the nature of this supersociety."

The ant had not crawled very much farther along the formation. It had hoped, after crawling out of the "–" depression, to find a pleasurable "9," but instead it encountered a "2," with a comfortable initial curve but a sharp turn at the end that was as fearsome as that of the "7." The premonition of an uncertain future. The ant continued onward to the next trough, a closed shape: "0." The path seemed like part of a "9," but it was a trap. Life needed smoothness, but it also needed direction. One could not always be returning to the point of origin. This, the ant understood. Although there were still two more troughs up ahead, it had lost interest. It turned vertically again.

"But . . . ours is the only civilization we know of right now."

"Which is why no one's done it before. The opportunity is left to you."

"Fascinating, Dr. Ye. Please go on."

"My thinking is that this can link your two disciplines together. The mathematical structure of cosmic sociology is far clearer than that of human sociology."

"Why do you say that?"

Ye Wenjie pointed at the sky. Twilight still illuminated the west, and they could still count the stars that had come out, making it easy to remember how the firmament had looked a few moments ago: a vast expanse and a blue void, or a face without pupils, like a marble statue. Now, though the stars were few in number, the giant eyes had pupils. The void was filled. The universe had sight. The stars were tiny, just single twinkling points of silver that hinted at some unease on the part of its creator. The cosmic sculptor had felt compelled to dot pupils onto the universe, yet had a tremendous terror of granting it sight. This balance of fear and desire resulted in the tininess of the stars against the hugeness of space, a declaration of caution above all.

"See how the stars are points? The factors of chaos and randomness in the complex makeups of every civilized society in

the universe get filtered out by the distance, so those civilizations can act as reference points that are relatively easy to manipulate mathematically."

"But there's nothing concrete to study in your cosmic sociology, Dr. Ye. Surveys and experiments aren't really possible."

"That means your ultimate result will be purely theoretical. Like Euclidean geometry, you'll set up a few simple axioms at first, then derive an overall theoretic system using those axioms as a foundation."

"It's all fascinating, but what would the axioms of cosmic sociology be?"

"First: Survival is the primary need of civilization. Second: Civilization continuously grows and expands, but the total matter in the universe remains constant."

The ant had not gone far before it realized that there were other troughs above it, many of them, in a complicated maze structure. The ant was sensitive to shapes and was confident of being able to work it out, but the limited storage capacity of its tiny neural network meant it had to forget the shapes it had previously crawled through. It did not feel any regret at forgetting the "9," for constant forgetting was part of life. There were few things that it needed to remember forever, and those were etched by its genes into the storage area known as instinct.

Having cleared its memory, the ant entered the maze. After navigating its twists and turns, it established another pattern in its simple consciousness: the Chinese character 墓—*mu,* meaning "grave," although the character and its meaning were not known to the ant. Farther up was another combination of troughs—far simpler this time, but to continue its exploration the ant had no choice but to clear its memory and forget the *mu*. Then it entered a wonderful line-trough, a shape that reminded it of the abdomen of a recently deceased cricket it had discovered not long ago. It quickly made out the new structure: 之, *zhi,* the Chinese possessive modifier. Then, as it continued upward, it encountered two more trough combinations, the first of which consisted of two droplet-shaped

depressions and a cricket stomach: the character 冬—*dong*, meaning "winter." The top one was split into two parts, which together formed the character 杨—*yang*, meaning "poplar." This was the last shape the ant remembered, and the only one it retained from its entire journey. The interesting shapes it previously encountered had all been forgotten.

"Those two axioms are solid enough from a sociological perspective . . . but you rattled them off so quickly, like you'd already worked them out," Luo Ji said, a little surprised.

"I've been thinking about this for most of my life, but I've never spoken about it with anyone before. I don't know why, really. . . . One more thing: To derive a basic picture of cosmic sociology from these two axioms, you need two other important concepts: chains of suspicion, and the technological explosion."

"Interesting terms. Can you explain them?"

Ye Wenjie glanced at her watch. "There's no time. But you're clever enough to figure them out. Use those two axioms as a starting point for your discipline, and you might end up becoming the Euclid of cosmic sociology."

"I'm no Euclid. But I'll remember what you said and give it a whirl. I might come to you for guidance, though."

"I'm afraid there won't be that opportunity. . . . In that case, you might as well just forget I said anything. Either way, I've fulfilled my duty. Well, Xiao Luo, I've got to go."

"Take care, Professor."

Ye Wenjie went off through the twilight to her final meetup.

The ant continued its climb and reached a round basin on the rock face, whose slick surface bore an extremely complicated image. It knew that its tiny neural net had no way to store such a thing, but after determining the overall shape of the image, its primitive one-cell aesthetic was as sparked as it had been by the sense of the "9." And somehow it seemed to recognize part of the image, a pair of eyes. The ant was sensitive to eyes, because their gaze meant danger. Yet it felt no anxiety now, for it knew the eyes were lifeless. It had already forgotten that when the giant being

named Luo Ji knelt down in silence before the formation, he had been looking at those eyes. The ant climbed out of the basin and up onto the formation's peak. It felt no sense of towering above its surroundings, because it had no fear of falling. It had been blown off of places higher than this many times without any injury. Without the fear of heights, there can be no appreciation for the beauty of high places.

At the foot of the formation, the spider that Luo Ji had swept aside with the flowers was beginning to reconstruct its web. It drew a glistening strand from the rock face and swung itself like a pendulum to the ground. Three more swings and the skeleton of the web was complete. Ten thousand times the web could be destroyed, and ten thousand times the spider would rebuild it. There was neither annoyance nor despair, nor any delight, just as it had been for a billion years.

Luo Ji stood in silence for a while and then departed. When the vibrations in the ground had dissipated, the ant crawled a different way down the formation to hurry back to the nest and report on the location of a dead beetle. The stars had grown dense in the sky. When the ant passed the spider down at the foot of the formation, they felt each other's presence, but did not communicate.

As that distant world held its breath to listen, neither ant nor spider was aware that they, out of all life on Earth, were the sole witnesses to the birth of the axioms of cosmic civilization.

Somewhat earlier, in the dead of night, Mike Evans was standing on the bow of *Judgment Day* as the Pacific Ocean slipped past like a swath of satin beneath the heavens. Evans enjoyed talking with the distant world at times like these because the text the sophon displayed on his retinas stood out wonderfully against the night sea and sky.

This is our twenty-second real-time conversation. We have come across some difficulties in our communication.

"Yes, Lord. I've learned that you can't actually understand a significant amount of the reference materials on humanity we've given you."

Yes. You've explained the parts very clearly, but we are unable to understand the whole. Something is different.

"Just one thing?"

Yes. But it sometimes seems as if your world is missing something, other times that it has something extra, and we don't know which.

"What is the area of confusion?"

We've carefully studied your documents and have discovered that the key to understanding the problem lies in a pair of synonyms.

"Synonyms?"

There are many synonyms and near-synonyms in your languages. In the first language we received from you, Chinese, there were words that expressed the same meaning, like "cold" and "chill," "heavy" and "weighty," "long" and "far."

"What pair of synonyms created the obstacle to understanding you've just mentioned?"

"Think" and "say." We've just learned, to our surprise, that they are not, in fact, synonyms.

"They are not synonyms at all."

In our understanding, they ought to be. "Think" means using thought organs to conduct mental activity. "Say" means communicating the content of thoughts to a counterpart. The latter, in your world,

is accomplished through the modulation of vibrations in the air produced by the vocal cords. Are these definitions correct?

"They are. But doesn't this demonstrate that 'think' and 'say' aren't synonyms?"

In our understanding, this shows that they are synonyms.

"May I think about this for a moment?"

Very well. We both need to think about it.

For two minutes, Evans gazed in thought at the waves undulating beneath the starlight.

"My Lord, what are your organs of communication?"

We do not have organs of communication. Our brains can display our thoughts to the outside world, thereby achieving communication.

"Display thoughts? How is that done?"

The thoughts in our brains emit electromagnetic waves on all frequencies, including what is visible light to us. They can be displayed at a significant distance.

"So that means that to you, thinking is speaking?"

Hence they are synonyms.

"Oh . . . That is not the case for us, but even so, that shouldn't present an obstacle to understanding those documents."

True. In the areas of thought and communication, the differences between us are not large. We both have brains, and our brains produce intelligence through huge numbers of neural connections.

The only difference is that our brain waves are stronger and can be directly received by our counterparts, eliminating the need for communication organs. That's the only difference.

"No. I suspect a major difference might be getting lost. My Lord, let me think about it again."

Very well.

Evans left the bow and strolled along the deck. Over the gunwale, the Pacific rose and fell silently in the night. He imagined it as a thinking brain.

"My Lord, let me tell you a story. To prepare for it, you need to understand the following elements: wolf, child, grandmother, and a house in the forest."

These elements are all easy to understand, except for "grandmother." I know that this is a blood relation among humans, and usually means a woman of advanced age. But her actual kinship status requires more explanation.

"Lord, that is not important. All you need to know is that she and the children have a close relationship. She is one of the only people the children trust."

Understood.

"I'll make it simple. Grandmother had to go out, so she left the children in the house, telling them they must make sure the door is shut and not to open it to anyone but her. On the road, Grandmother met a wolf, which ate her, and then put on her clothing and assumed her appearance. Then it went to the house and came up to the door, and said to the children, 'I'm your grandmother. I've come back. Open the door for me.' The children looked through the crack in the door and saw what looked like

their grandmother, and so they opened the door, and the wolf came in the house and ate them. Do you understand this story, my Lord?"

Not the slightest bit.

"Then maybe I've guessed right."

First of all, the wolf wanted all along to enter the house and eat the children, correct?

"Correct."

It engaged in communication with the children, correct?

"Correct."

This is what's incomprehensible. In order to achieve its own aims, it shouldn't have communicated with the children.

"Why?"

Isn't it obvious? If there was communication between them, the children would have known that the wolf wanted to come in and eat them, and they wouldn't have opened the door.

Evans stayed silent for a while. "I understand, my Lord. I understand."

What do you understand? Isn't what I said obvious?

"Your thoughts are completely exposed to the outside world. You can't hide."

How can thoughts hide? Your ideas are confusing.

"I mean, your thoughts and memories are transparent to the outside world, like a book placed out in public, or a film projected in a plaza, or a fish in a clear fishbowl. Totally exposed. Readable at a glance. Er, maybe some of the elements I just mentioned are . . ."

I understand them all. But isn't all that perfectly natural?

Evans was silent again. "So that's it. . . . My Lord, when you communicate face-to-face, everything you communicate is true. It's impossible for you to cheat or lie, so you can't pursue complicated strategic thinking."

We can communicate over significant distances, not just face-to-face. The words "cheating" and "lying" are another two that we have had a hard time understanding.

"What sort of a society is it when thought is completely transparent? What sort of culture does it produce? What sort of politics? No scheming, no pretending."

What are "scheming" and "pretending"?

Evans said nothing.

Human communication organs are but an evolutionary deficiency, a necessary compensation for the fact that your brains can't emit strong thought waves. This is one of your biological weaknesses. Direct display of thought is a superior, more efficient form of communication.

"A deficiency? A weakness? No, my Lord, you are wrong. This time you are totally wrong."

Is that so? Let me think about it. It's a shame you can't see my thoughts.

This time the interruption was longer. When twenty minutes had passed and no more text had appeared, Evans strolled from bow to stern, watching a school of fish leaping out of the ocean, tracing an arc on the surface that glittered silver under the starlight. Several years ago, he had spent some time on a fishing boat in the South China Sea investigating the effect of overfishing on coastal life. The fishermen called this phenomenon "the passing of dragon soldiers." To Evans, they looked like text projected on the eye of the ocean. Then text appeared before his own eyes.

You are correct. Looking back at those documents, I understand them a little better.

"My Lord, there's a long road to travel before you arrive at a true understanding of human matters. I'm almost afraid that you'll never be able to."

Indeed, they are complicated. All I know now is why I didn't understand them before. You are right.

"My Lord, you need us."

I am afraid of you.

The conversation stopped. This was the last time that Evans received a message from Trisolaris. He stood at the stern watching the snow-white body of *Judgment Day* stretch off into the hazy night, like time slipping away.