

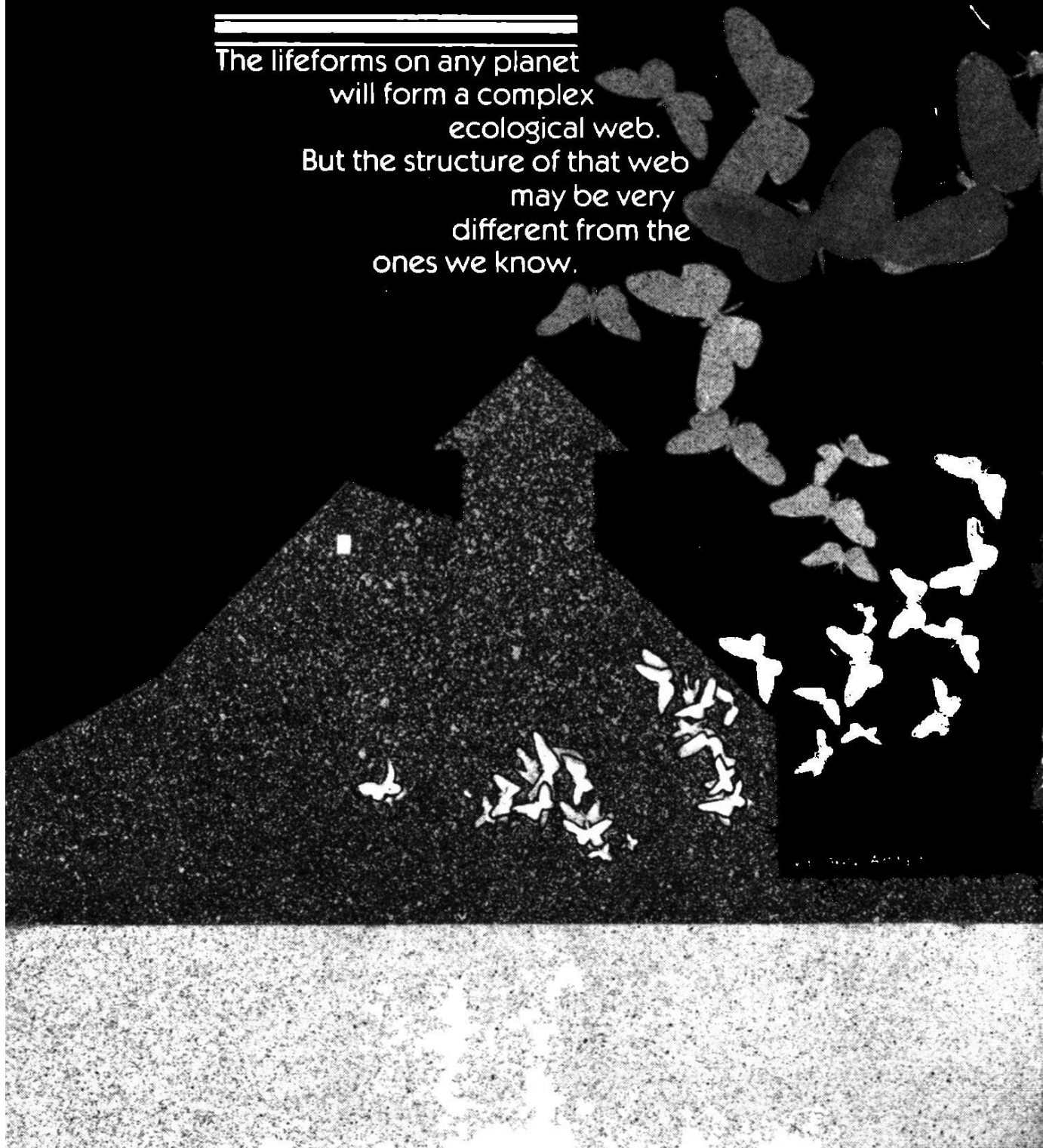
Thomas Erickson

# COCOON

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The lifeforms on any planet  
will form a complex  
ecological web.  
But the structure of that web  
may be very  
different from the  
ones we know.





*In the twilight the grey surface of the farm pond mirrored the sky: a maelstrom of dully flickering colors shot with darkness. For the last week the bright dancing colors of Teliat's endless day had been dimmed, and the farm withered in a twilight which should never have come. Cloaked in trembling shadows, the long rows of shoots, green and prospering the week before, now protruded from the ground like bleached splinters of bone. Overhead, boiling up in an invisible thunderhead, a tumorous thickening in the layer of butterflies blocked most of the incident light.*

“Well, normally, ma’am, passengers aren’t allowed up here, but since it’s just you and me, I figured it wouldn’t hurt—rules are made for bending. Besides, it would be a shame for you to miss the descent: Teliat’s butterflies are one of the wonders of the universe.” The pilot nodded his head sagely.

“I’m surprised. I’d never heard of either the planet or the butterflies until sector headquarters contacted me,” said Jena, as she strapped herself into the adjacent seat.

“Well, for one thing, the planet’s a pretty new discovery; the colony is only three years old, so word hasn’t gotten around much. And for another, it’s not quite as pretty from the ground. I mean, it’s nice and all that, but when you’re sinking down through the atmosphere and you’re surrounded by all them butterflies and colors and things, it’s like nothing you’ve ever experienced. That’s why I gave up my leave and volunteered to take this special run.”

“It must be quite something then,” Jena said.

“It is, ma’am,” the pilot said, nodding his greying head vigorously. “Why, I would have done it even without the time and a half.” He threw a sidelong glance her way. “Sector must be in quite a hurry to get you here, setting up a special flight with ships so tight and all.”

Jena hid a smile. “Yes. It’s no secret. The colony has been having severe problems with the butterflies. Apparently, since Sector has called me in, they think the butterflies may possess a fair amount of intelligence.”

The pilot’s eyebrows arched and he shot another sidelong look at Jena. “Truth? You wouldn’t be having some fun at my expense, now would you ma’am?”

“No, honestly. I’m a telepath. Why else would they have to actually transport someone in? And since you’re in the service, you know that interspecies communication is the only thing telepaths are really useful for.”

“Yes, I’d guessed that’s what you were, ma’am. I just find it hard to believe that those butterflies are very smart—they’re beautiful, I’ll grant you that, and there are lots of them too, but after all, their bodies aren’t but the size of my little finger and their wings the size of my hands. Seems peculiar that something that little should be smart.”

“Well, your superiors apparently think differently,” Jena said. “Since they’ve seen fit to send someone on death’s doorstep gallivanting halfway across the sector.”

“Think differently,” he repeated gravely. “Yes ma’am, that’s true; a very polite way of putting it. But if I may say so, ma’am, although I had

some doubts about your age at first, after seeing the way you zip around the ship I think you have a few parsecs left on you.”

“Thank you,” Jena said, surprised to feel a glow of pleasure. “I guess I still am pretty spry.”

A soft tone sounded and the pilot glanced at his panel and touched a few controls; the body straps seemed to tighten slightly as the ship began to gently decelerate. “We’re about ready to enter the atmosphere, ma’am.”

“When do we encounter the butterflies?”

“Not for a while yet. They seem to stick pretty near the ground. Perhaps there’s too much UV up here for them to handle. But you’ll have a good chance to see them: we’ll be going through them for about five minutes—the layer’s between five and seven hundred meters thick and we go real slow through them so as not to hurt any—native life form regulations, you know.”

Jena nodded, and they sat in silence for a while.

Another tone sounded. “Almost there,” he said cheerfully. Touching a few more controls, he said, “There, I’ve depolarized the bow a little bit; you’ll get a better look once we get a ways into the butterflies and we can depolarize all the way.” Through the now-translucent forward wall, Jena could dimly make out a grey surface flickering with motion, like a wind-blown lake at dusk.

Time passed, a tone sounded, and the deceleration increased to almost a G for a few moments and then fell off to about half that. Moving shapes fluttered slowly upward past the ship. They reminded

Jena of her childhood on Earth: of fall, when the leaves turned stiff and brown and fluttered to the ground—except here the process was somehow reversed: a forest of leaves fluttering up into the heavens. “This is the start,” the pilot said softly. “You can’t see them now, but these up here in the top layer are mostly white, so they reflect a lot of the light. As we get lower you’ll see all different kinds of colors—it’s a whole ecosystem.”

By and by the pilot depolarized the bow the rest of the way, and Jena was transfixed by the vibrant multicolored light. They drifted down through a cloud of butterflies whose wings were of translucent grey, shot with twisting veins of vivid green.

“Yes,” the pilot said in a hushed voice, in answer to her question, “as far as I know they’re all like that—veins of color on a grey background.” Yellow-winged butterflies began appearing among the greens, and soon displaced them. Occasionally, isolated bits of other colors fluttered by, and then a thin layer of crimson that was sandwiched in among the yellow butterflies, which was in turn displaced by light blues. Jena felt a sense of unreality, as though she were floating in a sea of light, clouds of colored bubbles tickling her vision as they flickered noiselessly past. And then an unmoving background appeared through the sea of butterflies, and the ship floated down out of the clouds of color toward the ground. A tone, a few touches on the control panel, and the ship decelerated softly and came to rest with a barely perceptible bump.

“Well, here you are, ma’am. hope you enjoyed the ride,” the pilot said.



“Yes,” she said, “yes, I did. That was remarkable.” She slowly unbuckled her body harness.

“Good luck. And when it comes time for you to return, feel free to request me—Dal Johnson—as your pilot. I love to come here. It makes me feel like I’m inside a giant kaleidoscope!” He tapped a control on a side panel and said, “Airlock’s open. Be seeing you.”

“Thank you, Dal,” Jena said, smiling at him. “I’ll request you if they give me a choice.” She got up and ducked out of the control room, stepped into the airlock, and opened the outer door.

Leo, and his small daughter Betsy, watched as the ship sank slowly out of the multi-colored clouds toward the ground. Betsy gripped his hand tightly and stared with fascination. She had seen plenty of ships before, but never a real telepath. And now she was actually going to meet one! She wondered if he would be like Jak Mellanin on the vidshows, tall and blond with piercing blue eyes and a broad grin. Daddy had said that telepaths were just like normal people, but she wasn’t so sure. He’d never met one, so how did he know? He certainly hadn’t been able to tell her anything about this one. He said that telepaths were hard to get and that the people at sector headquarters hadn’t known who they were going to send.

The ship came to rest on the ground. Her father said, “Come on, honey,” and they walked toward the ship. She hoped the telepath would be nice. She remembered the evil telepath in one of Jak Mellanin’s last movies. Betsy tightened her grip on her father’s hand and edged slightly closer to him. Suddenly

the ship’s door began to move, and Betsy stopped. Smoothly and silently the door slid upward, revealing a white-haired old lady in a light blue cloak. Betsy gaped. Was this the telepath? There was Daddy, walking forward and holding out his hand and saying something.

“Thank you, Mr. Landa,” she was saying, “the trip was fine. My name is Jena Thomas.”

“Please call me Leo. And this,” Leo stepped to the side and motioned to where Betsy had stopped, “is my daughter Betsy.”

“Hello, Betsy, I’m pleased to meet you,” the old lady said with a smile. Blue eyes twinkled beneath a head of white hair.

Betsy remembered her manners and said, “How do you do?” Then, getting up her courage, she asked doubtfully, “Are you really a telepath, Ms. Thomas?”

“Yes I am, Betsy—but please call me Jena; I’m too old for formality.” And then she smiled even more, so that fans of little lines crinkled at the corners of her eyes and mouth. “I’ll bet you don’t think I look very much like a telepath, do you?”

Betsy shook her head. “You look more like a grandma.”

Leo added, “I’m afraid she was expecting Jak Mellanin, or someone like that.”

Jena chuckled. “Well, I *am* a grandma, and as for Jak Mellanin, I used to look a lot more dashing before I retired.” Glancing at Leo, she said, “I’ve refused assignments for the last several years, but Sector was really desperate and said things here couldn’t wait

for one of the younger people to become available.”

“Well, things are looking pretty grim here; if the current trend keeps up, in six months we won’t be able to grow any food, and three months after that Well, Sector just doesn’t have the ships to evacuate ten thousand people.”

Jena nodded soberly.

“That’s the reason,” Leo continued, “for the small welcoming party — everyone is busy on the remaining farms or in the labs. We’ve been making a massive effort to study the butterflies, although we haven’t learned much of direct use yet.”

“Could you summarize your findings? How are they disrupting your farming, and what makes you think they’re intelligent?”

“Sure. While we’re at it, why don’t we head over to your lodgings so you can wash up for dinner.”

“Thank you. That would be greatly appreciated.” Leo pointed to a group of buildings and they began walking.

Leo rubbed his chin. “Well, to begin, your two questions are interrelated. Let me give you a brief history of what happened. For the first couple of years the colony prospered: we laid out farms and planted and harvested with no trouble whatsoever. Since things went so well we kept bringing in more people, and setting up villages and farms and so on. But then something strange happened. The butterflies formed thick clouds over the oldest farms, cutting off nearly all the light. Of course, the crops on those farms all died within a week or so. After that the clouds dissipated to their normal thickness, and curiously enough the remaining butterflies reseeded the land.”

“Reseeded the land,” repeated Jena.

“Yeah, that is to say they apparently gathered seeds from the native plants and scattered them over the land occupied by the farm. As you might expect, we were quite puzzled by all this and began research to try and discover the cause, but we weren’t too worried. After all, if worst came to worst, we’d just have to move our farms every couple years—a nuisance, but something we could live with if there were no other solution.”

“But apparently the butterflies weren’t as slow to take action on your other farms.”

“Yeah.” Leo nodded. “As time passed, other farms were blacked out. Each time it was the oldest remaining farm, and each time the lag between when the farm was started and when the butterflies blacked it out was shorter. After a while we were able to calculate the function that governed the decrease in lag: as I’ve said, we have six months until it goes to zero. After that we’ll have three months of food reserves. And after that Well, even if Sector had enough ships, you know their policy on colonies.” Leo shrugged.

“I see. Have you considered that the blacking out and reseeded behavior may just be an instinctive action? After all, your butterflies seem analogous in many ways to terrestrial social insects, which carry out activities that seem pretty complex, too.”

“Well, that could be. If so the colony is out of luck, because the butterflies are essential to the ecosystem of Teliat, and we can’t eradicate them without making Teliat uninhabitable. But we have other reasons for suspecting that

their behavior is guided by intelligence rather than instinct. The main objection is that instinctive behavior is—by definition—inflexible. Yet the butterflies respond to new farms quicker and quicker. It looks to us, biased though we may be, like they're learning. Also we've discovered that when the butterflies reseed, they don't collect just any seeds, but instead reseed with the same mixture of flora which was there before the farm was established."

"That's most interesting, but certainly not conclusive," said Jena.

"Yeah, we know that. But if they *are* intelligent, I understand that interspecies communication takes time, and we don't have much. So we figured it was now or never."

"Yes, it can take time. But once we make contact, we've always managed to resolve the situation—if not to everyone's entire satisfaction, at least to the extent of averting major catastrophes. And if they're intelligent, six months ought to be sufficient time."

*The warm breeze whispered through the leaves, and the cocoon, bound securely to a fork in the branch, shimmered like a coagulated rainbow in the multicolored light. Dimly visible through the translucent wrapper of cocoon, a grey form stirred. The brittle wrapper crackled softly, then split in several places. A butterfly crawled slowly forth from the shards of the cocoon, along one fork of the branch, and out onto a leaf of deep green, where it slowly unfolded its great wings and lay motionless in a patch of light. Predominantly grey, like smoked glass, the wings were covered with a dense network of twisting*

*threads of brilliant crimson which shaded into orange towards the extremities. The butterfly's outstretched wings covered the leaf like a shadow; though patterns of colored light danced across the surface of the leaf, they vanished when they reached the wings, as though the grey wings were holes gapping into another world.*

*The butterfly rested, waiting patiently on the leaf, its wings open to the shifting patterns of the sky. Tuned during metamorphosis to a specific range of color-patterns, the butterfly submitted to the gentle massage of raining light. Overhead the clouds of butterflies danced, forming pools of color which flowed slowly through one another, their hues sparkling in the phase-locked frequency of each group's wing rhythm. Suddenly, there it was, almost directly overhead: a streak of shimmering crimson oozing through a cloud of pale yellow. Even at the first slight stain of color the butterfly's wings had tensed and shaken with tremors. Now, as the underside of the yellow cloud became masked by crimson, the butterfly exploded from its tree, and with powerful wingbeats fluttered wildly up into the sky, driven by a body-shaking instinct to join with the cloud. From nearby trees, other butterflies fluttered upward, the glowing threads of crimson which veined their wings mirroring the cloud's color, their wings already taking up the group rhythm.*

Jena's mind probed slowly through the cloud, fixing on first one butterfly and then another and another. She would focus on a brain and, in a way she did not understand, discern the com-

plex ever-changing pattern within; she searched for recurring complex patterns which, if found, she would try to correlate with sensory images or motor movements. She had isolated a few patterns, primarily those governing wing frequency and breadth of stroke. Sensory patterns were harder: the visual and tactile impressions of thousands of nearby wings produced a sensory environment so chaotic that she was unable to discern more than a few regularities with which to correlate neural patterns. With such a small repertoire of basic imagery to work from, discerning and interpreting abstract thought patterns was difficult. Every now and then, though, she'd sense traces of abstract thought patterns: there would be an abrupt alteration in a whole slew of basic patterns as the butterfly's attention would shift to different sensory images and alter its wing frequency and stroke breadth—but she was unable to locate the causative pattern. It was as though it had been present just a moment before she tried to focus in on it, but had vanished as she approached. Like a mirage, she thought in frustration, as she retreated to her body.

Jena rose slowly from where she lay. *Another failure*, she thought unhappily. *Three long months of one failure after another. There's not much time left*, she thought, stretching her muscles gently. During the quarter hour she had been there, her muscles and joints had stiffened and she had begun shivering, though the breeze was only slightly cool. *I'm getting older and older*, Jena thought wistfully; *I'm not even a spry old lady any more—just old. Old and useless*. She gazed bitterly up at the sky,

at the dark storm of color which she knew to be a thick cloud of millions of butterflies—or what passed for butterflies here. In many ways, they were very different from the butterflies she remembered from Earth. They were larger, more variegated in color, remained aloft for much of their life, tended to fly in coherent groups, and engaged in a variety of complex activities—chief among which was the destruction of farms. So many differences, she mused, and yet it was inevitable that they be tagged as butterflies: like terrestrial butterflies they staggered and wobbled through the air, as though drunk on nectar and unused to Teliat's low gravity; and like the butterflies of Earth, their awkward beauty and the ceaseless energy which they exhibited in spite of their frailty made them apt symbols of life.

It was ironic that creatures which symbolized life should be destroying the colony, Jena thought to herself. And they were more than just symbols; they were the keystone of Teliat's ecology. The butterflies formed a living sheet which stretched over the entire day-side of the planet, the grey portion of their wings absorbing enough of the constant sunlight to supplement their stored reserves of energy. The colored portions of their wings reflected enough sunlight to make the surface habitable for both the native plants and the colonists. When butterflies made their occasional descents to restore their flagging energy reserves with nectar, they served as the sole pollination mechanism for Teliat's plants. After the final descent to lay eggs and die, their bodies fertilized the soil. And when the new eggs hatched, the caterpillars, ravenously accumulat-



ing the materials needed for their metamorphosis, kept the fecund plant life in check. *It all forms a nice tight pattern*, Jena thought; *the question is, is there room for us?*

The dining hall was only three-quarters full; a number of critical experiments were going on which couldn't be left unmonitored. In deference to the crisis, the custom of the entire village gathering for dinner had been abandoned, and the people in the research division had started taking shifts. Jena stood in line and stared at the floor, trying to avoid being drawn into conversation. She sniffed the odors wafting from the kitchen and wrinkled her nose: mushrooms again. Now that the farms were being blacked out immediately, the only fresh produce they had was mushrooms and sprouts germinated from their rapidly dwindling store of seed. And due to a disastrous spoilage which had wiped out half the colony's reserves of grain, it looked as though they only had a month left, rather than the three they had been counting on. Not that it would make any difference, Jena thought to herself. Everyone is hoping for a miracle, but I'm failing them.

Concealing a sigh, Jena took her tray and looked around the dining room for Leo. There he was, off sitting alone on the far side of the hall, ignoring his dinner as he scribbled in his notebook. She made her way across the room. "Can I join you?"

The big man looked up. "Sure, have a seat. Any luck today?"

"No," said Jena, shaking her head slowly, "none."

"I thought not," he said glumly.

"I'm convinced that they're not intelligent." He closed his notebook with a snap and held up his hand to forestall her interruption. "We made a breakthrough today," he said without enthusiasm. "We've discovered why they're blacking out the farms. I told you some time ago that we'd discovered that the butterflies' eggs—regardless of which subspecies laid them—all contain precisely the same genes, so that there's nothing to account for their subsequent differences."

"Yes, I remember that," Jena said. "And you also told me that there was additional genetic material in the adults, and that it differed from one subspecies to the next."

"Yeah. Well, we found out where it comes from. It turns out that the butterflies get the extra genes from the plants—either modifying plant genes or using the plants as gene reservoirs. We don't fully understand what's going on, but the general picture is that the extra genes are non-transmissible. The genes in the germ plasm are coded only to produce the single type of caterpillar. Then each type of caterpillar, in feeding on the plants, takes in the genes necessary for the transition to the butterfly stage. Since different plants have different genes—or are used to store different genes—that accounts for the huge variety of subspecies."

"That's really quite interesting," said Jena, momentarily forgetting her dejection. "That means there's a very tight coupling between the butterflies and the plants. The butterflies partially control the numbers and distribution of the plant species through pollination and reseedling, and the plants in turn control

the proportions of the various subspecies.”

“Yeah, it is interesting. But it mostly just convinces me that their behavior is instinctive and not intelligent. When they black out and reseed the farms, they’re just defending their gene pool. If that’s not something that would be instinctive behavior, I don’t know what is. And if they’re not intelligent, I’m afraid the colony is pretty much out of luck, isn’t it?”

Jena sighed and stared at her tray. “I’m afraid that’s true, Leo. If we were dealing with intelligent organisms, the task would be to persuade them to change their own behavior. But if the behavior is instinctive and the organisms aren’t sentient, then their behavior must be altered by an outside force. Although telepaths can alter the patterns of neural activity which generate instinctive behavior, in this case there are billions and billions of organisms whose patterns would have to be altered one by one. Even with all the telepaths in the sector it would take decades.” Jena looked up: “And we don’t have decades.”

“Yeah. I was afraid of something like that. Anyway, tomorrow I’m going to try and make arrangements to get Betsy out.”

Jena lowered her eyes again. “Don’t waste your time, Leo,” she said softly. “You know the rules; no one gets out of a failing colony. They aren’t even going to let me out.”

“What! But why? You weren’t a colony member, you didn’t commit yourself to Teliat.”

“There are lots of reasons, Leo. Nearly all of Sector’s ships are tied up

at Lilliand, by the possibility of war between humans and the natives. The remaining ships are spread far too thin to save one telepath. Particularly a telepath who has, at best, only a few years left anyway. And, I have to tell you, a telepath who may have lost her ability.”

“What do you mean?”

Jena took a deep breath. “It is possible that I may have lost my ability,” she repeated. “It could be that the butterflies are intelligent, and I just can’t tell.”

“I didn’t realize that could happen,” Leo said, looking concerned. “Don’t you know? Can’t you tell just by trying to read one of us?”

“Not necessarily. People think of telepaths as reading minds; but minds are really just patterns of activity in brains, which I am able to sense and influence to some extent. And since minds are in brains, the factor of physical size comes into play. When dealing with a mind in a brain of a very different size or structure, one has to alter the scope of one’s sense—focusing, I call it, and that is the key to telepathy. The thing is, the ability to focus has been known to deteriorate with age—my secret fear is that the butterflies are intelligent and that ten years ago I wouldn’t have had any trouble detecting it.”

Leo shrugged. “But you’ve said you can detect motor and sensory patterns in the butterflies—so obviously the brains aren’t too small.”

“Not necessarily. Sensory and motor patterns are usually fairly simple and, furthermore, tend to be spread out across the surface of the brain in a standard pattern—a sort of distorted projection of the organism’s body. Abstract

thought patterns tend to be more intricate, more compacted, and more idiosyncratic. It's possible that they're too dense, just beyond the threshold of my ability to resolve them."

"Damn," Leo said softly, "damn."

Jena said nothing. She sat, chin in hand, silently scrutinizing the other hand which rested in her lap, as though it belonged to someone else. She noticed the web of wrinkles which covered it, the bluish veins which twisted just below the surface; the slight tremor when she lifted the hand to grasp her glass. For a moment she saw it as a butterfly wing, blue-veined, fragile and trembling, but bringing death nonetheless.

"It's not your fault, Jena," Leo finally said. "Chances are they aren't intelligent at all. Even if they are, you can't help getting old. I'm just sorry that those bastards won't evacuate you."

"It doesn't matter that much, Leo—not to me. Part of me will welcome death. Growing old is hard. It's hard to feel your strength leaving you, to feel yourself becoming feeble and to know that eventually you'll be dependent on others. It's hard to get stiffly out of bed in the morning and see the lined face of an old woman peering out of the mirror. I used to be beautiful, you know."

"You are beautiful," Leo said softly, "and those lines—they just give your face character."

Jena smiled wistfully. "Thanks. I've got lots of character then. You know, until recently it would surprise me when I'd look in the mirror. I didn't feel especially old, so why should I look it? Silly, I know, but that's how I felt. Now I'm resigned. Death will be a relief for me, even though the thought still fright-

ens me a bit. But I'm really sorry for you younger folks; you're probably not as ready as I."

"No! We're not, at least I'm not," Leo said, pounding the table softly for emphasis. "You shouldn't be either — you're just being morbid! We still have at least a month before we talk about giving up. A lot can happen in a month."

In her sleep, Jena's muscles tensed slightly, and her eyes darted here and there beneath her closed lids. In her dream she was back on Earth, a little girl again, with her mother and father and brother and Grandma. Grandma. It had been scary ever since Grandma had come to live with them. She remembered, or thought she did, when they used to go to visit Grandma when she had lived in the country. Then she had been nice and kind and baked cookies and told wonderful stories about when she was a girl. But now that she had come to live with Jena and her parents, she was different. She couldn't walk without help and most of the time she didn't even notice Jena and she never made cookies any more. Mostly she sat on a rocking chair on the porch and rocked and rocked and rocked, staring off into the distance.

The rocking chair creaked again and again, as if in pain. Jena glanced up at Grandma and then rose from where she was sitting to go back into the house. The creaking stopped and Jena looked up with wide eyes: Grandma had stopped rocking and was staring at her. Jena froze. Grandma smiled toothlessly and said, "Once upon a time I was a little girl like you. I ran and played and had

fun.” Her face darkened. “But now all I can do is rock back and forth, and wait for people to do things for me. It’s no fun, no fun at all! Please, little Jena, will you trade places with me? I’d like to play again, just for a while.” But Jena could say nothing; she stared, transfixed with horror. And then something far in the distance, or perhaps far in the past, caught her grandma’s eyes, and she resumed her slow rocking. Jena stood rooted to the floor, unable to move for fear of catching Grandma’s attention again, and listened to the creak of the worn rocking chair, and watched its shadows move rhythmically across the lawn, like a great shadowy butterfly drying its wings. Creak, creak, creak. After what seemed like ages she broke the spell and rushed into the house to find Mother. But no one was there; just empty room after empty room, all filled with dust and fragments of bone which crunched as she ran. Jena awoke, shaking.

Jena calmed herself, running her wrinkled hands over her pillow to feel its soft coolness. Why do I fear death so much, Jena asked herself. I understand my fears about growing old and feeling useless. I’d hate to end up like my grandma. But why fear death? That’s the release from all that. I guess it’s something you just absorb from the social environment. Funerals, mortuary ads, the reluctance of people to discuss death and their negative reactions when they do, all the little rituals and protocols that are distributed throughout the social environment converge on the individual, on me, and convince me, deep down inside, that death is to be feared regardless of my rationalizations.

Then her thoughts froze. It was as if she had been strolling casually along and suddenly found herself on the brink of an abyss whose existence she hadn’t suspected. “Distributed throughout the social environment,” she murmured to herself. And the genes for a single butterfly are distributed throughout the physical environment. Perhaps, like the genetic information, the behavioral information is also distributed. Perhaps the abstract thought patterns are distributed over large numbers of butterflies, in the same way that certain beliefs are distributed through various aspects of a culture.

Jena closed her eyes and let an image fill her mind. Small knots of activity—the brain patterns of butterflies—danced like dust motes, each brain-mote isolated from the others by vast distances. Slowly at first, then more and more rapidly, a few brain-motes began growing projections of shimmering light: rays of color which lanced through the space and struck other motes. These responded with other rays of light, until a great ever-changing pattern of shimmering color hung in space, a brain-mote at every vertex. By and by there was a subtle change in the image: the brain-motes, which had at first seemed to bind the pattern together, now seemed to fade into the background, leaving only the shifting web of pattern shimmering before her mind’s eye.

That could be it, she thought, clasping her hands tightly together. That just could be why I’ve been failing: instead of trying to focus in on one of the butterflies, I need to defocus, I need to try and grasp the patterns in the interactions between different butterflies, or perhaps



between different groups of butterflies. The cloud of butterflies may be intelligent when taken as a whole, or the whole cloud may have a single pattern governing its instinctive behavior. Either way there's a good chance of success. My age may actually be an asset, allowing me to defocus more than a younger telepath ever could! I'll go out and try right now, she decided; I'll never get to sleep not knowing.

Jena got out of bed and began to dress, then stopped. Defocusing may be dangerous, she thought. I've never heard of anyone trying it; perhaps there's a reason. I'd better leave a note for Leo, she decided, telling him what I've come up with and what I'm trying to do, so if the worst should happen, maybe they can still bring in someone else. Then she shook her head and chuckled. "Just listen to me. 'If the worst should happen'—how melodramatic. I've decided I'm ready to face death, if that must be—and even if I'm not, there are thousands of others who aren't either. I've got to try."

Jena dressed and left the lodge, stopping by Leo's room to pin a note to his door. She then set out across the fields to the farm she had visited the day before. The large concentration of butterflies there might make it easier to grasp distributed patterns of thought, she thought to herself.

Jena selected a comfortable spot next to a withered bean field and lay down, relaxing her muscles and calming her mind. After a few minutes she projected her mind upward until, all about her, she could sense the tiny knots of activity in the brains of the butterflies which fluttered above the farm. Rather than

focusing in on one of the knots, she chose one as a reference point and let her mind slowly expand. As she did so, she began to sense patterns. Within the cloud the butterflies' wings beat in phase, sending pulses of light flickering from the wings of one creature to another; the three-dimensional configuration of the butterflies slowly changed, changing the pattern of pulses. Somehow, Jena sensed, the hues varied too, shifting a few nanometers, building up an intricate pattern of frequency and color.

Then, in a flash of glad recognition, she saw how the pattern correlated with the environment below. Jena let her mind expand further, and perceived the pattern within another cloud, and the pattern of interaction between the two clouds. The systems of pattern grew more and more complex as her mind expanded further and further, but she failed to encounter any feeling of consciousness or sentience—just increasingly complex patterns of interaction.

She reached farther and felt a warning from within herself. She hesitated perhaps the butterflies were not intelligent, perhaps this was just part of an incredibly complex instinctive mechanism. But even so, I still might be able to alter it if I can just find the right pattern, she thought vaguely. By now she was extended so far that thoughts of her own were difficult to maintain. Her thoughts were superimposed over the complex patterns of hue and frequency which she was attempting to monitor and now alter, and kept getting blurred by compelling changes in wing rhythm and hue.

Steeling herself, she relaxed and ex-

panded further, and felt herself stretched over and through and around a system of dynamic patterns which was slowly beginning to become comprehensible. A vast system of ungoverned, unconscious thoughts, maintaining itself and the creatures and ecosystem on which it depended in an exquisite balance. She dimly felt her breathing falter and, in a final effort, willed her mind to expand beyond its limits as she reached out, trying to grasp, to caress, to alter the patterns just slightly. Her thoughts merged with patterns of flickering color, and consciousness faded even as her mind's embrace encompassed the entire butterfly cloud.

Leo knelt beside Jena's body. There was no pulse, no breath. Her body was cool. He was too late. He damned himself for staying at the lab so long; damned her for leaving a note on his door instead of calling him. It could have been prevented, he thought, it should have been prevented. Kneeling beside her body, which looked so peaceful and yet so frail, he wept for her.

After a time, something penetrated his shroud of grief. Blinking through his tears, he looked up. No one was there, and for a minute he looked around, puzzled, unable to find what it was that had disturbed him, that still disturbed him. Then he saw it: the twilight had vanished and the normal colored light of Teliat's day flickered around him.

Later, reports came in from all over day-side. The shrouds of twilight had vanished from the farms—even those which had just been planted and whose crops were still living. Jena had succeeded at the cost of her life.

*Jena awoke, if waking be the name for it. Gradually awareness flowed through her like sunrise: first a dim perception of something; then, as sunbeams piercing through the mist, fragments of awareness struck her.*

*Billions upon billions of wings beating in a maelstrom of color, seething jungles of stem and leaf dancing wildly, glimpses of a frozen sunrise accompanied by frigid gusts of wind, great fields of grey fronds rippling with the breeze, streams wending their way through field and forest. Then the fragments congealed, and the planet flickered and danced around her and beneath her, and over her arched the sky, a dome of luminous blue shading into a band of rose and lavender—sunrise frozen for all eternity.*

*Through it all Jena's mind flickered, a dynamic pattern of light flashing among billions of wings, distributed across the planet. Superimposed over the smaller and more local patterns, Jena guided and altered them, adjusting frequencies and hues, weaving a new cocoon of light and color about the planet which would allow it to bring forth new life. ■*

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● The difference between a rabbit and a rock is the information content, and the difference between a living and a dead rabbit is in the availability or usability of the information.

Dr. John A. Ball