Jurassic Park

INTRODUCTION

BRIEF BIOGRAPHY OF MICHAEL CRICHTON

John Michael Crichton was born in 1942 in Chicago, Illinois, but he spent most of his childhood on Long Island in New York. He showed early promise as a writer when an essay he'd written about a trip to Arizona was published in the *New York Times*. In 1960, he began his college career at Harvard University. Although he initially pursued an English major, he switched to biological anthropology after concluding that at least some of his literature professors were more interested in grading harshly than nurturing their students' talents. Crichton graduated in 1964 and was accepted into Harvard Medical School in 1965. Despite hating medical school, he completed his MD degree in 1969. He made no attempt to gain licensure or practice medicine; instead, after a brief fellowship at the Salk Institute, he turned full time to his literary career. This had begun during medical school, with the publication of several pseudonymous novels. In 1969, he published *The Andromeda Strain*—his first novel under his own name, and the one that established his career as a bestselling author. By 1971, it had been adapted into a movie. Throughout the 1970s, Crichton wrote a series of historical novels and began directing film adaptations of his works. In the 1980s and 1990s, his work turned to speculative and science fiction topics with increasing frequency, including *Jurassic Park*, its sequel *The Lost World*, *Prey* (a book about nanotechnology and artificial intelligence), and *State of Fear* (which follows the attempts of a band of eco terrorists to bring attention to the danger of global warming). Crichton was married five times, with four of his marriages ending in divorce. He had two children: a daughter with his fourth wife, and a son born to his fifth wife shortly after his untimely death. In early 2008, Crichton was diagnosed with lymphoma. He continued to work until his death at the age of 66.

HISTORICAL CONTEXT

The premise of *Jurassic Park*—that dinosaurs could be resurrected from extinction after millennia through the application of genetic sequencing and engineering—rests on an explosion of bioresearch in academia and the private sector in the 1970s and 1980s. The novel's introduction explicitly cites the discovery of DNA by Watson and Crick in the 1950s; their work opened up a new world of opportunity for understanding, preventing, and treating diseases. Geneticist Rudolf Jaenisch successfully made the first transgenic animal (an animal whose genetic code includes foreign genes deliberately inserted by scientists) in 1974, and by the early 1980s, biotech companies were introducing the first genetically engineered crops. To even imagine applying genetic engineering techniques being pioneered in plants and animals required a thorough understanding of human genetic code, and to that end, the United States government launched the Human Genome Project in 1990, the same year *Jurassic Park* was published. Hammond and Wu's fictitious process for making dinosaurs required cloning, a technology that hadn't been successful by the time of *Jurassic Park*'s publication, but which came to fruition in 1996 with the birth of Dolly the Sheep, the world's first cloned animal.

RELATED LITERARY WORKS

Jurassic Park revisits some of the themes of Michael Crichton's 1973 film *Westworld*, in which the computer systems and androids of a futuristic theme park go haywire, causing guest deaths. What's more, in *Jurassic Park*, having created life, the park's creators find to their dismay that they can't control it—in this way, the book has an affinity with Mary Shelley's 1818 *Frankenstein, or The Modern Prometheus*, one of the earliest examples of science fiction in the western literary cannon. Victor Frankenstein makes a "Creature" out of reanimated, stitched-together body parts. Much to his surprise, he discovers (like Hammond and Wu) that he can't control his creation. Furthermore, published a little more than a decade after Jurassic Park, Margaret Atwood's 2003 *Oryx and Crake* considers many of the same themes surrounding the development and use of technology and the ability of nature to evade human control. Its scientists and engineers, driven by greed and an overconfident belief in their ability to exercise control over nature, alter nature in dangerous ways (for instance, generating viruses to infect people so they can turn around and make money from selling cures). And in the end, the book imagines humanity destroying itself through greed and a disrespect of nature. But the park's dinosaurs are perhaps the most compelling part of *Jurassic Park*. The novel draws inspiration from two other early science fiction novels featuring dinosaurs: Jules Verne's 1865 *Journey to the Center of the Earth* and Sir Arthur Conan Doyle's 1912 *The Lost World*.

KEY FACTS

- **Full Title:** Jurassic Park
- **When Written:** 1980s
- **Where Written:** United States
- **When Published:** 1990
- **Literary Period:** Contemporary
- **Genre:** Novel, Science Fiction, Speculative Fiction

- **Setting:** Isla Nublar, a fictional private island off the coast of Costa Rica
- **Climax:** The survivors of Jurassic Park restart the generators and regain control of the Park's computer systems.
- **Antagonist:** John Hammond and nature itself
- **Point of View:** Third Person

EXTRA CREDIT

Clean Up Your Act. In an interview with the British *Independent* newspaper, Michael Crichton told fans that he found it nearly impossible to write in a completely clean room. His inner muse required some cast-off clothing flung on the floor or a chair, and if his writing area was too clean, he would purposely toss some shoes or gym clothes into the corner.

Catch of the Day. One of the ways Michael Crichton cultivated focus while working on a draft was by eating the same thing for most of his meals. While writing *Jurassic Park*, his meal of choice was sushi.

PLOT SUMMARY

It's the late summer of 1989, and in Costa Rica, strange events are unfolding. American expat Dr. Roberta Carter treats a construction worker who looks like he was mauled by an animal while building a secretive resort on a remote **island**. Then, a lizard attacks Tina Bowman, an American tourist, on a beach. Local biologist Dr. Guitierrez assures her parents that she encountered a known species of lizard, but he nevertheless sends samples of the creature—and a drawing made by Tina—to New York City for analysis.

Meanwhile, Dr. Alan Grant discovers the complete **fossil** of a baby **velociraptor** at his paleontological dig site in Montana. A visit from Bob Morris, a lawyer investigating John Hammond and the suspicious actions of his company (InGen) on his private island near Costa Rica, interrupts his work. Morris interviews Grant because he consulted on the resort project a few years before. After Morris leaves, Grant receives two phone calls: one from a lab tech in New York who wants his opinion on the remains from the Costa Rican beach attack—which look like a well-executed dinosaur hoax—and one from Hammond, inviting Grant and his colleague Dr. Ellie Sattler to visit the island.

With Hammond, Donald Gennaro, fellow consultant Dr. Ian Malcolm, and computer systems analyst Dennis Nedry, Grant and Sattler arrive on Isla Nublar, where a hand-written sign welcomes them to Jurassic Park—a theme park filled with dinosaurs resurrected from the deep past using genetic sequencing and cloning technologies. Hammond's grandchildren Lex and Tim Murphy join the group as park warden Robert Muldoon, chief geneticist Dr. Henry Wu, and chief engineer John Arnold show off the nearly completed park. In the genetics lab, Wu explains the process of extracting genetic material from parasitic bugs preserved in amber, sequencing the DNA, and inserting it into crocodile eggs. They must do this because Wu has made all the dinosaurs female to keep them from breeding in the wild. While Nedry stays behind to address bugs in the park's computer system, electric ride vehicles whisk the rest of the guests around the island. The highlight of the pre-programmed itinerary is the chance to watch the adult tyrannosaurs gobble up a live goat. Next, the group stops at the stegosaur enclosure, where Grant and Ellie help the park's veterinarian, Dr. Harding, diagnose a periodic illness the giant herbivores experience. While doing so, Grant discovers fragments of a dinosaur egg.

A storm brews in the distance. Ellie stays with Dr. Harding as Grant and Malcolm radio the discovery of the dinosaur egg fragments to the control room. A revised computer survey of the animals reveals dozens running loose on the island; some species, including the raptors, have developed the ability to breed without anyone noticing. What's worse, on the drive back to the visitor center, Tim and Lex catch a glimpse of two stowaway raptors heading back to the mainland on the island's supply ship. As they're trying to warn the control room, the storm breaks overhead and Nedry cuts power to the park's security systems so he can steal some of the dinosaur embryos. With stolen goods in hand, he heads for a rendezvous with a buyer who has hired him to steal the embryos, but he gets lost and eaten by a herd of small carnivorous dinosaurs.

The power outage cut electricity to the enclosure fences, allowing the tyrannosaurus to break free. It attacks the stalled vehicles and their occupants, throwing Tim into a tree, seriously wounding Malcolm, and killing park publicist Ed Regis. Although Muldoon and Gennaro race to the scene, where they find Regis's dismembered leg and the injured Malcolm, Grant and the children have already fled in search of safe shelter.

Throughout the night, Arnold and Wu uncover and begin to undo Nedry's sabotage while Muldoon, Harding, and park employees fix the fences and round up escaped dinosaurs. Malcolm spends the night in the lodge tended by Ellie, while Grant and the children find shelter in the sauropod enclosure maintenance hut.

In the morning, Arnold restores the park systems with a hard reboot, allowing the control room to watch the escaped adult tyrannosaurs hunt and kill another dinosaur. Because they are trying to cross the field at the time, Grant and the children get a much closer view of the attack. Desperate to find a way back that affords some protection from the carnivorous beast, Grant finds a raft to carry himself and the children back to the resort on the park's manmade river. They float through the dangerous territories of the park's aviary (the giant cearadactyls are excessively territorial) and the dilophosaur enclosure (these animals can spit venom). The tyrannosaur stalks them the

whole time, until it corners them where the river ends by going over a waterfall into a lagoon. Fortunately, they find a maintenance shed that contains a vehicle and a juvenile, wild-bred raptor that Grant tranquilizes and brings along as evidence.

Back in the control room, the entire park suddenly goes dark. When Arnold rebooted the computers, he forgot to restart the main generator. Running on auxiliary power for hours drained the secondary generators. And it means that the enclosure fences have been unelectrified for hours, allowing the park's dangerous raptors to escape. When Arnold tries to access the power plant to restart the generator, they attack him. Muldoon kills one and wounds another, and the surviving animals scatter. One corners and kills Arnold in the power plant and another—the injured one—attacks Gennaro, frustrating his attempt to restore the power. When Grant, Tim, and Lex finally make it back to the visitor center, they find utter chaos and destruction. But they also find a radio, allowing them to learn that the survivors are all in the lodge, where the raptors are chewing through the (currently unelectrified) bars on the skylights.

Leaving the children in the cafeteria, where Tim successfully fends off an attack by trapping a raptor in a freezer, Grant gains access to the power plant, restarts the generator, and finds the terrified Gennaro huddled in a powerless vehicle. The two men return to the visitor center, but no sooner have they found the children than the raptors corner them all in the genetics lab. Grant dispatches the dinosaurs with the lab's dangerous chemicals. With the danger managed, they can turn their attention to restoring the park's systems through the computer interface in the control room.

While the survivors await rescue helicopters from the mainland, Hammond wanders off, and some of the smaller carnivores attack and kill him. Meanwhile, Malcolm succumbs to his injuries. Grant forces Gennaro to confront the consequences of InGen's actions by helping them count the wild-bred raptors. Finally, after arriving on the mainland, Grant learns from Dr. Guitierrez that more evidence of escaped Jurassic Park animals has surfaced. Until the government gets a handle on what happened on the island, no one associated with the park will be allowed to go home.

CHARACTERS

MAJOR CHARACTERS

Dr. Alan Grant – Dr. Alan Grant is a paleontologist who specializes in the breeding and social behavior of dinosaurs including hadrosaurs and raptors. He receives funding from John Hammond and consulted for InGen in the early phases of its Jurassic Park project. Along with his colleague Dr. Ellie Sattler, Grant travels to Isla Nublar to report on the feasibility and safety of the park for Donald Gennaro. When the tour vehicles become disabled and a tyrannosaur attacks the guests, Grant escapes with Tim and Lex Murphy, safely guiding them to the visitor center at the main resort complex. He shows bravery and level-headedness in several encounters with the park's **raptors**. Grant distrusts computers, perhaps because he doesn't understand them. Thus, he doesn't share John Arnold's confidence in the park's systems to ensure safe operations. In contrast to Hammond and his chief geneticist Dr. Henry Wu, Grant demonstrates a humble attitude towards nature that rises in part from his understanding of deep time. The **fossils** he studies come from creatures that died so long ago it's almost impossible to conceptualize; even the surface of the earth has undergone unimaginably massive changes over the vast time stretches of its existence, compared to which a human lifetime is infinitesimal. And, as much as Grant has been able to hypothesize about dinosaur physiology and behavior from a careful study of their remains, he understands how little dried bones can actually teach him. Thus, caution tempers his excitement over being able to observe living dinosaurs in the environment of Jurassic Park, and he doesn't share Wu and Hammond's confidence that the dinosaurs can be trained or controlled. Throughout his time on the island, Grant closely observes everything he can, using the new information that he gleans from his surroundings to update his knowledge base rather than sticking to his preconceived beliefs and biases. In these ways, he models the approach towards nature that the book argues humanity should take: respecting the power—and chaos—of life, observing carefully and in an unbiased way, and treating the environment with respect and care.

Dr. Ian Malcolm – Dr. Ian Malcolm is a mathematician and chaos theorist hired by John Hammond to consult on his Jurassic Park project. When Donald Gennaro invites some of the consultants to visit the island and asses its safety and feasibility, Malcolm accompanies him, Dr. Ellie Sattler, and Dr. Alan Grant to the island. Malcolm carries himself like a rockstar, wearing only black clothes and naming his discoveries like "the Malcolm effect" after himself. And while he approaches the world with a deep sense of pessimism and skepticism, a dry sense of humor tempers his outlook. As the voice of chaos, Malcolm provides the most consistent—and insistent—voice countering the confidence of men like Hammond, John Arnold, and Dr. Henry Wu, who believe humans can control nature and its chaos. In his descriptions of chaos theory and his philosophizing considerations of human hubris, unchecked and uncritical technological experimentation, and the history of science, Malcolm gives voice to the novel's main claims about the limited nature of human knowledge and control. He also highlights the need for regulation and oversight of human inquiry, and the pervasive nature of human flaws. Nor is Malcolm unwilling to admit his own flaws, including the fear and panic that drive him from the protection of the park vehicle during the tyrannosaur attack. After he flees, the dinosaur

catches him and injures him severely. Gennaro and Robert Muldoon rescue him and bring him back to the lodge, but despite receiving the best care that park veterinarian Dr. Harding can give him, Malcolm eventually succumbs to his injuries and dies just before the Costa Rican authorities arrive to evacuate the survivors. And, since he predicted the park's failings long before his arrival, his death due to the very problems he foresaw becomes the final rebuke of Hammond's flawed plan.

John Hammond – John Hammond is the eccentric, immensely wealthy businessman who conceives of the idea for Jurassic Park and brings it to fruition on his private **island**. Although he is in his mid-70s, he still possesses lots of energy, and he has worked hard to keep himself in shape, since he plans to live well beyond 100. Greed motivates Hammond. He founds a biotechnology firm because he sees the promise of wealth in developing genetic engineering technologies. And he focuses on amusement applications rather than humanitarian ones because, while he can charge anything he likes for a luxury good like an amusement park, most people react badly when companies try to make too much money off of their lifesaving innovations. In addition to greed, hubris drives Hammond's decisions, which are based on the arrogant assumption that enough wealth and technological expertise grant him and his employees the ability to tame the chaos that is life. Hammond believes absolutely in the rightness of his own vision, willfully closing his eyes to evidence that contradicts his ideas; for example, after asking Dr. Ian Malcolm to consult on the park project, he subsequently ignores Malcolm's analysis because it predicts failure. But when it becomes clear that Malcom was right, Hammond blames others for the park's failure, including his chief geneticist Dr. Henry Wu and his chief engineer John Arnold. Hammond also demonstrates a deep selfishness, putting his needs and concerns ahead of the safety of others. In an attempt to keep Donald Gennaro from shutting down the park, he invites his grandchildren Lex and Tim Murphy to the island, putting them in grave danger, even though the park's history of accidents includes several deaths by dinosaur mauling. In the end, however, Hammond falls prey to his own grandiosity when he's injured in the forest, allowing the scavenging "compy" dinosaurs to immobilize and eat him.

Donald Gennaro – Donald Gennaro is both a major investor in InGen and the company's chief legal counsel. His business association with John Hammond stretches back to the days when Hammond was wooing InGen's initial investors, and he's one of the few people beyond the confines of the **island** who knows that InGen is cloning dinosaurs. Greed and self-protection motivate Gennaro; he becomes an investor in the park project based on Hammond's promise that it will make them all very, very rich. But after Hammond turns furtive and Gennaro begins to worry that the eccentric businessman is covering up issues with the park, he invites Drs. Alan Grant, Ellie Sattler, and Ian Malcolm to visit the park and report on its safety and viability. When it becomes clear that the park has several major issues, Gennaro's initial impulse is to shutter it and destroy the evidence; this is why he cheers the news that the Costa Rican authorities plan to bomb it into oblivion. Nevertheless, his actions on the island demonstrate his ability to feel empathy and to place human life and safety above profits. Despite his fear, he joins Robert Muldoon in several search and rescue missions, and when John Arnold dies before he can restart the main generator, Gennaro steps up to the plate and tries to finish the job. Thus, while he initially stands as a stark reminder of the results of unbridled greed and irresponsibility, Gennaro's personal evolution offers hope that humankind can survive, if only it learns to overcome its baser instincts.

Dr. Ellie Sattler – Dr. Ellie Sattler is a colleague of Dr. Alan Grant who works with him at his Montana dig site. She is a paleobotanist, a scientist who studies the **vestiges** of ancient plant life. John Hammond invites her to visit the park with Grant and Dr. Ian Malcolm. There, she strikes up a working relationship with Dr. Harding, the park's vet, when her knowledge of botany and dinosaur behavior helps solve the mystery of why some of the animals keep getting sick. She demonstrates courage and quick thinking when she distracts some of the park's raptors long enough for Grant to access the power plant and when she joins him and the reluctant lawyer Donald Gennaro in surveying the raptor colony. Although she holds a different opinion about the nature of scientific progress than Malcolm, like him, Grant, and Muldoon, Ellie demonstrates a more thoughtful approach to the world than Hammond, John Arnold, and Dr. Henry Wu. She recognizes the fierce competition of life in nature, even among plants, and this endows her with a respect for the change and chaos that characterize existence. Therefore, she approaches the natural world with curiosity and humility, attitudes that serve her well on the island and help ensure her survival.

John Arnold – John Arnold is Jurassic Park's chief engineer. His career, before John Hammond hired him, included working on many world-famous amusement parks like Disney World and Land. It also included working with dangerous technologies, including a submarine-launched nuclear missile. Arnold's experience with long-term and complicated projects has made him into a worrier and he has more concerns about the park's chances of running smoothly and safely than either Hammond or Dr. Henry Wu. Nevertheless, he expresses confidence in the ability of the park's sophisticated computer system—and by extension its operators, including himself—to ultimately control all of the many variables at play in running Jurassic Park. Even after Dennis Nedry sabotages the computer programming, once Arnold reboots the machines, he feels that he has regained control. But in the end, this arrogance costs him his life: the computer systems are still vulnerable to human error,

and one of his errors ends up cutting power to the park and requiring a restart of the main generator. While he attempts this hazardous task, a **raptor** attacks and kills him.

Dr. Henry Wu – Dr. Henry Wu is the chief geneticist for the Jurassic Park project. As a graduate student, Wu worked in the lab of John Hammond's former geneticist; when that man died, Hammond recruited Wu with promises of wealth and recognition. Professional pride motivates Wu; he only agrees to work for Hammond after receiving assurance that when the park opens he'll be able to publish his work. Like his employer, Wu believes that his knowledge and technological prowess give him power over nature. He sees DNA as a blank medium to be manipulated as he pleases and feels total confidence in his ability to modify the park's dinosaurs as necessary, by making them all female or lysine-dependent, for example. Still, he finds himself at odds with Hammond on several counts: Wu's confidence in his ability to manipulate his creations runs afoul of Hammond's desire to have dinosaurs that are as true to life as possible. Wu feels uncomfortable about the old man's apparent lack of concern over the safety of his guests, and the realization that some of the animals have begun breeding independently convinces Wu that their work needs to be reassessed before the park can open. But before he can address the lapses in his judgment and scientific processes, Wu becomes the victim of his own creation when an escaped **raptor** attacks and kills him.

Robert Muldoon – Robert Muldoon is the Jurassic Park warden. Along with Dr. Henry Wu and John Arnold, he bears responsibility for showing John Hammond's early guests around the **island**. Muldoon grew up in Kenya and spent his early career as a guide for big game hunters. Subsequently, however, he changed paths and became a conservationist and wildlife consultant for zoos and nature preserves around the world. Muldoon doesn't share Hammond's or Wu's easy assurance about their ability to control and contain the park's dinosaurs. His experience with modern apex predators makes him cautious, and he feels that the dinosaurs that prove themselves to be particularly dangerous should be exterminated. In this way, Muldoon represents a more moderate and appropriate view of nature than the other park employees, since he recognizes his relative powerlessness—at least as long as he isn't armed with guns and rockets—against poorly understood, massive, prehistoric predators.

Dennis Nedry – Dennis Nedry is the brilliant computer systems analyst hired by InGen to design the computer systems for Jurassic Park. His crass and disrespectful attitude bothers John Arnold and Dr. Henry Wu. Shrewd, intelligent, and greedy, Nedry resents John Hammond and his company after they force him to do extra work without pay. Thus, he willingly accepts Lewis Dodgson's offer of $1.5 million for stealing some of InGen's dinosaur embryos. In the end, however, his greed proves to be his downfall. When he deactivates the security systems to steal the embryos, he unwittingly turns off the fences. And when he gets lost driving to the dock to hand the goods off to his contact, a herd of escaped dinosaurs attacks and eats him.

Lewis Dodgson – Lewis Dodgson is the chief geneticist at Biosyn, the rival of John Hammond's company, InGen. Pure greed motivates Dodgson, and in his desire to make money he willingly engages in immoral practices like experimenting on people without their consent, conducting dangerous experiments to see if he can increase the virulence and communicability of already deadly diseases, and engaging in corporate espionage by hiring Denis Nedry to steal frozen dinosaur embryos from Jurassic Park. As a character, he provides a warning about the kind of people that can flourish in a field without proper regulatory oversight or the internal will to police itself.

Ed Regis – Ed Regis is the publicist for InGen's Jurassic Park project, although John Hammond's cost-cutting and miserliness means that Regis ends up saddled with odd jobs, like accompanying injured workers to the mainland for medical treatment or babysitting Hammond's grandchildren. Because he has an intimate knowledge of the damage a dinosaur attack can do to a person, Regis fears the animals a great deal. Yet he still participates in advertising the park and trying to attract visitors. In this way, he demonstrates the ways in which greed privileges money over the health and safety of other people. He shows his own selfishness and fear when he abandons Tim and Lex Murphy in the midst of a tyrannosaurus attack; while the children survive, the dinosaur ends up tearing Regis's body into pieces.

Tim Murphy – Tim Murphy is John Hammond's grandson and the sister of Lex Murphy, with whom he travels to Jurassic Park. Eleven years old, Tim is a bit shy and bookish, more interested in dinosaurs and science than sports. In this way, he is unlike his sister. Tim knows Dr. Alan Grant by reputation and has read some of his books. Although he is scared of heights, he overcomes his discomfort when his survival demands it, as when he's thrown into a tree by a dinosaur or when he has to climb over the high fences around the tyrannosaur enclosure. Tim successfully figures out how to run the computer systems following the deaths of John Arnold and Dr. Henry Wu. His attention to the dinosaur behavior and the messages of the computer demonstrates the importance of critically assessing the evidence in front of one to draw the correct conclusions. Because he is a child and has fewer biases and beliefs than the adults around him, Tim proves to be more flexible and adaptive in this thinking.

Lex Murphy – Lex Murphy is John Hammond's granddaughter, whom he brings to the park along with her brother, Tim. Seven or eight years old, Lex is athletic and energetic. She speaks her mind and whines when she doesn't get her way. When the tyrannosaurus attacks her and the others in the ride vehicles,

she panics and temporarily reverts to a more child-like state, calling the creature "aminals" instead of "animals." Dr. Alan Grant rescues her and Tim from that situation and keeps them safe as they travel back to the visitor center. Although she bickers with and teases her brother, she follows his lead when necessary.

Dr. Harding – Dr. Harding is the veterinarian at Jurassic Park. Prior to being hired by John Hammond, he was the chief vet at the San Diego Zoo. His expertise in modern birds positions him as the best expert on dinosaur anatomy and physiology, although there are still many things he does not understand about the dinosaurs and their health. He joins the park out of a sense of pride; few discoveries or innovations remain in the modern era, and he wants the worldwide acclaim and acknowledgement he expects to receive as the author of the first book about dinosaur veterinary medicine.

Dr. Marty Guitierrez – Dr. Marty Guitierrez is a field biologist who trained at Yale University before moving to Costa Rica. When a mysterious lizard attacks tourist Tina Bowman, Dr. Guitierrez consults with the family and the hospital to identify the animal. And although his training tells him it must be a basilisk lizard and he initially discounts Tina's dinosaur-like drawing of the culprit, he continues to gather evidence that troubles his initial conclusion. When he recovers part of the lizard and realizes that it isn't the animal he expected, he sends it to a scientist in New York for identification. He continues to work with the Costa Rican government as they track unusual animal activities on the mainland; after they rescue Dr. Alan Grant and the other survivors from Jurassic Park, Dr. Guitierrez consults with Grant about these animals.

Bob Morris – Bob Morris is a lawyer who works for the Environmental Protection Agency (EPA) and is charged with investigating John Hammond and his company InGen. He visits Dr. Alan Grant to ask questions about Hammond and his company's activities. Morris's inability to gather the necessary evidence, even though his gut correctly warns him that Hammond is up to no good, contributes to the book's call for regulatory oversight of potentially dangerous biotech research and development projects.

Dr. Richard Stone – Dr. Richard Stone, the director of the Tropical Diseases Laboratory at Columbia University in New York City, receives the **remains** of the mysterious lizard that bit Tina Bowman. The reptile expert whom Dr. Marty Guitierrez wanted to identify is abroad, and his lab wants Stone to make sure the sample doesn't have any dangerous pathogens. Stone, like many others in the book, looks for evidence that supports his previously held beliefs, rather than critically assessing the evidence in front of him; thus he discounts the dinosaur-like features in the sample and belittles Alice Levin for pointing out the obvious (if improbable) truth that the lizard is, in fact, a dinosaur.

Tina Bowman – Tina Bowman is the daughter of Mike and Ellen Bowman. On vacation with her family in Costa Rica, a mysterious lizard (which turns out to be a procompsognathus, escaped from Jurassic Park) bites and seriously injures her. She survives the incident and draws a picture of the lizard that adults like Dr. Marty Guitierrez and Dr. Richard Stone dismiss as fanciful. However, as her parents attest, Tina is an observant child—she and her drawing thus provide an example of how unbiased observation leads to insight.

Ellen Bowman – Ellen Bowman is the wife of Mike Bowman and the mother of Tina Bowman. She is vacationing with her family in Costa Rica in part to explore the country's natural beauty and in part because it has inexpensive, widely available plastic surgery options. Despite being a beautiful woman, she feels insecure about her appearance and spends time and money enhancing it. She thus demonstrates that, despite humanity's evolution, as a species we are still plagued with flaws like vanity.

Elena Morales – Elena Morales is a Costa Rican midwife who attends to patients at clinics, including the one run by Dr. Roberta Carter. She is a practical, experienced woman who nevertheless chooses to cover up her encounter with one of Jurassic Park's escaped animals, a procompsognathus that attacks a newborn in her care, to protect herself from criticism.

MINOR CHARACTERS

Alice Levin – Alice Levin as a lab tech at Dr. Richard Stone's Tropical Diseases Laboratory. She correctly recognizes dinosaur features in the remains of the lizard sent by Dr. Marty Guitierrez and the drawing by Tina Bowman, and she calls Dr. Alan Grant to get his opinion.

Dr. Roberta Carter – Dr. Roberta Carter is an American doctor who runs a small clinic in rural Costa Rica. She treats a construction worker from InGen's resort, choosing not to directly question Ed Regis's nonsensical account of the man's injuries.

Mike Bowman – Mike Bowman is a wealthy American real estate developer who visits Costa Rica with his wife Ellen and daughter Tina.

TERMS

Chaos Theory – Chaos theory is an interdisciplinary field of research that initially arose at the intersection of mathematics and computer science, but which has grown to include other areas like biology, information science, medicine, meteorology, neuroscience, and physics. Described in *Jurassic Park* by **Dr. Ian Malcolm**, a mathematician and proponent of the theory, chaos theory essentially looks for underlying patterns in apparently random, complex events. Although the idea of "chaos" invokes messiness, chaos theory is concerned with incredibly precise

accounting of variables. Theoretician Edward Lorenz explains that chaos is where the present determines the future, but the *approximate* present can't determine an *approximate* future—or, as Malcolm would say, the tiny variables present in any system multiply as the system develops. Any understanding of a system that doesn't (or can't) account for all the tiny variables—an approximate understanding—will thus be incapable of accurately predicting the system's outcome.

THEMES

In LitCharts literature guides, each theme gets its own color-coded icon. These icons make it easy to track where the themes occur most prominently throughout the work. If you don't have a color printer, you can still use the icons to track themes in black and white.

CHAOS, CHANGE, AND CONTROL

As he attempts to create a theme park of dinosaurs resurrected from the deep past, John Hammond believes that, because he owns the **island** and has paid for the technological advances made in its genetics lab, he can command nature itself. But the lessons of natural history, especially as chaos theory interprets it, suggest that very little lies within human control, and the book explores the unintended or unexpected consequences that can arise from humankind's thoughtless actions. For instance, deforestation fulfils a need for raw materials (timber) or for arable land, but it also drives climate change and ecosystem losses that change animal behavior. Hammond's failure in the park illustrates the danger of humanity ignoring—or worse, overstepping—its limited control over nature.

Mathematician Dr. Ian Malcolm's study of chaos theory provides the starkest evidence that humans can never hope to control the innumerable variables in nature. Life doesn't follow a linear pathway, and the effects of even initially small variables can be magnified through repetition. Even after centuries of study and the development of powerful computers to help us assimilate and interpret the data we collect, humanity still struggles to accurately predict the weather or understand non-Newtonian physics. While Hammond rejects Malcolm's theories, events in the park quickly prove their accuracy: life escapes human control when the dinosaurs gain the ability to reproduce and when they literally escape their manmade enclosures. And although Hammond confidently predicted that the dinosaurs, being animals, could be trained, the **raptors** prove not only resistant to training but also lethally clever. But despite humanity's essential powerlessness in the face of random chance and ongoing change, Malcolm's function in the novel effectively reminds readers that humans can't hope to ever unlock all of nature's secrets. Instead, by accepting our limitations and respecting the power of change to create life in a bewildering array of forms, we can chart a path into the future that allows us to survive and thrive in a chaotic world.

SIGHT AND INSIGHT

For many people in *Jurassic Park*, seeing isn't believing. Sometimes external sources cloud the picture, like the literal fog and mist that shroud John Hammond's **island** or his attempts to locate the park beyond the sight of his investors, regulatory bodies, and governments. At other times, people see what they want to, ignoring the evident truth when it contradicts their beliefs or hopes. For example, Dr. Guitierrez discounts the observant Tina's drawing of the lizard that attacked her because it contradicts his expectations, and Dr. Stone refuses to see a dinosaur in the sample he assesses because he believes (reasonably) that dinosaurs are extinct. These examples of willful blindness stand in stark contrast to the insight of people like Drs. Alan Grant, Ellie Sattler, and Ian Malcolm, who calmly assess the evidence set before them. The conflict between Hammond's grand—but incomplete vision—and the clearsighted observations of his consultants shows how true insight requires both accurate vision and unbiased assessment of the available evidence.

Blinded by greed and arrogance, Gennaro, John Hammond, and Dr. Henry Wu overlook evidence that contradicts their expectations. Perhaps the clearest example of this is setting the computer to count only the animals they already expect to be on the island. In contrast, real insight requires adding new evidence to pre-existing paradigms. Sometimes this means being less attached to one's biases—children and less-invested adults (like Alice Levine) are better at seeing the escaped dinosaur as it is than the so-called experts. But experts can do it too, as when Lewis Dodgson (also a pioneering geneticist) realizes that the odd business decisions EPA lawyer Bob Morris can't interpret point to InGen cloning dinosaurs. And every time he observes the park's animals, Grant assimilates his new knowledge with the picture of dinosaur behavior he has built through years of careful paleontological study. In a key moment near the end of the book, Grant tries to force insight on Gennaro by making him participate in the wild-bred raptor count. This requires Gennaro to see and acknowledge the failures of the park—and his complicity in its downfall. In doing so, Grant underlines the importance of keeping an open mind and acting on the available information rather than relying on assumptions or hopes.

FLAWED HUMAN NATURE

Although the novel is ostensibly about dinosaurs, *Jurassic Park* shines a light on the amazing capabilities and ingenuity of *human beings*, the most advanced animals ever to evolve on earth. But, the book argues,

humans are still full of flaws that threaten our survival. Chief among these are greed, pride, and selfishness. Greed motivates John Hammond and Dr. Henry Wu to focus on entertainment over humanitarian research. It motivates men like Donald Gennaro to invest in the park. And it characterizes InGen's business practices, which prioritize saving money over human life and safety. Still, pride might be an even stronger motivation. Dr. Harding, park vet, and John Arnold, chief engineer, both join the project to cement their own legacies. And in a broader sense, an arrogant belief that humankind can control nature drives Hammond's grand vision for the park. Dr. Ian Malcolm criticizes Hammond and his kind for treating scientific power as a kind of inherited wealth that they can apply without proper discipline. And selfishness flows naturally from greed and pride. Hammond callously exposes his grandchildren to harm hoping that they'll keep Gennaro off his case, while Gennaro wants to avoid taking responsibility for his part in the park fiasco. By showing how human flaws lead to disaster on a small scale (on a remote island, with fewer than 25 people directly affected), the book makes an argument for how these same flaws endanger humanity, especially against the backdrop of deforestation, climate change, and global political upheaval driven by pride, selfishness, and greed. Unless humanity choses to address these flaws, *Jurassic Park* suggests, it will destroy itself, leaving other forms of life to thrive on earth in its absence.

TECHNOLOGY

Jurassic Park explores the breathtaking capability of technology to recreate the world around us, but the novel also warns that technology is only as good or bad as the ends to which humans direct it. The story takes place in 1989, during a scientific gold rush. Ground-penetrating scanners are revolutionizing paleontological research, allowing scientists like Drs. Alan Grant and Ellie Sattler to find and explore **fossils** without lengthy excavations. DNA analysis allows them to identify discoveries so fragmentary that they would otherwise have been worthless. And—perhaps less impressive to contemporary readers—modems and fax machines are gaining power in an increasingly connected world. But many innovations, the novel implies, fail to make the world better.

Sometimes, when companies like Biosyn (with its controversial chief geneticist Lewis Dodgson) or Hammond's InGen allow greed or pride to direct their research, the results are pointless. Biosyn engineers high-visibility trout that are prone to sunburn and that taste terrible; medical advances allow both life-saving treatments and increasingly sophisticated plastic surgery for insecure women like Ellen Bowman. In worse cases, companies can use their technology in dangerous ways, like when Biosyn engineers a more communicable strand of rabies—an exceptionally lethal virus—to test the efficacy of their new vaccine. Or when InGen resurrects dinosaurs after millions of years of extinction and places them in a glorified zoo without any real insight into their natural behavior.

The lack of human insight into the consequences of their scientific exploration prompts Dr. Ian Malcolm to provocatively declare all acts of discovery a violent and dangerous "rape of nature." He further criticizes men like Hammond, his chief geneticist Dr. Henry Wu, and his chief engineer John Arnold for being "thintelligent" in their application of technology to the natural world. Without pausing to consider the bigger picture, they make mistakes and miscalculations that have massive consequences. Hammond seems aware that his ideas might provoke resistance; this is why he constructs his lab and conducts his experiments on a remote private island, far from governmental oversight and regulation. By chronicling his fictitious downfall, however, the book makes a real and urgent argument that scientific research and technological development should be carefully directed and overseen to avoid predictable catastrophes.

SYMBOLS

Symbols appear in **teal text** throughout the Summary and Analysis sections of this LitChart.

ISLAND

In *Jurassic Park*, the island represents the interconnected nature of life on earth and the ways in which seemingly isolated events often end up having unexpected consequences. John Hammond purchases a private island specifically to avoid the oversight of regulatory or governmental bodies as he builds his state-of-the-art genetics lab. And Isla Nublar is, indeed, isolated: it can only be accessed by its one helicopter pad or its single dock, and the only regular transportation between the island and the mainland—at least before the planned opening of the park—is a supply ship that visits twice a month. Nevertheless, the island isn't completely sealed off from the rest of the world. Telephone lines, radios, and modems allow park employees to place calls to Costa Rica or even the more distant United States. And, as the early evidence of dinosaurs in the Costa Rican jungles and beaches shows, it isn't even possible to keep the park's animals completely contained on the island. In this way, the island demonstrates the chaos theory put forth by Dr. Ian Malcolm, particularly the so-called "butterfly effect," which holds that a tiny movement in one part of the world (like the island), amplified across great distances over time, can have an outsized effect on another part of the world.

RAPTORS

The raptors symbolize the power of nature and its

ability to evade and escape human control. Dr. Henry Wu can extract, sequence, and clone dinosaur DNA from biological matter preserved in amber. But he and his team can't predict which dinosaur they're making until it hatches, and they have no insight into the animal's behavior or physiology prior to its hatching. The raptors, it turns out, are lethal, intelligent, and coordinated, making them the most dangerous animals the park produces. They evade biological control when they gain the ability to reproduce independently, and the fact that they are isolated and kept off display due to the danger they pose undermines Hammond's assurances that all the animals—and the park—are perfectly safe and under control. Once they escape the confines of their enclosure, they pose the most direct and ongoing threat to the park's visitors, attacking Robert Muldoon, Tim, Lex, Ellie Sattler, John Arnold, and Wu. In this way, they also graphically demonstrate the dangers of inappropriate and uncritical applications of technology for its own sake (or for the sake of greed)—as Dr. Ian Malcolm complains, Wu and the others were so focused on *what* they could do with genetic technology that they never bothered to ask whether they *should* do it. Thus, when Wu falls victim to his own creation, his death contributes to the book's argument that technological and scientific discovery need to be guided by thoughtful regulation and oversight.

VESTIGES

In *Jurassic Park*, Vestiges—including footprints, fossils, tracks, and anything that shows the trace of something no longer present—symbolize the limits of human knowledge. By their very nature, vestiges offer an incomplete picture of whatever creature left them behind, although a careful observer can gather a great deal of information by interpreting them correctly. Paleontologists Alan Grant and Ellie Sattler spend their professional lives painstakingly uncovering, analyzing, and interpreting the vestiges of ancient plant and animal life. But their hypotheses are limited by what bones won't reveal (for instance, whether dinosaurs were slow and cold-blooded or warm-blooded and fast). And the passage and weight of time distort the remnants, rendering our understanding of the past even more distorted. John Hamond and Henry Wu also examine incomplete vestiges of the past—the genetic material they extract from insects preserved in amber. The resulting code has gaps in it, but instead of acknowledging the limits of their understanding, Wu and Hammond arrogantly assume their ability to fill in those gaps with modern computers. Thus, their understanding of the creatures they make remains limited. And because of these limitations, they are unable to predict or plan for the dinosaurs' behavior.

QUOTES

Note: all page numbers for the quotes below refer to the Ballantine Books edition of *Jurassic Park* published in 2012.

Introduction Quotes

It is necessary to emphasize how significant this shift in attitude actually was. In the past, pure scientists took a snobbish view of business. They saw the pursuit of money as intellectually uninteresting, suited only to shopkeepers. And to do research for industry, even at the prestigious Bell or IMB labs, was only for those who couldn't get a university appointment. Thus the attitude of pure scientists was fundamentally critical toward the work of applied scientists, and to industry in general. Their long-standing antagonism kept university scientists free of contaminating industry ties, and whenever debate arose about technological matters, disinterested scientists were able to discuss the issues at the highest levels.

Related Characters: John Hammond, Dr. Henry Wu

Related Themes:

Page Number: xi

Explanation and Analysis

By surveying the massive cultural shift that followed the advent of biotechnology in the late 20th century, the introduction to *Jurassic Park* lays out one of the book's key arguments. It claims that scientific and technological research and development require careful oversight and regulation to benefit rather than harm humanity. By namedropping real life biotech firms like Genentech alongside its fictional creations—namely, Biosyn and InGen—the introduction blends the book's fictional story with reality to increase the persuasiveness of its argument. In this interpretation of history, scientific research used to be protected from market concerns and corporate greed by its location in universities and scientific societies. In this apparent golden age, scientists were able to police themselves because they were untainted by industry. By implication, modern science, by aligning itself with research firms, has been contaminated by greed, pride, and secrecy. John Hammond and his chief geneticist Dr. Henry Wu exemplify these human failures, and their reckless and uncontrolled experimentation on the island doesn't just ruin the park but also poses the threat of a deadly dinosaur spillover into other ecosystems.

Yet, while the book criticizes InGen's actions (and, by implication, asks readers to consider whether the

increasingly wealthy and powerful biotechnology sector should face more oversight and regulation), it doesn't provide a vision for how this would work. After all, Hammond neatly avoids oversight simply by conducting his research on a private island that lies outside of the jurisdiction of his own country (the United States) and the closest national government (Costa Rica). To regulate these technologies internationally would require worldwide cooperation on an almost unimaginable scale. Thus, although the book's critique pointedly demonstrates the dangers of humanity's current scientific moment, it suggests that solutions are harder to imagine.

First Iteration: Puntarenas Quotes

❝❝ Mike Bowman then showed Guitierrez the picture that Tina had drawn. Guitierrez nodded. "I would accept this as a picture of a basilisk lizard," he said. "A few details are wrong, of course. The neck is much too long, and she has drawn the hind legs with only three toes instead of five. The tail is too thick, and raised too high. But otherwise this is a perfectly serviceable lizard of the kind we are talking about."

"But Tina specifically said the neck was long," Ellen Bowman insisted. "And she said there were three toes on the foot."

"Tina's pretty observant," Mike Bowman said.

"I'm sure she is," Guitierrez said, smiling. "But I still think your daughter was bitten by a common *basilisk amoratus*."

Related Characters: Dr. Marty Guitierrez (speaker), Tina Bowman, Ellen Bowman, Mike Bowman

Related Themes:

Related Symbols:

Page Number: 19

Explanation and Analysis

When a mysterious lizard attacks tourist Tina Bowman, various entities in Costa Rica work together to identify the culprit. Biologist Dr. Marty Guitierrez consults with the family and the girl's doctors, quickly assuring everyone that a common lizard of the Costa Rican jungle attacked Tina. However, as this passage indicates, his survey of the available evidence leaves much to be desired. In looking at the drawing, Guitierrez finds more differences with the expected animal than similarities.

But instead of pausing to consider why this might be the case, he discounts the discrepancies. He looks for information to confirm his hypothesis rather than considering the evidence in front of him. And because his biases limit his field of vision, he can't see the truth—that the animal belongs to a new species (even if he can't imagine what readers know—that it is a dinosaur escaped from Jurassic Park). Even his words drip with scientific condescension: he tells the Bowmans he "would accept" Tina's drawing as an example of basilisk lizard as if it's a school assignment receiving a grade rather than a piece of evidence from a wild animal attack. Guitierrez thus confirms (and sets an early example for) the book's argument that a person can only see what they look for.

First Iteration: The Beach Quotes

❝❝ Such a new and distinctive pattern led Guitierrez to suspect the presence of a previously unknown species of lizard. This was particularly likely to happen in Costa Rica [...because] within its limited space, [it] had a remarkable diversity of biological habitats: seacoasts on both the Atlantic and Pacific; four separate mountain ranges [...]; rain forests, cloud forests, temperate zones, swampy marshes, and arid deserts. Such ecological diversity sustained an astonishing diversity of plant and animal life. Costa Rica had three times as many species of birds as all of North America. More than a thousand species of orchids. More than five thousand species of insects.

New species were being discovered all the time at a pace that had increased in recent years, for a sad reason. Costa Rica was becoming deforested, and as jungle species lost their habitats, they moved to other areas, and sometimes changed behavior as well.

Related Characters: Dr. Marty Guitierrez, Tina Bowman

Related Themes:

Page Number: 22-23

Explanation and Analysis

As Dr. Marty Guitierrez visits the beach where a mysterious lizard attacks Tina, he considers the astonishing diversity of life across Costa Rica's many ecosystems. Importantly, while in his initial interview with the family he showed a tendency toward discounting any evidence that didn't fit his preconceived hypothesis about the lizard's identity, he knows that the local ecosystem abounds with life. If scientists and other observers are still discovering new species, then it's inappropriate for Guitierrez to so quickly assume that he knows the identity of the mystery lizard. The collective list of species in the Costa Rican jungles only includes the species that humans have observed and reported.

This abundance points toward the endlessly generative capacity of life in a world where the only constant is change. The density of creatures in the jungles also suggests that more variables and possibilities exist than humans have accounted for. And this reminds Guitierrez that, since humanity hasn't yet seen and accounted for everything on the earth, people should remain humble about the limits of our knowledge. Unfortunately, humans don't display much humility in the face of nature, as humanity's wanton destruction of the natural environment shows. Selfishness, greed, and shortsightedness cause habitat destruction on previously unimaginable levels that will have unpredictable consequences in the future.

Second Iteration: The Shore of the Inland Sea Quotes

It was outrageous. It was irresponsible. It was criminally negligent. But no action was taken against Biosyn. The Chilean farmers who unwittingly risked their lives were ignorant peasants; the government of Chile had an economic crisis to worry about; and the American authorities had no jurisdiction. So Lewis Dodgson, the geneticist responsible for the test, was still working at Biosyn. Biosyn was still as reckless as ever. And other American companies were hurrying to set up facilities in foreign countries that lacked sophistication about genetic research. Countries that perceived genetic engineering to be like any other high-tech development and welcomed it in their lands, unaware of the dangers posed.

Related Characters: Dr. Alan Grant, John Hammond, Lewis Dodgson, Bob Morris

Related Themes:

Page Number: 43-44

Explanation and Analysis

Bob Morris, a lawyer with the Environmental Protection Agency, visits Dr. Alan Grant as part of an investigation into whether John Hammond and his company InGen are engaged in potentially illegal activities. As part of their conversation, they consider the kinds of irresponsible and illegal behavior going on in the poorly regulated biotech space, which provides the background for some of Morris's fears. Biosyn's abuses of the scientific and moral codes show the degree to which pride and greed direct corporatized research. And because Biosyn's concerns include profits and power, not necessarily human betterment, they reward Dodgson for his reckless experimentation and abuse of human subjects. The so-called rabies case illustrates how easily biotech companies can evade oversight by crossing international boundaries and by conducting their most problematic work in countries that lack a meaningful understanding of emerging technologies and their dangers. These choices are obviously immoral, since they expose people to risks they don't fully understand. But Biosyn isn't the only villain in this scenario; the government of Chile also fails to protect its own citizens due to ongoing political distractions, suggesting that even governmental oversight may be insufficient. This contributes to the book's call for neutral, sober oversight of emerging technology.

Second Iteration: Skeleton Quotes

Ellie's first thought was that she was looking at a hoax—an ingenious, skillful hoax, but a hoax nonetheless. Every biologist knew that the threat of a hoax was omnipresent. The most famous hoax, the Piltdown man, had gone undetected for forty years, and its perpetrator was still unknown. More recently, the distinguished astronomer Fred Hoyle had claimed that a fossil winged dinosaur, *Archaeopteryx*, on display at the British Museum, was a fraud. (It was later shown to be genuine.)

The essence of a successful hoax was that it presented scientists with what they expected to see. And, to Ellie's eye, the X ray image of the lizard was exactly correct [...] It was a young *Procompsognathus*.

Related Characters: Dr. Alan Grant, Dr. Ellie Sattler, Dr. Marty Guitierrez, Dr. Richard Stone, Alice Levin

Related Themes:

Related Symbols:

Page Number: 48

Explanation and Analysis

Because she disagrees with her boss about the dinosaur-like appearance of the mystery lizard remains from Costa Rica, lab tech Alice Levin calls Dr. Alan Grant and asks for his opinion on its x-ray. In the images, Grant and Ellie see what Alice sees: a dinosaur. But, since they believe dinosaurs are extinct, they look for other explanations. The passage's reference to successful hoaxes reiterates the book's argument that people tend to see what they want to see. This is why Dr. Stone believes the remains belong to a lizard, not a dinosaur. When scientists like Dr. Stone rely too heavily on their preconceived biases and knowledge (for example, dinosaurs are extinct), they tend to misunderstand

or misinterpret the evidence in front of them.

As this passage shows, this confirmation bias works both ways. A successful hoax can mislead the scientific community, just like the scientific community's biases can blind them to the reality of the Costa Rican lizard account. As paleontologists, Grant and Ellie can only analyze and interpret signs left behind by ancient lifeforms, not the lifeforms themselves. This leads them to approach their analysis of ancient life forms like detectives. Their training helps them to keep an open mind when looking at new evidence, allowing them to identify the so-called lizard as a dinosaur much faster than Stone, Guitierrez, and others.

Second Iteration: Plans Quotes

"It looks kind of distorted," one of the kids said. "But I don't think it's the computer."

"No," Grant said. "It's just time. Lots and lots of time."

Grant knew that people could not imagine geological time. Human life was lived on another scale of time entirely. An apple turned brown in a few minutes. Silverware turned black in a few days. A compost heap decayed in a season. A child grew up in a decade. None of these everyday human experiences prepared people to be able to imagine the meaning of eighty million years—the length of time that had passed since this little animal had died.

In the classroom, Grant tried different comparisons. If you imagined the human lifespan of sixty years was compressed to a day, then eighty million years would still be 3,652 years—older than the pyramids. The velociraptor had been dead a long time.

Related Characters: Dr. Alan Grant (speaker), Dr. Ian Malcolm, John Hammond, Dr. Henry Wu

Related Themes:

Page Number: 61-2

Explanation and Analysis

Preparing to leave his dig for the weekend, Grant has to protect the fossilized raptor skeleton he's just discovered. His team uses computer-assisted sonic tomography to visualize the remains underground, and one of the graduate students notes distortions in the image on the computer screen. The computer can see what's there, but it requires knowledge—specifically Dr. Grant's expertise—to interpret the image correctly, reminding readers that insight requires both the ability to see what's there and the background to understand it. This also reminds readers that it doesn't matter how impressive technologies are—their vision matches that of their human operators, so they will help or hinder human progress according to how they're used.

The limitations of technology come into even sharper focus when Grant considers the almost unimaginable sweep of geological time. In the eons since the fossilized raptor lived, the shape of continents and the creatures that live on them—even the atmosphere—has changed. Indeed, the only constant in life is change itself. It's this fluidity that leads to the incredible variety of life on the planet and causes the chaos inherent in earth's complex system. Finally, the sweep of geological time reminds Grant of how small he—and human civilization itself—is. The things he will never know vastly outweigh the things he can know. This gives him an attitude of humility that markedly contrasts with the scientific and technological arrogance that Malcolm criticizes in Hammond and Wu. And because the fossil that initiates Malcolm's chain of thought belongs to a raptor, this moment subtly foreshadows the ways in which life and nature will escape human control in Jurassic Park.

Second Iteration: Target of Opportunity Quotes

In the 1980s, a few genetic engineering companies began to ask, "What is the biological equivalent of a Sony Walkman?" These companies weren't interested in pharmaceuticals or health; they were interested in entertainment, sports, leisure activities, cosmetics, and pets. The perceived demand for "consumer biologicals" in the 1990s was high. InGen and Biosyn were both at work in this field.

Biosyn had already achieved some success, engineering a new, pale trout under contract to the Department of Fish and Game in the State of Idaho. This trout was easier to spot in streams, and was said to represent a step forward in angling. (At least, it eliminated complaints to the Fish and Game Department that there were no trout in the streams.) The fact that the pale trout sometimes died of sunburn, and that its flesh was soggy and tasteless, was not discussed.

Related Characters: Dr. Ian Malcolm, John Hammond, Lewis Dodgson

Related Themes:

Page Number: 72

Explanation and Analysis

As Lewis Dodgson prepares to ask the Biosyn board for their tacit approval on a plan to steal proprietary technology from rival company InGen, he reflects on the

state of biotech engineering. As this passage reveals, in the world of the book, the biotech field pursues trendy and marketable innovations with little regard for ecological responsibility or even whether anyone wants the products they make. Using a capitalistic approach, they consider how much money they can make and focus on patentable products with mass market appeal. This passage also links back to the introduction, which includes the pale trout on its list of questionable bioengineering applications. Pointless innovations like highly visible trout contribute to the book's overall argument that biotechnology needs external oversight and regulation. But the need for care in crafting safeguards comes into focus when readers attend to the fact that the pale fish were engineered on a government contract. Oversight and regulation need to be enacted with an eye to the big picture, not just out a narrow focus on reducing customer complaints.

Later, Malcolm will criticize Hammond and others for failing to ask whether they *should* do things rather than focusing on whether they *can*. At this point in history, humans can exert a nearly god-like level of control over the world. But it's impossible to foresee all the consequences of these actions. Nature represents a very complex system, full of innumerable unpredictable variables, and it lies outside of the scope of human power to account for all of them. Thus, the "improved" fish struggle to survive in an environment to which their natural counterparts are adapted. And, the book argues, when humans tinker with the natural world, unaware of their own ignorance and limitations, the consequences won't always be as benign as some sunburned, tasteless fish.

Second Iteration: Malcolm Quotes

"If I use a cannon to fire a shell of a certain weight, at a certain speed, and a certain angle of inclination—and if I then fire a second shell with almost the same weight, speed, and angle—what will happen?"

"The two shells will land at almost the same spot."

"Right," Malcolm said. "That's linear dynamics."

"Okay."

"But if I have a weather system that I start up with a certain temperature and a certain wind speed and a certain humidity—and if I then repeat it with almost the same temperature, wind, and humidity—the second system will not behave almost the same. It'll wander off and rapidly will become very different from the first. Thunderstorms instead of sunshine. That's nonlinear dynamics. They are sensitive to initial conditions: tiny differences become amplified."

Related Characters: Dr. Ian Malcolm (speaker), John Hammond, Donald Gennaro

Related Themes: 

Page Number: 82

Explanation and Analysis

When Hammond's private jet picks up Dr. Ian Malcolm, the mathematician immediately warns the group that he expects serious problems on the island, which he initially predicted. In this passage, he explains the outlines of chaos theory to Gennaro. A key tenet of chaos theory says that, although the present determines the future, knowing the approximate present doesn't allow one to predict the approximate future. In other words, because of the innumerable variables present in a complex system (like life on planet earth broadly, or like Jurassic Park on a smaller scale), it's pretty much impossible for humans to get an exact picture of the exact present at any given moment. Therefore, because human beings cannot see all the variables—and thus cannot predict how each may affect the system—they cannot meaningfully predict many events.

Even the example Malcolm gives of a linear (in other words, easily predictable) system suggests this truth: two *almost* identical shells shot at *almost* the same speed will land in *almost* the same spot. Humans can only predict outcomes insofar as they ignore minor variables and accept a margin of error in accuracy. Here as throughout the novel, Malcolm provides a contrarian viewpoint to reign in or contradict the arrogance of Hammond and the others who think that their technological mastery grants them control over nature.

Second Iteration: Welcome Quotes

Gennaro was speechless. He had known all along what to expect—he had known about it for years—but he had somehow never believed it would happen, and now he was shocked into silence. The awesome power of the new genetic technology, which he had formerly considered to be just so many words in an overwrought sales pitch—the power suddenly became clear to him. These animals were so big! They were enormous! Big as a house! And so many of them! Actual damned dinosaurs! Just as real as you could want!

Gennaro thought: We are going to make a fortune on this place. *A fortune.*

He hoped to God the island was safe.

Related Characters: Donald Gennaro (speaker), John Hammond

Related Themes:

Related Symbols:

Page Number: 88

Explanation and Analysis

When the visitors arrive on Isla Nublar, the first sight of the dinosaurs amazes everyone. In this passage, readers get to see Gennaro's reaction to the experience in real time. This passage demonstrates the link between seeing and believing: Gennaro knew plan for the park all along but couldn't truly grasp it until he saw living proof with his own eyes. It also suggests the need for oversight and regulation of powerful technologies by knowledgeable parties. Gennaro seems to have been the only source of oversight on the Jurassic Park project, but he understood the technology and what it could do poorly, if at all.

The sight of the dinosaurs fills Gennaro with awe for only a moment before greed displaces it. Gennaro expects monetary returns as gargantuan as the creatures in front of him, and these interest him far more than the animals themselves. Like Hammond and other irresponsible biotech researchers, Gennaro supports reckless scientific and technological experimentation not for the betterment of humankind but to increase the size of his own bankroll. And, notably, his concerns for safety occur last, and seem to be more connected with the park's money-making prospects than bettering humankind. His biggest concern is that a dangerous, unstable park must be shut down—and a shuttered park won't make him (or anyone else) rich.

Third Iteration: When Dinosaurs Ruled the Earth Quotes

"You arrogant little snot," Hammond said. He stood, and walked out of the room.

"Gentlemen, gentlemen," Gennaro said.

"I'm sorry," Malcolm said, "but the point remains. What we call nature is in fact a complex system of far greater subtlety than we are willing to accept. We make a simplified image of nature and then we botch it up. I'm no environmentalist, but you have to understand what you don't understand. How many times must the point be made? We build the Aswam Dam and claim it is going to revitalize the country. Instead, it destroys the fertile Nile Delta, produces parasitic infestation, and wrecks the Egyptian economy. We build the—"

"Excuse me," Gennaro said, "But I think I hear the helicopter. That's probably the sample for Dr. Grant to look at." He started out of the room. They all followed.

Related Characters: Dr. Ian Malcolm (speaker), Dr. Alan Grant, John Hammond, Donald Gennaro

Related Themes:

Related Symbols:

Page Number: 102

Explanation and Analysis

Before the guests' tour of the island begins, Gennaro explains that they've been asked to assess the safety and viability of the park after evidence of possible dinosaur escapes. Malcolm assures him that the animals have already escaped; Hammond cannot create an entirely isolated outpost of nature. In this passage, while Hammond storms off, Malcolm presses the point to Gennaro, detailing other examples of human intervention in the natural world going terribly awry due to shortsightedness. Chaos theory looks for the underlying patterns in apparently random events by considering the interaction of variables in complex systems. Its main premise holds that tiny variables—many of which are too small to even see—can have an outsized effect on events.

In this passage, Malcolm points out that humans have a bad track record of messing up the environment around them through their failure to consider the downstream effects their actions will have. The Aswan Dam, constructed in the 1950s in Egypt, has had beneficial and detrimental effects on the local economy, agriculture, and population health. Malcolm's point is that the full effects of the dam couldn't be predicted at its construction and only became evident over time. And, as if to prove Malcolm's point about chaos and unpredictability, the conversation ends when the helicopter arrives again carrying not the expected biological evidence but introducing another variable to the island's volatile system in the form of Hammond's grandchildren.

Third Iteration: Control (I) Quotes

Look, we're not fools. We understand these are prehistoric animals. They are part of a vanished ecology—a complex web of life that became extinct millions of years ago. They might have no predators in the contemporary world, no checks on their growth. We don't want them to survive in the wild. So I've made them lysine dependent. I inserted a gene that makes a single faulty enzyme in protein metabolism. As a result, the animals cannot manufacture the amino acid lysine. They must ingest it from the outside. Unless they get a rich dietary source of exogenous lysine—supplied by us, in tablet form—they'll go into a coma within twelve hours and expire. These animals are genetically engineered to be unable to survive in the real world. They can only live here in Jurassic Park. They are not free at all. They are essentially our prisoners.

Related Characters: Dr. Henry Wu (speaker), Dr. Ian Malcolm

Related Themes:

Related Symbols:

Page Number: 126-127

Explanation and Analysis

At the outset of the Jurassic Park tour, Dr. Henry Wu explains to Malcolm and the others why reports indicating escaped dinosaurs do not alarm him. As he explains in this passage, he edited the animals' genetic code to make them incapable of surviving on their own in the wild. Or at least, so he believes. Events in the park will soon prove otherwise. But at this point in the book, Wu's confidence allows readers to examine ideas about human control over nature.

Genetic sequencing, splicing, and cloning technologies mean that the Jurassic Park scientists can recreate dinosaur genomes and insert those into reptile eggs, creating living creatures. It's a small step from filling in missing spaces in genetic code to editing that code purposefully, as Wu does when he makes the animals dependent on lysine. However, his arrogant short-sightedness means that he fails to consider the ways in which adaptation, mutation, and chance intersect with his careful laboratory work. The specific animals bred on the park may indeed be Wu's "prisoners," confined to the island and subject to human control. But life itself resists this kind of human control.

Moreover, Wu's insistence that the lysine dependency functions as a kill switch to keep the dinosaurs from surviving in the wild suggests the ways that one's point of view limits their insight. Because the park supplements the animals' diets with lysine, Wu apparently forgets that various plants and animals provide rich dietary sources of the amino acid, meaning that any dinosaurs that can find sufficient sources in the wild can survive off of the island. Because he only expects to find comatose or dead escapees, Wu can't see or acknowledge living ones.

Third Iteration: Control (II) Quotes

"What you see here," Arnold said, "is an entirely separate counting procedure. It isn't based on the tracking data. It's a fresh look. The whole idea is that the computer can't make a mistake, because it compares two different ways of gathering the data. If an animal were missing, we'd know it within five minutes."

"I see," Malcolm said. "And has that ever actually been tested?"

"Well, in a way," Arnold said. "We've had a few animals die [...]"And in each case, once the animal stopped moving, the numbers stopped tallying and the computer signaled an alert."

Related Characters: John Arnold (speaker), Dr. Ian Malcolm

Related Themes:

Page Number: 143-144

Explanation and Analysis

On the tour of Jurassic Park, chief engineer John Arnold shows off the park's state-of-the-art computer system. Every 30 seconds, it uses video motion sensors throughout the park to mark the location of each individual animal. This provides operators with up-to-the-minute data and aggregate information about the dinosaurs' movement and home ranges over time. Then, four times an hour, the computer counts all the dinosaurs in the park, comparing this tally to the ongoing monitoring. Because the first tracks individual and then second tracks species, Arnold considers the procedures "totally different," and has full confidence that a comparison between the two will show any deviations from the expected numbers.

But in both cases, the computer only looks for the animals that the operators have told it to look for, and it cannot see anything else. This offers a pointed reminder that the technology developed by humans cannot surpass its designers. Its success or failure depends on its operators' ability to foresee contingencies. This passage also contributes to the book's broader criticism of arrogance and reliance on technology. Because Arnold trusts the computer to tell him when things go wrong, he ignores and

discounts evidence that comes from sources other than the computer system. This limits his ability to perceive and interpret events accurately.

> Yes […] Look here. The basic event that has happened in Jurassic Park is that the scientists and technicians have tried to make a new, complete biological world. And the scientists in the control room expect to see a natural world. As in the graph they just showed us. Even though a moment's thought reveals that a nice, normal distribution is terribly worrisome on this island […] Based on what Dr. Wu told us earlier, one should never see a population graph like that […because it] is a graph for a normal biological population. Which is precisely what Jurassic Park is not. Jurassic Park is not the real world. It is intended to be a controlled world that only imitates the natural world. In that sense, it's a true park, rather like a Japanese formal garden. Nature manipulated to be more than the real thing, if you will.

Related Characters: Dr. Ian Malcolm (speaker), Donald Gennaro, John Arnold, Dr. Henry Wu

Related Themes:

Related Symbols:

Page Number: 149

Explanation and Analysis

As the tour group prepares to leave the control room, Malcolm asks Arnold if the computer gathers population data on the park's animals. Arnold responds by pulling up a graph of the compys by height. This gives Malcolm all the evidence he needs to confirm that animals have escaped, although he doesn't explain fully what he sees. Instead, in this passage, he explains yet again to Donald Gennaro the problems with the very idea of the park. These boil down to insufficient insight, an arrogant assumption of control over nature, and a naïve belief in the power of technology. These three faults combined blind the park operators to evidence that Malcolm, an outsider with fresh eyes, considers painfully obvious.

In contrast, park operators' assumptions limit their vision and insight. Sometimes, they ignore evidence that contradicts their assumptions (for instance, that the dinosaurs can't survive off the island). But they also make a mistake in expecting to see natural patterns in the human-made park just because they've succeeded in emulating nature. In a way, the park operators have fallen victim to their own illusions and look at their creation through the eyes of guests rather than architects. Further, because the park operators believe they have absolute control over nature in the park, they ignore signs of potential danger or loss of control, naively trusting systems that are no more omniscient than their creators.

Third Iteration: Control (III) Quotes

> "Let's keep it in perspective," Hammond said. "You get the engineering correct and the animals will fall into place. After all, they're trainable."

From the beginning, this had been one of the core beliefs of the planners. The animals, however exotic, would fundamentally behave like animals in zoos anywhere. They would learn the regularities of their care, and they would respond.

Related Characters: John Hammond (speaker), John Arnold

Related Themes:

Related Symbols:

Page Number: 157

Explanation and Analysis

In the control room while their guests tour the island, John Hammond and John Arnold argue about the difficulty of maintaining a system as complex as Jurassic Park. This passage points out the primary flaw in the Jurassic Park system: the assumption that ancient animals like dinosaurs will behave in expected, predictable ways, and that their human controllers will be able to capitalize on these behaviors to create a safe and controlled environment. But the prevalence of engineering bugs in the park systems should suggest to readers, if not to Hammond, that his confidence rests on an unstable foundation of assumptions. Moreover, Hammond's belief that nature will conform to his expectations shows a profound lack of humility. No one has observed dinosaur behavior; paleontologists base their theories on the scanty evidence remaining after millions of years.

Still, the success (and safety) of the park rest entirely on this primary assumption. And repeatedly, the book has already documented the park planners' failure to make accurate predictions: they plant poisonous vegetation near the visitor center; they don't know what species of dinosaur they'll get from a new DNA strand until it hatches and they can identify it; the intelligence of some species (like the

raptors) catches them off guard. Thus, by clinging to his mistaken beliefs, Hammond not only shows the limits of human vision and insight in this moment, but he also shows the profound danger of humanity's prideful approach to nature.

Third Iteration: Big Rex Quotes

❝ Muldoon worried even more about the velociraptors. They were instinctive hunters, and they never passed up prey. They killed even when they weren't hungry. They killed for the pleasure of killing. They were swift: strong runners and astonishing jumpers. They had lethal claws on all four limbs; one swipe of a forearm would disembowel a man, spilling his guts out. And they had powerful tearing jaws that ripped flesh instead of biting it. They were far more intelligent than the other dinosaurs, and they seemed to be natural cage-breakers. […] Raptors were at least as intelligent as chimpanzees. And, like chimpanzees, they had agile hands that enabled them to open doors and manipulate objects. They could escape with ease. And when, as Muldoon had feared, one of them finally escaped, it killed two construction workers and maimed a third before it had been captured.

Related Characters: Robert Muldoon

Related Themes:

Related Symbols:

Page Number: 164

Explanation and Analysis

While the guests tour the island, Robert Muldoon paces the control room with increasing agitation. He worries about the park's ability to contain the animals and keep its guests safe. Of all the park's animals, he most fears the raptors, for the reasons outlined in this passage. More than any other animals, the raptors challenge a belief in humanity's dominion over nature. In almost every way—speed, agility, lethality, cooperation—the raptors match or exceed their human captors. And they possess an intelligence close to that of the humans. Moreover, they've already proven themselves to be a danger to human life in the park. Yet, park operators insist on keeping them, implying an unshakable belief in their ability to control these wild animals, despite all the evidence to the contrary. Thus, this passage indicts the park operators' arrogant assumption of dominion over nature, a superiority the book will show to be imaginary when the raptors do eventually escape.

This passage also contributes to the book's criticism of misused technology. The raptors, like all living creatures, will do their best to survive and thrive in their environment. Thus, their actions cannot be labeled good or bad. Likewise, the technology used to create them is neither good nor bad in and of itself. Rather, it can only be judged by the consequences of its use. This contributes to the book's argument that oversight and regulation must reign in human greed and pride and make sure that technologies support beneficial and non-harmful goals.

Third Iteration: Breeding Sites Quotes

❝ But we have soothed ourselves into imagining sudden change as something that happens outside the normal order of things. An accident, like a car crash. Or beyond our control, like a fatal illness. We do not conceive of sudden, radical, irrational change as built into the very fabric of existence. Yet it is. And chaos theory teaches us […] that straight linearity, which we have come to take for granted in everything from physics to fiction, simply does not exist. Linearity is an artificial way of viewing the world. Real life isn't a series of interconnected events occurring one after another like beads strung on a necklace. Life is actually a series of encounters in which one event may change those that follow in a wholly unpredictable, even devastating way. […] That's a deep truth about the structure of our universe. But, for some reason, we insist on behaving as if it were not true.

Related Characters: Dr. Ian Malcolm (speaker), Dr. Alan Grant, Dr. Ellie Sattler

Related Themes:

Page Number: 190-191

Explanation and Analysis

After Grant and Ellie discover the fragments of dinosaur eggshells, the tour group prepares to cut their itinerary short and return to the visitor center. On the way, Grant asks Malcolm how it feels to have had his theories validated, and Malcolm surprises Grant by admitting a deep sense of dread and impending doom. His study of chaos theory, as this quote illustrates, has given him a deep sense of life's contingency and chaos. Broadly speaking, the characters in this book fall along a spectrum in their beliefs about the randomness and chaos inherent in life. On one end, Hammond and Arnold think that, with enough time, money, and attention, they can exert near total control over nature—at least in confined, isolated environments like the island. On the other end, Malcolm sees the world as

completely unpredictable. In his view, the only thing one can confidently expect is the unexpected.

But outside the academic discipline of chaos theory, most people would not agree with his beliefs. And human civilization conditions people to expect order and predictability—physics has explained how objects move in space and has allowed humanity to propel themselves to the moon, for example. Literature promises neat story arcs that tie the events of a life together into one meaningful tapestry. But to Malcolm, these comforting illusions only render people vulnerable to more suffering when they don't expect what occurs, as Hammond's ongoing disbelief over events in the park shows. Still, Malcolm's viewpoint of chaos and contingency is hard to maintain; the very fact that it comes to readers in a book that follows the kind of deterministic narrative arc he mocks points to how the idea of linearity pervades people's thinking. And by pointing to this human flaw, Malcolm believes that he represents an evolution in human understanding that could save humanity, if enough people accept it.

Fourth Iteration: Bungalow Quotes

❝ Yet, you'll remember [...] that the original genetic engineering companies, like Genentech and Cetus, were all started to make pharmaceuticals. [...] Unfortunately, drugs face all kinds of barriers. [...] Even worse, there are forces at work in the marketplace. Suppose you make a miracle drug for cancer or heart disease—as Genentech did. Suppose you now want to charge a thousand dollars or two thousand dollars a dose. You might imagine it is your privilege. After all, you invented the drug, you paid to develop and test it; you should be able to charge whatever you wish. But do you really think that the government will let you do that? No, Henry, they will not. [...] *Something* will force you to see reason—and sell your drug at a lower cost. From a business standpoint, that makes helping mankind a very risky business. Personally, I would *never* help mankind.

Related Characters: John Hammond (speaker), Dr. Henry Wu

Related Themes:

Page Number: 222-223

Explanation and Analysis

Seemingly unperturbed by evidence of dinosaur breeding, a rising storm, and sudden loss of contract with the group in the park's tour vehicles, Hammond insists that Wu join him for dinner where he reminds Wu of the park's true purpose: to delight guests who will pay a lot of money to be there, making Hammond even richer. This passage provides perhaps the book's clearest description of Hammond's shortsightedness, selfishness, and greed. As he tells Wu, helping humankind doesn't make economic sense. Some of his concerns, about the obstacles that lie in the way of humanity using the technologies it has created responsibly, may be valid. Regulation to protect consumers must be balanced against allowing companies to take the kinds of risks that innovation requires. But, in the context of the events taking place on this island, readers should interpret this passage as an indictment of Hammond and the irresponsible science he represents.

This passage also shows the book's effective use of speculative fiction by mentioning two real-life biotechnology firms. Putting the fictional InGen in the company of Genentech (founded in 1976 and still in operation today) and Cetus (founded in 1971 and now a part of biotech firm Novartis) asks readers to consider the potential ramifications of society turning over scientific research to people and corporations for whom greed is more motivating than the betterment of humanity. Interestingly, Hammond's complaints about the economic limitations on drug manufacturing, imagined in a 1990 novel, resonate with early 21st-century scandals involving drug companies overcharging for lifesaving medications.

Fourth Iteration: Control (I) Quotes

❝ Hammond was like every other management guy Arnold had ever seen. Whether it was Disney or the Navy, management guys always behaved the same. They never understood the technical issues; and they thought that screaming was the way to make things happen. [...]

But screaming didn't make any difference at all to the problems that Arnold now faced. The computer didn't care if it was screamed at. The power network didn't care if it was screamed at. Technical systems were completely indifferent to all this explosive human emotion. If anything, screaming was counterproductive, because Arnold now faced the virtual certainty that Nedry wasn't coming back, which meant that Arnold himself had to go into the computer code and try and figure out what had gone wrong. It was going to be a painstaking job; he'd need to be calm and careful.

Related Characters: Dr. Alan Grant, Dr. Ian Malcolm, John Hammond, John Arnold, Dennis Nedry

Related Themes:

Page Number: 245

Explanation and Analysis

When park engineer John Arnold realizes that Dennis Nedry has sabotaged parts of the park's computer systems, he scrambles to restore order and control while Hammond rails at him to get the park back on track immediately. Up to their point of failure, Hammond, Arnold, and everyone else in the park has trusted the computer systems completely. They have rejected the warnings offered by outsiders like Malcolm that this trust limits their ability and might paradoxically reduce their ability to actually control the park. In other words, while this catastrophic loss of control comes as a surprise to Hammond and his employees, it doesn't surprise readers or the characters with whom they are supposed to identify, like Grant and Malcolm.

This passage also subtly and ironically plays with the idea of control and self-control. Park operators trust the computer systems to give them control over the island without considering the system's vulnerabilities. And when Nedry's unexpected sabotage proves Malcolm's ongoing assertions that the only thing a person should expect is the unexpected, Arnold and Hammond react in markedly different ways. Arnold asserts masterful self-control in the face of catastrophe, while Hammond has a tantrum. In part, this has to do with each's ability to actually do something in this moment; Arnold has technical expertise while Hammond knows nothing about how the park systems actually function. But this also points toward Hammond's foundational, flawed arrogance. As soon as Hammond loses the illusion of control over the world around him, he also loses control over himself, showing the illusory nature of his sense of control.

Fourth Iteration: The Park (I) Quotes

"Malcolm's models tend to have a ledge, or a sharp incline, where the drop of water will speed up greatly. He modestly calls this speeding-up movement the Malcolm Effect. The whole system could suddenly collapse. And that was what he said about Jurassic Park. That it had inherent instability."

"Inherent instability," Gennaro said. "And what did you do when you got his report?"

"We disagreed with it, and ignored it, of course," Arnold said.

"Was that wise?"
"It's self-evident," Arnold said. "We're dealing with living systems, after all. This is life, not computer models."

Related Characters: John Arnold (speaker), Dr. Ian Malcolm, John Hammond, Donald Gennaro

Related Themes:  

Page Number: 274

Explanation and Analysis

As the park's systems come back online and park staff return escaped animals to their proper enclosures, Arnold explains the "Malcolm Effect"—which Hammond earlier mentioned in passing—to Gennaro. Hammond, Arnold, and other park planners asked for outside consultants to contribute their expertise, then rejected those ideas (specifically Malcolm's) which were inconvenient to their plans. This moment emphatically supports the book's claim that people's biases and beliefs limit their field of vision. In other words, the self-evident incorrectness of Malcolm's models was only self-evident to the park operators because it contradicted their previously formed ideas. They looked only for the evidence that supported their beliefs and ignored or threw away anything that didn't. And the confidence with which a systems engineer and an eccentric rich man threw away the projections of an expert also speaks to the extreme arrogance and pride of the park operators. But although they were unwilling to listen to Malcolm's warnings, events in the park prove the accuracy of his predictions.

"Malcolm's just another theoretician. [...] Sitting in his office, he made a nice mathematical model, and it never occurred to him that what he saw as defects were actually necessities. Look: when I was working on missile, we dealt with something called resonant yaw. Resonant yaw meant that, even though a missile was only slightly unstable off the pad, it was hopeless. It was inevitably going to go out of control, and it couldn't be brought back. That's a feature of mechanical systems. A little wobble can get worse until the whole system collapses. But those same little wobbles are essential to a living system. They mean the system is healthy and responsive. Malcolm never understood that. [...] Look, the proof is right here. [...] In less than an hour, [...] the park will all be back online. [...] And that's not theoretical. That's a fact.

Related Characters: John Arnold (speaker), Dr. Ian Malcolm, John Hammond, Donald Gennaro

Related Themes:  

Page Number: 276-277

Explanation and Analysis

As he works to reestablish control over the park—with apparent success—Arnold explains to Gennaro what he sees as the flaws in Malcolm's assessment of the park's risk of instability. But Arnold's dismissal of Malcolm's theories points to a fundamental misunderstanding: Arnold thinks that Malcolm sees instability as a bug in nature, not a feature. However, careful readers will remember that Malcolm has acknowledged instability's important role in living systems. He agrees with Arnold that chaos drives adaptation and change in the world.

Where Malcolm and Arnold diverge is in their belief that humans can predict and control these instabilities. Malcolm holds that all complex systems lie beyond the realm of human control and that any system which involves living creatures qualifies for this level of complexity. In contrast, Arnold sees the park as a zoo. Refusing to acknowledge that he presides over a natural rather than a manmade system, Arnold believes that he can foresee and control all events in the park with the help of advanced computers. Since events in the book will prove Malcolm, rather than Arnold, right, this passage reinforces the book's claim that humans are ultimately powerless to control the world around them. And, because Arnold's shortsightedness will cost his own life and many others, moments like this contribute to the book's criticism of people who are blinded by their own biases and beliefs.

Fifth Iteration: Aviary Quotes

Ellie said, "You don't think much of Arnold, do you?"

"He's all right. He's an engineer. Wu's the same. They're both technicians. They don't have intelligence. They have what I call 'thintelligence.' They see an immediate situation. They think narrowly and call it 'being focused.' They don't' see the surround. They don't see the consequences. That's how you get an island like this. From thintelligent thinking. Because you cannot make an animal and not expect it to act alive. To be unpredictable. To escape. But they don't see that."

Related Characters: Dr. Ian Malcolm (speaker), Dr. Ellie Sattler, John Arnold, Dr. Henry Wu

Related Themes:

Related Symbols:

Page Number: 317

Explanation and Analysis

On the dawn of the second day on the island, Ellie keeps the wounded Malcolm company in his hotel room while the other park employees work to restore order. He continues to criticize park operators for their shortsightedness and greed, and in this passage, he defines their essential character flaw as one of "thintelligence." At its most basic level, "thintelligence" describes a way of missing the forest for the trees. Wu, Arnold, and others focus so intently on their small part of the world that they misunderstand or misappraise how events and variables intersect with and influence each other. Malcolm isn't criticizing technical expertise, but he does explore its limits.

Thus, Malcolm's words advance the book's exploration of the limits of human insight and understanding. Malcolm can see the flaws in the park system more readily than its expert operators because he occupies a different vantage point, one which lies far enough away to see how the trees in the forest come together to form a bigger picture. And, by extension, the idea of "thintelligent" thinking contributes to the book's call for appropriate regulation and oversight of scientific exploration and technological development. The very expertise needed to innovate in these fields stands at odds with the kind of big-picture thinking necessary to guide development toward beneficial ends. Thus, outside experts should be tasked with overseeing research in order to ensure that progress benefits rather than harms humanity.

Fifth Iteration: Control Quotes

Scientists are actually preoccupied with accomplishment. So they are focused on whether they can do something. They never stop to ask if they *should* do something. They conveniently define such considerations as pointless. If they don't do it, someone else will. Discovery, they believe, is inevitable. So they just try to do it first. That's the game in science. Even pure scientific discovery is an aggressive, penetrative act. It takes big equipment, and it literally changes the world afterward. Particle accelerators scar the land, and leave radioactive byproducts. Astronauts leave trash on the moon. There is always some proof that scientists were there, making their discoveries. Discovery is always a rape of the natural world. Always."

Related Characters: Dr. Ian Malcolm (speaker), Dr. Ellie Sattler

Related Themes:

Page Number: 318

Explanation and Analysis

Malcolm waxes philosophical—possibly due to large doses of morphine—as he talks with Ellie in the lodge about the limits of scientific inquiry and human insight. Malcolm's words in this passage echo the introduction, which criticized scientists who abandon the pure research of the university system, lured by the lack of regulation and possibility of wealth in the private sector. But Malcom extends this criticism further, implicating science as a discipline in a violent contest of control over nature itself. Malcolm's study of complex systems has led him to believe that humankind has a finite ability to understand the way nature works. Computer systems can help us discover the patterns in seemingly random events, but only up to a certain point. And science can't answer all of humanity's questions—some of those belong to the realms of philosophy. Malcolm makes a rather ghoulish comparison between discovery and rape, and while he points to the physical damage scientific advances have made to the earth, it's also possible to read his criticism more broadly. By uncritically taking what we want from the earth in the name of progress, humanity endangers the existence of itself as well as countless other species. Malcolm asks, in essence, whether our current state of technological advancement is worth what it costs the world to get there.

> But scientific power is like inherited wealth: attained without discipline. You read what others have done, and you take the next step. You can do it very young. You can make progress very fast. There is no discipline lasting many decades. There is no mastery: old scientists are ignored. There is no humility before nature. There is only a get-rich-quick, make-a-name-for-yourself-fast philosophy. Cheat, lie, falsify—it doesn't matter. Not to you, or your colleagues. No one will criticize you. No one has any standards. They are all trying to do the same thing: to do something big, and do it fast.

Related Characters: Dr. Ian Malcolm (speaker), Dr. Alan Grant, John Hammond, Dennis Nedry, Lewis Dodgson

Related Themes:

Page Number: 343

Explanation and Analysis

As Malcolm continues to criticize John Hammond following the disastrous collapse of the park thanks to Nedry's sabotage and Arnold's incompetence, he expands his criticism toward all scientists who use their powers inappropriately. Malcolm uses the martial arts as a metaphor for science. In martial arts, a master gains ability to deal grievous bodily harm to others only through a long apprenticeship that also teaches him the discipline to use his power responsibly. In contrast, the late 20th-century scientist, with access to powerful supercomputers and gene-editing technologies, doesn't necessarily have to develop that discipline. This doesn't mean that all scientists lack it; Grant exemplifies mature, responsible scientific power. Events on the island confirm many of the theories he has developed about dinosaur behavior over many years of careful and tedious study of their fossilized remains. While the prospect of studying living dinosaurs excites and moves him, caution balances his sense of wonder.

In contrast, Lewis Dodgson represents the book's clearest example of "cheat, lie, falsify" science, or science that cuts ethical and technical corners for the sake of discovery. Between these two extremes sits Wu. Over the course of the book, events in the park temper his initial optimism about his ability to manipulate and control nature. But he still exemplifies the use of science as inherited wealth—he even inherited the Jurassic Park project from his doctoral advisor, who worked with Hammond before dying of cancer. Events in the park show the potentially disastrous consequences of this uncritical, undisciplined approach to science, especially for Wu, who pays for his arrogance with his life in the jaws of creatures he himself has made.

> At the same time, the great intellectual justification of science has vanished. Ever since Newton and Descartes, science has explicitly offered us the vision of total control. Science has claimed the power to eventually control everything, through its understanding of natural laws. But in the twentieth century, that claim has been shattered beyond repair [...] Now we know that what we call 'reason' is just an arbitrary game. It's not special, in the way we thought it was [...] And so the grand vision of science, hundreds of years old—the dream of total control—has died, in our century. And with it much of the justification, the rationale for science to do what it does. And for us to listen to it.

Related Characters: Dr. Ian Malcolm (speaker), John Arnold

Related Themes:

Page Number: 350

Explanation and Analysis

Malcolm ends his lengthy criticism of science as a discipline with a return to chaos theory, which illustrates the hard limits within which humanity must operate. He attributes the park's failure to the scientific hubris that characterizes the modern age, the culmination of a development that began in the Renaissance. Centuries of scientific research gave humans the sense that our understanding of and control over the world could one day be absolute. Only in the second half of the 20th century did limits on our knowledge become apparent. Thus science—the quest to understand reality—has lost its ultimate purpose. The only way to continue, as Malcolm has suggested elsewhere, is to focus so narrowly on individual advances (like cloning dinosaurs) that modern scientists all too often develop a myopic, "thintelligent" view of the world.

In a broader sense, Malcolm's criticism forms part of the book's claim that humans should oversee and guide science with care, attention, and humility. When they don't, other motivations like greed and pride too easily fill the vacuum. And without an appropriate goal, scientists become free to use their knowledge to whatever ends they choose. And when they choose ends like Jurassic Park—animated by pride or motivated by greed—disaster follows.

Sixth Iteration: Return Quotes

❝ The behavior of the dinosaurs had always been a minor consideration for Wu. […] You couldn't really predict behavior, and you couldn't really control it, except for in very crude ways. […] You couldn't look at a DNA sequence and predict behavior. It was impossible.

And that had made Wu's DNA work purely empirical. It was a matter of tinkering, in the way a modern workman might repair an antique grandfather clock. You were dealing with something out of the past, something constructed of ancient materials and following ancient rules […] Wu would make an adjustment and then see if the animals behaved any better. And he only tried to correct gross behavior: uncontrolled butting of the electrical fences, or rubbing the skin raw on tree trunks. Those were the behaviors that sent him back to the drawing board.

Related Characters: Dr. Alan Grant, Dr. Ian Malcolm, Dr. Ellie Sattler, Dr. Henry Wu

Related Themes:

Related Symbols:

Page Number: 374

Explanation and Analysis

As Wu watches the park's escaped raptors toy with Ellie (who is, in turn, trying to distract them so that Grant can safely restart the generator), he considers elements of his creations that he hadn't bothered thinking about before, like their intelligence and behavior. Wu's approach to filling in the dinosaurs' genetic codes demonstrates both the power of advanced modern technology and the limits of human understanding. In this way, it points toward Malcolm's idea of modern science as inherited wealth. The technology at his disposal allowed Wu to extract DNA from amber, replicate it, break it apart and enumerate its code via computer, modify it by filling in gaps and correcting errors, and then use it to create living things. But despite his ability to manipulate it, Wu doesn't understand DNA as a substance very well—no one yet does. But what's worse, he didn't show any interest in learning about the creatures he was making, either. Instead, he assumed that because he could do something, he would be able to control the outcome and correct any mistakes or unexpected consequences.

Wu's somewhat haphazard and iterative approach to "correcting" issues with his dinosaurs also demonstrates the limits nature imposes on human control. Animal behavior combines instinct (based in genetic code) with socialization. Thus, Wu's recreated dinosaurs were always going to be inexact copies of their ancient relatives. But even the instinctual parts of their behavior have proved difficult to predict and control, due to the complexity of an animal's genetic code. For example, it took more than a decade of research across dozens of institutions simply to map the complete human genome. And research into how our genes affect not only our physical bodies but also our behavior continues to this day. Given the almost incomprehensible complexity of the systems in the natural world, the idea that humans can understand and control living creatures to the extent that would be required to make a project like Jurassic Park safe is ridiculous. Yet, in his pride and greed, Wu attempted to do exactly that, and nature gave him dinosaurs like the raptors, with their unexpected and lethal intelligence.

Seventh Iteration: Hammond Quotes

The compys didn't look dangerous. They were about as big as chickens, and they moved [...] chickens. But he knew [that...their] bites had a slow-acting poison that they used to kill crippled animals.

Crippled animals, he thought, frowning.

The first of the compys perched on the hillside, staring at him. It stayed about five feet away, beyond his reach, and just watched him. Others came down soon after, and they stood in a row. Watching. They hopped up and down and chittered and waved their little clawed hands.

"Shoo! Get out!" he said, and threw a rock.

The compys backed away, but only a foot or two. They weren't afraid. They seemed to know he couldn't hurt them.

Angrily, Hammond tore a branch from a tree and swiped at them with it. The compys dodged, nipped at the leaves, squeaked happily. They seemed to think he was playing a game.

Related Characters: John Hammond, Tina Bowman

Related Themes:

Related Symbols:

Page Number: 439-440

Explanation and Analysis

After a great deal of effort and good luck, the survivors of Jurassic Park have managed to restart the generator call for rescue from the mainland. While they wait, Hammond wanders off and breaks his ankle tripping in the underbrush. Sensing his vulnerability, the park's compys close in on him. In this passage, readers watch with Hammond as they circle for their final attack. In turning on their creator, the compys demonstrate the fundamental inability of humankind to predict and control nature. Being killed by the compys serves several forms of metaphorical justice on Hammond. The compys were the first animals to escape the island, and the book began with one attacking Tina Bowman on the mainland. At the time, Hammond discounted this event, blindly insisting on the power of the park systems to control everything. But more importantly, the compys are scavengers.

In Hammond's death, the book denies the elderly, injured Hammond the dignity of a death at the hands of one of the park's more fearsome predators, like the tyrannosaurs or the raptors. Instead, it dispatches him like so much metaphorical waste that the compys need to scour from the island in the same way they clean up the larger dinosaurs' droppings. And in the end, Hammond can't even fight off the smallest of the park dinosaurs. He's fallen—literally and figuratively—from a position of god-like power over these animals and in his final moments must face the reality that he is a mortal creature, just as subject to the laws of nature as every other thing in the world.

SUMMARY AND ANALYSIS

The color-coded icons under each analysis entry make it easy to track where the themes occur most prominently throughout the work. Each icon corresponds to one of the themes explained in the Themes section of this LitChart.

INTRODUCTION

The introduction begins with a survey of the late 20th century's biotech "scientific gold rush," which promises to change everything about the human experience. This scientific revolution differs from previous ones in three ways: hundreds of companies and thousands of labs work independently from each other, with no overarching goal; it looks for thoughtless and frivolous discoveries; and it is underregulated, if not functionally "uncontrolled."

The book begins with an introduction considering the nature of rapid technological change in the late 20th century. Concerns over the rapid change and insufficient oversight of modern scientific research establish the need for regulation and oversight by disinterested groups to prevent unnecessary or immoral use.

In the past, scientists tended to ignore national boundaries, avoid secrecy in research, and disdain monetary incentives. They frequently avoided patenting important discoveries, feeling that their research was for the benefit of humankind. That included the work of James Watson and Francis Crick, who figured out the structure of DNA in the 1950s. But in the 1970s, the foundation of Genentech began a new wave of commercialized science. Within a decade, molecular biologists and geneticists had fled from the universities to better-paying positions at biotech firms. Now they do research "in secret, in haste, and for profit."

The book criticizes the changes privatization brought to the scientific community. Monetary incentives—in other words, greed—have made scientists less cooperative and more secretive. And without oversight and regulation, mistakes and oversteps increase in frequency and danger. As a work of speculative fiction, Jurassic Park *blends its fictitious events with real developments by naming Genentech—a real-world American biotech research firm.*

These circumstances precipitate the rise of the extremely ambitious International Genetic Technologies company—and its swift, devastating downfall. Few people pay attention when InGen declares bankruptcy in October of 1989—the third biotech firm of the year to do so. The hearings happened behind closed doors, and most of the parties signed nondisclosure agreements that prevent comment. But a few people can speak freely enough to recreate the events of August 1989 on a remote **island** off the coast of Costa Rica.

Initially, the introduction feels like the author's commentary on the trends that inspired the novel. It's only at the end that readers realize that it blends fact with fiction to make us feel urgency about the issues at stake: unregulated, potentially dangerous scientific research and technological development and the human flaws (like greed and pride) that can undermine human progress.

PROLOGUE: THE BITE OF THE RAPTOR

Dr. Roberta Carter, newly transplanted from a high-stress residency in emergency medicine in Chicago to an idyllic fishing village in Costa Rica, stares at the torrential downpour outside the medical clinic. She's getting tired of the unending rain. Suddenly, she hears the approach of a helicopter through the storm. The aircraft marked "InGen Construction" lands outside and disgorges two crewmen, an injured worker on a stretcher, and a man in a yellow raincoat named Ed Regis.

Although Dr. Carter has moved to a tropical paradise, the unending rain offers a pointed reminder that humans have limited control over nature or natural processes. Notably, Malcolm uses the weather repeatedly as an example of chaos theory. The fact that the helicopter attempts to land in a storm indicates the seriousness of the worker's injuries, and by extension the resort's unacknowledged dangers

The injured worker—a kid no older than 18—looks like the victim of a wild animal mauling, although a clearly nervous Ed Regis tells Dr. Carter that a backhoe ran over and dragged him. Without dirt or contamination in the wounds, she doesn't believe him—and her doubt increases when she spots defensive wounds on the worker's hands and arms. The worker is in shock, and he whispers "Lo sa **raptor**" while she examines him. Her assistant refuses to help clean the foul-smelling wounds, worried that a "hupia"—a local bogeyman believed to hurt and steal small children—caused them. The worker suffers vomiting spells and seizures, and then he dies. The InGen crew collect his body.

Because Dr. Carter chooses to pay attention and interpret the evidence in front of her, she correctly guesses the true nature of the accident, even if she can't identify the animal. Her hypothesis shows how far unbiased judgement can go toward uncovering the truth, and her inability to interpret the worker's whispers reminds us that the available information will always limit insight. The assistant's identification of the "raptor" with the "hupia" bogeyman point toward forces in nature beyond human understanding or control.

Later, using her Spanish dictionary, Dr. Carter learns that "**raptor**" means "ravisher" or "abductor." When local midwife Elena Morales comes in with a woman in labor, Dr. Carter tries to ask her about raptors and "hupias." Elena doesn't want to invite bad luck by talking about such topics, but she does tell Dr. Carter that raptors steal victims, they don't maul them. Still later, in her English dictionary, Dr. Carter discovers another definition of the word raptor: a bird of prey.

Dr. Carter's research doesn't bring her closer to clarity because she can't see what's happening on the distant island. Still, her dictionary reading associates the idea of the park's raptors—which symbolize the uncontrollable, irrepressible power of nature—with danger long before the book introduces the dinosaurs themselves.

FIRST ITERATION: ALMOST PARADISE

Mike Bowman, an American real-estate developer, enjoys a vacation in Costa Rica with his wife Ellen and their daughter Tina. It turns out that Ellen picked the country not only for its scenic beaches but also its affordable plastic surgery. Mike wishes that Ellen weren't so worried about her physical appearance; at 30, she's very beautiful. As they drive to an isolated beach in the Cabo Blanco Biological Reserve, Tina looks for new animals to add to a list she's keeping for a school project. At the beach, Tina runs off, hoping to find a sloth. Ellen worries about snakes, but Mike assures her that Tina is safe.

Ellen Bowman's obsession with her physical appearance—demonstrating vanity—points to the flaws that still exist in human nature, despite its advanced state of development. The Bowmans visit a pristine beach in a country filled with immensely diverse ecosystems, but Ellen can only worry about herself. Thus, when a dinosaur attacks her daughter, her self-focus metaphorically suggests the ways in which humanity ignores the true threats to its existence in favor of focusing on superficial issues.

After a few minutes wading in the ocean, Tina heads towards the tangle of palm and mangrove trees that line the beach, hoping to spot a sloth in the wild. In the beach's sand, she sees **vestiges** of local birds—three-toed footprints in the sand. Most look small, but she sees some large and deep ones, too. She hears a bird-like chirping, and then, from the shadow of the trees, a chicken-sized lizard appears, balancing itself with a thick tail as it walks on its hind legs. As the curious, unafraid creature approaches her, Tina realizes it made the larger sets of tracks. She holds out her open hand, and it scrambles up her arm, towards her face. Still near their car, Ellen and Mike hear Tina's terrified screams.

Many of the experts in Jurassic Park, *especially in the first few sections, or "Iterations," fail to understand events in Costa Rica, because their biases make them ignore the obvious but implausible fact that dinosaurs roam the jungles of modern Costa Rica. With her unbiased child's eyes, Tina makes more accurate observations of the signs, like the footprints, than the adult experts. Her perceptiveness contributes to the book's argument that insight requires accepting the evidence one actually sees, not the evidence one wants or expects to see.*

FIRST ITERATION: PUNTARENAS

In Puntarenas, the local doctor assures Mike and Ellen Bowman that Tina will survive the attack, despite the alarming swelling and labored breathing she suffered on their drive back into civilization. They found her covered in saliva and dozens of tiny animal bites. To identify the animal that attacked her—and of which Tina has drawn a picture—the doctor has collected **samples** of its saliva and asked a local biologist, Dr. Marty Guitierrez to consult.

Tina's reaction to the animal bites—and the fact that the doctor has asked for a biologist to consult—suggest that the attack is unlike anything he's seen before. The bitemarks, saliva, and drawing are also all vestiges (traces of something that is no longer present), and an expert should be able to interpret correctly.

After confirming the family's description of the animal—a green and brown lizard, about a foot long, walking on its hind legs—Dr. Guitierrez assures them that Tina encountered a non-poisonous, striped basilisk lizard. Lizard bites are common—recently, a lizard bit an infant in her crib about 60 miles away. He glances at Tina's picture, which confirms his suspicion, even though he notes that Tina has incorrectly given it a long neck and three toes instead of five. Mike and Ellen trust their daughter's drawing as accurate, since Tina is an observant child. Still, everyone else trusts Guitierrez's identification enough to stop trying to analyze the saliva, although the hospital forwards a sample to the nearest university.

When the expert arrives, he selectively looks for the evidence that will confirm his theories; despite Tina's parents' assurance that Tina accurately drew what she saw, he rejects it as incorrect because it doesn't align with his expectations. While his blind spot to the possibility of living dinosaurs is understandable, this encounter still points to the dangers inherent in overconfidence. This leaves people vulnerable to the unexpected, and this kind of limited vision threatens humanity's ability to adapt and survive in a changing world.

In the morning, when the doctor discharges Tina, she notices that he changed his shirt—but not his tie—after his overnight shift. This confirms her observant nature, so the doctor asks her again how many toes the lizard has. She insists on three—not only because she saw them on the animal but because they matched the **tracks** in the sand. The doctor reports this conversation to Dr. Guitierrez, who admits that he's no longer so sure that she encountered a basilisk lizard and asks to be notified of any other lizard bites.

The brief episode with the doctor independently confirms Tina's observant nature, allowing readers to understand anew Dr. Guitierrez's foolishness in discounting the evidence of her drawing. To his credit, in response to Tina's repeated insistence, Dr. Guitierrez models the proper, unbiased spirit of scientific inquiry rather than falling back on his own assumptions.

FIRST ITERATION: THE BEACH

Two days later, Dr. Guitierrez visits the beach at Cabo Blanco. He's troubled by the incident with the Bowmans. Basilisk bites and lizard bites requiring hospitalization are strange; he can't find any examples in the research literature. And when he looks into the incident with the infant that he described at the hospital, he learns that recently, lizard bites have become quite common. He begins to suspect the discovery of a new species—not uncommon in Costa Rica, with its extreme biodiversity. Additionally, deforestation means that habitat losses push species into new niches and change their behavior.

Dr. Guitierrez models the curiosity and integrity necessary for insight. He follows the growing trail of evidence that a previously undiscovered animal bit Tina, although InGen's secrecy still limits his vision. The extreme biodiversity of the country, which harbors many undiscovered species, also points to the chaos and change that characterize nature and put it beyond human capacity for complete understanding.

Just as Dr. Guitierrez prepares to leave—the sun is setting and he doesn't want to have to drive back on the rugged road in darkness—he spots a howler monkey ambling down the beach, munching on a lizard. On closer inspection, he sees a green tail with brown stripes. Shooting the monkey with a tranquilizer dart, Guitierrez retrieves the lizard's **remains**. Now he can send them to the world's preeminent authority on lizard taxonomy, Dr. Simpson, for proper identification.

In a stroke of good fortune that illustrates the chaos and contingency of life, Dr. Guitierrez discovers the lizard just before he leaves. Unfortunately, the fact that only half of it remains limits his ability to analyze the lizard's remains. These signs require the knowledgeable eye of an expert like Dr. Stone.

FIRST ITERATION: NEW YORK

Dr. Richard Stone heads the Tropical Diseases Laboratory at Columbia University. Medical advances have rendered much of its work mundane, so it surprises the lab when they receive the **fragment** of an unidentified Costa Rican lizard. Dr. Simpson is away, so his lab sent the lizard over to be screened for potential infectious diseases in the meantime. Someone carefully wrapped the sample to prevent possible biological contamination. And Tina's drawing has traveled to New York alongside it. Dr. Stone asks a tech to photograph and x-ray the lizard and then run tests on its blood.

Dr. Stone isn't an expert on reptiles, so he can only screen the sample for dangerous chemicals, bacteria, and viruses. Still, his conclusions about the sample's species will carry a great deal of weight. The book carefully details the precautions that people took with the lizard's remains, pointedly reminding readers that any evidence from this sample, uncontaminated by outside sources, should be taken at face value.

The lizard's blood isn't reactive to known viral or bacterial antigens, suggesting that its bites won't sicken people. The toxicity profiles indicate a slight similarity to the venom of the Indian king cobra, but because cross-reactivity among reptiles is common, Dr. Stone fails to include it in the report he sends back to Dr. Guitierrez. Based on Stone's report, Guitierrez assumes that Dr. Simpson has confirmed his basilisk lizard identification and that the lack of communicable disease means that the lizards present no serious health risks. Reassured of the accuracy of his hypothesis—that deforestation has driven a lizard species into new and alarming contact with humans—Guitierrez assumes the situation will soon settle down.

Dr. Stone doesn't report the full results of his tests where they contradict his beliefs about the lizard, namely that it belongs to the basilisk species, since that's how the sample was labeled. Likewise, when Dr. Guitierrez accepts the report at face value, his assumptions magnify Dr. Stone's. Although both men look at Tina's drawing and the sample of the lizard in various ways, neither has the insight to understand what they're looking at. Their complacency doesn't just prevent identification of the animal, but it also puts people in danger.

But at almost the same moment, Costa Rican midwife Elena Morales leaves the side of a newly delivered mother to check on the newborn lying in the next room. She finds three dark green lizards crouched around the bassinette with blood dripping from their noses. She scares them off, but they have eaten through the baby's face, killing it.

Because Dr. Guitierrez and Dr. Stone both made large assumptions about the lizard attack based on their blind spots and their biases, they failed to appreciate the danger these animals pose. Therefore, their arrogant overconfidence puts innocent victims at risk, reminding readers that humanity's unaddressed flaws pose a grave risk to human survival, both individually and collectively.

FIRST ITERATION: THE SHAPE OF THE DATA

Worried that she might face consequences for leaving the baby alone, Elena Morales reports its death as a case of Sudden Infant Death Syndrome. Meanwhile, the university lab analyzing the saliva sample from the Tina Bowman attack discovers that it contains a neurotoxin related to cobra venom as well as a marker for genetic engineering. But because they believe the sample came from a wild animal, the lab techs assume that the sample has been contaminated, so they don't report it to Dr. Guitierrez.

The lab techs at the Costa Rican university also disregard data that contradicts their expectations. The extent of human knowledge can blind people to what we can't explain or don't know. This represents a particularly terrible oversight, since the lab finds but then ignores evidence of danger—neurotoxins—and evidence that this isn't a previously undiscovered species, in fact, but a manmade one.

But in New York, a lab technician named Alice Levin sees Tina's drawing and identifies it as a dinosaur. Dr. Stone asserts that it isn't a dinosaur, but a living creature. When Alice insists, after looking at the frozen remains, on the dinosaur-like appearance of the Costa Rican lizard, Dr. Stone writes her off as an "uninformed" tech with an "active imagination."

In contrast to the experts like Dr. Stone and Dr. Guitierrez, Alice Levin clearly sees what's there in the lab sample and drawing: a dinosaur. But instead of respecting her vision, Dr. Stone uses it to dismiss her ideas as uninformed. His inability to see things that contradict his beliefs blinds him to what's there, even when it's blindingly obvious.

SECOND ITERATION: THE SHORE OF THE INLAND SEA

Alan Grant painstakingly excavates a tiny, fossilized **skeleton** from the limestone, oblivious to the heat and uncomfortable position in which he crouches. In the distance, someone calls his name. In the present, heat, dust, and wind fill these barren and rocky Montana badlands. But in his mind's eye, Grant can see the swampy shoreline of the ancient inland sea that covered much of the United States millions of years earlier. In that distant, distant past, an island in that lake provided a sanctuary for duck-billed dinosaurs to lay their eggs and raise their young. Someone calls his name again, breaking his reverie. In the distance, Ellie Sattler beckons him to camp. They have a visitor.

In contrast to the greedy and dangerous scientists criticized in the introduction, Grant and Ellie pursue scientific discovery for love, not for money. They put up with discomfort and difficulty for the reward of an opportunity to uncover minute details about dinosaurs and their lives on earth. When Grant considers the vast changes that time, geology, and environmental processes have wrought on the earth, he reminds readers of how little humans truly know or understand about the nature of their planet.

Massive worldwide changes like deforestation and global warming make the knowledge of paleontologists like Dr. Grant increasingly valuable, and he's used to providing his expertise. On this day, Bob Morris, a young lawyer from the Environmental Protection Agency, wants to talk to him. Morris expresses surprise that the paleontologists use tipis for shelter, but Grant assures him that nothing else works as well. Modern tents blow away, but tipis modeled on the shelters made by the Blackfoot tribes who once lived in the badlands best survive the winds.

The team's tipis represent another vestige of the past—the shelters used by the land's indigenous inhabitants stand the test of time and outperform modern tents. This shows how Grant and his team attend carefully to the lessons of the past. It also suggests that modern technology isn't necessarily better than the older ways of doing things, especially when it fails to respond appropriately to the conditions.

Grant teaches paleontology at the University of Denver, but he prefers fieldwork and has little patience for social niceties or the cerebral work of academics and museum curators afraid to get their hands dirty. Morris gets right to the point: he's investigating the Hammond Foundation, which generously contributes to Grant's expeditions and for which Grant has served as consultant. John Hammond, a wealthy, eccentric "dinosaur nut" funds many paleontological projects, Grant explains. Morris notes that Hammond only funds digs in the northern reaches of the globe; that he has amassed the largest privately-held stock of **amber** in the world; and that he purchased an **island** off the cost of Costa Rica.

In investigating the Hammond Foundation from afar, Bob Morris can only carefully study the vestiges of their activities. His attempt to discern InGen's research activities parallels Grant's attempts to figure out how dinosaurs lived based on the scanty evidence of their fossilized remains. Both investigations suggest that true understanding requires careful attention to even the smallest pieces of evidence and point to the difficulty of drawing correct conclusions based on incomplete evidence.

Grant specializes in the rearing behavior of dinosaurs, following his discovery of a clutch of eggs at a Montana dig in 1979 and his massively appealing hypothesis that dinosaurs possessed maternal instincts. He tells Morris that, as a consultant to InGen, he mostly talked with a lawyer named Donald Gennaro on the phone. The company offered Grant $50,000—enough to support two full summers of fieldwork—to write up his previously unpublished findings on "nesting behavior, territorial ranges, feeding behavior [and] social behavior" of the dinosaurs he'd studied. Grant recalls that, although Gennaro claimed he was researching a children's museum exhibit, he would call up with oddly specific, strangely urgent questions at all hours of the day and night. Grant got tired of it and revoked the consultancy in 1985, after which the Hammond Foundation started to support his work annually.

Grant's paleontological research demonstrates his ability to gain insight by careful observation, which yielded insights about dinosaur behavior based on a handful of bones and fossilized nests. It's this expertise that the InGen taps when they hire him as a consultant. InGen's success in breeding and rearing dinosaurs in their lab proves the accuracy of many of Grant's theories. This shows how insight and understanding depend on careful attention. And while Grant does his research for love, his digs are still expensive, and John Hammond can exert control over him with the promise of necessary funding.


Although he has no proof, Morris feels certain that John Hammond is "evading the law." He came under suspicion when his company transferred three incredibly powerful computers and 24 automated gene sequencers to a remote **island** near Costa Rica. These actions sparked concern since they seem to have established a genetic engineering facility in a country with no regulation. This has happened before, most notably the Biosyn Rabies case of 1986, in which a biotech firm tested a rabies vaccine on Chilean farm workers without their full consent. And they genetically modified the rabies virus to be capable of airborne spread. Thanks to political distraction and commercial pressures, Biosyn faced no accountability, and the geneticist in charge of the project, Lewis Dodgson, still works for them.

Morris clearly suggests that Hammond purchased the island to evade oversight and control over InGen's research. The case of Biosyn illustrates the dangers of unregulated technological and scientific research. It recalls historical abuses of unwitting subjects, such as the Tuskegee Syphilis study—for which none of the scientists involved were held accountable. But it also incorporates the powers unlocked by genetic sequencing and modification, which in theory can be used to make deadly viruses, like rabies, even more dangerous.


Despite his gut feeling that John Hammond is skirting regulatory oversight in a similarly dangerous way, Morris admits that he lacks the evidence to continue the investigation. As his conversation with Grant draws to a close, they can hear Ellie answer the phone at the other end of the trailer. Grant assures Morris that the team has never given Hammond physical **materials** like bones or eggs. They send pieces that are too fragmented for museum preservation to a lab for genetic analysis.

Grant's final exchange with Morris provides another breadcrumb for the lawyer as he tries to piece together a picture of Hammond's activities; the current state of technology allows scientists to extract genetic material from fossilized dinosaur bones for identification purposes. And Morris's question seems to indicate that Hammond might have asked for such DNA-rich material from other paleontologists.

As he walks out the door, Morris asks Grant what else InGen could have done with the information he gave them if they weren't making a museum exhibit. Laughing, Grant replies they could have fed a baby hadrosaur. A dejected Morris climbs into his car. As he and Ellie laugh over the idea of John Hammond being a sinister arch villain, Grant asks who called. Ellie names the caller as Alice Levin, a scientist in New York who wants a call back right away.

Grant accidentally stumbles onto the truth but finds it so implausible that he only offers it as a humorous hypothesis to Morris. The two men have all the evidence necessary, but they lack the insight—or the vision—to image that anyone would actually try to secretly clone dinosaurs. And the section ends by teasing whatever urgent information the scientist in New York has to share with Grant.

SECOND ITERATION: SKELETON

While Ellie carefully works to dissolve the limestone from around excavated **fossils**, she listens to Alan Grant on the phone with Alice Levin. He promises to help her identify a lizard if she faxes him its x-ray. While he waits, he tells Ellie about the infant velociraptor skull he discovered before Morris's arrival. Ellie asks if he's excited about finding his first predator fossil they've found at the site—but Grant doesn't answer. He's staring at the faxed x-ray in dumfounded silence.

Ellie's efforts with the fossils demonstrate the care and attention that must go into understanding the world and building a true understanding of the past. Meanwhile, Alan and Alice can talk and share data thanks to powerful modern telecommunications technology, offering a reminder that technologies in and of themselves are morally neutral; their benefit or harm depend on how they're used.

Ellie and Grant agree that the creature in the x-ray isn't a lizard. But Ellie can't bring herself to accept it as real. She's thinks it must be a well-executed hoax. Still, if it is a hoax, they agree it's a skillful one—especially considering they believe the x-ray shows a *Procompsognathus*, a relatively obscure dinosaur. They discuss the possibilities. This may be a rediscovery of an animal thought to be extinct, like the coelacanth, the Australian pygmy possum, or a New Guinean fruit bat from 10,000 years ago. Still, none of these creatures are as ancient as a Triassic dinosaur.

With their expert knowledge of dinosaur bones, Ellie and Grant immediately see what other, less informed "experts" missed: the Costa Rican mystery lizard looks like a dinosaur. But their disbelief points to their reliance on the mental shortcuts they use to understand the world, namely the one that says dinosaurs went extinct millions of years ago. Still, the discovery of other animals previously thought extinct points to significant knowledge gaps.

As Ellie and Grant debate whether the x-ray depicts a hoax or a legitimate rediscovery, the phone rings again. This time it's John Hammond, whom Grant puts on speaker so they can both listen. Hammond wants to know if the EPA lawyer who recently visited Ian Malcolm (another one of his consultants) has harassed them. But mostly, he says, he wants to invite them to visit his nearly completed "biological preserve" on Isla Nublar, an **island** off the coast of Costa Rica. Grant protests that he'd rather excavate his dig **fossils** or fly to New York to investigate the potential rediscovery of a living procompsognathid ("compy"). The mention of the living dinosaur seems to surprise and upset Hammond. He fishes for more details about the find.

As an incredibly wealthy man, John Hammond seems accustomed to being able to control circumstances and people around him. And his paranoid attempts to find out about Bob Morris's actions suggests that he does, indeed, have something to hide on his island. As a pure scientist, Grant expresses disdain for Hammond's projects; he would rather dig in the hot, barren badlands than visit a cushy resort.

Undeterred by any excuse, Hammond presses Ellie and Grant to visit his island at the usual consultant fee of $20,000 per day. The weekend trip would earn them $120,000—enough to finance two years' worth of fieldwork. They accept, and Hammond tells them that his corporate jet will pick them up the next day.

Hammond exerts control on the people around him with money; throwing it around like he does when he offers to pay Grant and Ellie for their time both gives him leverage over them—they need the funding to continue their research—and allows him to show off other vices like pride in his wealth.

SECOND ITERATION: COWAN, SWAIN AND ROSS

At the plush San Francisco law offices of Cowan, Swain and Ross, Donald Gennaro's boss waits for him to get off the phone with John Hammond. After Gennaro hangs up, he bluntly tells his boss that they can't trust Hammond any longer. He insists that everything is going well, but between construction delays, rumors of dead workmen, and the apparent discovery of a strange new lizard biting people in Costa Rica, Gennaro doesn't believe him. He forced Hammond to accept a series of independent site inspections beginning immediately.

Hammond attempted to remove himself from regulation and oversight by all bodies, including his investors, by establishing his lab on a private island. But his attempt to control the park has already failed on both accounts: Gennaro plans to force accountability from outside, and the reports from Costa Rica indicate that some dinosaurs may have escaped Hammond's control.

Gennaro's relationship with Hammond began in 1982, when the 70-year-old eccentric was raising the capital to start InGen. Gennaro helped him amass nearly a billion dollars. The law firm owns a five percent stake in InGen, and it wants to ensure the success of its investment. Gennaro decided to ask Hammond to invite Grant, Ellie, Malcolm, and a computer system analyst—all of whom served as consultants on the island project. He will accompany them. After updating his boss, Gennaro calls Dr. Grant to thank him for agreeing to come to the island on short notice…and to ask him for information about the potential "compy" specimen.

The human flaw of greed motivates both Gennaro and Hammond, and the park's failures will point toward the dangers greed and other vices pose to humanity's survival. Gennaro's financial stake in the park will reward him for its success and potentially ruin him with its failure, suggesting that his involvement runs too deep for him to provide adequate oversight. To get an accurate view requires the expertise and insight of outsiders.

SECOND ITERATION: PLANS

The next day, a package from Hammond arrives at the dig site for Grant and Ellie. Instead of formal promotional materials—which aren't yet ready—it contains topographical maps, plans, and blueprints for the Isla Nublar project. Although the **island** looks like a zoo, they can't guess what animals would require 30-foot-wide moats, electrical fences, and concrete bunkers.

Grant and Ellie quickly discern the general outlines of Hammond's project—an oversized zoo—without understanding the implications. This suggests the novelty of InGen's technologies, further suggesting the need to develop these powers with care, caution, and oversight—all things that the park lacks.

In preparation for visiting the **island**, Grant needs to protect the precious discovery of the velociraptor **fossil**, so he and his team use computer-assisted sonic tomography to divine the edges of the specimen before covering it with plastic tarps to prevent erosion. The technology promises a revolution in archeology and paleontology by reducing the need to perform excavations. But in the field, it performs haphazardly. Still, eventually, they uncover a cross-sectional image of the full skeleton. When the sun dried out the ligaments of its neck after its death, the velociraptor's spine twisted to an unnatural angle.

The scene with the sonic tomography further develops the theme of sight and insight, in the way the technology uncovers hidden things. It also establishes the antagonism and distrust Grant has for technology that will set him at odds with Hammond almost as soon as he arrives at the park. But the care necessary to locate and preserve the raptor skeleton suggests the fragility of signs and vestiges. And it raises the question of how much we can really know if evidence can so easily be lost.

The timeframes required for fossilization are so immense, Grant knows, that most people struggle to conceptualize them. In comparison, the decades of a human lifespan or the few brief months the **fossilized** juvenile lived seem almost incomprehensibly small. One of the students remarks that the fossilized baby doesn't look fierce, and Grant concedes that he probably wasn't—but he would have been if he grew up. Adult **raptors** were "quick, intelligent, and vicious" and probably the most "rapacious" dinosaurs that ever lived. They will probably never know how this one died; infant mortality is common, especially among predatory animals. And researchers like Grant still know next to nothing about dinosaur behavior, even 150 years after the science of paleontology began.

Grant reflects on the limits of his own knowledge and humanity's collective understanding of our world. Despite decades of dedicated scientific research, humans still know almost nothing about dinosaurs. They lived such an incomprehensively long time ago, the fact that any fossils or other signs of their existence have survived itself starts to feel surprising. After years of his own research, Grant has just now found his first juvenile carnivore. He knows enough, however, to have formed a terrifying portrait of raptors as a species.

SECOND ITERATION: HAMMOND

Gennaro's secretary brings him a hastily purchased suitcase of new clothes, remarking that his forgetfulness about packing shows how little he wants to go on his upcoming trip to the island. He's going to miss his daughter's fourth birthday party. As Gennaro heads for the elevators, his boss stops him in the hallway with an order: if there's a problem on the island, Gennaro should "burn it to the ground."

Gennaro drags his feet about the trip to the island, suggesting he knows more about it—and its dangers—than almost anyone else. This also demonstrates his selfish desire to avoid responsibility for his part in InGen and its projects. He'd rather ignore the problems and stay home.

On the flight from California to Montana, Hammond reproaches Gennaro for neglecting his old friend John. Gennaro knows that Hammond's small, child-like stature belies his "flamboyant [...] showman" tendencies. He remembers how, in their early years of fundraising, Hammond carried around a miniature 9-inch-tall elephant in a cage as an example of the promising potential of "consumer biologicals." Gennaro knows the details that Hammond didn't share with potential investors: the elephant wasn't technically genetically engineered; Hammond's geneticist couldn't replicate his initial success; the elephant was sickly; it displayed abnormal behavior for an elephant; and the geneticist was dying of terminal cancer. But, with Gennaro's help, Hammond raised the money he needed to get InGen started.

Hammond's short, innocuous body belies his drive and recklessness, offering a reminder that looks can be deceiving. But because Gennaro has known Hammond for many years, his memories offer insight into Hammond's deeply flawed character. The story of the miniature elephant shows how Hammond lies to his investors, denies and ignores evidence that contradicts his vision, and has little concern for the welfare of his animal or human partner. Without evidence that Hammond has addressed any of these flaws, Gennaro worries about the viability of the newest project.

Gennaro considers Hammond's tendency for denial. Even now Hammond treats the trip like a grand social event rather than an inspection that Gennaro forced on him. Gennaro asks if the park is ready for visitors, and while Hammond evades the question a little, he notes that the hotel is built and he boasts that they have "two hundred and thirty-eight animals" from 15 different species. The resort, Hammond assures Gennaro, is "state-of-the-art [... and] perfectly wonderful." He says no one should be concerned; any delays and postponements were inevitable, given the nature of the park's astonishing, living attractions. And anyway, the men agree, the project will still deliver on its most important promise: making them "lots and lots of money."

Hammond's denial and evasive answers confirm that his character hasn't evolved since Gennaro met him, raising concerns over his current project. He ignores any potential issues to focus on the park's cutting-edge nature and the number of animals—representing the number of times his team successfully recreated and raised a living dinosaur. And he restates his primary motivation (which Gennaro shares): greed. As much as Hammond feels pride over his park, his main goal is personal enrichment.

The secret to making money is limiting costs, Hammond reasons. He assures Gennaro that the huge initial investment in computer technology will save money through automating as many tasks as possible. Still, between an advanced computer system and wild animals, one "run[s] into snags." And he admits to several accidents—three deaths, total. But no accidents have occurred for months.

Hammond's desire for wealth makes him prioritize cost cutting. This, along with his distressing pattern of callousness toward animal and human suffering, should raise questions for readers about the park's safety. His attempt to brush off the park's accidents—fatalities, really—as old news is callous and suggests that things aren't as well controlled as he would like Gennaro to believe.

SECOND ITERATION: CHOTEAU

Grant and Ellie wait for Hammond's private jet to arrive, peeved at having to "wait on the money man." But paleontology still depends on the generosity of private donors, unlike other scientific disciplines that attract federal funding. Once they board the plane, Hammond introduces them to Gennaro, who expresses surprise that Dr. Sattler—Ellie—is a woman. Neither she nor Grant like the lawyer. The company will fly to Dallas to refuel and pick up their last passenger, then continue to Costa Rica in the morning. Hammond assures Grant and Ellie that the trip will take no more than 48 hours, although Gennaro doesn't share his optimism.

Hammond can exert control over Grant and Ellie because he has the money and the interest to fund their research. Ellie and Grant's distaste for him and Gennaro thus comes to function as a subtle critique of greed. Presumably, paleontology attracts less funding than other disciplines because people perceive it to have fewer real-world applications. This suggests a dangerous lack of foresight and regulation of emerging technologies, which promise humans the power to do things like resurrect extinct species.

SECOND ITERATION: TARGET OF OPPORTUNITY

In California, the Biosyn Corporation has called its board of directors to an emergency meeting chaired by Lewis Dodgson. Dodgson, either the most reckless or fearless geneticist of his generation, doesn't care about proper protocols or getting informed consent from his experimental subjects. His rabies vaccine experiment earned him the job of head of product development—really, head of corporate espionage—at Biosyn. It's the 1980s, and these biotech firms want to capitalize on consumer interest and spending rather than enhancing health or human welfare. Biosyn's breakthroughs are marketable, even if they have questionable worth, like engineering paler, more visible trout for fishermen in Idaho.

Biosyn's 1980s, "go big or go home" attitude exemplifies the need for oversight and regulation of biotechnology firms as the technology they wield grows ever more powerful and potentially dangerous. At this point in the novel, it seems like Dodgson, with his obvious disregard for health and human safety or for the boundaries of ethical business practices, seems to offer a pointed contrast to the less evil John Hammond. But in reality, both men respond to the same motivations of greed and control, with equally dangerous consequences.

When the final board member finally arrives, Dodgson presents the company's next "target of opportunity," InGen. He tells board members about Biosyn's ongoing surveillance of InGen as it courted investors then purchased supercomputers, gene sequencers, unusual amounts of **amber**, and the **island**. But they could not guess what InGen was up to until they acquired a small plastics company that innovated a plastic that could be used to make functional synthetic eggs. This, combined with the massive infrastructure projects on Isla Nublar, hinted that InGen had figured out how to clone "animals that hatch from eggs" and "require a lot of room in a zoo"—dinosaurs.

As it turns out, Bob Morris and the EPA weren't the only ones surveilling John Hammond and InGen. But what appeared opaque and confusing to them presents a clear and legible pattern to Lewis Dodgson, since his knowledge base includes the necessary technical information to understand how the amber, supercomputers, and synthetic eggs could be connected. This passage thus suggests that insight requires looking at the evidence along with the knowledge to interpret it correctly.

The board members express extreme surprise, much to Dodgson's annoyance. Scientists have discussed cloning dinosaurs—at least theoretically—since the early 1980s. Finding DNA poses a challenge, but now that scientists have proven that fossilization doesn't destroy DNA, one could, in theory, grind up huge quantities of dinosaur bones to extract the necessary sequences. InGen seems to have set itself this impossibly difficult task. And as a result, they're about to have "the greatest single tourist attraction in the history of the world" in addition to cornering the market on domestic dinosaur production. Biosyn could follow suit and make its own dinosaurs, but it would be years behind InGen. Instead, Dodgson proposes an act of corporate espionage. He's cultivated a source at InGen who will, for a price, acquire the necessary genetic material for them to quickly reverse engineer the technology.

Jurassic Park is a work of speculative fiction, meaning that it builds on historical trends and current developments to extrapolate a plausible—if unlikely—version of the future. The technologies the book presents draw from real developments in the 1970s and 1980s to help build the novel's argument that the immense power that cracking the code of DNA will give humans requires careful and ethical research overseen by disinterested bodies. Otherwise, the future might hold ill-conceived and dangerous experiments designed for entertainment and enrichment rather than humanitarian ends. The corporate competition between InGen and Biosyn further dramatizes the dangers of a powerful and competitive—but underregulated—industry.

SECOND ITERATION: AIRPORT

At the San Francisco airport, a disguised Lewis Dodgson meets "his man" (later named as Dennis Nedry) in a coffee shop. The man mocks Dodgson's pathetic attempt at a disguise. Dodgson dislikes the obnoxious and arrogant Nedry, but infiltrating InGen hasn't been as easy as his earlier attempts to steal other companies' tech. He's brought $750,000—half of the agreed payment—with him in a briefcase, which he hands to his spy. Then, he gives him a can of shaving cream with a special compartment for transporting the frozen dinosaur embryos. It has enough coolant for 36 hours—enough time for another contractor to collect the specimens by boat and bring them back to the mainland.

Like Hammond, Gennaro, and (apparently) Biosyn's board of directors, Dennis Nedry wants to make a lot of money and doesn't really care how he does it, even if his actions harm others or pose a threat to anyone's safety. His treachery pokes another hole into Hammond's illusion of control, offering a stark reminder of how many chaotic and unpredictable circumstances influence events.

SECOND ITERATION: MALCOLM

Dressed in black, Ian Malcolm boards Hammond's private jet in Dallas. Grant knows Malcom by reputation—he belongs to a cohort of mathematicians who use computers, study chaos theory, search for real-world applications for their theories, and dress and act like rock stars. Malcolm tells Ellie that he wears only black and gray because it wastes time to worry about things like clothing. Hammond introduces Malcolm as "a man of strong opinions." And Malcolm strongly opines that Hammond's **island** is "unworkable." He confidently predicts that it will shut down imminently. And he pulls out his original consultancy paper to show his work in support of this hypothesis.

Ian Malcolm fulfills the role of the book's philosopher, often voicing most clearly its theories and arguments. In particular, he speaks for the chaos and change that characterize life on earth; as a proponent of chaos theory, he operates under no illusions about his ability to control nature or the surrounding world, unlike Hammond and the other park creators. Malcolm exercises the only real kind of control: self-control.

As the plane flies through the night, Malcolm explains his work to Grant and Gennaro. Physics, he says, successfully describes "the regular movement of objects." But it struggles to predict or explain turbulent movements like weather. Chaos theory describes these turbulent movement by attempting to account for the tiny differences in initial conditions that systemic movement amplifies. Gennaro takes this to mean that chaos is "random and unpredictable," but Malcolm continues to explain that complex systems frequently contain hidden regularities, an "underlying order." Very briefly, chaos theory holds that complex systems have underlying order. And that simple systems can generate complex behavior by amplifying those tiny irregularities.

Understanding physics—a prerequisite to the development of technologies like the airplane the guests take to Jurassic Park—marks one of humanity's great achievements. But, as Malcolm points out, just because humans can understand and exercise a sort of mastery over the way objects move in space doesn't mean that they can unlock all of nature's secrets. Chaos theory accounts for variables so small and numerous that people can't see them, much less try to account for or control all of them. In essence, chaos theory offers a reminder of the underlying, apparent randomness that renders much of life unpredictable.

Then why, Gennaro asks, does Malcolm think the project will fail? Malcolm's critique hinges on the difficulty of predicting anything—even simple movements according to Newtonian physics—for more than a few seconds in real world conditions. In this light, Hammond's project—the apparently simple setup of animals in a zoo condition—is bound to eventually show unpredictable behavior. The **island** is "an accident waiting to happen."

On the surface, Hammond's resort project seems to be just another iteration of the classic idea of the zoo. But even before he knows that the operators plan to contain dinosaurs, Malcolm has doubts about the viability of such a vast and complex undertaking. The sheer size of the park suggests that there are already too many variables in play to control.

SECOND ITERATION: ISLA NUBLAR

Hammond, Gennaro, Grant, Malcolm, Dennis Nedry, and Ellie take off in a helicopter from the San José airport bound for Isla Nublar. Mist obscures the **island**—which, at 22 square miles, Hammond boasts, is the largest private animal preserve in North America. The dense fog and dangerous wind make the landing stressful, despite the pilot's skill. Ed Regis waits on the helipad to greet the guests.

Because the island lies so far away from the mainland and the rest of the world, it lulls Hammond into the mistaken belief that he can create an isolated world-within-a-world. In his vision, he exercises a god-like control over this space. But the treacherous weather points toward the chaotic, complex systems—like the weather—that remain uncontrollable. And the fog metaphorically indicates how much he cannot—or chooses not—to see.

As the consultants walk towards the resort buildings, Regis explains that the **island** has two primary ecological zones: a deciduous rainforest at the higher elevations and a tropical rainforest—like the mainland—in the lowlands. Through the mist Grant sees a graceful, curving tree trunk. Except it isn't a tree trunk at all; it's the long neck of a dinosaur.

If Hammond hoped to control the island, the fact that it doesn't even have one climate suggests the difficulty of doing so. And the fact that the lowlands have a climate like the mainland adds evidence that potentially escaped dinosaurs would be adapted to survive there.

SECOND ITERATION: WELCOME

As everyone stares at the dinosaur, Ellie whispers "My God." She's surprised at the animals' beauty and grace, despite their immense size. Even though Gennaro has always known about InGen's plan for the **island**, seeing the dinosaurs in the flesh still leaves him speechless. Grant feels dizzy and disoriented. But as he grapples with this unbelievable reality, his analytical mind clicks back into gear. He's looking at apatosaurs, commonly misidentified as brontosaurs. People think—thought, Grant corrects himself, now that he can see the evidence to the contrary with his own eyes—that they needed water to support their massive bulk. Hammond continues walking down the path, unfazed, calmly discussing the weekend's itinerary as the company walks under a "crude, hand-painted sign" welcoming them to Jurassic Park.

Gennaro demonstrates the kind of reaction Hammond hopes to provoke in his park guests: unabashed amazement. Seeing is believing in this case; even though he knew about the dinosaurs, Gennaro must see them to accept their existence. Grant initially shares Gennaro's shocked reaction, but he's a trained scientist who integrates the evidence he can see with his knowledge. This knowledge frequently allows him to understand what he sees more clearly than uninformed characters like Wu, Hammond, and Arnold. But he also demonstrates humility when he allows new evidence to update his mental paradigms. The crude, hand-painted sign offers a hint that, despite the incredible scientific and technological prowess on display in the park, InGen has cut corners as it rushes to open the park.

THIRD ITERATION: JURASSIC PARK

As the group walks towards the visitor building, Grant reflects on how the park will change the direction of paleontology. No longer will paleontologists need to do detective work or make deductions about dinosaurs. Debates, like the one over whether dinosaurs were warm- or cold-blooded, will be settled. Malcolm expresses surprise that the sudden redundancy of his life's work doesn't bother Grant. But Grant replies that although no one expected it so soon, he and others have considered the possibility of one day cloning dinosaurs.

Paleontologists like Grant learn to read and interpret the vestiges of the past, and they've made incredible discoveries about creatures like the dinosaurs that lived and died eons before humans came into existence. But bones can't give insight into how these animals lived or behaved. Now, with access to living animals, scientists will gain the insight necessary to correct or refine their hypotheses.

When Ed Regis draws Ellie's attention to the "authentic Jurassic ferns" around the pool, she realizes that the park planners have inadvertently created a potential hazard. These plants are poisonous, dangerous to eat or even to touch. Most people, Ellie thinks, consider plants a decorative backdrop to real life, never realizing how vital—and competitive—plants can be within their ecosystems.

As a paleobotanist, or scientist who studies ancient plant life, Ellie possesses specialized knowledge that the park's planners don't have. The planners' lack of insight into the potential dangers of their decorative foliage shows an insufficient insight into the potential dangers of the park. And the competition between plants and animals in ecosystems illustrates the chaos and myriad variables that exist in natural environments.

The hotel rooms still need some finishing work. Looking around, Grant notices heavy bars over the skylights and windows. Neither he nor Ellie remember seeing them—or fortifications like the steel-clad doors and enormous fence surrounding the building—on the plans.

The fortifications added to the lodge suggest the park creators' unacknowledged awareness of the dangers that some of the dinosaurs pose. And by noticing them, Grant and Ellie demonstrate the careful attention to detail that insight requires.

THIRD ITERATION: WHEN DINOSAURS RULED THE EARTH

The party assembles in the visitor building where exhibits sit partially completed. Before the tour, Gennaro tells the consultants that he summoned them to determine the safety and viability of the park and its dinosaur containment measures before it welcomes visitors. He notes the evidence against containment: the **sample** recovered from the Costa Rican mainland by Dr. Guitierrez and an alarming pattern of increased infant mortality there.

Gennaro has paid more attention to the mounting evidence of trouble at the park than Hammond and his cronies. This better positions him to make an accurate assessment, but he still needs the input of experts who can use their extensive background knowledge to help interpret that evidence correctly.

Looking at Gennaro's evidence, Malcolm quickly assures him that the infant mortality rate is unconnected; its nonlinear signature suggests other explanations. However, he confidently assumes that the dinosaurs have escaped, because the math says that no one can successfully duplicate—or completely isolate—nature in the way InGen wants to do. The sound of an approaching helicopter cut the conversation short.

Malcolm reminds Gennaro—and by extension, readers—about the ubiquity of chaos and randomness in the world when he points to the unconnected spikes in the infant mortality rate and when he predicts that the dinosaurs have already begun to escape. He pointedly rejects Hammond's implicit belief that he can completely control the island just because it is completely isolated.

On the landing pad, Gennaro discovers that John Hammond has invited his grandchildren to stay on the **island** for the weekend. Despite Gennaro's concerns, Hammond completely believes in the park's safety and security, no matter what "that damn mathematician" (Malcolm) says.

Even as Malcolm lectures everyone about the instability of systems with too many variables, Hammond adds more variables to the island in the form of his grandchildren. This act also demonstrates his character defects, which include pride and a selfish and callous disregard for others' health and safety.

THIRD ITERATION: THE TOUR (I)

Tim Murphy feels anxious watching his grandfather (Hammond) argue with Gennaro. He and his sister Alexis ("Lex") argue about who must introduce themself first until Ed Regis steps in. Tim forms chaotic impressions of the assembled experts until he realizes that he recognizes Dr. Alan Grant as the author of one of his favorite books, *Lost World of the Dinosaurs*. As the tour begins, Grant falls into step with Tim, asking him about his interest in dinosaurs.

Tim's first impressions of the group reinforce Malcolm's insistent reminders about how increasing variables push a system toward chaos: the clash of personalities among the adults does indeed create instability. It's fitting, then, that Tim locates solid ground in the figure of Grant, who represents in part the slow and steady progress of traditional academic science.

Tim tells Grant that he likes to visit natural history museums to look at the **fossils** when he can convince his family to go. He remembers his last trip, on which he argued with his dad about the relative size and age of various specimens. Then, Tim pointed out that the tyrannosaur skeleton had too many vertebrae. His father didn't believe him until a security guard confirmed it. Grant likes the story, in part because he recognizes the incorrect skeleton Tim describes, having seen it himself at one point.

Like Grant, Tim is a careful observer and correct interpreter of the things he sees. The incorrect skeleton warns against humans playing god: if it's this hard to assemble a fossil, how much harder must it be to correctly put together a living creature? And the episode provides a miniature version of the island visit, during which Hammond openly argues with or denies his exerts' observations and predictions. It remains to be seen whether he, like Tim's father, will humbly admit his mistakes or not.

Ed Regis, for his part, resents having to babysit Hammond's grandchildren. He's the head of public relations for the park, and he has too much to do to prepare for its public opening in a year's time. And maintaining strict secrecy until closer to opening makes his job even harder. He doesn't feel respected in his work, like he's always being given the odd, unwanted tasks like taking care of injured workers and small children.

Ed Regis's plight points toward the expense-cutting corners park management take, including stretching their small workforce to the breaking point. His internal griping also offers a pointed reminder that the park is a commercial endeavor first, and a scientific one second. This raises questions about the reasons for which biotech firms develop their technologies.

The tour passes the control room, where Regis boasts that the maximally automated park can run on a skeleton crew. Inside, they see the chief engineer, John Arnold, and park warden, Robert Muldoon. Next up they visit the genetics lab, run by Dr. Henry Wu. Wu explains that, while scientists can extract DNA from ground-up dinosaur **bones**, the park uses a proprietary process to extract it from the blood of parasitic insects preserved in amber. Then, they analyze the DNA using the park's supercomputers and gene sequencers. These use advanced software to predict and fill in any gaps in the genetic code.

Hammond relies on automation to run the park partly to save money on staffing (as he previously discussed with Gennaro), and partly due to his unwavering belief in humanity's ability to control the world around them through technological advancement. Wu shares Hammond's confidence, even using computers to fill in pieces of dinosaur DNA that have been lost to time. But each prediction introduces another variable, which the park creators should—but do not—account for.

Dennis Nedry, the computer systems analyst, finds Wu's lecture boring. Although InGen proved very cagy about the details of the work they asked him to do, the sheer size of the project suggested that they were sequencing genomes, so he's not surprised. Given the size and complexity of what InGen wanted him to do, he's also not surprised that the system has bugs. But Arnold's and Hammond's concern over this state of affairs annoys him.

Nedry's reflections on the Jurassic Park computer system seem to prove Malcolm's assertions that any large, complex system will be full of unpredictable variables (or "bugs" in computer terms). But he's more like Hammond than Malcolm in his belief that these represent a simple nuisance rather than the potential for danger.

In the Fertilization Room, Wu explains how technicians replace the DNA in unfertilized crocodile eggs to grow dinosaurs. Their work involves the use of lethal poisons to interrupt cellular division. The tour moves on to the Hatchery Room, where the ambient atmosphere recreates Jurassic conditions: 99-degree heat, 100% humidity, and a higher oxygen concentration than modern air. Technicians babysit and attend to hundreds of eggs. Only about 4% of hatched dinosaurs survive, in part because so many variables can affect each embryo's development. Some of the dinosaurs about to hatch belong to a mystery species; without a positive identification the geneticists can only guess until the first batch starts to hatch.

While the ability to control Hatchery Room's atmosphere through climate control technologies suggests humans' ability to control the world around them, atmospheric changes of millennia also point to the incredible changes that have occurred over the history of the earth. The low hatchling survival rate also provides evidence for the instability of natural systems, with their innumerable, uncontrollable variables. Not knowing what species will hatch from a strand of newly recovered DNA provides the clearest example of this natural unpredictability.

Finally, the group arrives in the nursery, where a technician tends to a baby **velociraptor**. The small yellow and brown creature jumps into Tim's arms. Both Wu and the tech assure everyone that the baby is harmless—it doesn't even have egg teeth. In the lab, techs must help the raptors break free from their shell. Grant wants to know how the babies hatch in the wild, but Wu explains that technicians hatch all dinosaurs in the lab. By withholding certain hormones during embryonic development, he has engineered exclusively female animals. In addition, they use large doses of radiation to sterilize the dinosaurs. None of them can reproduce.

Grant rose to prominence as a paleontologist by hypothesizing that dinosaurs actively cared for their young, unlike modern reptiles. The help the baby raptors need when they hatch confirms his theory. And it suggests that at least some of these animals exhibit unanticipated social behavior. Wu makes modifications to the dinosaur stock to prevent them from breeding in the wild in the park's most pointed exercise of control over nature.

Grant wants to look at the baby **raptor**, which Tim willingly hands over. But Grant handles the creature callously, stressing it and causing it to scream. Regis intervenes, forcing Grant to relinquish the juvenile. He explains that the fragile infant dinosaurs tend to die of stress. Additionally, the park wants to treat the dinosaurs as "humanely" as possible. When Grant can't help himself and tries to approach the dinosaur again, she snaps her jaws and hisses at him with "sudden intense fury."

Grant usually works with fossils of animals that have been dead for millions of years; his bumbling attempt to handle the baby dinosaur offers a pointed reminder that these dinosaurs are anything but lifeless specimens. With her own instincts and behavior, the dinosaur makes it clear that she will defend herself if necessary.

THIRD ITERATION: CONTROL (I)

As the group walks back to the control room, Malcolm asks Wu how many species they've made thus far. Wu thinks it's 15, but he looks to Regis for confirmation, explaining that he can't keep track because some of the attempts didn't work out and they had to start over. They've hatched more like 20 species, but only 15 have thrived.

Wu's answer points to the instabilities in the Jurassic Park system: how can park operators hope to control a population of animals if they don't know how many or which ones they have? It also seems to acknowledge how novel—and unpredictable—their dinosaur cloning success is.

Malcolm wants to know if compys—like the animal allegedly recovered in Costa Rica—are one of the successful species. Wu confirms that the park has dozens of these scavengers, which help to clean up the droppings of the larger herbivores. Malcolm then asks how the park can possibly keep track of fifty small, roaming dinosaurs, insinuating that some may have escaped. This, Wu tells him, cannot have happened. He's engineered the dinosaurs to be incapable of producing lysine, an enzyme necessary for life. Unless they receive it as a dietary supplement (as they do on the **island**), they will quickly fall into a coma and die. Given how foreign dinosaurs are to modern ecosystems, the park wants to prevent dinosaurs surviving in—and possibly overrunning—the world.

Wu has such confidence in his ability to manipulate the animals he creates—by making them female, by making them dependent on dietary supplementation for survival—that he refuses to reexamine his assumptions in light of new evidence, specifically the potential discovery of a compy on the mainland. This demonstrates a stunning lack of insight and arrogance—ignoring evidence that his efforts have failed doesn't change the fact that they have failed.

The tour group waits outside of the control room while the operations team talks a supply ship through the process of docking and unloading. Ellie takes the opportunity to press Wu for more details about what happens when the dinosaur development process fails. Grant wants to know how they measure success, since no living person has seen a real dinosaur. Wu smiles and expresses the hope that paleontologists will eventually compare his animals to the fossil record to verify their development.

Just moments after he asserted his ability to control the development and physiological functioning of the park's dinosaurs, Wu admits the limitations of his knowledge to Ellie and Grant. Unable to account for or control all the variables in a creature's growth and development, Wu must wait for evidence of problems to arise before he can try to fix what's wrong. And he has no way to know how much his dinosaurs reflect their ancient forbears, compared to the imported DNA the computer generated to fill in gaps in the genetic code.

Grant asks if the park already has adult **raptors**. They do, Wu and Regis tell him, but they're not yet "integrated into the park setting." In the meantime, they invite Grant to visit their temporary enclosure, near the visitor center. While they wait for the control room to open, Lex and Regis play catch on the lawn while Grant, Ellie, Malcolm, and Tim go to see the raptors.

Again, the trouble getting the raptors "integrated into the park setting"—which implies an ability to safely contain and manage them—hints that Hammond and the park operators don't have as much control over the animals as they would like their guests to believe.

Grant likes kids—especially the way so many of them seem fascinated by dinosaurs—so he asks Tim questions about **raptors** while they walk. Tim knows that raptors are pack hunters. Grant adds that they were "larger-brained, more intelligent than most dinosaurs." The visitors pass a giant generator system—way bigger than a normal resort would need—then a pen of goats before arriving at the raptor enclosure. They can hear animals moving in the brush, but they must stand still and silent for several minutes before Ellie catches sight of one and points it out to the others. Grant instinctively recognizes the animal's hunting behavior, but it still surprises him when three animals burst through the growth and make a high-speed charge at the fence. Grant updates his assessment of raptors to include ambush hunting as well as pack behavior.

Grant's conversation with Tim allows the book to introduce the raptors as a species to readers. Since they represent nature's ability to evade human control, their speed, intelligence, and pack instincts pose a particularly dire threat to humanity. The technology used to recreate them is undoubtedly impressive. But the motivations of its operators, for good or ill, determines the outcomes of its use. And their poor decision to keep lethal animals in the park reveals their arrogant assumption of human domination over nature. Unlike the park operators, who want to make the dinosaurs conform to their expectations, Grant allows his observations of the living animals to increase and update his knowledge—and predictions—about the species.

Returning to the visitor center, Malcolm and Grant discuss the speed of the attack, judging that the raptors reached speeds of at least 60 or 70 miles an hour. Malcolm expresses surprise over the raptors' bird-like movements and intelligence. As Grant explains, due to the nature of its work with **fossilized** records, paleontology has cycled through many theories about dinosaurs; the **raptors**' behavior conforms with most up-to-date theories. And then Malcolm wonders aloud whether the raptors attacked the fence because they had learned, at some point, that humans make easy prey.

Some elements of dinosaur behavior—like the speed and coordination of the attack—would have been impossible to predict based on fossilized remains alone. But through assiduous observation, paleontologists have had the insight to adjust their theories about dinosaurs many times. As outside observers, Malcolm and Grant both pay attention to details that park creators ignore, downplay, or cover up; this allows Malcolm to correctly suppose that the raptors have already attacked people, even though he doesn't know about the history of worker fatalities.

THIRD ITERATION: VERSION 4.4

In his private bungalow, John Hammond questions Henry Wu about the experts' reactions to the tour. Wu reports that they accepted his explanation. After all, most people can understand the genetic work in broad strokes. Only the details—which Wu wants to discuss with Hammond—pose a challenge. The dinosaurs on the **island** don't behave the way most people expect them to. They're much faster and smarter. Wu wants to modify their genetics to conform to these expectations to provide a better guest experience. Hammond resists—he wants to keep the dinosaurs as "real" as possible, only intentionally modifying them for reasons like containment (for example, making them lysine dependent) and economics (making the genetic code patentable to prevent competition). Hammond assures Wu that he's done a good job and that people will like the less modified dinosaurs.

Wu believes that he has a better or more informed perspective on the park project than the guests because he understands the tiny details of the genetics work. In reality, this kind of focus on the details at the expense of the bigger picture lead to oversights and blind spots that could undermine the park's viability. In his conversation with Hammond, Wu points toward the almost unlimited potential of the genetic engineering technology InGen has pioneered, effectively without any regulation or oversight. And although Hammond rejects the idea of modifying the animals further than necessary, it hints at unsettling questions about what genetic engineering can design.


Wu, who was a graduate student under Hammond's former business partner, owes his career to the eccentric man. After the partner's death, Hammond convinced Wu to give up the "backwater" of university research for the groundbreaking, lucrative—and largely underregulated—world of private research. With copious amounts of money, Wu got InGen's dinosaur project up and running successfully. In that time, Wu faced pressures, deadlines, and strong opinions; he also found his attention pulled from the pure science towards administrative concerns. He succeeded, but now Hammond won't listen to him, refusing to even discuss Wu's plan for another, more consciously modified version of the dinosaurs. With a dismissive smile, Hammond ushers Wu out the door.

Wu's career follows the trajectory outlined—and criticized—in the book's introduction. Though for now, the ends—within a few short years, he's pioneered groundbreaking technological advances in genetic sequencing, engineering, and cloning—seem to justify the means. The emotional tension underlying this exchange also points toward the character flaws—greed, arrogance, and excessive self-assurance—that Wu and Hammond share.


THIRD ITERATION: CONTROL (II)

In the control room, Grant regards the computer systems with distrust and annoyance. The chief engineer, John Arnold, eagerly explains the park's control systems to the guests. The computers can track the movements of each individual dinosaur via motion sensors and cameras that cover 92% of the **island**. This system updates twice a minute, and every 15 minutes the computer tallies the number of animals by species. Then, it compares the two datasets to account for all the animals. Grant asks about the version numbers for each species, and Wu explains that they change the numbers whenever they must make major changes to their genetics. Grant finds the idea of creatures having release numbers like computer programs discomforting.

Grant dislikes and distrusts the computer systems in part because he doesn't understand how they work. His reaction suggests that an uncritical, unlimited trust in technology could be a bad thing—which will prove to be the case in Jurassic Park. It's important to pay attention to the technology's limitations: it can't see 8 percent of the island, undermining Hammond's sense of god-like control over the park. Arnold and Wu think that the two competing surveys that the computer conducted guarantee insight, since the computer looks for two different things. But because they've artificially limited the computer's range of vision—only asking it to search for the expected number of animals—they remain blind to what's really happening. Finally, Wu's discussion of version numbers shows that he thinks of the dinosaurs as a technology, not as living creatures.

Gennaro asks about the physical containment systems, and Arnold explains that a moat surrounds each enclosure, ranging from 12 to 30 feet deep, depending on the species. Next come 12-foot-tall electric fences—50 miles surround the **island**'s perimeter and each individual enclosure. If, hypothetically speaking, an animal escapes, park warden Robert Muldoon would capture it with the aid of non-lethal equipment like shock guns and tranquilizers. Because of the expense of creating and maintaining the animals, the park focuses on protecting that investment. They have hardened the computer system against external security threats. The park may have a lot of problems—keeping ancient animals healthy and functional in the modern world isn't easy, according to Arnold—but they don't include animals escaping to the mainland.

The park's containment systems seem more than adequate to contain their expensive and exclusive animals. But they are designed from a human point of view that doesn't sufficiently take into account nature's clever and never-ending variations. The park creators can't see what they're not looking for, and by limiting their assessment to the threats they most fear, like the theft of their intellectual property or the destruction of their monopoly by competitors who might try to hack the system, they can't see all the potential threats to their system.

Gennaro asks about the "mechanical systems," reminding Grant and the others that the **island** is destined to become an amusement park. Grant finds this idea as discomforting as the computer systems. But even when the whole park is up and running, workers will control most of its functions from this very room. And the computer system Nedry designed can track, feed, and water the animals autonomously for up to 48 hours at a time, if necessary. At least, it will once he's done debugging it.

The conversation in the control room further demonstrates the park operators' unwavering faith in the power of the systems they've designed to control nature within the confines of the park. In contrast, Grant finds the very idea of engineered dinosaurs in an amusement park disturbing. But instead of dealing with this distress, the park creators simply ignore and discount it. And thus, they continue to miss or ignore warning signs of the park's instability.

The last question goes to Malcolm, who asks if the computer can display other data on the dinosaurs. In answer, Arnold pulls up a graph of the compys' heights, which displays a normal bell curve. Gennaro expresses his firm belief that, given these redundant systems, he can't see how any animals might escape. On the contrary, seeing the park's workings has only convinced Malcolm further that dinosaurs have already left the **island**. In his opinion, the park's engineers and caretakers make foolish assumptions based on an expectation that they've created a natural ecosystem rather than an artificial one.

Although he has the final word on whether the park continues toward its opening or not, Gennaro's lack of expertise on dinosaurs, genetic engineering, or amusement parks makes him unqualified to judge the system. And he proves willing to accept the park's systems as adequate without subjecting them to any critical review. Malcolm yet again points out that the park operators have massive blind spots. Readers might not yet understand the significance of the bell curve yet, either. But readers' ignorance—unlike the operators'—can be excused because they exist outside the system. Those responsible for running it, by contrast, should not allow their biases and expectations to blind them to reality.

THIRD ITERATION: THE TOUR (II)

Ed Regis guides the visitors to the front of the visitor center, where electric Land Cruisers wait to whisk them around the **island**. Grant, Ellie, Malcolm, and Gennaro take the first car, leaving Tim, Lex, and Regis to ride in the second. Each car contains a display screen, CD-ROM player, walkie-talkie, and radio. Regis and the children use the intercom to listen in on an argument in the front car between Malcolm and Gennaro. The tour begins with a recording narrated by a famous actor—the park creators have "spared no expense." At each stop, the transmitter lights blink and direct the on-board computer to play the correct track from the CD-ROM, including photographs of the relevant dinosaurs if they happen to be out of sight.

The park rides showcase cutting-edge technology for the time in which the book was published. In contrast to Hammond's efforts to save money elsewhere, park operators planned the guest-facing parts of the park to impress. The driverless vehicles also reinforce the idea of the amusement park, suggesting the careful design of the entire experience and implying that guest experience remains under the complete control of the park operators.

The tour yields sightings of othnielia in the trees and hypsilophodontids in the tall grasses—the latter encouraged to appear thanks to the loudspeakers on the cars playing a mating call. The narration notes that the hypsilophodontids scratch their skin for reasons the park veterinarians have yet to figure out.

Using recorded mating calls allows human operators to apparently control the dinosaurs. But the animals' instinctual reaction to the call—as well as their inexplicable itching—pointedly reminds readers that these animals are wild and mysterious, not tame and domesticated.

THIRD ITERATION: CONTROL (III)

In the control room, Arnold makes a note to have maintenance check out the grinding gears of the Land Cruisers. This, according to Hammond, is a minor detail, to which Arnold—a veteran amusement park engineer—counters that "there are no minor details." Always nervous, Arnold feels particularly edgy now that the park hosts actual visitors for the first time. He knows from experience that it can take years to iron out the bugs in even just one element of an amusement park and worries that Jurassic Park won't be ready in time for its opening in a year's time.

Although Arnold's attitude suggests an ultimate belief that he can iron out all of a system's bugs—or at least the important ones—his nervousness belies his earlier boasts about the power of the park's computers. On some level, he seems to understand that his sense of control over the park rests on a shaky foundation. In contrast, Hammond—unaware of the system's details and thus not qualified to judge its success—serenely assures Arnold of the rightness of his vision for the park.

When Hammond labels Arnold "just a worrier," Arnold lists the things that add complexity to running Jurassic Park: it has all the issues of a normal amusement park and a major zoo combined, plus the wild card of caring for animals that no one has ever tried to keep previously. Issues arise all the time, like the tyrannosaur making itself sick drinking lagoon water or the triceratops killing each other in struggles for dominance, or the **raptors**—but Hammond cuts Arnold off before he can repeat complaints about the raptors. He maintains that if they can just get the park engineering and computer systems fully functioning, then the animals—which they can train, after all—will "fall into place." Hammond turns his ire on Nedry, blaming his "damn computer" for the park's issues.

Arnold's list of variables here confirms Malcolm's ongoing assertions that Jurassic Park is a complex system, in contrast to Hammond's insistence that the idea is actually quite simple. Since chaos theory holds that systemic instability arises from an abundance of variables, no matter how tiny or inconsequential they seem, the park operators should be concerned. And not all of the variables are tiny, it turns out: the bloodthirsty raptors resist any attempts at human control. Instead of facing these issues, Hammond looks away, pushing the blame onto Nedry.

Nedry's running list of bugs now includes 130 items, from minor issues to major hazards, like the fact that the security program won't run on auxiliary power. Faced with the realization that he can't fix them all himself, Nedry has commandeered the phone lines to transfer program data to his team in the United States for help. And while Nedry works, Arnold keeps a paranoid eye on his actions.

Nedry's lengthy list of bugs reinforces a growing sense of the park's instability. And Arnold's paranoid behavior suggests that he suspects Nedry as another potential source of chaos.

On the tour, the Land Cruisers pass the site of the incomplete Jurassic Park aviary on their way to the Mesozoic jungle habitat that houses the dilophosaurs. These beautiful creatures, spotted like leopards and bearing impressive crests on their heads, are among the earliest carnivores. Like modern Komodo dragons, they use poison to dispatch their prey so they can eat at their leisure. Next come the triceratops, near-sighted animals with large, bony hoods that stand, motionless and boring, in the shade of the trees.

The narration piped into the ride vehicles continues to portray the park as a glorified zoo, while the dinosaurs themselves continue to point to the ability of nature to resist or evade human control. The dilophosaurs' venom makes them dangerous, requiring them to be kept far from the road. And the motionless triceratops fails to entertain the guests.

THIRD ITERATION: BIG REX

The Land Cruisers stop at the crest of a hill while the narration continues. Ed Regis appreciates the early evening light, but his guests impatiently demand to see the tyrannosaurs. Regis explains that the juvenile often sticks close to the lagoon because she has learned to fish. The adult often stands and watches the herds of apatosaurs, just out of reach beyond the electric fence. The adult dinosaur often conceals itself in the shadows, and they think its skin may sunburn easily. But no one really knows, Regis concedes.

The questions about the tyrannosaurs' behavior point yet again to the blind spots in the park operators' vision. Since these animals are essentially unknown in the modern world, it's almost impossible to predict—and thus plan for—their behavior. The tyrannosaurs' hunting behavior also points to their essential wildness.

In the control room, Muldoon's caution about the park's dangers contrasts with Hammond's excitement. Muldoon built a reputation as a big-game hunter before becoming a conservationist and well-known consultant to world-class zoos. He likes the interesting challenge of working at Jurassic Park, but he's under no illusions about the nature of predators. He thinks some are too dangerous to justify keeping, especially given the gaps in knowledge about dinosaur behavior and adaptation. The revelation about the dilophosaurs' venom—and their ability to shoot it up to 50 feet—luckily came before the animals hurt or killed someone. And the **raptors**...well, Muldoon knows that they are instinctive hunters who love the thrill of the chase even when they aren't hungry. And they're smart enough to evade their enclosure.

Of the park operators, Muldoon operates under the fewest illusions about human control over the wildness and chaos of the natural world. And developments like the dilophosaurs' venom or the raptors' deadly hunting behavior reinforce his feelings. But his concerns don't affect the other decisionmakers, suggesting their choice to close their eyes to evidence they don't want to deal with.

On the tour, Grant watches from the car as a mechanical system deposits a goat in the tyrannosaur enclosure. He looks for the big dinosaur's approach, only to realize with shock that he can see it camouflaged among the trees. It lies in wait for a few minutes before bursting explosively from the vegetation, clearing the distance to the goat in four strides, and killing the goat with one bite. Then, on high alert for the competition of other predators, she takes her prey back to the shelter of the trees for consumption. The episode fascinates Grant and terrifies Gennaro.

Watching the tyrannosaur hunt only confirms the dangers these animals would pose if they got loose from their enclosures; despite its size, the animal remains nearly invisible while it stalks its prey. And this reinforces the book's ideas about the importance of clear sight, since it's not always easy to see the full picture. Grant knows what he's looking for, but the animal's camouflage still makes it hard for him to pick it out of the trees.

THIRD ITERATION: CONTROL (IV)

Henry Wu joins Arnold and Hammond in the control room just in time to overhear Gennaro, Grant, Malcolm, and Ellie over the car radio as they discuss the dangers posed by a tyrannosaur escape. Hammond and Wu share a fundamental perception that the park and their work there are sound; Wu feels offended that the guests think he would expose himself or anyone else to a dangerous project. Hammond expresses distaste for Malcolm, by whom he feels persecuted. Meanwhile, in the compound basement, Muldoon visits the cache of weapons that he finally convinced Hammond to allow him to have. He drops a rocket launcher and ammunition into the only available gas-powered Jeep, just in case rescue becomes necessary.

The park guests, with their fresh eyes, have a very different view of the park and its dinosaurs than the operators. Wu and Hammond wallow in their sense of persecution while the much more practical and clear-eyed Muldoon makes preparations for a nightmare scenario like an escape. Those closer to nature, like the former hunter or the scientists who study ancient dinosaurs, have a clearer view of its power and potential for chaos.

On the tour, thunder begins to rumble as the Land Cruisers approach the apatosaur and hadrosaur enclosure. As the vehicles begin to move once again, Tim thinks he catches a glimpse of a brown-and-yellow animal—a **raptor**—stalking through the tall grass. He screams for Regis to stop the car, but Regis refuses to accept that Tim saw what he thinks he did. When Malcolm and Grant overhear the ruckus on the radio, they suggest turning back, only to discover from Regis that the cars can't go backwards. They must finish the tour as programmed.

Tim notices the raptor loose in the large dinosaur enclosure because his sight is unbiased, unlike the park operators, who assume that the animals are contained, and that their safeguards are foolproof. Likewise, the clear-eyed and unbiased Malcolm and Grant want to investigate further. But the vehicles can't turn back—a neat metaphor for the unwillingness of the park operators to stop or delay the project despite signs of danger.

In the control room, Arnold asks Wu what he thinks Tim saw, and Wu suggests an othnielia, down from the trees. Hammond complains that his first park visitors look at the park "like accountants," searching for problems. The radio crackles as the supply ship's captain requests permission to disembark early thanks to his concerns over the rising storm. Hammond wants to insist that the ship stay and finish offloading, but, as Arnold points out, he refused to spend the money on a storm wall, leaving ships vulnerable to storms. Peevishly, Hammond grants the captain's request.

Hammond doesn't appreciate his guests precisely because, as habitually careful and close observers of the world, they all see the inconvenient details he and his team have ignored or denied. This suggests an awareness on some level that the park is more complex and potentially dangerous than he would like to admit. The lack of a seawall offers another example of his insufficient foresight of potential difficulties and dangers (as well as his greedy willingness to cut corners to save money).

THIRD ITERATION: STEGOSAUR

The tour stops at the southern end of the **island**, near the stegosaurus enclosure where they find the veterinarian's Jeep parked by the road. Regis explains that the vet, Dr. Harding, has tranquilized one of the animals for study. The stegosaurs periodically get sick and no one knows why. Eager to help, Ellie approaches the animal to inspect it.

The park planners' understandable ignorance of dinosaur behavior (since no one has observed living dinosaurs before) provides another example of their blind spots and their attendant inability to account for all the variables in their complex system.

Ellie's conversation with Dr. Harding reveals that the animals become sick periodically with symptoms that suggest poisoning from nearby chinaberry bushes. But the bushes show no sign of being eaten and although some berries lie on the ground, she knows they taste so bitter that she can't imagine the animals willingly ingesting them. Then, she and Grant notice small piles of smooth stones on the ground all around them, and everything clicks into place in their minds. They suspect that the stegosaurus swallow gizzard stones to help their digestion, accidentally taking in some of the berries at the same time and poisoning themselves each time they need a new batch of stones. Out of habit, Grant rifles through a nearby pile of stones, where he makes a startling discovery.

The park's experts have limited vision in part because of their inexperience with dinosaurs. Harding and Muldoon can only project expectations based on the behavior of modern animals onto the dinosaurs. In contrast, their training as paleontologists—who carefully observe and interpret the signs left behind by ancient life—makes Grant and Ellie attentive to things in the surrounding environment that others miss, like the piles of dinosaur gizzard stones. A person's perspective and background necessarily limit their sight. And though this isn't necessarily bad, it does mean that, without a willingness to be open to the evidence, a person can overlook or ignore important details.

Near the vehicles, Gennaro plays catch with Lex while asking Malcolm how the sick stegosaurus fits into his theories about the **island**. Malcolm answers with a brief history lesson. People invented computers, he explains, in part to predict the weather. At one time, people believed that if they could gather enough information, they could predict almost anything. But chaos theory holds that some phenomena resist prediction. Life is one of these phenomena, as the history of evolution suggest. Despite all odds, life breaks free and expands to new territories. Life always "finds a way."

While Grant and Ellie try to help Harding diagnose the sick animals, Malcolm offers Gennaro the opportunity to enlarge his viewpoint with a mini lesson on chaos theory. With the development of science, some humans began to hold the arrogant belief that they could predict—and eventually control—nature itself if only they could gain a deep enough understanding of its processes. What chaos theory proves, however, is that due to the extreme complexity of nature, humanity doesn't have the capacity for this kind of understanding.

Muldoon returns to the control room, where Nedry demands that someone bring him a beverage and Arnold monitors the visitors' stop at the stegosaurus enclosure. The radio signals start to break up because they're so far away.

In the control room, Arnold continues to engage in a fantasy of god-like omniscience, watching and listening in on the visitors' vehicles. But he isn't a god, as his inability to control the radio waves demonstrates.

On the tour, Grant's discovery underwhelms Gennaro. But Grant maintains that the small white fragment in his hand came from a dinosaur egg. Dr. Harding, reminding the guests that all the dinosaurs are sterile females, suggests that it must come from a local bird. But Grant insists that it's a dinosaur egg. And not just any dinosaur egg—a **raptor** egg.

Assured that the park's technology gives them control over nature, Gennaro and Harding try to ignore evidence to the contrary. But Grant's expert eye—and lack of biases concerning the park's operations—allows him to see the truth readily.

THIRD ITERATION: CONTROL (V)

In the control room, Hammond insists that the shell **fragment** must belong to a bird. Over the radio, Malcolm suggests a test of that theory and asks Arnold to run a tally of the dinosaurs on the **island**. The count finds all 238 expected specimens present. But Malcolm asks Arnold to search for 239 animals—and the computer finds 239. When Malcolm asks Arnold to search for 300, the computer slowly tallies up 283 total animals, including extra maiasaurs, compys, othnielia, and **raptors**. Hammond assumes that a computer bug causes the miscount, but Nedry explains that he programmed the computer to allow the user to enter an expected number of animals to speed up the count. Then Hammond insists that the extra animals must be rodents or birds because, as Wu confirms, the animals can't breed.

Hammond, like his employees, doesn't want to look at evidence that contradicts his sense of control over the island and the park. But his denial doesn't change the facts. Malcolm finally reveals the key oversight in the computer's count of the animals—because it looks for the expected total, it can only count missing animals, not extra ones. Thus, the proof that the animals couldn't breed rested on only counting the expected number of animals, creating a feedback loop. Only looking for expected things will yield only the expected things, not the full truth.


Malcolm then deigns to point out the design flaw: worried only about escapes, the operators failed to consider looking for extra animals, only missing ones. Earlier, when Arnold showed them the compys' size spread, the graph looked like a normal bell curve. But if the dinosaurs were bred and released in three batches, Malcolm explains, the size distribution should reflect three generations. It would look more like an ascending "m" with each hump corresponding to one generation. The bell curve graph indicated the natural size spread of a breeding population. While a dumbfounded Wu takes in the implications, Hammond attacks him for "screw[ing] up" and allowing animals to breed in the wild.

Malcolm also explains why the earlier bell curve of the compys proved his theory of dinosaur escape. His outsider perspective, unblinded by the park employees' assumptions and biases, allowed him to critically appraise the data and correctly interpret it. In contrast, the park operators focus exclusively on the details to the point of misunderstanding the big picture. And yet again, Hammond's response to the possibility that his grand vision is flawed is to attack someone else rather than to admit his own responsibility.


THIRD ITERATION: BREEDING SITES

Grant's expertise in the breeding and nesting habits of dinosaurs allows him to postulate that the **island** boasts seven breeding sites, based on the numbers: two each for the **raptors** and compys and one each for the other three species. He further hypothesizes that bigger breeding animals have produced fewer young due to predation by the loose raptors and compys. No one has witnessed the wild raptors because they hunt nocturnally. Wu admits that the island initially had a large rodent population which has drastically shrunk over time—suggesting a food source for wild roaming dinosaurs—although no one ever investigated why.

It turns out that park operators had ample evidence of uncounted animals (the crashing population of native rodents, for instance), but they ignored it. Their assurance in their mistaken beliefs—that they controlled nature in the park, that their technology was foolproof, that the dinosaurs they wanted to see were the only ones there—allowed them to ignore and deny inconvenient evidence.

As to the question of how the all-female dinosaurs became capable of breeding, Grant asks whether the geneticists filled in any gaps in the dinosaur DNA with frog DNA. Wu volunteers to check the records. To start figuring out how many dinosaurs may have escaped, Grant suggests surveying the nesting sites to estimate the number of hatched animals, then comparing this to the census of animals on the **island**.

Grant's ability to rapidly form a hypothesis suggests the existence of readily available information that Wu could or should have looked at.

The visitors prepare to split up. Ellie will stay with Dr. Harding to finish documenting the stegosaurus's symptoms. Gennaro volunteers to join them. Malcolm and Grant prepare to return to the visitor center in the second vehicle, while Regis, Tim and Lex climb into the front car. To assuage Tim's frustration at not being allowed to ride with Malcolm and Grant, Regis shows him how to operate the car's night-vision goggles.

By handing Tim the night-vision goggles, allowing him to literally see through the gathering gloom of the evening and the storm, Regis reinforces the book's idea that pretty much anyone—even children—has better insight into the park than its tunnel-visioned operators.

On the ride back, Grant expects Malcolm to feel vindicated, since events have proven his predictions. Instead, Malcolm admits fear. Mathematical theories show a sameness of things across different scales, he explains. And instead of demonstrating a linear quality, accident and unpredictability tend to rule human lives. People might not want to accept a series of wholly unpredictable encounters as life, but that's the case. The sound of the children shouting over the intercom interrupts their conversation. Having caught a glimpse of the departing supply ship through his binoculars, Tim swears he saw a stowaway dinosaur on deck. The sea spray and gathering dust make it hard to see. But eventually, Grant confirms Tim's sighting of at least two juvenile **raptors**.

Malcolm's fear reminds readers that, for him and the others, the park isn't some mental exercise. The oversight and hubris of park planners and operators poses a real risk to their safety and even their lives. The dinosaur breeding proves that humans have far less control over chaotic and unpredictable nature than men like Hammond and Wu want to believe. And right on cue, another sign of this powerlessness appears in the form of raptors—the deadliest of the park's animals and the ones that most clearly represent the power of nature to evade human control—on their way to wreak havoc on the mainland.

In the control room, Hammond, Arnold, and Muldoon saw the Land Cruisers stop, but they can't communicate with the guests via radio, possibly due to electrical interference from an approaching storm. When Arnold picks up the phone to call down to the dining room, he discovers that Nedry's data transfer has commandeered all the park's phone lines—both internal and external. Nedry apologizes, then stands up to get his own drink.

Again, the broken lines of communication between the control room and the park guests prove how little control park operators have, even within the carefully designed and delimited world of Jurassic Park. Their inability to maintain control of the human-designed technological systems doesn't inspire confidence about their ability to control nature.

On the tour, Grant asks Regis how long the ship takes to reach the mainland. They have 18 hours to raise a warning, but they discover they can't reach the control room or raise Dr. Harding on the walkie-talkie. They're about 17 minutes from the base when the lights abruptly turn off and the cars—controlled by electrical tracks in the road—come to a halt.

In the tour vehicles, Grant, Malcolm, Regis, and the children are at the complete mercy of the park's operators, totally dependent on the park systems running as intended. This makes them vulnerable to chaos in the form of unexpected events, like the power cutting out.

In the control room, Arnold realizes that, although the visitor center has electricity, the electrical grid on the **island**'s perimeter has lost power. The vehicles, somewhere around the tyrannosaur paddock, must have stopped. He picks up a phone to call maintenance only to remember that Nedry has clogged up all the lines.

When Nedry cuts the power to the island's perimeter to facilitate his theft of InGen's dinosaur embryos, he dramatically demonstrates one of the dangers of the park operators' decision to consolidate operations into one massive automated system: any blip can start a disastrous cascade of events.

With the perimeter power out, all the security-card locks are disarmed. Nedry knew this would happen; he built secret entrances into his programming partly as a failsafe if someone locked up the system, partly to feed his ego. And then, when he became annoyed with InGen for demanding free, extensive modifications late in the project via a sort of corporate blackmail, the trapdoors became an insurance policy. Thus, when Lewis Dodgson approached him about stealing dinosaur embryos, he had both the motive and the opportunity. In the Fertilization Room, he stashes frozen embryos in his shaving cream can device. Then he goes to the basement, climbs into the remaining gas-powered Jeep, and heads for the dock.

Human character flaws lie at the heart of the event that begins the destruction of Jurassic Park: Hammond and InGen abused Nedry's contract out of greed and their desire to save as much money on park construction as possible; in turn, Nedry's pride in his own abilities and his greedy desire for wealth motivated him to help Dodgson. And, in turning off the park's systems, he endangers everyone, demonstrating a selfish disregard for the lives and safety of others.

In the control room, Arnold swears, causing Muldoon to turn, just missing seeing Nedry driving away in the Jeep. Arnold has realized that, in turning off the security system, Nedry has also disengaged the electric fences. Maybe nothing will happen; most of the animals have been shocked by the fences, and conventional wisdom says they probably won't test their luck. Still, Muldoon decides to head out in the Jeep to collect the visitors before they do something stupid like leave the cars. When the power comes back on, the vehicles will restart automatically regardless of whether they are occupied or not. Congratulating himself on the foresight he showed by putting the rocket launcher in the Jeep already, Muldoon enters the garage to find the vehicle missing.

With the disengagement of the park's enclosure fences, the biggest test of humans' ability to predict and control nature begins. They don't know how the dinosaurs will react—whether external stimuli can modify their behavior, or even if some of them possess enough intelligence to recognize and capitalize on their opportunity to escape. Arnold hopes the dinosaurs will behave like modern animals which, having been shocked, would learn to avoid the fences. Muldoon on the other hand, worries about unpredictable behavior on the part of the dinosaurs or the humans. And he gets evidence for this almost immediately when he sees that Nedry has unexpectedly stolen the Jeep.

FOURTH ITERATION: THE MAIN ROAD

On the main road, Tim looks through the night vision goggles while the rain pours over the roof of the Land Cruiser. Over the radios, the parties in the two vehicles agree to stay put in the cars. Lex becomes agitated over the thunderstorm—she doesn't like lightning—and increasingly complains of hunger. But without power, they're stuck. Suddenly, a large dark shape passes between the two cars. Looking around for the creature, Tim sees the adult tyrannosaur standing just beyond the fence and staring towards the cars.

The limited visibility in the vehicles—a combination of the evening's falling darkness and the pouring rain of the tropical storm—dramatically illustrates the limitations of humans' ability to see, and thus understand, the workings of the world around them. The stalled vehicles pointedly remind their occupants that human technology can fail, leaving people vulnerable to the forces of nature.


The tyrannosaur reaches out and grips the fence. Ed Regis, the only person in the group to have seen the aftermath of a dinosaur attack, shakes uncontrollably, "pee[s] in his pants" and flees the car in a blind panic, leaving the door wide open. Tim tells Lex to close it, but she's too frightened. As Tim radios the other car to let Grant know that power seems to be out to the fences too and that Regis abandoned them, the tyrannosaur crashes free of its enclosure. Tim hops out of the car, closes the door, and gets back in as quickly as possible. Over the radio, Grant tells the children to stay as quiet and still as possible.

When the tyrannosaur escapes, Ed Regis loses his mind from fear. He knows these creatures are dangerous, yet his job entails convincing as many people as possible to visit the park. The gap between his knowledge of the danger and his callous attempts to lure visitors illustrates the danger of human character flaws like greed and selfishness. And he demonstrates this selfishness even more clearly when he leaves the defenseless children alone in the car.

The adult tyrannosaur looks through the windows of the car and doesn't see the kids. But it rams the vehicle with its massive head repeatedly until it manages to break through the windshield. As the animal batters the car, Lex hits her head and falls unconscious. When the dinosaur realizes that it can't reach its prey inside the car, it picks the entire vehicle up in its powerful jaws and—to Tim and Lex's horror—tosses it into the air.

The tyrannosaur seems to have an even more limited vision than the park operators; it can't see the children who sit unmoving in the car. But this creates an opportunity for it to show off its intelligence. Even though it can't see the kids, it suspects—or knows—they're there, and it engages in several attempts to dislodge them.

Malcolm and Grant realize that the lead car has disappeared, although they think they can hear Lex screaming faintly. The tyrannosaur stands in the road in front of them. Malcolm flees the vehicle in a panic. With a few strides and a swift flick of its head, the dinosaur catches up to him and casually tosses him into the underbrush. When the tyrannosaur swings its massive head back towards Grant, now standing outside the car, the paleontologist freezes. Although it comes close enough that he can smell its foul breath, the dinosaur walks right past him. He realizes that, although it knows he's there, it can't see him unless he's moving. He holds motionless as the frustrated dinosaur kicks the Land Cruiser over, sending Grant hurtling through the air, too.

Like Ed Regis, Malcolm flees the car. Unlike the publicist, he hasn't seen the aftermath of a dinosaur attack. But his awareness of the chaos in the world has already primed him for danger. Ironically, this awareness hasn't better prepared him to face the unexpected but has instead rendered him more prone to frenzied decisions. In contrast, Grant survives the attack relatively intact based on his ability to be still—which gives him space to observe the dinosaur's behavior and respond to the new data he gathers, rather than reacting impulsively like Regis or Malcolm.

FOURTH ITERATION: RETURN

Elsewhere on the **island**, Dr. Harding, Ellie, and Gennaro find the road blocked by a massive fallen tree. Harding can't reach the control room or the other vehicles on the radio. Assuming that the others have made it back safely to the visitor center, Harding prepares to return via the more circuitous maintenance road system.

Encountering the fallen tree shows just how little thought the park planners have put into hardening their infrastructure even against easily predictable hazards like extreme weather. While individual storms may still be somewhat unpredictable (as Malcolm has asserted), intense tropical storms are common in Costa Rica.

As lightning streaks outside, the control room monitors go black. All park systems are surge-protected, but Arnold isn't so confident about the modems, with which Nedry is sending data to his team. The screens flicker back on after a moment, but Arnold's relief is short-lived. No sooner does the system reboot than Muldoon bursts in saying that someone has taken the gas-powered Jeep. Because Dr. Harding hasn't returned, Arnold and Muldoon assume he stopped to pick up the rest of the visitors on his way back. No one wants to tell Hammond that his grandchildren aren't back yet, especially not Arnold, who knows that he must figure out what Nedry did to the computer system.

As designed, the park systems have relatively few points of failure and little redundancy. When they're running properly, they successfully automate many park functions. But when the unexpected occurs—either deliberate internal sabotage or storm-related power surges—their vulnerability to disruption becomes apparent. Yet again, the park operators' assurance in the power of their automated systems appears short-sighted and foolish. Not only that, but without their radios, video feeds, or motion tracking operational, they become literally blind to what's happening in the park.

FOURTH ITERATION: NEDRY

Nedry opens the disarmed 10,000-volt perimeter fence and drives through the park towards the east dock, where a boat sent by Lewis Dodgson waits to collect the frozen embryos. The rain threatens to derail his clever plan—and his opportunity to earn an easy $1.5 million. He's even prepared blackmail materials to make sure Dodgson doesn't try to weasel out of the second half of his payment.

The chaos and random chance of the world affect Dennis Nedry just like they affect everyone else. If anything, Nedry's greed and selfishness make him more vulnerable due to the ways in which they narrow his vision to his own concerns and desires rather than the bigger picture.

A creature darts through the beams of Nedry's headlights as he realizes that he's lost. Instead of reaching the dock, he finds his way blocked by a concrete barrier. He parks the Jeep and gets out, trying to figure out where he is. Drawn by the sound of water, he walks around the barrier and realizes he has driven up to the jungle river. His plan lies in ruins. He's so focused on trying to figure out a backup plan that he doesn't notice the sounds of creatures among the trees. But when he hears a largish dinosaur crashing towards him, he breaks into a run.

Metaphorically, Nedry's getting lost on the drive represents his inability to see the world around him. Like the car headlights, which can only illuminate things that fall within the small area of their illumination, his greed and self-focus cause him to lose track of the bigger picture. And he's subject to outside chaos, like the rainstorm, which has impeded his progress through the park.

Unfortunately, other dinosaurs stand waiting near the Jeep. Because Nedry didn't take the tour, he doesn't recognize them. He freezes, fearing an attack, but the dinosaur only spits at him. While he wipes the slug of saliva off his shirt, a second slug hits his cheek. His cheek and hand begin to sting and swell as the poison takes effect. And then, as he tries to climb into the Jeep, the dinosaur gets him again, this time in the eyes. Blinded, screaming with pain and terror, Nedry tries to ward off the coming attack. But he can't. The dinosaur slices his belly open and his guts fall out. As he falls to the ground, all he can do is wish that death will come quickly.

The dilophosaurs' venom isn't deadly, but it can lead to literal blindness. Their attack on Nedry thus contributes to the book's criticism of his—and others'—figurative blindness to the world around them through selfishness, greed, and illusions of control over nature. A blinded Nedry becomes open to attack from any angle. And his justified death suggests that selfishness and greed threaten the very survival of humanity.

FOURTH ITERATION: BUNGALOW

In Hammond's private bungalow, he and Henry Wu finish supper while watching the storm. Privately, Wu worries about the changes he's noticed in Hammond's character. He can attribute some, like rambling speech and emotional instability, to Hammond's age. But his evasiveness, "insistence on having his way," and denial cause concern. For example, the evidence of wild breeding makes Wu want to check his research records. But Hammond, unwilling to deal with the situation, insists on his company at dinner first. Nor does Hammond seem concerned when they notice that the video monitors in the room have cut out and they can't call the control room on the phone. He's more concerned about the ice cream he wants for dessert.

In the park, chaos reigns in the form of power outages, a blinding rainstorm, and escaped dinosaurs. But safe in his luxe private residence, Hammond can maintain the illusion of control. Wu worries about Hammond's tendency toward denial and his inability to accept evidence for flaws in his plans. These traits run so deep that Hammond doesn't even worry when his line of vision into the park—the video monitors—goes dark. And whether his callousness toward his guests and grandchildren functions as an extension of his selfishness or his deep denial, it reminds readers that no amount of technological advancement will benefit humanity unless we address our species' character flaws.

Thus, Wu feels relief when Hammond confesses to some "fears" about the park. But this isn't a sign of Hammond facing the facts; instead, he's worried that he won't live long enough to see the delight of children enjoying his work. He reminds Wu that they originally planned to make a lot of money from emerging genetic technologies, launching into a well-practiced speech. According to Hammond, using these technologies for noble purposes like developing pharmaceuticals is a fool's errand. Too much regulation slows progress, while sick people—and their insurance carriers—balk at paying the kinds of prices for these drugs that would make a man rich.

Hammond's vision of the successful Jurassic Park shows readers what motivates him: pride and greed. Wu has heard this speech before because these flaws are so deeply embedded into Hammond's character. Some of his critique of governmental oversight points toward real issues, such as a lack of public investment and innovation-stifling oversight. But events in the park—dinosaurs escaping the biological and physical limits their human creators have tried to place on them—strongly suggest that a total lack of oversight is even worse.

But entertainment is different. Because no one needs it, no one will complain about the price. Thus, amusement parks offered the only avenue for making the kind of money Hammond wants. And, between the park on Isla Nublar and ventures planned for Jurassic Park Europe (in the Azores) and Jurassic Park Japan (in Guam), the company stands to make $20 billion a year—by conservative estimates. And that's without bothering with the pet dinosaur project that Hammond knows Lewis Dodgson suspects him of.

Hammond reveals the sheer size of his plans for the Jurassic Park franchise: within the space of just a few years, he expects InGen to find a place among the highest ranks of worldwide corporations. With this kind of sway, the lack of regulation and oversight of the park's activities becomes an even bigger threat. InGen's technology is morally neutral in itself—but when directed toward selfish and greedy ends, it becomes dangerous.

In the control room, a guard informs Arnold that someone saw Nedry (the "fat slob") going into the garage about 15 minutes earlier. Muldoon curses.

A person can't see what they're not looking for. Earlier, Malcolm criticized the park operators for setting up their computer systems to monitor the dinosaur population exclusively for escapes, not for breeding. And ironically, since they don't expect their contractors to turn on them, it turns out they can't see Nedry's escape all that well, either.

On the road, Dr. Harding slams on the breaks as a herd of apatosaurs crosses the road. They're huge—each as big as a house—and none of them seem bothered by the Jeep. Unaccustomed to nighttime cars, they don't see the vehicle as a threat. They can see the humans (at least when they're moving—their amphibian visual system looks for movement), but the humans don't mean anything to them.

Harding explains to Ellie the mechanics of the dinosaurs' vision that Grant already discovered experientially: the dinosaurs are more attuned to movement than any other visual stimulus. Although this represented the cutting-edge paleontological theories of the time of the book's publication, subsequent research has disputed this hypothesis. Regardless, the apatosaurs' disinterest in the humans parallels the park operators' disinterest in attending to the facts available to them about their work. And while the humans don't mean anything to the giant dinosaurs, unfortunately, the unforeseen variables affecting the park do have real consequences.

In the bungalow, Wu warns Hammond that he will likely face pressures on his technology and his parks, anyway. Scientists might balk at his use of the technology and try to stop him. Hammond scoffs that scientists just want to research, not actually make real progress. And besides, he continues, because he owns the **island**, no one can tell him what to do with it.

When Wu suggests that social pressures or control might be brought to bear on Hammond and his parks, Hammond rejects the idea entirely. He had unshakable confidence in his ownership—and thus ability to control—his technology and his island, despite the growing evidence to the contrary.

On the road, the Jeep pauses again to allow a herd of compys to cross the road. Dr. Harding, noting that the scavengers don't usually move at night, wonders where they're off to. He hypothesizes that they might be attracted to a dead or dying animal, so he and Ellie agree that they should follow the dinosaurs to investigate.

Readers already know what dead "animal" has attracted the compys' attention—Nedry. The characters' corresponding lack of insight serves to remind readers of how perspective and background knowledge limit or enable people to correctly interpret the things happening around them.

FOURTH ITERATION: TIM

Tim Murphy comes back to consciousness. He seems to have suffered a concussion. Slowly, he realizes that he—and the Land Cruiser—lie tangled in the branches of a tree near the road. Moving carefully, he manages to open the rear door and climb out of the vehicle. As he makes an awkward and painful descent from the tree—he's at least 20 feet above the ground—the car tumbles after him. Tim falls the last 10 or 12 feet to the ground, injuring his shoulder, but at least he's not crushed. Luckily, the night-vision goggles survived the crash, and they help Tim find the wreckage of the second vehicle. But he sees no sign of Grant, Malcolm, or anyone else. Scared and alone, he plops onto the muddy road and begins to cry.

Up to this point, the park's victims have been workers, inconsequential in a personal sense to John Hammond. But his grandchildren's presence potentially raises the personal stakes for Hammond, although at this point it remains to be seen if this will break through his wall of selfishness and greed. By aligning readers' perspectives with a small child at this point, the book emphasizes the smallness and weakness of humanity in the face of nature's fury and power. Tim survives his encounter with the tyrannosaur but nevertheless incurs injures.

Muldoon walks back into the control room, carrying a case of emergency radios. Because they weren't plugged in, they need to be charged first. But then they can try to use them to communicate with anyone still alive in the park.

The park operators' lack of foresight extends to their surviving but useless backup systems. The fact that no one thought to charge the emergency radios suggests an arrogant assumption that the park's main systems would not or could not fail.

Henry Wu enters the Fertilization Lab to search the records for frog DNA, although he doesn't know what Grant is looking for. DNA is so ancient and foundational to life on earth that living creatures share most of their genetic codes with each other. A human being and a bacterium share about 90% of their DNA. Thus, Wu sees DNA as a blank, malleable substance that he can use interchangeably or rearrange as necessary. But when the computer returns the results of his search, it confirms Grant's hypothesis. The genetic code of all the breeding species incorporates frog DNA.

As Wu finally searches his records to figure out what may have given the dinosaurs the ability to reproduce, readers can see the extent of his arrogance and limited knowledge. Assuming that he not only understands but is completely in control of DNA, Wu takes on god-like powers in his manipulation of DNA. Clearly, however, he missed something, although the book refuses to spell it out for readers at this point. By keeping readers in the dark as well, the book makes them complicit with Wu's ignorance.

FOURTH ITERATION: LEX

Tim finds Lex huddled in a drainage pipe, chewing on her baseball mitt, weeping, and banging her head on the pipe. Other than her emotional duress, she seems unharmed. Tim tries to coax her out, but she refuses to leave the pipe because of the "aminals." She only emerges when he promises that the adults are coming. Dr. Grant, she reveals, passed close by just a few minutes ago. She calls out his name, and within a few seconds, he emerges from the trees.

Lex shows clear signs of trauma related to the dinosaur attack, including self-destructive behavior and childhood regression. She longs for an adult to take charge in ways that will reassure her of her safety. In a way, this represents a very human desire to believe that the world is understandable and predictable and therefore safe. But, as Malcolm has argued, and as events are proving, this isn't the case.

After fleeing the car, Ed Regis wedges himself into a hiding place among some boulders on the hill below the road. As he calms down, he begins to feel horror and shame over abandoning the kids, but he can't work up the nerve to leave. At least, he can't until he realizes he's covered in giant, disgusting leeches, and he hears Lex calling Dr. Grant in the distance. Regis takes control of himself and prepares to resume control of the situation. But when Lex's voice falls silent (along with almost everything else), he concludes that something might have happened to her. And if she doesn't need help, he reasons, it makes more sense to start back towards camp.

Regis's (entirely appropriate) shame over abandoning the children isn't strong enough to overcome his instinctual fear of the powerful dinosaurs; only another equally distressing emotion—disgust over the leeches—propels him from his hiding spot. It's possible to read Regis—and the rest of the park operators—as parasitic leeches, willing to take advantage of and expose others to dangers for the purpose of enriching themselves.

A relieved Grant checks Tim and Lex for injuries. Hers are minor; his are more serious, but both children can still walk. As for himself, Grant has bleeding scratches from being raked by the tyrannosaur's claws when it kicked him and the car. He wonders why the tyrannosaur, which could have so easily killed them all, didn't. Worried about the possibility of encountering either the juvenile or adult dinosaur, he decides that they should wait in place for rescue.

Grant and the children all bear the consequences of the park operators' callous disregard for safety in favor of their greed and their arrogant assumption of control over nature. In contrast, Wu, Arnold, and Hammond sit in the resort buildings, still relatively safe and protected.

Lex complains about being hungry, but Grant silences her. Ed Regis stands in plain sight near the road, pressed up against a tree trunk while the juvenile tyrannosaur emerges from the trees. It walks past Regis at first, but when he lets down his guard and resumes his hike back to camp, it bursts through the trees again, knocking him to the ground. With growing horror, Grant realizes that the animal is playing with Regis, allowing him to stand up only to knock him down again. Finally, however, the creature decides to finish him off with a vicious bite. And then, the sound of the night-vision goggles falling from Tim's head captures her attention. Grant grabs the children's hands and begins to run.

It's important to note how silently the big tyrannosaur can move through the trees. Nature—through the vehicle of dinosaur behavior—continues to show itself as a force of unexpected revelation. And yet again, Grant demonstrates the proper scientific attitude, paying careful attention to the dinosaur's behavior until he can form a hypothesis about its actions. In the attack on Ed Regis, the tyrannosaur shows that nature can be as cruel and inhumane as it is unpredictable.


FOURTH ITERATION: CONTROL (I)

Elsewhere on the **island**, a call from Arnold over the radio interrupts the group in the Jeep as they track the compys. Ellie hears enough of the garbled transmission to realize that the tour cars are stuck, and Muldoon wants to use the Jeep to pick the others up. Confused by the urgency in Arnold's voice, Harding points the vehicle towards the base.

Since the book poses Malcolm, Grant, and Ellie, against park operators (including Harding and Gennaro), contrasting each group's willingness or ability to look at and correctly interpret the world around them, it's fitting that of the three people in the vehicle, only Ellie can make sense of Arnold's garbled transmission.

In the control room, an irate Hammond screams at Arnold to "get this park back on track!" and find his grandchildren "*Now!*" All management guys are like that, Arnold thinks, yelling and screaming as if that will get them the results they want, even when one should keep a cool head. And he needs a cool head to wade into the computer code, try to figure out what Nedry broke, and attempt to fix it. Ushering Hammond from the control room, he boots up the computer.

As it becomes clear that Hammond's vision of total control over nature in the park was faulty, he begins to lose control of himself and his temper, too. This is ironic, since, as Arnold notes, an emergency is exactly the time that self-control becomes the most necessary.

FOURTH ITERATION: THE ROAD

Muldoon and Gennaro speed over muddy roads in the Jeep. Muldoon won't relax until he makes sure everyone is safe and sound. As they round a curve, they see a leg—capped by Ed Regis's shoe—lying in the middle of the road. While Gennaro tries not to vomit in horror, Muldoon examines the **limb**, determining that it was torn—not bitten—off by the tyrannosaur. The men wrap the leg in a tarp and stash it in the back of the Jeep before driving on. After a moment, they find the crumpled remains of the two Land Cruisers.

Muldoon treats Regis's severed leg as just another sign he must interpret in the aftermath of the dinosaur attack. On the one hand, he demonstrates the kind of attention to detail that insight and understanding require. But, as Gennaro's horrified reaction demonstrates, he also betrays the kind of casual disregard for human life that characterizes the park design and makes it so potentially dangerous.

Muldoon inspects the wreckage of the vehicles carefully, noting the crushed radio handset and Tim's watch. The watch itself is broken, but the band is intact, suggesting to Muldoon that the kid took it off before crawling out of the vehicle alive and voluntarily. If that's the case, Gennaro asks, where did the kid go? Muldoon consults **tracks** in the muddy road to see if he can determine that. Gennaro doesn't share Muldoon's optimism that anyone survived the attack, and his fears drive a grim determination not just to close the park but to utterly destroy it.

Muldoon reads the signs that remain after the dinosaur attack with care and attention. In contrast, Gennaro reacts impulsively, swinging from horror and disgust to anger. In the face of a chaotic world, the book suggests here, it is critical to keep a cool head. Acting without thinking—like Gennaro wants to do—led to the park's creation in the first place, and undoing the damage the park has wrought will take more care.

Muldoon can't determine where the kids went from the confusion of tracks in the road, but he sees enough evidence to bet that at least one of them—possibly both, and possibly at least one adult—survived. They need, he insists, to search the whole park. And then he hears a wheezing sound in the bushes. They find Malcolm, in shock and with a badly mangled leg, but still alive. Muldoon and Gennaro abandon the search for the others—even though Malcolm confirms that Lex survived the initial attack—in favor of getting Malcolm back to base for immediate medical attention.

Muldoon's priority after the dinosaur breach is locating all of the surviving visitors. In a pointed irony, Malcolm—the very person who had the clearest vision of the park's instability and imminent collapse—suffers the greatest consequences of this collapse.

FOURTH ITERATION: CONTROL (II)

In the cafeteria, John Hammond surprises Gennaro by calmly eating ice cream as if his grandchildren aren't missing on an **island** overrun with carnivorous dinosaurs. Hammond has decided that they've all experienced just "a little breakdown" from "the storm or whatever" leading to a terrible, regrettable accident—Ed Regis's death and Malcolm's mauling. He expresses confidence that soon, Arnold will have the computer systems back online and Muldoon will have found the kids.

With the initial shock of the emergency over, Hammond calmly returns to asserting the rightness of his vision for the park. He trivializes Regis's death and Malcolm's grievous injuries, showing a selfish disregard for the suffering of others. And he doesn't even show concern over his own family members, suggesting a deep and abiding narcissism. Instead of being humbled before nature, he ignores the signs of the park's instability and asserts that he and his operators will soon have everything back under their control.

But in the control room, Arnold faces the daunting task of examining half a million lines of computer code. Wu reminds him that he can run a program to track the keystrokes Nedry made during the day. Within a minute, the computer produces this list. Arnold realizes that Nedry spent much of the day wasting time before accessing and trying to turn off the park's security systems. He obviously hadn't realized that they had transferred those functions to manual switches. Failing in his first attempt, he ran a command to open his trapdoor, then turned off the security and perimeter systems via the main computer. Arnold starts to turn the security systems back on, while Wu, noting that someone had accessed the freezers recently, goes to count the dinosaur embryos.

The gap between Hammond's easy assurance and Arnold's panicked attempts to fix the computer systems also suggests that some of Hammond's bliss comes from his ignorance. He doesn't really understand how complex the park system—or the science that recreated the dinosaurs—actually is.

Ellie stands in her room, about to change out of her wet clothes, when Muldoon knocks on the door. He tells her that he and Gennaro found Malcolm, badly injured, near the crumpled Land Cruisers and that he thinks Grant, Lex, and Tim are still alive but lost in the park. Dr. Harding, the closest person to a medical professional on the island, needs her help providing first aid to Malcolm. Ellie feels worried, but not panicked. She knows that Grant has gotten himself out of some bad situations before.

In contrast to Hammond's callousness—he simply rejects the idea that his family members could be in any real danger, despite evidence to the contrary—Ellie worries about Grant and the kids. She neither panics nor denies her feelings, opting for a middle ground that acknowledges the dangers while still holding faith in Grant's survival abilities.

FOURTH ITERATION: IN THE PARK

It's getting late and Lex asks Grant to carry her, complaining about getting tired. The paleontologist and the children are in the tyrannosaur paddock. The park's motion sensors have markings on them that he's trying to use to navigate; he and Tim quickly realize they're labeled around a central point like a compass. They press north, back towards the resort buildings. While Grant carries Lex for a while, Tim walks alongside, opening up about his parents' divorce. He wants to know about Grant's and Ellie's personal lives. Grant explains that he himself is a widower and Ellie is engaged to a doctor in Chicago. Everyone grows more tired, and Grant knows they need to stop. But where? He remembers seeing concrete bunkers on the plans and climbs up a tree to look for one. Fortunately, one lies less than half a mile away, just beyond the division between the tyrannosaur and sauropod areas.

Grant has kept his head in the wake of two narrow escapes from the tyrannosaur's jaws, but the nonfunctioning park systems, including the motion sensors, stymie his attempts to contact the visitor center. A reliance on the park's main system means that the operators haven't correctly predicted or planned for emergencies, leaving the animals and guests alike exposed to danger. Like scientists Grant and Ellie, young Tim shows a burning desire to gather information about the world around him, whether it's about dinosaurs or people's families. He makes meaning through careful study of the facts rather than trying to make life conform to his expectations. The very fact of his parents' divorce offers a powerful reminder that he can't control life.

Lex still quakes at the sound of any "aminal" in the distance, but when the trio comes to the fence, she's quick to mock Tim for his fear of heights. Nevertheless, all three climb over into the moat without incident. The smooth concrete of its walls gives them more difficulty, but Grant eventually finds a convenient vine to climb up. Exhausted, they squeeze between the bars in the fence around the maintenance building and collapse on the haybales inside.

The extensive fence and moat systems that the park planners designed have utterly failed to contain the dinosaurs, yet they impede the human guests' progress back toward the safety of the visitor centers. This suggest a human-centric design bias underlying some of the park's failures to accept chaos and plan for unexpected or unlikely events (like power outages and dinosaur escapes).

FOURTH ITERATION: CONTROL (III)

In the control room, Arnold hoots in triumph: he's found the command to reverse Nedry's sabotage. No sooner has he executed it than lights begin to come on across the **island**. Miles away, the sudden blaze wakes Grant. He decides to sleep for a few more minutes before going out into the sauropod field to wave at the motion sensors to attract the control room's attention.

For the moment, it seems, Arnold has used his canny human intelligence to regain control of the island. But in reality, he only has regained control over the park's humanmade systems, including the lights. His control doesn't extend to nature itself.

As the park systems come back online, the control room identifies three areas of the electric fence that need repairs: where the tyrannosaur knocked the fence down by the main road; where the tyrannosaur evidently knocked the fence down to get into the sauropod paddock; and by the jungle river. The motion sensors come back online, and the computer begins a count of the animals. There's no sign of Grant and the children yet, but Arnold isn't worried. He assumes they are probably sleeping up a tree somewhere. The computers can't identify motionless animals, even ones as big as the tyrannosaurs.

Reminders of human limitation dampen Arnold's success in restoring systems; Grant and the children remain unaccounted for. The park operators can see a lot, but they cannot see—and thus cannot even react to, much less hope to control—what lies outside of the range of their cameras and sensors.

Gennaro leaves the control room to check on Malcolm. He needs surgery, but with Dr. Harding's attention and high doses of morphine, he appears relaxed and stable. He describes the tyrannosaur attack to the lawyer. The bite isn't the worst of it; his worst injuries, including the compound fracture to his leg, resulted from the dinosaur casually tossing him through the air. Harding explains that most of the carnivores kill their prey by snapping necks, not by biting. Malcolm was so small compared to the animal that its thrashing left him relatively unharmed. And, he maintains, it attacked him rather halfheartedly. He survived, but he tells Gennaro that he's still worried about a "Malcolm Effect."

Malcolm's injuries point toward another potential consequence of automating tasks and reducing human staff and facilities in the park. Without a doctor on staff or appropriate medical facilities, people injured on the island (including workers that the raptors attacked in the past) must be taken to the mainland for care, greatly increasing their chances of mortality. With some pain management, Malcolm recovers his spirits, but even with his mind dulled a little by opiate drugs, he doesn't lose sight of the park's vulnerability to chaos and instability.

FOURTH ITERATION: THE PARK (I)

Near the jungle river, Muldoon realizes that an incorrectly secured tree shorted out the fence. They're deep in dilophosaur country, and he wants to get himself and the workmen out of the range of the venomous animals as quickly as possible. So, he decides to hold off on investigating the dim lights—possibly headlights—one of the workmen spots in the distance.

Park employees used the incorrect materials when installing this tree, exactly the kind of small, unpredictable irregularity that chaos theory says time and life will amplify. And Muldoon's decision to ignore the report of headlights offers yet another reminder that a person can't see what's going on if they choose not to look.

In the control room, Arnold's mood has improved. Enough of the park systems have come back online to allow him to humor Gennaro with an explanation of the "Malcolm Effect." Malcolm, he explains, uses computers to model the behavior of complex systems. These systems have limits; for example, Arnold could drop a bead of water onto the back of his hand, and although he can't predict which direction it will run, he knows it must follow the surface of his hand until it drops off. Arnold tells Gennaro that Malcolm's models tend to have "a ledge" where the drop's motion will accelerate. He named this acceleration the "Malcolm Effect," and it tends to cause systems to collapse. His initial report labeled Jurassic Park an unstable system destined to collapse. And, when he and Hammond got the report, they disagreed with it and ignored it.

In having Arnold, not Malcolm, explain the nature of "the Malcolm Effect," the book demonstrates that park operators can understand the risks their choices incur—they just chose to ignore them, like Arnold, Wu, and Hammond ignored Malcolm's initial report. The drop of water on the back of Arnold's hand gives readers a concrete way to visualize chaos theory, which considers the way small variables can have outsize effects on events. Malcolm's innovation is predicting a particular tipping point where any ability to affect the outcome of a system evaporates. Arnold feels certain the danger of this point has passed.

In the park, Hammond supervises Dr. Harding and the work crews as they tranquilize and move a hypsilophodont. Hammond frets over the creature, repeatedly questioning Dr. Harding's decisions. Harding came to Jurassic Park from the San Diego Zoo, drawn by the opportunity to write the world's first textbook of dinosaur veterinary care. He resents Hammond questioning his expertise.

In contrast to Muldoon, who has consistently demonstrated concern over the health and safety of the park visitors, Hammond worries more about anything happening to his expensive and exclusive dinosaurs. And readers get a bit of insight here into Dr. Harding's reason for joining the project: pride.

Meanwhile, back in the control room, Arnold tries to explain to Gennaro why he and Hammond discounted Malcolm's report. Their park project involved living things, which—unlike mechanical systems—exist in a constant state of flux. "[T]iny jiggles" signify health in a living system, although Malcolm treats them as defects, according to Arnold. Only in a mechanical system, he claims, do small wobbles tend to increase to the point of destruction. Malcolm, he insists, simply didn't understand that tiny changes in a natural system signify health and responsivity. Gennaro suggests that Malcolm may understand the difference between natural and mechanical systems better than Arnold gives him credit for, but Arnold points to the reawakening park as evidence for the park's stability.

Arnold's explanation demonstrates his belief that he understood Malcolm's argument. But Gennaro pushes back on this assurance, and he strongly suggests that perhaps Arnold and Hammond missed some very important pieces of chaos theory. The biases Arnold carries from his personal history as a mechanical engineer limit his vision. In contrast, Gennaro—a lawyer with fewer preconceived notions about the ways mechanical or natural systems work—can see the truth much more easily.

In the park, Dr. Harding revives an anesthetized dinosaur, assuring Hammond of her wellbeing despite her wobbly gait. Arnold turns off electricity to the jungle fence so Muldoon's team can repair it. When they're done, they move on to the other shorted sections. Arnold is trying to fix the phone lines when Muldoon calls in from the field to report that the tyrannosaurs seem to have gotten into the sauropod paddock. When he finds out, Hammond wants Muldoon to subdue the carnivorous dinosaur immediately, worried about how many sauropods he might lose. But Muldoon refuses to comply; not only is it nighttime, but there isn't anything in his arsenal capable of taking down an adult tyrannosaur. None of the tranquilizers will have an effect, and the one rocket that Hammond allowed him to buy disappeared hours earlier with Nedry.

Hammond spends a lot more time worrying about safely retrieving the dinosaurs than finding the missing guests—including his grandchildren. He shows little concern for human health or safety, especially when compared to his monetary investment in the park and his hopes for the vast fortune he thinks it will make for him. Notably, as the only park employee with extensive experience of predatory animals (Dr. Harding's expertise is with birds, not apex predators), and thus with a sense of how little control humans actually have over events in the wild, Muldoon is the only park employee willing to take a stand against Hammond.

FOURTH ITERATION: DAWN

Grant wakes up, sore and stiff, in the soft light of dawn. He finds Lex feeding hay from the maintenance building's stores to a baby triceratops that has stuck its head through the fence bars. She's named it Ralph, after one of her classmates. Grant tries but can't get through to the control room on the shed's phone. Suddenly, in response to a sound outside the fence, the baby dinosaur becomes agitated. Grant and Lex have to help it pull its head back through the bars as an adult triceratops appears and herds the baby away. When Grant prepares to go out into the exposed field to wave at the motion sensors, Lex and Tim insist on going with him.

Despite her fear of the tyrannosaur, Lex's tendency to anthropomorphize the less frightening animals—babies and herbivores like "Ralph"—shows how easy it is for humans, with their intelligence and advanced technologies, to assume that they can understand or control nature. And despite Arnold's early assurance that the park was just about back under control, the ongoing phone jamming suggests otherwise.

In the pre-dawn light, the meadow looks peaceful. The adult and juvenile triceratops amble towards a flock of duckbilled dinosaurs congregated near the lagoon. In the distance, a giant apatosaurus raises its head above the tree line. A gigantic, prehistoric dragonfly lands on Tim's arm. Grant, Lex, and Tim approach the nearest sensor, but it seems to be offline, so they strike farther into the field.

It's not just the phones that are down, it's the motion sensors, too, or at least some of them. And the malfunctioning of the park systems draws Grant and the children deeper into the field, exposing them to increasing danger rather than keeping them safe.

In the control room, Arnold stares blearily at the computer screens. He stayed up through the night trying to restore the phone lines without success. Wu suggests that they reboot the entire system to clear whatever jamming program Nedry initiated. Arnold doesn't like the idea, but they need phone lines urgently; Gennaro arrives with the report that Malcolm is getting sicker. Reluctantly, Arnold turns off the safety systems, then shuts the park down completely.

The park's overreliance on the computer system means that issues like the phone lines being jammed aren't isolated but can lead to catastrophic failure. And the isolation that protected the island from scrutiny by regulatory bodies, investors, and competitors also means that, without its phone lines intact, it completely loses contact with the rest of the world. Finally, Arnold shows clear signs of fatigue; as the only person capable of dealing with the technical issues, he also becomes a single point of the park's success—or failure.

In the apatosaur paddock, Lex catches a foul odor on the breeze just a few seconds before panic seizes the herd of duckbilled dinosaurs. The adult tyrannosaurs bursts from the trees, scattering the herd and setting off a stampede. Grant, Lex, and Tim run.

The experience of Grant, Lex, and Tim belies Hammond's assumption of control over nature itself. In the park, away from the protection of the visitor center, the guests become just more prey for the tyrannosaurs.

In the control room, Arnold waits 30 seconds and then tries to restart the computer. For a sickening moment, nothing happens. Then he remembers that he must restart the safety systems first. The computer obediently comes back to life when he flips the switches. The computer system isn't supposed to ever be turned off, so in the event of a crash it requires manual rebooting. The systems come back to life just in time to give Gennaro and Arnold onscreen footage of the tyrannosaur attacking the flock of stampeding hadrosaurs. Arnold asks Gennaro to tell Muldoon that he needs to go investigate the situation. In the field, Grant, Lex, and Tim see the stampeding dinosaurs from a very different vantage point as they crouch behind a rocky outcropping to avoid being trampled. When the coast is clear, they climb a tree.

As it turns out, the park's systems are only fully automatic so long as they keep functioning. When anything happens to disrupt them, they require a fully manual reboot. Wu explains the rationale behind this choice to Gennaro, but it also illustrates the importance of human direction to technological systems. Without operators, the computer system itself doesn't know what would be helpful or harmful to do. Readers should pay attention to the role of the operator—Arnold—who must bring all the modules back online in the correct order. And if the park operators needed another reminder of how little humans actually control, they regain the full use of the park's computer systems just in time to see the tyrannosaur attack.

FOURTH ITERATION: THE PARK (II)

Huddled in the tree with Lex and Tim, Grant suddenly finds himself face to face with a hadrosaur grazing on the foliage. This encounter, perhaps more than any other on the **island**, moves him, since he studies the **fossils** of these dinosaurs in Montana. The dinosaur doesn't react to his presence, so he concludes she can't smell him. She does respond when he coughs loudly, but unless he's moving, she doesn't seem to see him. And after just a minute or two, she seems to forget about his presence. After the dinosaur ambles off, Grant, Lex, and Tim climb down from the tree. Although Lex doesn't want to walk among the dinosaurs anymore, Grant doesn't know how else they can get back to the resort. Tim helpfully points out that the maintenance building has a raft.

In the aftermath of the latest tyrannosaurs attack, Grant gets the opportunity to remember his love for dinosaurs and to reflect on how powerful InGen's technology could have been—or could be—if it had developed it with more care and forethought. As much as he knows about these dinosaurs from his study—and as many of his hypotheses as the island has confirmed—the information he can get from ancient vestiges of life pales in comparison to the observation of living animals.

In the control room, Arnold begins an exhaustive visual search of the island for the Jeep that Nedry stole. Muldoon insists on recovering the weapons. He watches as the monitor clicks through the park's visual feeds in order, until Hammond summons him to the genetics lab.

Despite the power of the park's automated surveillance system, as Arnold has already noted several times, the motion sensors can only find moving objects. Only human eyes can spot inanimate Jeeps or dead creatures, like the unfortunate Nedry.

In the park, it takes some time for Grant to locate the raft, which lies in a separate shed attached to a dock in the lagoon. But in the process, he also acquires a topographical map of the **island** and a tranquilizer gun. As they approach the dock, he, Lex, and Tim hear snoring. The tyrannosaur, full after its hadrosaur feast, sits in the shade of a tree, fast asleep. Signaling the children to stay still and silent, Grant tiptoes past the dinosaur. He deploys one of the rafts, and although the dinosaur startles, it doesn't wake up. They climb aboard and begin to drift silently into the lagoon. But then Lex coughs, waking up the beast.

Yet again, Grant's careful observation of the world around him yields helpful information—in this case, a map to guide their trek across the island, and a tranquilizer gun to provide safety—or at least, to provide alleged safety. As Muldoon has already explained, the amount of sedative in this gun will have little to no effect on the adult tyrannosaur. Fortunately, the animal can't see the humans as they tiptoe past it in its sleep. Unfortunately, chaos intervenes yet again in the form of Lex's uncontrollable cough.


Grant rows the boat into the center of the lagoon, but the tyrannosaur follows them. Once it walks past the shallows, it uses its powerful tail to swim through the water like the world's largest and most deadly crocodile. It lunges at the raft, narrowly missing it. In desperation, Grant shoots a tranquilizer dart; although it strikes the dinosaur on the cheek, it has no real effect. But just then, the juvenile tyrannosaur comes upon the carcass of the hadrosaur and lets out a roar, attempting to claim the kill for itself. The adult, intent on protecting its rightful prey, splashes back to shore. As it retreats, Lex taunts it. Angry and exhausted, Grant throws down the paddles in consternation, but, caught in the river's current, the trio continues to drift back towards the resort.

Just as nature can present humans with unexpected challenges—like dinosaurs that are faster, stealthier, and much more intelligent than the popular imagination granted—it can also offer unexpected boons. It's a stroke of good fortune when the juvenile tyrannosaur distracts the adult from its human prey.

FIFTH ITERATION: SEARCH

From the relative safety of the Jeep, Gennaro and Muldoon survey the aftermath of the tyrannosaur attack on the hadrosaurs. Muldoon's experience as a hunter and tracker helps him to analyze the scene. Based on **droppings and bite marks**, he ascertains that the tyrannosaur separated a juvenile from the stampeding herd and then dispatched it. After the larger dinosaur cleared the area, smaller scavengers joined in the feast. The radio crackles. It's Arnold, calling from the control room to say that he's located Nedry.

Arnold's discovery in the control room parallels Muldoon's interpretation of the aftermath of the tyrannosaur attack. In both cases, a careful attention to what one can see (especially when one keeps an open mind) yields important information about the ongoing situation. The tyrannosaur behaves in many ways like a typical predator, peeling the most vulnerable member of the herd off before dispatching it. Nature follows patterns are predictable when viewed with an unbiased eye.

Muldoon and Gennaro drive to the place where Nedry abandoned his Jeep. His bloated corpse lies near the car, providing a feast for a flock of compys. But after seeing the swelling on his hands and face and smelling the telltale scent of dilophosaur venom, Muldoon pieces together the story of his final minutes. The park warden retrieves the rockets from the front seat of the second Jeep but leaves the body to the scavengers. As he tells Gennaro, they have bigger problems to deal with first.

Muldoon rescued Malcolm when he was injured; he leaves the dead Nedry behind. More than any other character in the book, Muldoon lives his life according to the rules and laws of nature. Nedry's actions sealed his fate, and so Muldoon leaves him to the mercy of the food chain. But he does retrieve the tranquilizer rockets in light of the serious dangers everyone faces.

As the jungle river becomes narrower, it runs faster, carrying Grant, Lex, and Tim back towards the base. Lex, still hungry, wants to try berries from trees alongside the river, but Grant tells her not to. They may be dangerous. Annoyed and missing her father, she picks on Tim for his interest in computers and dinosaurs. But they stop bickering when they hear an unearthly shriek from somewhere ahead.

Despite the dangers they face, Tim and Lex still behave like siblings and children, picking on each other and griping about their hunger and fatigue. Despite our advanced intelligence, humans still suffer discomfort and behave in cruel and unlikable ways.

In the Jeep, Muldoon grows increasingly impatient with Arnold's inability to find the tyrannosaur via the computers. Arnold insists that the computer system can find neither the giant dinosaur nor the lost paleontologist and children.

Yet again, the park operators demonstrate their excessive reliance on the park's computer systems. But this system, by design, doesn't allow them to see the whole picture. Their inability to see (both literally and metaphorically) limits their insight.


Back on the river, the raft drifts towards the steel framework dome of the aviary. Grant remembers that there's a second lodge here. Hoping to find functional motion sensors or—even better—a phone, he lands the raft.

The aviary loomed large when the guests landed on the island, but it wasn't featured on the tour. Grant's hopeful expectation of finding a way to communicate with the control room keeps him from wondering why.

FIFTH ITERATION: AVIARY

In the control room, surrounded by chaos and mess, Arnold calls Malcolm's room in the lodge. He's trying to figure out why he can't find the tyrannosaur or the missing visitors. Malcolm posits that the motion sensors cover an insufficient area of the park; he guesses that the 7% of unmonitored land is contiguous. Any person or dinosaur sticking to these areas will disappear from the computer's sight. He guesses that Grant, Tim, and Lex might be following one of these unmonitored sections, the river, which provides a direct path back to base. Arnold hopes the missing visitors aren't on the river—not only is the river difficult to navigate on foot, but it runs directly through the aviary.

The chaos and mess in the control room call attention to the chaos and mess in the park and stand in stark contrast to the very idea of "control." It's as if this chaos reminds Arnold of Malcolm, whom he consults now. And indeed, Malcolm proves himself yet again capable of seeing what the park designers can't. It makes sense why Grant and the children would follow the man-made river—it's a direct and easy-to-follow path back to the resort. But their choice to do so also exposes them to unknown dangers: first, they are out of the control room's sight. Second, they are bound for the aviary.

This is dangerous territory because they only realized the animals' territorial instincts after they'd gotten giant cearadactyls into the enclosure. They fight viciously among themselves and attack any other creatures—including humans—who invade their space.

The book has already introduced dinosaurs whose unexpected and dangerous behaviors surprised the park operators—the raptors' intelligence; the compys' and dilophosaurs' venom—but the cearadactyls are too dangerous to even include on the tour. The operators have introduced the animals to their planned environment only to belatedly realize that these animals, too, evade their control.

In the aviary, Lex judges the incomplete lodge a "dump." There's no phone and dinosaur droppings cover every surface. A shadow passes over the trio as they trudge back to the raft. Grant looks up, entranced by the graceful flight of the big cearadactyls. But then one swoops down, nipping at the back of Lex's head and drawing blood. They begin to run, throwing themselves to the ground when the dinosaurs swoop down at them. One manages to grab Lex, but it can't lift her weight off the ground. Grant throws himself on the animal, knocking it off the girl and to the ground. The disoriented dinosaur rights itself and then stalks away on its wing claws. Grant realizes this vindicates another paleontologist's theories about the animal's movements, but another attack quickly motivates him to abandon scientific inquiry in favor of escaping the aviary as soon as possible.

The incomplete and dangerous lodge in the aviary stands as a metaphorical miniature of the half-finished, dangerous park itself. Human greed, arrogance, and lack of insight have doomed both. In this moment, Grant yet again finds himself slipping into the role of scientific observer, matching the behavior of the dinosaurs in front of him with received wisdom and current theories. His ongoing, habitual observational habits model the kind of vision the book claims is necessary for true insight and understanding.

When the raft drifts out of the giant aviary enclosure, Lex cheers. As they ride the river's increasing currents, Tim asks Grant why he asked Wu about frog DNA the previous afternoon. Grant explains that animals reproduce in a stunning variety of ways, and that in some species there's less differentiation between male and female than in humans. But before he can finish his explanation, the tyrannosaur bursts through the trees on the riverbank. It continues to follow them, but the density of the jungle prevents it from getting close enough to catch them. Frustrated after two failed attempts, it peels off and heads downstream. Ahead, the raft's occupants hear the hooting call of the dilophosaurs.

In yet another example of nature behaving in unexpected ways, the tyrannosaur seems to be chasing Grant and the children for sport, or out of some vague animal annoyance, rather than for food. Harding and Malcolm just explained that the humans are too tiny to satisfy the giant animal; moreover, it recently had a dinosaur-sized meal. Like the raptors, the tyrannosaurs point towards nature's ability to turn deadly, especially against human beings who remain vulnerable to chaos despite their intelligence and advanced civilization.

In the lodge, Malcolm discovers from Ellie that the park doesn't seem to have much in the way of emergency stores like flashlights, matches, or bottled water. He tells her he has a low opinion of Arnold's and Wu's "thintelligen[ce]." They think narrowly and miss the big picture. Like most Western scientists and engineers, they tell themselves that they want to know the truth about nature. But, Malcolm asserts, they just want to accomplish things. They're so focused on whether they *can* do something that they don't stop to wonder whether they *should*. According to Malcolm, scientific discovery always damages the natural world.

The lack of preparations for even easily predicted disasters, like the storm-related power outages the park experienced the night before, points yet again toward the park operators' arrogant assumption that they have full control over nature on the island to the point that nothing harmful can happen. It also implicates their lack of vision and insight; choosing not to anticipate any potential disasters, they failed to prepare for any. Malcolm criticizes these faults—particularly limited vision—directly.

Ellie protests that without scientific exploration, humanity would lose valuable advances. But Malcolm cuts her off, pointing out that many so-called "advances" fail to deliver on their promises. Despite engineering and technological advances, people still spend the same amount of time doing housework in the 1980s as they did in the 1950s. Cavemen lived better lives, according to Malcolm. Twenty hours of effort a week went to securing food and shelter, and they could spend the rest of their unadvanced lives however they wished.

Ellie speaks up here for a kind of vision of scientific progress that includes care and oversight. She thus implicitly endorses a view of human progress with which Malcolm disagrees. Instead, he claims that innovations and technological advances don't necessarily produce beneficial changes for human life because the technologies are no better or worse than the ways in which people use them.

On the river, Grant slows the boat to a cautious crawl despite the current. He and Tim both remember from the tour that the dilophosaurs have poisonous venom. Coming around a corner, they spot two, one standing on each bank of the river, hooting and mirroring each other's movements. With growing surprise, Grant realizes they're performing a mating ritual. Until they stop, they won't allow the raft to safely pass. And it might last for hours. But while he tries to think what to do, the tyrannosaur approaches through the forest, distracting the dilophosaurs. Grant tells Lex and Tim to lie down in the bottom of the boat as they slide past. And after catching on the river bottom for an agonizing moment, the raft floats safely downriver.

Although ample evidence has supported Grant's and Malcolm's assertion that the dinosaurs are breeding—eggshell fragments and extra dinosaurs on computer scans, for instance—the dilophosaurs' mating dance provides the first direct piece of evidence anyone has observed. Without knowing what to look for or where to look—remember that the river isn't covered by the park's video monitors—the operators couldn't see activity going on beneath their noses.

FIFTH ITERATION: TYRANNOSAUR

Muldoon and Gennaro speed across the **island** in the Jeep searching for the tyrannosaur. The radio crackles: Arnold calls to say that he's found the giant dinosaur in sector 442. When Muldoon confirms that he's picked up the dinosaur's movements on the Jeep's onboard computer, Arnold sternly reminds him to not hurt it. It is, after all, the park's main tourist attraction. Focusing on tourists, after all that has gone wrong, strikes Muldoon as ridiculous.

Arnold's tense exchange with Muldoon places the chief engineer solidly in John Hammond's camp, more concerned with the wellbeing of the dinosaurs—and thus the park's potential for making money—opposed to the safety and security of their guests. The operators' greed causes massive collateral damage.

When Muldoon and Gennaro catch up to the beast, Muldoon shows the lawyer how to load the rocket launcher with doses of tranquilizer large enough to bring down a herd of elephants. He's just guessing at the dose, since they still know so little about how dinosaurs behave and how their physiology works. People used to think of them as a group of barely differentiated lizards, but it's becoming clear that they were nearly as diversified as mammals are today. And some of them, especially the **raptors**, seem incredibly intelligent. They close some of the distance between themselves and the dinosaur in the Jeep, then Muldoon exits the vehicle with the launcher. His first shot misses. His second shot also fails to tranquilize the animal. It charges, and Muldoon leaps back into the vehicle as Gennaro guns the engine and they drive away.

If one thing has become clear throughout the course of the book, it's that humans cannot organize or control dangerous, messy nature. No matter how manicured the park is, the nature it contains remains wild. And in the spirit of kill-or-be-killed, Muldoon and Gennaro must stop the adult tyrannosaur's rampage. Muldoon's miniature lecture on dinosaur physiology and behavior—highlighting, as it does, how little the park's operators know about these animals—pointedly dispels any illusion that the park's staff can control the animals. The tranquilizer's failure to stop the tyrannosaur merely emphasizes the park's unruliness.

The river carrying Grant, Lex, and Tim back towards the resort buildings moves so fast now that it feels like an amusement park ride. In the distance, the river appears to end abruptly in a straight line. Grant suddenly realizes that the river ends in a waterfall. Despite his furious efforts, he can't stop the raft—and its passengers—from going over into the pool below, where the tyrannosaur stands, patiently waiting for them.

The speeding river recalls the "ledge" of the Malcolm Effect, where the instability of a system becomes unstoppable, as well as the fact that this wild, unpredictable, dangerous place was supposed to be a manicured amusement park. And if readers needed another reminder that nature eludes human prediction and control, the fact that the un-tranquilized tyrannosaur guessed the path of its human prey and cut them off at the lagoon offers it.

From Grant's perspective, the fall into the pool 50 feet below seems to take an eternity. When he resurfaces, he manages to pull himself and Tim from the water quickly, but he can't find Lex, whose bright orange lifejacket dangles from the tyrannosaur's jaws. After an agonizing moment, though, her gray and waterlogged body pops to the surface of the water. Grant knows they don't have much time to escape as the tyrannosaur shreds the lifejacket, scanning for signs of their movement downstream. Then, he sees a dirt path with clear **signs** of human use leading behind the waterfall. They're just ducking behind the water when the tyrannosaur turns, catching a glimpse of them before they disappear into an alcove full of the pumps and filters that run the river.

Luckily, Grant, Tim, and Lex all survive the trip over the waterfall relatively unharmed. Having lost sight of its prey, the tyrannosaur turns its sight in the direction it thinks their escape most likely: farther downstream. This is no pea-brained reptile, but an intelligent, thoughtful hunter capable of anticipating its prey's movement and stalking them over long distances. The dinosaurs continue to act in ways the park operators did not predict.

Lex worries that the dinosaur might have seen them ducking behind the waterfall while Grant inspects the alcove, looking for a phone to call the control room. The door—to a maintenance shed—is locked, but someone has helpfully scratched the code onto the keypad cover. When the door swings open, the children hesitate to enter the dark room, so Grant tells them to stay put. But then the door swings shut behind him and he's left in darkness. A moment's groping yields a handy flashlight, which illuminates the damp and slippery steps leading down into the maintenance shed. In the darkness beyond its beam, Grant hears animal movements.

It turns out that the waterfall is manmade, too, yet another part of the park's attempt to emulate nature. The alcove behind the waterfall houses the massive amounts of equipment necessary to keep up the illusion, which also offer another reminder of the degree to which the park operators have deluded themselves. Because they can control the "natural" features they've created, they forget that they can't exercise the same control over the living dinosaurs their advanced technology allowed them to make.

A small electric vehicle sits charging at the back of the shed, but as Grant approaches it, a dinosaur springs from the darkness at him. Instinctively, he shoots it with a tranquilizer dart. The animal—a juvenile male **raptor**, according to Grant's assessment—falls to the ground, dazed. Excited by the discovery of one of the wild-bred animals, Grant nevertheless has the presence of mind to return to get the children. He discovers, much to his chagrin, that the door locked behind him and he can't open it from the inside.

Earlier, the dilophosaurs' mating ritual provided the first eyewitness evidence of dinosaur reproduction on the island; now Grant sees an actual, wild-born juvenile. Of course, it's a raptor—the species that presents the most danger and represents the nature's ability to evade human control.

Lex and Tim are waiting for Grant to return when the tyrannosaur's head bursts through the waterfall. It swings wildly about but can't find the children who have frozen in fear. When the dinosaur momentarily retreats, Tim and Lex slink as far back into the alcove as they can. The next time that the dinosaur pokes through the water, it sticks out an enormous, prehensile tongue and uses it to probe for the children in the darkness. After a minute or two, it finds Tim, wraps around his head, and starts to pull him towards the dinosaur's gaping jaws. Lex grabs Tim's waist and tries to pull him from its grip unsuccessfully. But just before the dinosaur can maneuver Tim into its jaws, it lets go and slowly pulls its head back through the waterfall.

Just when it seems as if the situation can't possibly get worse, it does—solidly illustrating the power of the Malcolm Effect. A locked door separates Grant from the children—even when the park's systems function properly, they create havoc. And the tyrannosaur continues to stalk the humans, apparently for sport.

FIFTH ITERATION: CONTROL

In the control room, Arnold breathes a sigh of relief as he confirms that the tyrannosaur is "down." The park, he feels, is finally back in order. Muldoon's second shot must have hit the beast, but it took an hour for the tranquilizer to take effect. Arnold wants to rub his success in Gennaro's face; he arrogantly points out that "the park is now completely back to normal," just as Gennaro notices a warning flashing on the system monitor behind Arnold. It says "AUX PWR LOW," which confuses Arnold, who thinks that the main power is on. As the warning turns red and begins to count down, Wu suggests that Arnold print out a system status log.

Arnold's sense of regained control fails abruptly, proving the illusory nature of human control over nature. The park's cascading failures also exemplify the Malcolm Effect. In addition, it's worth noting that Arnold seems to have forgotten about the still-missing Grant, Lex, and Tim. His sense of pride in his own power outweighs a concern for the health and safety of others.

In the park, Tim cautiously peers out from behind the waterfall. The tyrannosaur is tranquilized, not dead. Tim notices the dart still stuck in the back of its head. While he stares, the waterfall slows to a trickle and stops completely, and then the door to the maintenance shed pops open. Grant beckons Tim and Lex inside.

The power outage represents yet another stage in the park operators' loss of control, but in the moment, it proves an unexpected boon to Grant and the children, allowing them to regroup and head back to the resort.

In the control room, Arnold stares at the system status log in disbelief. When he restarted the computers earlier that morning, the system reverted to auxiliary power, as it was designed to. Arnold knows this, but because he hasn't ever needed to turn the system off, he forgot that the main power hadn't been restored when the lights and systems can back on in the control room. This means, as he confesses to Muldoon and Gennaro, that the park has run exclusively on auxiliary power since 5 a.m. And the fences require too much electricity to run on auxiliary power. They have been off for hours all over the park. Even the **velociraptors**' fence.

The generator shuts down due to a combination of human error—Arnold forgot to switch the park systems back to main power after he rebooted the computers earlier in the day—and an overreliance on mechanical systems and the control room's interfaces to give park operators the full picture. Because it didn't occur to Arnold to check the source once electricity was restored, he missed an important piece of information. And deadly consequences ensure when the raptors (i.e., nature) escape human control.

The men in the control room hear a scream in the distance as Muldoon snaps into action, handing out radios and giving orders. He tasks Arnold with turning on the main generator and tells Wu—the only person besides Arnold who understands the computer system—to stay in the control room. Hammond pensively demands to know what Muldoon plans to do with "[his] animals," but Muldoon orders him to run to the lodge, shut the doors, and stay put. Gennaro wants to run away, but he chooses to follow the park warden to the weapons cache. Muldoon warns him that dinosaur physiology makes them very hard to kill. And, although the park officially has eight **raptors**, they only have six shells.

Hammond faces the same lethal danger as everyone else still alive on the island, but his greed and arrogance keep him from seeing or feeling it. He's more concerned about protecting his investment in the dinosaurs than everyone's lives, including his own. And it doesn't matter how many raptors the park officially has; the raptors are one of the reproducing species. Jurassic Park will never have enough ammunition to neutralize all of the animals, due to the operators' greed and lack of foresight.

Muldoon and Gennaro leave the visitor center in time to see three **raptors** closing in on Arnold, who cowers in front of the power plant door. Muldoon drops to his knee and asks Gennaro to load a shell into the rocket launcher; it takes the inexperienced lawyer two tries to get it right. Gennaro watches as one of the animals explodes, falling victim to Muldoon's well-aimed shot. The raptors turn in the direction of the shot, moving menacingly towards Muldoon and Gennaro. Muldoon shoots again, injuring one in the leg, before he and Gennaro start to run. In the control room, Wu listens in horror to the sound of shots and screaming. But he can't leave the control room, or he won't be ready to restart the main generator. Outside, Muldoon sprains his ankle and tumbles down an embankment, pursued by the raptors, while Gennaro runs in the opposite direction.

Early in the book, readers got a glimpse of the raptors and their terrifying potential as hunters when Grant, Ellie, and Malcolm visited their enclosure. Now that they've escaped, readers—and horrified park operators and guests like Arnold, Muldoon, and Gennaro—get to see these powerful animals in action in broad daylight. These animals are equally fascinating—their coordinated behavior suggests an almost human-like intelligence and sense of cooperation similar to that shared by humans—and terrifying. The park operators have lost their illusion of "control" completely: Wu hears and sees events from the control room, but he cannot interfere in them.

In the lodge, Ellie helps Dr. Harding administer more morphine to Malcolm. When Hammond arrives to check on his guest, he glumly reports that the **raptors** escaped. He's reluctant to admit that Malcolm, who predicted a failure of fence integrity, was right. In frustration, Hammond protests that he had a simple, elegant idea for the park. This enrages Malcolm, who decries Hammond's scientific power as a form of inherited wealth. Most people attain power only through years of hard work and discipline, which teaches them responsibility. But scientists, especially those who have the benefit of modern technology, have neither mastery nor humility toward nature. The main problems with Hammond's plan, according to Malcolm, arise from his twin beliefs that just because he could resurrect dinosaurs he should, and that creating them meant he could control them.

As an outsider to the park project—and, crucially, as a person who won't gain fame or wealth by its success—Malcolm has a better vantage point from which to assess the whole premise. In contrast, Hammond's greed, pride, and denial limit his field of vision to those facts that tend to reinforce (or at least not contradict) his predetermined ideas. His ongoing assertions of simplicity attest to the depth of his delusion that human beings have dominion or control over nature thanks to their advanced intellects and technologies. And in this scene, Malcolm directly calls out the arrogance and hubris underlying much of late 20th-century scientific research: the accelerating pace of discovery, building on previous research and innovation, doesn't leave enough time for the philosophical questions that should attend scientific research and technological development: not just whether one can, *but whether one* should.

Muldoon radios Wu in the control room to ask if Arnold has succeeded, and to explain that he's stuck, wedged into a drainage pipe just out of the **raptors**' reach. Meanwhile, barely containing his panic, Arnold opens the door to the maintenance shed. The power outage has cut the lights, and he didn't think to bring a flashlight. Leaving the door cracked open a few inches provides enough daylight to work with, so he props it with one of his shoes. While he creeps along the catwalk, the light disappears. A velociraptor stands in the doorway. He backs away slowly until he can scramble down the steep and narrow steps, confident that the animal can't manage them. It can't—but it jumps nimbly off the catwalk and lands a few feet behind him. The auxiliary generator lies just beyond reach when the raptor's claws slam into his back.

While Hammond and Malcolm argue about the philosophical basis of modern science, everyone outside of the lodge contends with the consequences of reckless experimentation: the escaped dinosaurs. Arnold's choices here demonstrate a stunning lack of insight into the behavior of the animals he was charged with overseeing as the park's chief engineer. His missteps mirror, and thus critique, the missteps of the park as a whole. He leaves vulnerabilities in the system (the shoe propping the door open), and he underestimates the dinosaurs' capabilities. And he pays for these mistakes with his life.

Gennaro doesn't like living dangerously, but he thinks he has a plan. Assuming that the **raptors** wait on the south side of the maintenance shed, he circles around and approaches from the north. He finds Arnold's shoe propping the door open and leaves it while he continues inside. Although he doesn't know where he's going and he forgot his radio, he's confident that he can identify—and start up—the generator. Gennaro freezes when he hears an animal snarl, and something—blood!—starts to drip on his shoulder. Above him, perched on a pipe, sits a raptor. It has an injured leg, and he's able to fight it off momentarily. While he looks around for a weapon to use to kill it, it disappears. And then he feels teeth close around his hand and something yanks him off his feet.

If Arnold's encounter with the raptors mirrors failures of the park creators and operators, Gennaro's attempt to restart the generator mirrors his relationship with the park, too. His overconfidence in his ability to fix the situation leads him into the maintenance shed without a plan and without the proper background knowledge to accomplish the task (it's questionable whether he actually could recognize and restart the generator without instructions). Similarly, fully confident that he understood Hammond and that he had the power and knowledge to stop the park project from going too far, Gennaro failed to provide the necessary close oversight that might have prevented the unfolding catastrophe.

Over the radio, Muldoon and Wu make plans to regroup and join the others at the lodge. While they wait, Malcolm tells Ellie and Hammond that the park operators' attempt to control nature represents the logical conclusion of Western attitudes dating back to the Renaissance. New scientific ideas promised a rational and objective way to look at the world. But after a few centuries, science has demonstrated its limits. It grants enormous power but doesn't help anyone figure out how to use that power responsibly. And it offers an empty promise that humanity can understand and control nature. Chaos theory proves the inherent unpredictability of life on earth, and now humanity faces an imminent, major paradigm shift. Hammond coos pityingly over Malcolm, implying his delirium. But the right-minded Malcolm points out the extreme unlikeliness that any of them will escape the **island** alive.

Ultimately, while the egos, greed, and work of a few specific men (especially Hammond, Wu, and Gennaro) led to the creation of Jurassic Park, Malcolm warns that the issue transcends this one example. Arrogance has been baked into western scientific progress for centuries. The number of things that humans could track, understand, and predict grew, allowing humanity to feel an ever-greater sense of control over the world around it. But powerful forces remain in the natural world and in human nature, and they've proven more difficult to predict (such as the weather or he surprising adaptations of evolution) or counteract (such as flaws like greed and pride in human nature).

SIXTH ITERATION: RETURN

Grant, Lex, and Tim race through the underground tunnel in the electric car, carrying the tranquilized juvenile male **raptor** with them. Grant wants to preserve it as evidence of wild breeding. Lex shines the flashlight on Grant's watch to reveal the time—10:15 in the morning. They only have 45 minutes until the supply ship, with its raptor stowaways, arrives on the mainland. Finally, the tunnel disgorges them in front of the visitor center garage. In the garage, they find animal cages in which they stash the raptor before entering the lobby. The "When Dinosaurs Ruled the World" sign hangs askew, creaking in the wind. Grant takes a radio from the body of a dead guard, and, in a moment, he contacts Ellie and the others in the lodge.

Reminding readers that a person's field of vision is limited, Grant and the children don't know about the chaos in the visitor center. More importantly, no one in the control room knows about the raptors on the boat to the mainland. The island, it turns out, isn't as closed off from the rest of the world as it first seemed, and the chaos in the park threatens to spill over to the mainland.

Ellie tells Grant that two **raptors** have climbed to the roof and are chewing through the steel bars on the skylight above the room where she, Malcolm, Hammond, Wu, and Muldoon are sheltering. They only need a few minutes more to break through and get inside. Ellie and the others confer about their options. They need to create a distraction to keep the raptors occupied long enough for Grant to reach the maintenance building and restart the auxiliary generator. Malcolm and Muldoon both have injuries, and they can't risk Wu—the only person left who knows the computer system—as bait. Ellie laces her shoes and heads for the door.

The deadly, intelligent raptors provide the ultimate example of the dangers of unchecked, thoughtless scientific and technological experimentation. As they prepare to break through the bars and destroy their creators, they offer a pointed reminder that, deprived of the benefit of their advanced technologies, humans are uniquely weak and vulnerable to many animals they consider inferior.

In the visitor center, Grant receives word from Wu. He should wait five minutes and then try to reach the maintenance building. Once he's there, Wu will talk him through restarting the generator. Grant wants Tim and Lex to stay in the visitor center; because Lex complains of hunger, he directs them to shelter in the cafeteria. Without power, the cafeteria and kitchen lie in almost complete darkness, but Tim still has the night-vision goggles. Leading his sister by the hand, Tim heads for the kitchen to look for the ice cream she wants.

The dark cafeteria reinforces the book's claim that limited vision and lack of insight render human beings individually and collectively vulnerable to the powerful forces of nature. Tim can pierce the darkness literally with his night-vision goggles, but the book gives him this tool in part because it idealizes his unbiased, unblinkered child's vision as opposed to the shortsightedness of the park creators.

At the lodge, Ellie and Muldoon cautiously walk up to the exterior fence. Ellie shouts and bangs on the bars; no **raptors** appear through the mist. Finally, banking on their intelligence, she decides to open the gate as loudly as possible and walk a few yards beyond its protection. This idea distresses Muldoon, but he can't dissuade her. Although she's waiting for the attack, she's still surprised when the animals charge at her in perfect formation. With speed and luck, she manages to dodge them and run back into the protection of the fence. The raptors snarl and jump at the fence, so she and Muldoon decide to stay outside and keep them distracted long enough for Grant to find the door to the shed, still propped open with a shoe.

The raptors' intelligence and collective action make them nearly the equal of the human survivors in terms of ingenuity. In addition, they have the benefit in terms of size, agility, speed, and razor-sharp teeth and claws. Absent technological advantages like electricity or military-grade rockets, the dinosaurs easily outmatch their human prey. InGen's research on the island has been reckless and dangerous, and the very existence of the raptors argues for the necessity of oversight and regulation of emerging technologies.

In Malcolm's room, Wu can still see two **raptors** on the skylight, but the noise of their fellows outside the fence draws their attention away from the bars. He watches through the window as Ellie jogs along the fence and he realizes that the trio of raptors outside aren't seriously trying to get in any longer. They're smart enough to realize they can't, but they continue to harass their prey. When Grant's voice crackles over the radio, Wu carefully guides him through the building and the process of restarting the auxiliary generator. After a few tense minutes, they succeed, but as soon as Wu tells Grant that he has to go back to the control room to restart the main generator, Grant's radio goes dead.

Wu watches the raptors' behavior and realizes it has changed, but he's a geneticist, not a biologist. His lack of expertise means that he realizes the meaning of what he's seeing only slowly. And yet again, the park operators' overconfident reliance on technology to keep the park running smoothly proves naïve when Wu loses radio contact with Grant. Technology only gives humans the illusion of control over nature when it's working. When it fails, people must face the reality that they are subject to the world's chaos.

In the kitchen, Tim finds several refrigerators, all fully stocked with staples like vegetables, steaks, and milk, before he locates the freezer. As he opens the door, Lex frantically whispers, "*something's here*," and when he steps back into the kitchen, he can hear a hissing sound. He creeps to the kitchen doors and looks through their windows to see a **velociraptor** stalking through the dining room. Meanwhile, as Grant retraces his steps through the maintenance shed, he hears someone shouting over the noise of the generator. Following the sounds, he finds Gennaro, hiding inside a truck covered with compys.

The well-stocked kitchens remind readers yet again, in this moment where the survivors face extreme danger from the escaped dinosaurs, that the island was meant to be an amusement park—and one that was going to open to the public very soon. The scale of disaster that InGen's arrogance, denial, and insufficient insight caused could have been so much larger.

Back in the kitchen, Tim watches the **velociraptor** follow their scent towards the kitchen. The books all say that dinosaurs have a terrible sense of smell, but what do they know? Only the people on the **island** have ever encountered a living one. Tim pulls a stack of steaks from the fridge and lays them out on the floor. When the dinosaur opens the door with its claws, it quickly finds the meat. It follows the steaks to the freezer door, where it hesitates momentarily due to the cold. But then it takes the bait and goes inside. Tim rushes to slam the door shut. The raptor throws its body against the door; if it hits the interior handle, the door will open. But just in time, Lex helps him lock the door from the outside. They have trapped the dinosaur.

The guests have been on the island for less than 72 hours, but their knowledge of dinosaur physiology and behavior has grown exponentially over that time. Tim realizes that he—and everyone else—knows next to nothing. His "knowledge" about dinosaurs turns out to be little better than guesswork.

Grant leads Gennaro out of the maintenance shed. Gennaro describes fighting off the raptor; he assumes it was the one that Muldoon had injured. He doesn't know what happened after he fended the creature off. It could be inside or outside the building, dead or alive.

As Grant and Gennaro compare notes, they—like Tim—must face the reality of their own ignorance about the raptors.

At the lodge, Wu grows increasingly uneasy watching the **raptors** mock-attacking the fence. He hasn't paid much attention to dinosaur behavior previously since he can't predict or control for it. His lack of insight into ancient dinosaur behavior limits his ability to change it via genetic modification. Secretly, he's proud at the evidence of wild breeding, since it means that he put the dinosaurs together correctly. Slowly, he realizes that the raptors—such intelligent creatures—seem to be staging a diversion to keep Ellie's and Muldoon's attention. And when Dr. Harding informs him that the two raptors on the roof abandoned the skylight, he hurries to call Ellie and Muldoon inside.

As the park unravels, Wu increasingly reflects on his own blind spots—like dinosaur behavior. From a genetic standpoint, this lack of interest makes sense. But, in the context of an amusement park, the behavior of the dinosaurs—more than their physiological accuracy—carries a lot more weight. Wu might have done an excellent job recreating the raptors, but their behavior suggests that doing so was a terrible mistake. And even when he sees the shift in their behavior—from attacking to toying with Ellie—his insight arrives too late to prevent danger.

But Wu arrives too late. He's trying to convince Ellie to come inside when one of the skylight **raptors** jumps on him from the roof. Muldoon runs inside and slams the front door, while the raptors disembowel and begin to eat the unfortunate Dr. Wu. As Ellie takes off around the corner of the building, Muldoon watches through the window while the three raptors outside the fence head towards the visitor center. In the fog, they run right past Gennaro and Grant.

Like Arnold, Wu ultimately becomes the victim of his choices in creating the park, which were driven by his lack of insight and his greed and pride. Of the park creators who demonstrated insufficient humility and respect for nature, only Hammond now remains. Readers know that the three raptors are likely heading toward the visitor center due to the distress of their compatriot, trapped in the freezer by Tim. But, to the survivors on the ground, with their limited insight, the dinosaurs' behavior seems mysterious, almost random.

Ellie, feeling euphoric from adrenaline, rounds the corner and easily climbs up a tree to the lodge roof. She has a short head start while the **raptors** finish eating Wu, but soon enough they follow her up the tree and onto the roof. She heads for the roof access door, but it's locked from the inside. She is trapped on the roof, and the only way down is to jump into the pool below. She worries about missing and hitting the concrete pool deck, but after second's hesitation, she jumps. She expects the dinosaurs to follow her, but luckily Dr. Harding unlocks and opens the access door on the roof at just that moment, distracting them long enough for her to climb from the pool and run inside through the main doors.

Ellie runs into chaos—defined in Malcolm's terms as the amplification of tiny variables—twice in her successful escape from the raptors. First, she can't get off the roof through the access door because it is locked; then she manages to scramble into the front door because Dr. Harding opens that same door from the inside, distracting the raptors just long enough. In both cases, we see how chaos and contingency affect life on earth as much—if not more—than deliberate human action.

In the visitor center, Tim and Lex search for the control room, where Tim hopes to find a radio. The doors are closed and have key card readers, but with the power out, they are all unlocked. In the control room, they first find someone's disembodied ear, then the computer program's startup menu on the display screens, then finally a radio—which they squabble over. When Muldoon's voice crackles over the airwaves demanding to know what's going on, it startles Lex.

Tim and Lex provide another chaotic element—but one that works in the survivors' favor—to the situation when they successfully make it into the control room.

Outside, Grant and Gennaro crouch in the fog, watching the three **raptors** alternately listening to something and trying to get into the visitor center. Grant worries that they're trying to get into the cafeteria, where he left the kids. Finally, one succeeds in jumping to a second-story balcony, gaining access to the building. Meanwhile, over the radio, Tim tells Muldoon that he's made it to the control room. If someone will give him instructions, he's confident that he can reboot the system. Unfortunately, Muldoon replies, everyone who knows the system has died. Tim decides to try on his own, despite Lex's vote of no confidence in his abilities. Her concerns seem warranted when he's unable to type in any commands, but then he realizes that the computers have touchscreens.

Yet again, Grant observes the dinosaurs exhibiting previously unknown potential. This emphasizes the gaps in human knowledge, and these gaps mean that the park project (as Malcolm has claimed) was always doomed to failure based on the innumerable instances of its operators' ignorance. The process by which Tim ultimately figures out how to work the park's computers shows the importance of careful observation—only by taking the time to look carefully at what's in front of him and to identify patterns can Tim succeed in restoring power.

Lex pokes at the screen, turning the cameras back on Images pop up on the control room's monitors: fog and mist; Malcolm lying in his bed at the lodge; the supply ship approaching harbor on the mainland; **raptors** on the roof of the lodge, about to jump into Malcolm's room.

As Tim gets closer to restoring the park systems, Lex helpfully (and metaphorically) restores the control room's sight by turning the video feeds back on. Unfortunately, they reveal a truly dire situation.

SIXTH ITERATION: THE GRID

As Tim struggles to navigate the confusing computer interface, he tries to ignore Lex's needling questions. Pushing buttons on the "Setgrids" menu, he figures out which grid will power the lodge, but each time he tries to turn it on, he receives a "Power Incompatible with Command" error. As he tries to understand the error, Lex frantically pulls him from the screen, and he hears the snarling of **raptors**. Tim and Lex step into the hallway and the control room door locks behind them. As the raptors close in on them, Tim sees a security card on the belt of a dead guard. Running wildly, he snags it, opens the nearest door, and tumbles through with his sister. Meanwhile, at the lodge, the raptors have almost chewed through the final bar. "It won't be long now," Malcolm observes, as he tries unsuccessfully to raise Tim on the radio.

Tim experiments with the computer, carefully observing what happens as he presses different buttons and accesses different submenus. His attention to detail acknowledges that control of the computer system relies on clear understanding and respect for its parameters—he thus demonstrates both the ability to gain insight and the proper orientation of humans toward the chaotic, uncontrollable world around them. In the hall, he maintains enough presence of mind to see and use the available tools at his disposal.

SIXTH ITERATION: LODGE

In the lodge, Malcolm breathes painfully. Hammond wonders aloud who could have imagined that they would end up a situation like this, and Ellie points out that Malcolm did. Malcolm corrects her. He didn't imagine it; he calculated it. Hammond protests that he didn't want any of this and that he's tired of hearing Malcolm say different versions of "I told you so." Malcolm wearily points out that the minute a person invites doom is the moment he believes himself master over nature. Nevertheless, Hammond didn't just imagine that he could control nature, he deliberately engineered systems that required him to do so to avoid catastrophe. "He's lost me," Hammond says to no one in particular.

Despite ample evidence that the park project invited catastrophe, Hammond continues to act surprised at the way things have turned out. He has no right to be surprised: he saw Malcolm's calculations and rejected them out of a combination of arrogance, greed, and a presumptuous sense that he could control nature. His personal failings and character flaws, in other words, limited his field of vision to seeing only what he wanted to see. And he continues to do this even now, willfully choosing to not understand Malcolm's words.

Grant and Gennaro find the visitor center's rear door locked, requiring them to run around to the front where they can climb through the broken glass. But inside, they confront another set of locked doors separating them from Tim and Lex…and the **raptors**.

While Hammond continues to cling to his idealized vision of the park, Grant, Gennaro, and Hammond's own grandchildren face mortal peril thanks to his shortsightedness.

Tim falls to the floor screaming: as he passed through the door, he felt the touch of reptile skin. But it's just the baby **raptor**: he and Lex have stumbled into the nursery. The scared baby jumps into his arms, chirping and squeaking in terror because the adult raptors have followed the children through the still-open door. Tim flings the baby in their direction. Much to his horror and distress, the adults immediately kill and start to eat it. In a blind panic, Tim and Lex run madly through the lab until they run into Grant, with Gennaro by his side. It took Grant longer than it took Tim to think of taking a security key off a dead guard, but once he did, he and Gennaro entered the lab in search of the kids.

At the beginning of his time on the island, Tim seemed to befriend the innocuous juvenile raptor. But any illusion that these animals are friendly, controllable, or safe has since evaporated—as Tim has seen new evidence, his opinion of the animals has changed. And the raptors continue to demonstrate nature's cruel power and ability to shock and overwhelm people when they tear the infant up and eat it.

Grant tells Gennaro that he has a plan to dispatch the raptors and pushes him, Lex, and Tim, through a nearby door. He hopes it will allow them to access the control room, but it doesn't have an exit on the other side. Slowly and cautiously, Grant leads the **raptors** from room to room until they reach the Fertilization Room. Remembering what Wu said on the tour—that the lab contained dangerous chemicals—Grant pokes around until he finds a collection of vials marked with skull and crossbones. He carefully draws some into a syringe. The raptors enter the hatchery, stealing quietly between the tables. Slowly and quietly, Grant injects an egg with the poison, then rolls it towards the raptors. The first egg stops short; the second rolls too slowly. But the third egg, which Grant rolls fast, activates one of the raptors' chasing instincts.

Grant's use of the lab's poisons—and his changing strategy of egg rolling to catch the raptors' attention—again shows him to be a careful and astute observer of the world. And it demonstrates that careful observation has a direct impact on humans' ability to survive when nature becomes hostile. This in turn has implications for the ability of humanity to survive on a planet that's rapidly changing due to novel technologies and human interactions with wild ecosystems (like the deforestation mentioned at the beginning of the book).


One of the raptors bites the egg before catching sight of Grant and stalking toward him. Just before it pounces, the poison takes effect and the gasping, gurgling creature collapses to the floor. A second raptor seizes on its vulnerable state to take a nip at its hind leg, but the first raptor lashes out, sinking its teeth into the second's neck. The poison quickly dispatches that dinosaur too, leaving only one, which turns its attention to Grant. Suddenly remembering the radio, Grant calls Ellie and asks her to keep talking, then he slides the radio across the floor. The raptor, distracted by the strange, disembodied voice, turns its attention from Grant to investigate, giving him the opportunity to plunge the needle with its remaining poison into the beast's tail. Once the danger has passed, Grant, Gennaro, Lex, and Tim head back to the control room.

Hammond's and Arnold's earlier insistence that Muldoon ensure the health and safety of the dinosaurs limited his earlier attempts to stop the rampaging tyrannosaur. At that point, they still prioritized the park's financial success over the lives of their visitors. Now that the survivors find themselves in a life-and-death struggle, Grant simply poisons the animals. Advanced human technology gives him an edge over the lethally clever raptors, at least when he has access to it.

SIXTH ITERATION: CONTROL

In the control room, the computer screens flash inexplicably. The video monitor shows that the supply boat has nearly arrived at port. Tim pushes the button for the grid, receiving another error message about the auxiliary power. Gennaro snaps his fingers. This happened before, he says; they can fix it by turning on main power. Tim desperately pushes the main power button again and again, until finally, mercifully, the lights flicker back on. Lex yells; Grant says something that Tim can't quite hear; over the radio, Malcolm swears. Tim pushes the button for the lodge grid and the electrified bars zap and kill the **raptors** on the lodge roof. Next, Tim calls the boat captain, who hears a child's voice and thinks he's the victim of a practical joke. Gennaro grabs the phone and threatens the captain with some legalese. It works—the captain turns the boat back toward the **island**.

Tim's careful observation of the computer systems earlier does come in handy in this climactic scene where he restores power to the park's electric defenses and reestablishes lines of communication with the outside world just in the nick of time. But this scene also reminds readers that the motivations and blind spots of the park's operators limit the park's computer system, despite its sophistication. Gennaro and Tim must combine their knowledge to save the day. Hammond believed that he had total control over the island and the life on it, but recent events have shown otherwise. But, by banding together, the survivors have indeed managed to carry the day against the dinosaurs. At least, it seems, no one on the mainland will be victimized by any escaped raptors.

SEVENTH ITERATION: DESTROYING THE WORLD

As Harding and the others move Malcolm to a clean bed, Hammond perks up. At least, he says, disaster has been averted; the dinosaurs won't escape the **island** and "destroy the planet." Malcolm judges Hammond's fear as yet another example of his arrogance. Humanity might destroy itself, but despite its capacity for visiting extreme disruption and destruction on earth's ecosystems, evolutionary history suggests that some form of life will survive to start the process of diversification again. When some plants started exhaling oxygen into the atmosphere three billion years ago, they created a mass extinction event for anerobic bacteria, but opened the door for other creatures to thrive and develop. Malcolm feels confident that just humans, not the planet, "are in jeopardy." People can't save or destroy the earth, only themselves.

As the survivors restore order (at least somewhat) to the park, this revives Hammond's confidence in humankind's control over nature. He believes in humanity's dominion over nature—and by extension his own capacity to control nature for good (creating the park) or ill (destroying the world by unleashing new apex predators on an unsuspecting population). As evidence for human power, he points to deforestation and climate change. But Malcolm, as always looking at things from a very different perspective, challenges this view. Humans may be rendering the planet uninhabitable for themselves and countless other modern species. But from the point of view of life generally—from an evolutionary point of view, in other words—humans can't destroy the planet. They can only destroy themselves through their arrogance, short-sightedness, and greed.

SEVENTH ITERATION: UNDER CONTROL

By midafternoon, the survivors have restored the air conditioning and other computer systems to normal function. After a call to the mainland, the Costa Rican authorities have promised to evacuate them with helicopters. Eight are dead and six are missing, leaving only about 10 survivors. Tim runs a headcount on the dinosaurs. The count has dropped from 292 to 203. With the animals released from their formerly isolated enclosures, they're reaching a more sustainable Jurassic equilibrium, as predation picks up. As an example, Gennaro, Grant, and Ellie watch a pack of six **raptors** take down a hadrosaur on one of the video monitors. The paleontologists stare at the screens, watching the living behavior of dinosaurs they know only through **fossils**.

As if to prove Malcolm's assertion that life will always find a way to balance itself, the survivors watch the park animals turn the island into a true nature preserve. Readers can imagine that over time, if allowed to live unchecked, the ecosystem would stabilize based on the availability of resources. And with a sense of order and safety restored, Grant and Ellie can once again appreciate the incredible opportunity to observe living dinosaurs achieved through technology. This provides a reminder of the promise of scientific and technological innovation: the island could have been amazing if Hammond's greed and selfishness hadn't destroyed it.

Muldoon reminds Grant about approaching dusk; if the survivors want to find the raptor breeding grounds, they need to do it quickly. Everyone expects that the Costa Rican government will bomb the **island** into oblivion as soon as they evacuate the survivors. Gennaro can't wait for them to finish off the dangerous theme park. This angers Grant, who slams the lawyer into a wall and insists that Gennaro needs to take responsibility for his part in the fiasco. He sold investors on the concept without explaining it fully; he failed to supervise the business in which he and his firm were investors; and he let Hammond—a known liar—"screw around with the most dangerous technology in human history." Grant insists that Gennaro accompany them to the raptor nest to help count the wild herd. No one can clean up the mess until they understand its full extent.

Hammond exists in a state of blissful denial about the consequences of Jurassic Park, and no one has been able to break through to him. Gennaro, on the other hand, has witnessed the park's dangers firsthand. He has no excuse for his own denial and refusal of responsibility, and Grant forces him to see the consequences of InGen's reckless work. He insists that no one can clean up the mess without understanding its size, which requires a visual assessment. In other words, just as the park operators couldn't see what they weren't looking for, the survivors can't fix what they haven't accurately assessed.

After watching the **raptors**' movements on the wall map, Ellie has hypothesized that their nest sits on the southern end of the island, near the volcanic steam fields. The area provides warmth and—thanks to waterworks created by the park to control flooding—water and shelter. Ellie asks Tim to bring up a map of the water tunnels. But first, he reveals his discovery of an unmarked storage room behind the maintenance building. Even Arnold doesn't seem to have known about it because he didn't try to access it at any point during the catastrophe. But now the survivors find an armory filled with potent nerve gas grenades.

The park's waterworks offer another reminder that the island only looks like an untouched wilderness. In reality, almost all of it bears the imprint of human activity. And ironically, these places where park operators intervened provide room for wild, chaotic nature to thrive out of sight. The discovery of the deadly agent storage room remains something of a mystery. It indicates that someone has acknowledged the park's true danger—but without blaming any park operator directly for seeing the danger and subsequently hiding it.

After gathering weapons, Ellie, Grant, Gennaro, and Muldoon head to the garage, where Lex plays with the juvenile **raptor** Grant captured the previous day. She helps them put a radio collar on the animal which they hope will allow them to track it back to the nest. As she handles the animal, they realize that its skin color changes slightly in response to stress. It must have some imported chameleon DNA. This reminds Muldoon to ask Grant about the frog DNA. Grant explains that many species—including, most commonly, amphibians—can change from female to male in environments where all the animals are the same sex. He thinks the dinosaurs accomplished this feat so they could breed. Everyone but Lex piles into the Jeep as she releases the raptor back into the wild and shoos it off to find its home.

Despite her terrifying escape through the island, Lex quickly seems to forgive the dinosaurs and goes back to treating them like glorified pets. Her willingness to forgive and forget suggests humanity's limited insight and tendency to repeat its mistakes. This also demonstrates the necessity of destroying the island and the dinosaurs lest anyone get clever ideas about trying the exercise again. And Grant finally finishes explaining his hypothesis about the dinosaurs' unexpected reproductive ability. The ability to change sexes illustrates the unpredictability of nature and offers readers yet another reminder of how little knowledge and control humans have when it comes to the natural world.

In the Jeep, Gennaro asks Grant what to expect in the raptor nest, and Grant confesses he doesn't know. Although he's an expert, he's only studied **fossils** "distorted by the weight of millennia." He has hypotheses and guesses, but no sure knowledge. In the face of Gennaro's rising frustration and fear, Grant explains that scientists don't even know much about the nesting habits of living reptiles. But what they do know suggests that even cold-blooded reptiles care greatly about defending their young. And anyway, dinosaur behavior might be closer to birds than reptiles. Once the search party has reached the steam vents, Gennaro wants to know how Grant and Ellie remain calm in the face of the unknown. Ellie suspects that Grant does feel nervous. But he's also thought about encountering dinosaurs for his whole life. Gennaro reflects that there isn't anything he's thought about or waited for that intensely.

Grant admits the limits of his knowledge, demonstrating the attitude the book wants scientists (and humankind generally) to have toward nature. His humility contrasts with Hammond's serene assumption of power and Gennaro's panicked desire to feel like humans have the ability to control—or at least protect themselves from—the world around them. But as Grant explains, humankind can't know what it doesn't know. Important discoveries require careful observation. And we must always remember that nature has the capacity to surprise us. Only by understanding these truths can humans calmly face the natural world, as Grant himself faces the prospect of the raptor nest.

The juvenile **raptor**—or *a* juvenile raptor—pops in and out of view among the rocks, almost like he's playing a game with the search party. Ellie realizes the stunning implications of this behavior. Among modern living creatures, only humans, chimpanzees, and gorillas have the capacity to "invent and execute plans." Although, as Grant points out, scientists are realizing that some primates and birds have symbolic intelligence—the ability to think and organize knowledge through images—and the capacity for language. As Gennaro grumbles that no intelligent bird has ever stalked him, the juvenile disappears from view down a hole.

The raptor's unexpected behavior shows signs of intelligence rare among living animals. And it reinforces the book's claims—given life by Grant, Ellie, and Malcolm—that nature is far more complex and surprising than most people give it credit it for. Ignoring this truth can be dangerous. The intelligence of animals also calls into question human primacy on earth. The illusion of control that men like Hammond have rests on the sense that humans possess an innate superiority to other creatures, but current science complicates that picture.

Grant lowers a camera into the hole, and although it can't see deep enough into the cave to show the dinosaurs, its microphone picks up the sound of many animals. Grant dons a gas mask and prepares to drop into the hole. Gennaro, scared to face so many animals, suggests that they drop the nerve gas grenades down first to kill the dinosaurs. But Grant refuses; the gas will cause convulsions and if any dinosaurs trample the nests in their death throes, they might compromise the population count. Once again pointing out that Gennaro has a responsibility to participate in assessing and cleaning up the mess of Jurassic Park, Grant ignores his protests and drops into the hole.

As in every other circumstance of obscured sight, the camera's inability to show the raptor nest and the necessity of looking with one's own eyes reinforces the book's claim that a person's vantage point necessarily limits their field of vision and thus their understanding. True insight requires as clear and accurate a vision as a person can achieve—and technology doesn't necessarily guarantee better insight. And to gain this insight, Grant and Ellie must demonstrate a respectful attitude toward nature, rather than taking the bombastic, destructive approach Gennaro would prefer.

SEVENTH ITERATION: ALMOST PARADIGM

In the lodge, Hammond paces impatiently around Malcolm's room, overwhelmed by the scent of his putrefying wound and angry at the thought that the mathematician's possible death, by confirming his predictions about the park, will become his final rebuke of John Hammond and his grand ideas. And Malcolm lies on death's door, mumbling deliriously though semi-consciousness about paradigms. Hammond leaves Malcolm in Dr. Harding's charge, declaring that he's going outside for some air.

Malcolm's slow, agonizing death does indeed continually rebuke Hammond's arrogance and selfishness; it's notable that the direst consequences of these failures have happened to other people, including innocent victims, like Malcolm. Instead of facing the consequences of his actions, Hammond chooses to avoid them both literally and emotionally by leaving the lodge.

The fresh air invigorates Hammond, reminding him of the park's potential. He's determined to make his idea work, using the backup embryos stashed at InGen headquarters to start again. Like a good engineer, he will solve the problems that this iteration of the park uncovered. He also decides that he can attribute the failure to Wu—who Hammond decides was too sloppy and too focused on tinkering with the dinosaurs—and Arnold, who missed important details despite his persistent worries. Most importantly, Hammond concludes, neither man had a grand enough vision of the park's potential. He will hire better people next time.

Hammond's denial runs so deep that putting problems like dying guests out of sight allows him to excise them from his mind, as well. And he continues to close his eyes to the reality around him to preserve his internal vision of the park's success. Rather than recognizing his humanity, acknowledging his limits, and accepting responsibility, Hammond blames his dead employees.

Hammond wanders towards his bungalow, lost in thought, until the sound of the tyrannosaur's roar fills the jungle around him. Running away in a blind panic, he stumbles and falls down an embankment into the woods where he breaks his ankle tripping on the vegetation. In the control room, Lex and Tim fight over the computer controls after realizing that they can broadcast recorded dinosaur sounds over the park's loudspeakers.

Hammond's instinctive panic shows that he sees, on some level, the flaws in his vision. Even though his denial keeps him from acknowledging it, he knows the park is dangerous. And in the end, ironically, he falls victim to nature through his manipulation of the world around him—it's not the real tyrannosaur that frightens him, but a recorded sound relayed through the park's sophisticated and all-encompassing electronic systems.

John Hammond lies cowering in the jungle, listening to the tyrannosaur roar. After a few minutes, he hears Tim and Lex over the loudspeakers and realizes that they're playing with the park systems. He curses them in anger. He only brought them to the **island** as insurance against Gennaro shutting him down. They didn't help on that count, and now they're mucking around in the control room. Still, knowing that the tyrannosaur isn't after him allows Hammond to calm down. He begins shouting for help.

At this point in the book, readers have seen more than enough evidence of Hammond's character flaws, including greed, pride, and selfishness. Still, his admission (to himself) that he used his grandchildren—exposing them to mortal peril to shield his idea from scrutiny or rebuke—makes him seem even more objectionable.

In the lodge, Malcolm's voice grows fainter as he mutters that everything looks different on the other side of the paradigm shift. Dr. Harding knows scientists talk about worldview changes—discoveries so massive they force humanity to reassess its beliefs—as "paradigm shifts." Darwinian evolutionary theory instigated a paradigm shift in the 19th century. Harding muses on these shifts as Malcolm smiles that he doesn't care about "anything" because "everything looks different … on the other side."

Ultimately, events on the island have proven Malcolm right: humanity cannot fully predict or control chaotic, complicated nature. The only constant is change, and those unwilling or unable to accept this will fall victim to nature's power. This knowledge gives him hope, however, since it promises that those willing and able to adapt will not only survive but thrive.

SEVENTH ITERATION: DESCENT

Gennaro watches incredulously as Ellie prepares to follow Grant into the dinosaur's tunnel. After she disappears, he tells Muldoon that he refuses to follow. But, Muldoon points out, Ellie and Grant expect him. If he doesn't want to go in on his own, Muldoon offers to goad him with one of the anti-dinosaur shock sticks. Muldoon doesn't expect the shock to kill him, just to make him uncomfortable and to cost him control of his bowels. Faced with two terrible options, Gennaro opts for the tunnel, approaching headfirst so that he can see where he's going. Beyond the entrance, the tunnel drops off quickly, and Gennaro can't control his descent. He falls face first onto concrete. Ellie and Grant wait for him, crouched silently behind some large steel junction boxes, out of sight of the herd of dinosaurs below.

In the end, Gennaro faces what he, Hammond, and the others have allowed to happen. But he resists this insight with as much strength as he can muster. Only physical threats, ultimately, compel him into the tunnel. Earlier, he willingly turned his eyes away from the dangers of the park project. As if to make up for this mistake, he enters the tunnel headfirst—but the book rebukes his earlier blindness by having him land flat on his face. Hindsight has limited benefits; humanity needs insight and foresight to survive, and Gennaro's belated attempts to look before he leaps prove this.

As his eyes adjust, Gennaro realizes he sits on a ledge in a giant, subterranean structure filled with at least 30 **raptors**. Grant whispers in Gennaro's ear that they've found the colony, which consists of four or six adults along with dozens of juveniles and infants. The youngest, he thinks, are only about four months old. A curious baby raptor climbs up onto the ledge where the humans hide, followed by an adult. Surprisingly, the adult doesn't react to their presence; without any unhatched eggs, Grant postulates, the dinosaurs have relaxed their guard. As long as the humans stay quiet and don't move too much, they're unlikely to draw the animals' attention.

The size of the raptor colony shouldn't surprise Gennaro or anyone else; the computer scans conducted the previous afternoon revealed dozens of extra animals. Still, seeing is believing. And events in the raptor nest show how much humans still don't know about dinosaur behavior and physiology. Earlier, Tim thought that the dinosaur could track him and his sister by smell, but in the nest, the adult dinosaurs neither see nor seem to smell the intruders.

Just then, the juvenile **raptor** with the radio collar hops onto the ledge next to Ellie. It whimpers in discomfort as the collar chafes its skin, drawing the attention of an adult. The trio of humans pass a tense moment as the adult approaches; Grant slowly pulls out a nerve gas grenade, but Gennaro points to indicate that Ellie isn't wearing a mask. Grant switches to a shock prod. Ellie slowly, calmly eases the collar off the animal. It scampers away, followed by the adult. Finally, they can get to work. Through night-vision goggles, Grant counts the **remains** of the eggs to a total of 34 raptors hatched. Meanwhile, Ellie has realized that she can distinguish the juveniles by the markings on their heads. They're in motion, so she's not totally confident in her numbers, but she estimates about 33 infants and 22 juveniles.

Once more, Ellie and Grant demonstrate the proper way of looking at the world, with an attention to detail and with an eye to finding the patterns that will help them make sense of what they're seeing. Grant's count of the hatched animals doesn't tally with Ellie's survey of juveniles and infants, suggesting that some animals may, indeed, have escaped the island already.

While counting, Ellie also notices that when they aren't playing, the babies—and adults—tend to line up along one of the cavern's axes. While Grant and Ellie ponder the implications—maybe this indicates a hive intelligence among the **raptors**, like bees, or maybe there's a breeze—Gennaro opens his watch and checks its compass. The animals orient themselves along a northeast-southwest line. But this doesn't answer the question of why, either. Just as Grant and Ellie realize that they can't definitively figure it out, all the raptors hop up and begin running down a tunnel leading off the cavern.

The raptors' behavior at first seems random, but with attention, the three humans can begin to form some hypotheses about it. Still, this offers a stark reminder of how little they truly know about dinosaur behavior—and how little they'll be able to learn now that Hammond's recklessness has doomed these animals to extermination at the hands of the Costa Rican authorities.

SEVENTH ITERATION: HAMMOND

In the dense vegetation of the jungle, Hammond sits down to catch his breath. The hot and humid air makes it hard to breathe, and his swollen, painful ankle forces him to hop slowly up the hill towards the path. He finds it hard to catch his breath and fight off the dizziness that washes him over in waves. He assures himself that he's not in danger—the bungalow must sit close by—but he feels tired and frustrated. Still, he has many reasons left to live, like opening other parks and creating other wonders.

Far from being in command of nature, Hammond's uncomfortable and frustrating experience in the thick vegetation merely confirms his powerlessness. And the longer he sits in nature, the harder he has to work to maintain his sense of domination, by reminding himself of the nearness of civilization and his plans for the future.

A chittering sound in the undergrowth interrupts his thoughts. A flock of compys converges on Hammond where he sits in the dirt. They don't look dangerous, but he knows that they have a venomous bite that they use to kill crippled animals. While the implications of that fact sink in, he tries unsuccessfully to shoo the small creatures away. From an animal handler who got bit, Hammond knows that the venom isn't painful—it's more like a narcotic that makes its victim feel peaceful and happy. But, unwilling to die, he hauls himself to his good foot and resumes hopping up the hill. Suddenly, one compy jumps onto his back, knocking him to the ground. Another dashes forward and nips his hand. He scrambles away on all fours as a third bites him on the back of the neck.

In the end, John Hammond turns out to be just another wounded animal vulnerable to predation. The compys' clean up the waste from other dinosaurs; when they dispatch Hammond, they thus metaphorically suggest that he (and his ideas) must be disposed of. And, because he's killed by many small animals, rather than one impressive one, Hammond's death itself points back to Malcolm's theories, especially the idea that many tiny variables can create massive effects in combination.

Hammond rolls onto his back, overcome with a sense of detachment. But he rests assured of Malcolm's error. Hammond made no mistakes with the park. His efforts to defend himself from the compys become halfhearted, and he feels only the slightest discomfort when a compy jumps to his chest and begins to chew though his neck.

Still, Hammond's last conscious act is one of denial: even as the evidence of his failures literally crawls over his body to kill him, he refuses to admit his error. He clings to the vice of pride to the very end.

SEVENTH ITERATION: THE BEACH

Chasing the **raptors**, Gennaro, Grant, and Ellie follow the tunnels to the beach. The dinosaurs array themselves along the shore, standing in almost militarily precise arrangements, facing in the same direction as they did in the cave. After a moment, the trio of humans hears a ship passing the **island** to the south. Grant realizes how little he truly knows about dinosaurs despite a lifetime of study; **fossils** reveal next to nothing about animal behavior. As a scientist, he became adept at working with bones, and now he realizes that along the way he forgot "the unprovable possibilities" that he couldn't see. And then it dawns on him—if dinosaurs are essentially birds, maybe what these raptors want to do isn't *escape* the island, but to migrate.

On the beach, the dinosaurs continue to display inexplicable but very clear behavior. Grant reflects on how little he really knows about these animals after a lifetime of study, since vestiges like bones and footprints leave so much unseen, from the basic physiology of the animals to their behavioral interactions. Still, his knowledge, combined with observation, leads to an insight when he recognizes that the behavior might align with some of the dinosaurs' modern descendants: migratory birds. If these dinosaurs do long to migrate, their behavior offers yet another reminder of the shortsightedness of Hammond's project. No one predicted—much less began to think of how to control—migratory behavior.

SEVENTH ITERATION: APPROACHING DARK

Ellie and Grant find the idea of the **raptors** migrating exhilarating. But they don't have long to celebrate the discovery before they hear an approaching helicopter. As it lands, the dinosaurs scatter. Soldiers rush to escort Grant, Ellie, and Gennaro onboard. Tim, Lex, and Muldoon are already strapped in. Muldoon tells the newcomers that a second helicopter took Dr. Harding and the remaining workmen; someone found Hammond's body where the compys left it; Malcolm died. As the helicopter races toward the mainland, Grant hears bombs falling from other aircraft over the **island**. He wonders where the raptors would have migrated to if they could, and he feels both sad and relieved that they won't have the opportunity. The Costa Rican soldiers beg to know who's in charge. Grant says, "No one."

Grant and Ellie have just witnessed evidence of a behavior previously unknown and unstudied in dinosaurs. But the Costa Rican authorities arrive to shut down the island and its experiments permanently. The very interference that Hammond most feared has arrived to destroy his legacy, although he didn't live to see it. The book intends for readers to identify with Grant's viewpoint in the end. Any chance to responsibly resurrect dinosaurs through genetic sequencing and cloning technologies has essentially been foreclosed by Hammond's reckless experimentation; Grant, Ellie, and the others essentially witness a second extinction of the dinosaurs. Still, their humbling experiences on the island have reminded them—and readers—of how fragile humans really are and how dangerous the world around them can be. Thus, relief accompanies Grant's sadness.

SEVENTH ITERATION: EPILOGUE: SAN JOSÉ

On the mainland, the government treats the survivors well. But they have questions. They want to know how Grant knew Hammond, what he knew about the project, why he had gone to the island, and what had happened there. Grant forms the distinct impression that the Costa Rican officials are waiting for something, but he doesn't know what.

When things went awry on the island, Hammond looked for other people to blame. The Costa Rican authorities also want to assign blame for the Jurassic Park fiasco, but all the responsible parties are dead.

Then, one day, Dr. Guitierrez approaches Grant and introduces himself. Grant expresses his impatience to get back to his dig before the snow flies in Montana—it happens early at that high latitude. Guitierrez asks if Hammond sponsored northern digs because the cold climates were more likely to support the conditions for DNA preservation. Grant replies that he assumes so. But since Hammond is dead, no one will know.

Both careful and attentive scientists, Grant and Guitierrez can infer more about Hammond and his plans even after all the evidence has been lost by piecing together the messages left behind in the vestiges of his actions. Like the amber that preserved the dinosaur DNA, people's knowledge about the InGen incident will continue to yield insight through careful study.

Finally, Guitierrez explains to Grant why the Costa Rican government hesitates to let him and the others go. Strange things have happened in the rural hinterlands, where some unknown animals passed through a few months ago. They traveled in a straight line, as if they were migrating. And they only ate beans and chicken. This catches Grant's attention, because these foods contain a lot of lysine. No one knows where these strange animals went. But the government, feeling anxious over the possibilities, wants to keep the scientists around, just in case. Neither Guitierrez nor Grant is going anywhere soon.

The book closes on Malcolm's notion that life will find a way to evade attempts at control, no matter what people like Hammond, Arnold, and Wu believe. Events on the island showed the failure of Wu's attempt to sterilize the dinosaurs; events on the mainland suggest that his attempt to engineer animals that couldn't survive in the wild also failed. Dietary supplements on Isla Nublar aren't the only source of lysine, and those animals clever or lucky enough to discover rich natural sources of it seem to be thriving. And if the escaped dinosaurs prove that the only constant is change, the best humans can hope to do is pay attention and adapt themselves to meet the future.

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