Mark W. Moffett climbs a tree in the Monteverde Cloud Forest Reserve of Costa Rica to study the forest-canopy ecosystem, 1989.

JOHN LONGINO

ONE OF US

MARK W. MOFFETT ON THE SOCIAL BEHAVIOR OF HUMANS AND OTHER ANIMALS

MARK LEVITON

Locating the naturalist, writer, and photographer Mark W. Moffett is not always an easy task. On any given day he might be spelunking in Mexico, investigating turtle nests in Borneo, climbing a tree in the Brazilian rain forest, or evading stampeding elephants in Sri Lanka.

In his many decades of discovery — he's now in his sixties and published his first scientific papers while still in his teens — Moffett has been called the "Indiana Jones of entomology" and the "Jane Goodall of ants." He is also affectionately known as "Dr. Bugs." (His website is doctorbugs.com.) Moffett's Harvard mentor, biologist Edward O. Wilson, has said, "Mark has the soul of a nineteenth-century explorer."

Many of his colleagues are surprised he isn't already dead, given the number of dangerous situations he's been in. For several years Moffett was coholder of the Guinness world record for climbing the tallest tree, and when he received the Lowell Thomas Award from the venerable Explorers Club in Manhattan, he accepted his medal by descending eighty feet through the chandeliers.

A high-school dropout who eventually earned a PhD from Harvard, Moffett has published more than 120 scientific-journal and magazine articles, had several hundred photographs in National Geographic, *and has written four books, including* The High Frontier, Face to Face with Frogs, *and* Adventures among Ants. *An inveterate storyteller, he's appeared multiple times on* The Colbert Report *and* Late Night with Conan O'Brien. *He's even tried his hand at stand-up in comedy clubs. He is self-employed and spends most of his money on travel and research —* Wired *magazine estimated at one point that he traveled more than the U.S. secretary of state. He says his wife, Melissa, whom he married late in life, has gotten him to "grapple with the practicalities of actual existence, which I don't do very well."*

Moffett's latest book, The Human Swarm: How Our Societies Arise, Thrive, and Fall, *is a synthesis of his decades of fieldwork. Deeply researched (he references more than a thousand books and journals in the endnotes) and often humorous,* The Human Swarm *is a multidisciplinary tour-de-force that shows how the society we live in "sets the tone of our days, influences our beliefs, and informs our experiences." Moffett explores a wide intellectual canvas to make sense of the societies of different animal species, human ancestors, and people today.*

I met Moffett at the Explorers Club (founded in 1904) on a late-spring day. Surrounded by artifacts — a flag that's been to the moon, letters written by Amelia Earhart — we talked for two hours, then walked to lunch at a nearby cafe. As we strolled up Fifth Avenue, he spoke excitedly about his fundraising plans for his upcoming expeditions to research the rise and fall of societies, asking if I knew any wealthy patrons who might want to give money to a good cause.

Leviton: You've spent most of your life studying lizards, frogs, spiders, insects, and especially ants. In *The Human Swarm* you turn your attention to *Homo sapiens*, the human species. Why have you focused on humans this time?

Moffett: I'm a student of the American sociobiologist E.O. Wilson, and, as brilliant as he is, to my mind he never really defined what a society is, leaving it unclear, for instance, how to separate one society from another such group. I wanted to figure out which other animals have societies and whether humans have always had societies.

Leviton: You examined not only our nearest primate cousins, chimpanzees and bonobos (with whom we share 98.7 percent of our genes), but also dolphins, lions, elephants, rodents, ants, and bees. Why study other species in order to understand humans?

Moffett: Once we figure out which animals have societies, I think it makes sense to ask why societies are valuable for those species, then to see how that usefulness plays out for humans. I found it more interesting to look at ants than I did primates. It's important to compare things that are pretty alike, like humans and chimps, with their evolutionary ties, but when you find similarities between things that are ordinarily seen as very different, like humans and ants — that's where the new ideas come from.

Ants are fundamentally alien to us in many ways, but they are always coming up with solutions to problems that are familiar to us, like traffic jams, public health, food scarcity, and so forth. There are endless books comparing humans to chimpanzees, yet in many ways their societies don't seem at all like ours. The males are tyrannical. The females get beaten up and forced to have sex as a matter of course. They have sex only when they're "in heat." The capacity to work together to build anything is minimal. They'll copy each other, but that's about it. It's kind of remarkable how little there is that connects our society to theirs, given the amount of genetic material we share.

Whereas ants — with their building of structures, division of labor, assembly lines, and so forth — can seem surprisingly like us. I argue that social similarity often has little to do with genetic relatedness and instead comes from the fact that, as societies grow bigger, certain issues come up. Chimpanzees don't need to deal with public health, but in a society of a million ants, there's going to be harmful CO_2 building up in the nest. There's going to be disease and garbage. Some of the larger ant societies have squads devoted to removing dangerous materials from the nest and keeping it clean. Any larger, more complex society is going to fail if it doesn't deal with such problems, whether

through nature or nurture.

Leviton: You point out that groups of primates need to recognize each other individually, so there's a limit to how many of them can be in a society. Ants don't have that constraint, because they can identify colony members they've never met by scent. Human societies can be closer in scale to ant colonies than groups of primates.

Moffett: I'm fond of saying, "Chimpanzees need to know everybody; ants need to know nobody; humans only need to know *some*body."

The size of a human society isn't limited by how many people we can recognize. As long as we can identify correctly who belongs and who doesn't, our societies can grow. There's no question that the human ability to be around strangers whom we nevertheless see as "one of us" is a pretty unique trait, just as important to us as our opposable thumbs or our upright stance.

Leviton: You've studied Argentine-ant "supercolonies" that can spread over hundreds of miles in California and other parts of the world. How do ant colonies deal with intruders and neighboring colonies?

Moffett: Except for slave-making ants, ants don't accommodate being anywhere near outsiders of their own species. When they come in contact with ants from a different colony, they either avoid them or wipe them out.

I've called the Argentine ant a "pinnacle of social evolution." If you live anywhere in Southern California, you're likely to have them all over your backyard. You can drive one of those ants to the Mexican border, put it on the ground, and it'll approach whatever fellow Argentine ants come along, sniffing with its antennae. If they are part of the same supercolony, the new ant will just start working with them. Its scent is its "passport." But if you notice heaps of dead ants along a line that extends for miles, you've found the border between two colonies. UC San Diego ecologist David Holway observed a battlefield in Escondido where millions of ants die every month.

The Argentines and a very few other ants have the capacity to create societies of any size. No other species besides humans can do that. Lions, meerkats, badgers, wild horses, gray wolves, African wild dogs, and monkeys are like chimpanzees: they need to know everyone in their society as an individual. Among such species the chimpanzee has exceptionally large societies, reaching about two hundred — a ceiling on population that almost certainly reflects, at least in part, the cognitive difficulties all these animals face when keeping track of so many individuals.

Leviton: You started noticing ants and other insects when you were a kid growing up in Colorado and Wisconsin. Were you aware then that studying other species could tell you something about humans?

Moffett: Absolutely. As a kid, I was fascinated by ants partly because they were doing things I recognized. Ants build highways and infrastructure; they jointly haul back food to their nests; they organize attacks on other creatures. Kids everywhere get down in the dirt to watch ants, but most of us are talked out of such "child's play" as we get older. I just never drifted away. Before I turned twenty-one, I'd been part of expeditions to Central and South America, studying snakes, lizards, frogs, beetles, and butterflies — though I finally got back to ants in grad school.

> I think there's more going on in an ant brain than we give them credit for. Imagine if we could prove consciousness in insects. We'd have to worry about crushing a conscious being with every footfall.

It's intuitive to look at the animal kingdom for clues about human life. We very much tend to see everything through a human lens, yet other creatures often need to solve similar problems.

Leviton: How common is it for animals to form societies?

Moffett: A great majority of animals are loners or are social only part of the time. They have small networks of friends and may get a few things done collectively. Birds, for example, might gather in a flock to stir up edible insects but disperse at the end of the day and each join a different flock tomorrow. True societies arise in less than 1 percent of species — mostly social insects, with a few mammals and fish and birds. Individuals have to see enough benefits to make up for the costs they incur from being together in the long term, given that they have to compete with these other society members for food, shelter, mates, and so on.

Leviton: Group members are competing, but they are also cooperating. Female vampire bats, for instance, donate blood to neighboring bats to ensure their survival. There's reciprocal altruism at work: if you don't have food today, I'll share mine, expecting that you'll do the same if I'm in need.

Moffett: Humans can be very cooperative, so when we look at other species, we tend to emphasize cooperation

when we see it. But you can cooperate *without* forming a society. Vampire bats don't have a society; they get friendly with their immediate neighbors in a cave, and cooperation arises among those individuals. Meanwhile some animals that do live in societies get along with very little cooperation. Dan Blumstein, who does evolutionary biology at UCLA, has studied social cohesion in marmots, a kind of alpine squirrel. He once said, "I don't think they even *like* each other." [*Laughs.*] It's the same with the badgers in Eastern Europe: The members of their groups fight all the time. They don't get a heck of a lot done, but they do manage to keep competitors away and mate within their own group.

Being part of a group can be self-serving. During my first trip to Costa Rica as an undergrad, I studied a caterpillar that crowded into clusters. Caterpillars that forced their way into the middle of a cluster avoided being eaten by spiders and wasps. Biologist W.D. Hamilton noticed this behavior in herds of mammals and schools of fish. He called them "selfish herds." Such groups aren't societies: individuals come and go from herds, and I could move caterpillars between clusters without incident, as long as they were of similar size. Of course, there's selfish behavior in societies, too. A society is best thought of, then, not as an assembly of cooperators but as an enduring group of well-defined membership set apart from other such groups by a shared identity. Opportunities for cooperation within a society are important — indeed, essential in our own species — and yet not a requirement. A misanthrope or a hermit can still unmistakably belong to a particular nationality.

Leviton: All this must take a lot of intelligence. Do animals have consciousness?

Moffett: That's a philosophical question we could discuss for the rest of the day.

In a 1974 essay Thomas Nagel asked, "What is it like to be a bat?" He argued that although humans can imagine what it might be like, we can never *know*, because . . . well, we aren't bats. Bats "know" what it's like to be a bat, dogs "know" what it's like to be a dog, and so on. There's no way for us to objectively understand their experience from the outside. Our brains are built for a human type of consciousness, which narrows our perception of the possibilities. Though, to the point here, working out society memberships doesn't take much brainpower — ants do it just fine.

I think there's more going on in an ant brain than we give them credit for. Imagine if we could prove consciousness in insects. We'd have to worry about crushing a conscious being with every footfall. The Jains in India already do this. They take a vow not to harm any living creature, no matter how small-brained. Some of them wear a mask to avoid inhaling tiny insects.

Leviton: It's generally acknowledged that humans are capable of feeling six basic emotions: happiness, fear, anger, sadness, disgust, and surprise. But social psychologists also identify secondary emotions that are dependent on the culture, such as shame, pity, regret, or pride.

Moffett: We share those primary emotions with animals, who can also be happy, or angry, or fearful. Secondary emotions are often more complex, and human children learn them as they grow up. They learn to be ashamed of certain actions, for example. We often see outsiders as inferior, less developed emotionally, lacking the capacity for these nuanced feelings. Should those outsiders claim to feel regret for past actions, we may doubt their sincerity. So it becomes hard to make amends with them after a conflict.

And because the people of each society believe they possess a higher morality, they also think these pariahs cannot follow proper ethical codes and must be controlled for their own good. We treat the out-group unequally and then resent their accusations of unfairness. We turn our own deficits into virtues: "We may be a rigid people, but that builds character." We develop an idea of what it means to be human based on our way of life and then see our group as rightfully on top. Denigrated societies, or the denigrated ethnicities within them, are devalued to the point where they sometimes internalize the negative attitude of others and become "self-loathing." But for basic survival, everyone needs to find points of pride and to feel they deserve to live and thrive.

Humans are messy, complicated creatures. That's why I've spent so much time in the jungle studying insects. [*Laughs.*]

Leviton: Do nonhuman animals ever feel secondary emotions?

Moffett: We are gradually chipping away at the idea that they have only primary emotions. Obviously it's hard to determine what animals are feeling, but we can safely assume some things. I can't imagine your dog is patriotic, for instance. [*Laughs.*] Dogs do get jealous, though. A research team in Budapest demonstrated that dogs show jealous behavior when their owners display affection toward another dog. The primatologist Frans de Waal has been cataloging similarities between humans and other primates when it comes to empathy, justice, and morality. He doesn't believe humans are the only moral animals. His most recent book, *Mama's Last Hug*, makes the case that animals have a deeper emotional life than we give them credit for — pigs hope, and coyotes show pride.

Leviton: To a great extent what we do every day is shaped by the rules of the society in which we live, yet we are still individuals.

Moffett: A central theme of psychology is that humans turn everything into a kind of story. We create our identities in part from the stories we tell ourselves and each other. We create both an individual identity and a social identity. Psychologists call some of the tools we use for storytelling "symbols" because they have complex meanings, which have to be taught — things like a national

anthem or the American flag. Symbols grade into more-obscure cues, some of which we don't even consciously learn or notice, and others, like physical features, we are born with. I prefer to call all these many and varied signs of identity, from the most arduously memorized symbols to slight differentiating traits, "markers of identity." Some markers define us as individuals, and others link to our membership in a society. It's because of markers that we don't have to recall each other the way chimps do — thank goodness. We don't look at every person we encounter and need to know who they are and how we're related, so long as we can use markers to situate them.

Evidence suggests that learning markers is instinctive — meaning it's organized in advance of experience. Markers give us all kinds of information about individuals. We see a ring on the third finger of the left hand, for example, and register, "That person is married." Once a marker becomes a central part of our identity, we don't have to think about what it means. Someone who's survived the Holocaust doesn't have to stop and ponder the meaning of the swastika to feel terrified when they see one.

And not only do we recognize memberships in an instant; we also assign rank or status based on markers. Even attractiveness. When humans are sexually aroused, their pupils dilate. So if I am a straight male, I will find photos of women with dilated pupils more attractive than those without, even if I'm not aware why. I might report that it was the subject's smile or hair that I found attractive, but my body made the "decision" before my conscious mind did.

There are studies of "nonverbal accents" — subtle differences in the way people from different cultures display who they are. People in Alabama and the East End of London both speak English, but we can tell them apart because of their accents. Well, faces have accents as well. Darwin believed emotional states are revealed by a distinct set of facial-muscle movements that are the same for all people, in all cultures. We frown when we're displeased, for instance. The reality turns out to be much more nuanced. We are better at interpreting the expressions of people from our own culture. Tests have shown a frown in Japan is different from a frown in this country. Abigail Marsh at Georgetown University has also shown that we can usually tell fellow Americans from a distance by how they walk or wave a hand — even though her research subjects had no idea they had this skill.

Leviton: Is it true that newborn babies can divide faces into categories?

Moffett: From the age of a few months, children are already responding more positively to faces of their parents' own ethnic group, which is kind of scary. Lawrence Hirschfeld, who studies how children come to use social categories like race, age, and gender, describes biases acquired in our early years as "tenaciously resistant to counterevidence." It turns out, contrary to the Rodgers and Hammerstein song from *South Pacific*, you *don't* have to be "carefully taught" to acquire prejudices.

Although no specific prejudice is a result of genetics, and there is no biological basis for race, we are prone to put people into categories and form biases based on appearance. One implicit-association test asks subjects to match faces with words. Americans perform the test faster and with less effort when they are asked to match dark-skinned faces with unfavorable words and light-skinned faces with positive ones. This is true even for people who find such stereotypes objectionable. And, according to social psychologists, awareness of hidden biases doesn't seem to help eradicate them.

We live in societies where many ethnicities coexist, an outcome of populations moving from one society to join another. No other animals do this — whole, healthy societies don't freely merge. Indeed, for most of human history this fusion required force. The idea that we welcome a large number of new individuals into our society, with the expectation they are going to stay, is pretty much exclusive to humans, a novelty with which we're still struggling. Hunter-gatherer societies some ten thousand years ago might have taken in the occasional outsider, but it was nothing like the massive incorporation of other ethnic groups that we've seen in recent millennia, first by force and now by immigration. One society might conquer another through warfare, and over the years the defeated can become assimilated, but they never completely lose their differences. Even the Han, who make up about 90 percent of all people in mainland China and are often thought of as alike, make distinctions between *types* of Han. Nearly two thousand years since the end of the Han dynasty, there are still variations among them — some obvious, like language or diet, but many too subtle for naive outsiders like you and me to detect. The Han people are supersensitive to nuances that likely trace back to the various tribes from which their ethnicity arose. Look closely enough, and even the most homogeneous nation is actually a mishmash.

Once humans started subjugating other humans and integrating them into their societies, "belonging" became partly about following the rules for how to act. But assimilation has its limits — someone from an ethnic minority may make great efforts to fit into the majority culture, yet still find they are not completely accepted by the larger group. On top of that, they might be rejected by their own minority group for their ambitions.

There's a concept called "optimal distinctiveness": people have the most self-esteem when they achieve a balance between their sense of uniqueness and their sense of inclusion. We want to be different enough to be special, yet similar enough to feel we belong. If every person in the U.S. rooted for the same baseball team, ate the same food, and wore the same clothes, it'd be boring and depressing. We would lose a lot of our self-worth. For minorities, notably,

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Specialized soldiers of the African army ant guard their colony's highway with open mandibles.

it's a balancing act to be similar enough to other citizens to fit into the society, and distinct enough to still maintain an ethnic culture of their own.

Leviton: We don't want to make everyone the same, but we do want everyone to have the same opportunities, right?

Moffett: The trouble is, access to opportunity tends to remain unequal because the dominant group controls the symbols, wealth, and power of the nation. Minorities face a constant struggle.

Leviton: We talked about how biases are almost impossible to counteract once they have formed. Are such biases actually part of the "wiring" of our brains?

Moffett: Pretty much, in that we are stuck with a way of identifying other humans that we cannot get around. Mahzarin Banaji coauthored a book called *Blindspot,* detailing how exposure to the culture we live in inculcates certain prejudices. We might push back against them, but they are still there, operating in the background, even if we don't realize it. For example, it's been shown that white doctors will more readily prescribe drugs to white patients than to black. This appears to be a consequence of hidden biases, such as the belief that black patients exaggerate their pain.

Leviton: According to a United Nations report, a million species are threatened with extinction. In a recent *Los Angeles Times* op-ed you said our abuse of nature is connected to the human drive to distinguish "in" and "out" groups. How so?

Moffett: Each human society looks at other societies as if they were, in effect, different species. We recognize elephants because they have trunks and giant ears, and we know that so-and-so tribe wears *that* kind of hat and carries *that* kind of stick. We divide humanity into "us" and "them," and "we" are the true humans, while others who don't show our markers are of lesser status, right down to the most despised, who we may see as no better than an animal. We are less likely to help those we see as "nonhuman." This is why Nazis and others use words like *vermin* to describe the perceived enemies of society. Vermin are at the bottom of the hierarchy of warm-blooded creatures and are the most repellent to us.

There's a remarkable difference between thinking people are like animals, which reduces their humanity, and

reversing that: thinking animals are like people. When research subjects read essays about the human-like qualities of animals, it changes some of their most prejudiced attitudes about immigrants, even though the essays say nothing about humans. The effect is fairly short-lived, but it's clear that we need to keep building a scientifically accurate point of view about animals, which is that they have meaningful similarities to humans. This knowledge will support a positive attitude about nature while reducing bias and prejudice among people.

Our environmental problems and our attitudes about foreigners and ethnic groups are linked. When I traveled to the Socotra archipelago in the Arabian Sea, I found that species loss wasn't as bad there as it was in other archipelagos with comparable biological diversity, such as the Galapagos and the Hawaiian Islands. The Socotra archipelago has remained ecologically intact largely because its tribal peoples have maintained a spiritual connection with the land and the goats they raise. They look after the land and caress and sing to animals that are to be slaughtered. They know each goat and take each death seriously. And the tribes there treat each other well.

Conservationists and ethicists haven't explored deeply enough this connection between how we treat animals and how we treat each other. The philosopher Peter Singer has said, "Animals have interests. When these are similar to ours, or their pain is on a similar level, why give them less consideration?"

Leviton: Many people have no problem loving a household pet and also consuming a steak. Why do we make this distinction between animals as food and animals as pets?

Moffett: Melanie Joy wrote a book called *Why We Love Dogs, Eat Pigs, and Wear Cows*. Hal Herzog has one called *Some We Love, Some We Hate, Some We Eat*. Anthropologists will point out that these categories change across societies. People who live in countries where it's common to eat dogs might be disgusted by foreigners who eat crustaceans. In this country we tend to eat animals with which we share the least amount of emotional attachment. This is why animal activists use photos in which cows and sheep and pigs make eye contact with the camera. Maybe you'll change your mind about eating them if they remind you of your household pets.

Studies show we relate less to animals that have "fixed faces." Dogs and pigs and cows can express emotions on their faces, while ants and other insects can't. Whether ants have emotions or not is an unanswered question, but because they're tiny and lack expressions, we assume they don't. People who've lost the ability to show emotion on their faces, because of either muscular failure or brain injury, are also perceived as lacking emotion. But just because they can't *show* their feelings doesn't mean they don't have feelings. I'd argue the same is true about the ant.

When I photograph an ant through the lens of a high-powered camera, it will often seem to tense up and begin to turn toward me. In that moment I believe it's figured out I'm there, and it's growing angry. I typically back off and hide, just as I would if it were a leopard. And once the ant calms down, I can move closer and take its picture.

I've spent time with hunter-gatherers who can look at an elephant track and know where the animal is going and what its mood is. They project human thoughts onto the elephant, to get into its head. Used intelligently, this sort of anthropomorphism is a way of solving problems and arriving at conclusions that make sense. Even scientists think this way all the time.

Leviton: It seems that our ability to express ourselves through language is also a big dividing point between humans and nonhuman animals. Do other species have languages?

Moffett: They communicate, but we don't normally call this "language." We define language as what we do: communicating through a complex system of arbitrary symbols, using grammar to combine multiple elements, and so on. Ants might lay down a scent trail that signals to other ants, "Food is over there," but because they don't use visual or aural symbols, as we do, we say they don't have a language. All discussions of language require semantic definitions of what the elements of language are, and that can be slippery.

What interests me is a special chimpanzee scream called the "pant-hoot," which might be considered a primitive word meaning "us." Chimps learn a particular pant-hoot that's unique to their community, which other chimps can recognize from a distance. It's a group-coordination signal that mobilizes the society's members through call and response and helps them monitor the location of chimps from other communities.

Perhaps early humans used a similar vocalization as their very first marker to separate *us* from *them*, like a password not much more complicated than the colony odor of ants. It makes sense, if you're in a hunter-gatherer society that's spread out across the terrain, to have a way to say, "I'm one of us," when you spot someone who might not have seen you for a long time and who might not recognize you because your hair's longer or you have a limp you didn't have before. Beginning with that password, early humans would have developed the myriad markers we display today — including the most complex one of all, language.

Can chimpanzees employ their pant-hoot in this manner? A primatologist named Andrew Marshall was studying captive chimpanzees in a zoo where one chimp could not match the pant-hoot of the rest. He just couldn't do it. It was like a speech impediment. And the others didn't let him eat with them. The habitat was an island, and the poor chimp was eventually driven into the water and drowned. There's no proof that his failure to pronounce the correct pant-hoot did him in, but it seems likely.

Leviton: You describe hunter-gatherer groups as "fission-fusion" societies — coming together at times, then splitting up to avoid competing for resources.

Moffett: Yes, in a fission-fusion society individuals don't have to be right on top of each other. They have the option to wander away and still stay members. Such creatures, which also include species like chimps, dolphins, and elephants, need to have good memories so when they come across individuals they haven't seen in a while, they know immediately who fits in and who doesn't. That's the reason these species end up with bigger brains. E.O. Wilson proposed that our ancestors evolved social smarts from gathering together. But the fact they could remain apart for a long time and yet recognize who belonged, and keep relationships going, was just as important.

So being human has a dual aspect: we're often together, but we have the luxury of getting away from each other, often in ever-changing groups. This helps to explain how we can build a dizzying range of cultures.

Argentine-ant societies can grow indefinitely, provided they can take over more suitable land to accommodate them. The biggest supercolonies consist of thousands of interconnected nests housing billions of workers and millions of egg-laying queens, but no one leads them. Humans have a much harder time living in swarming cities than ants! [*Laughs.*] As our population grows, we need central leaders and eventually a bureaucracy to prevent social breakdowns. Once we settled down, and especially when agriculture led to towns and cities, we could accumulate resources, and for the first time some people garnered more wealth than others. In wandering hunter-gatherer groups, social acceptance had been based on how generous you were, how much you shared. Now it was based on how much you owned, hoarded, or even wasted. Lawns were invented to show that the landowner was so rich, he could afford to leave part of his holdings uncultivated.

Some behaviors we think of as basic human traits are actually specific to settled societies. The social psychologist Jonathan Haidt identifies six moral foundations upon which we build our societies: care, fairness, liberty, loyalty, authority, and purity. To my mind this list grows if we consider nomadic hunter-gatherers. One of their characteristics is a lack of social hierarchies and leadership — in fact, a complete hatred for leadership. They'll kick someone out who tries to convince the others to do something they don't feel like doing. And, as I said, these hunter-gatherers strongly prioritize sharing and don't accumulate stuff. If you kill a bison, you often don't even eat any of it; you give it away. We have few opportunities to recognize those qualities in ourselves anymore, because they are no longer integral to how our societies are put together. The human mind is remarkably flexible, though, and those hunter-gatherer potentials are still in there for us to access — moral foundations that are rather more liberal-minded. Modern people would still feel quite comfortable with that type of culture if they had been born into it.

Leviton: Let's talk about how societies break up. There are more than forty wars going on right now, and some countries, including Afghanistan, Sudan, and Syria, might not survive in their current form.

Moffett: Probably the majority of wars in history have been civil wars. As the *Pogo* comic said: "We have met the enemy, and he is us." The division of societies is one area that hasn't had enough study. How old are civil wars? Anthropologists don't know. The Romans were fighting with each other two thousand years ago. The Ali and Umayyad sects of Islam went to war around 1,400 years ago. Through warfare or otherwise, our societies have always been breaking up.

In *Collapse* Jared Diamond focuses on wars or environmental disasters to explain why societies fail, but these catastrophes aren't a requirement. As far as I can tell, both in the animal kingdom and among humans, societies go through a cycle: they form, develop in size and often in complexity, and break up. For example, when Jane Goodall went to Tanzania's Gombe Stream National Park, she observed chimpanzees who appeared to belong to one continuous social group. Unbeknownst to her at the time, two subgroups had formed. Everyone still interacted and had friends on each side, but they grew apart until one day — *whoosh!* They split into northern and southern communities. Former friends became enemies. After that, the stronger community started *killing* the other. This was shocking to Goodall. Joseph Feldblum and colleagues at Duke University subsequently reexamined Goodall's detailed field notes and concluded that the split had actually been several years in the making and might have started with the death of a senior male Goodall called Leakey, who had provided a kind of bridge between the northern and southern chimps.

One bonobo community similarly split in half, but after a year the two sides became friendly again. Bonobos know how to make up and bury the hatchet. Humans are somewhere in between chimps and bonobos in our level of hostilities.

The members of ancient hunter-gatherer societies would also gradually drift apart into subgroups over the centuries, but because humans employ elaborate systems of markers, they stayed under the same flag, as it were, until each faction began acting strangely enough that the other wouldn't accept its people anymore. Consider Australia, which had an Aboriginal population broken up into hundreds of societies when Europeans showed up in the early seventeenth century. Each society was organized into small bands that were spread out across its territory. Some bands might not see each other for a whole year. In that time the bands might invent their own modes of dress, vocabularies, ways of carrying out rituals, and so on until there was a sudden division of the society.

Leviton: There are many groups within our society, whether it's the KKK, the Mafia, Scientology, the Boy Scouts, or the Elks Club. Many of these associations demand a high level of commitment. Are they precursors to societal breakup or just coping mechanisms in a large society?

Moffett: These affiliations reflect our striving for optimal distinctiveness — our search to feel different while still part of a greater whole. Yet certain groups take advantage of the binding characteristics of societies to form stronger allegiances than you have with, say, your book club. In a way these groups are mirrors of the larger society. Some corporations encourage conformity in dress and attitude and rally employees around a goal, giving them a sense of unity. Very few groups, however, expect memberships to continue down through the generations the way societies do, and most of these affiliations don't normally represent a threat to the society as a whole. Which is not to say that certain persistent, strongly bonded groups like the Mafia don't wreak havoc!

Leviton: Do these groups form and stay together due to a specific set of conditions?

Moffett: Any group with a strong identity will introduce distinctive dress, have jargon, and write its own idiosyncratic history in order to make members feel bonded. And when people go through a lot of stress and turmoil together, that really unites them. Violence can be a strong social glue. Charles Manson ordered his followers to murder strangers to prove their devotion to him. Just as tribal peoples pursue dangerous games together and scar and tattoo each other, college fraternities and sororities have initiation rituals that often require pledges to endure pain and embarrassment. In the most extreme cases, suicide bombers show their devotion to the group by sacrificing their lives, convinced they will be properly rewarded in the afterlife.

The Sateré-Mawé tribe in the Amazon has a coming-of-age ritual in which all boys must endure the excruciating stings of the bullet ant. As the name indicates, this is like being shot by a bullet. And not just one but dozens of ants are stuck in gloves the boys must wear. It's no surprise that this tribe is extremely well bonded and also warlike. These types of extreme rituals tend to emerge in times of stress, when the group is in danger, but they can persist. Anthropologist Harvey Whitehouse describes such people as undergoing identity fusion — becoming one with the group.

Leviton: In 2016 some Texas politicians tried to force a vote on whether their state should explore seceding from the union. Do you see more national disintegration in our future?

Moffett: Societies are continually building up and breaking down. There's no way to stop that. Since *Homo sapiens* arrived, there have been something like a million human societies on our planet. We've been devoted to those societies since the dawn of humanity, yet people's sense of belonging diverges over time. But the most significant factor in the breakup of nations is ancient affiliations. Countries today typically fragment into regions overwhelmingly occupied by distinct ethnicities that originally lived independently on those parcels of land. Yugoslavia was a case in point.

It's also true that some national borders, especially those set up in an arbitrary manner by colonial superpowers, don't convey a strong identity. That makes them particularly fragile. People in those countries often identify more with their ancient tribes than with their nation. Afghanistan, for example, is made up of at least fourteen different ethnic or tribal groups, including Pashtun, Uzbek, and Turkmen. The tribal identities that have always been present in the region are at the core of current conflicts. Think of what's happened in Pakistan, India, Bangladesh, and Myanmar — long histories of war and unrest. But success in the modern world does require a certain amount of functioning at a national scale, and unless a tribe controls a vast area, it's unlikely to survive as a politically separate entity. Generally the greatest power is at the national level, which keeps those countries from quickly decomposing into tiny units, though in some regions it's a constant concern.

Societies that grow through immigration have to perform a kind of trick: immigrants have to be seen as contributing without competing. If newcomers are viewed as rivals for resources or jobs, there will be pushback. Even the Roman Empire, which was multicultural by any standard, would expel some ethnicities when there wasn't enough food. When resources are scarce, societies fragment more often. A foreign threat, on the other hand, can bring people together.

Leviton: When there is a war of conquest, in which the victor rules over a vanquished people, what tends to happen?

Moffett: Some conquerors have kept the conquered people apart and not allowed them to integrate or move freely in the dominant society. The Incas, when they captured territory, stopped the local inhabitants from dressing or acting Incan or learning their language. I would argue that this approach, had it persisted, would have shortened the life span of the Incan Empire, which was only a century old when the Spanish brought a quick end to it.

Longer-lasting societies nearly always bring conquered people into the fold. The dominant culture might at first maintain the newcomers in separate districts, but over time the conquered are permitted more freedom of movement and take on many of the traits of the mainstream society. The Roman military occupation of Britain, for example, profoundly changed life for the local inhabitants. The Romans encouraged the Brits to live in big towns, laid out in grid patterns with market squares or forums in the center. They also introduced sewers and an economic

> The idea that we welcome a large number of new individuals into our society, with the expectation they are going to stay, is pretty much exclusive to humans, a novelty with which we're still struggling.

system that depended on coins instead of barter. And Brits — who had been an oral culture — were introduced to the Latin alphabet. By 391 CE Christianity, the official religion of Rome, had penetrated much of Britain as well. The British became "Romanized," though with their own twist on Roman identity. Indeed, throughout the empire there were different flavors of being Roman, which suited both the locals, who retained some of their past identities, and the original Romans, who wanted to remain a unique and dominant people. The Roman Empire was an excellent example of integration. Formerly conquered districts had little reason to rebel and become independent if they were treated as part of the empire and began to identify with it.

Leviton: Most powerful civilizations have also enslaved conquered people, haven't they?

Moffett: Yes. Slavery obviously meant total domination over the conquered. The enslaved lost their identity entirely, making them legally equivalent to beasts of burden. They were forbidden to use their birth names or practice anything from their original culture, and could be tattooed or branded with a hot iron to "mark" them for life. It was tempting for nations to wage wars not to take over entire populations and their lands but to acquire prisoners as needed, who could then be forced to render a lifetime of labor — a far better payoff than killing people.

The international slave trade developed because some colonial powers — Portugal, France, England, Spain, the Netherlands, and the Scandinavian countries — had a powerful economic incentive to enslave and trade captives, who were considered less than human and "destined" for their position as chattel. Between the sixteenth and nineteenth centuries, the Atlantic slave trade alone involved some 12 million enslaved people, with perhaps 1.5 million dying on board ships bringing them from Africa to North America.

Slavery is an almost exclusively human activity. I say "almost" because there are exceptions. Slave-making ants exploit the way ants determine identity — through scent — to seize the young or pupae of the same or a closely related ant species and imprint upon them, through grooming, the captors' "national scent." These captives carry out all the labor in their underground cities, perhaps unable to discern that they aren't working for their birth colony — though there are cases in which the slaves try to run away and have to be hauled back. If the slave ants happen upon the nest from which they were stolen, they will be attacked as foreigners. They are no longer recognized. Their identity has changed.

Leviton: Many scientists believe the biggest threat to human survival is climate change. How do you think societies will react when extreme weather events and species extinction become even more common?

Moffett: I'll admit I'm not eager to make predictions. I'm as puzzled by human behavior as the next person. When I finished writing *The Human Swarm*, I realized I hadn't come up with a punch line, the sort of simple conclusion many authors present to satisfy readers. We're all wrestling with the same existential questions.

I did conclude, however, that societies are not going away. They bring us meaning and validation, and are deeply rooted in our minds. No global entity can replace them. National feelings are intense, grounded as they are in the symbols, stories, and traditions people venerate and fight for. Jockeying for power and resources will continue, each society pursuing its own interests. We need a functioning international response to climate change, but how can we get it? It's difficult enough for one society to engage with long-term issues when most governments turn over leadership every few years. Even totalitarian regimes come and go. Weak as it may be compared to our national bonds, the best approach is still ultimately something like the United Nations. We need to figure out how to make such an umbrella organization more effective — a tough task, for sure.

I'm an ecologist, so I think in million-year increments. What we're going through now is a minor blip in the multi-billion-year history of our planet. The earth is unlikely to live or die based on what happens to humans in the next hundred years. There's plenty of evidence that species will decline and ecosystems will be compromised, and for our future as a species, we need to take that seriously. But in terms of the long-term ecology of the planet, things are going to sort out. I'm an optimist that way. Even if Earth's future doesn't involve humans, it will have a future. Maybe the descendants of the ants that I love so much will figure things out better than we have. Does that sound like an optimist's point of view to you? Probably not! [*Laughs.*] ■