"Why Don't Ants Play?"
An Interview with Mark W. Moffett

Mark W. Moffett is a research associate at the Smithsonian Institution and a frequent contributor to and contract photographer for the National Geographic Society, which has dubbed him the "Indiana Jones of Entomology." While earning his doctorate in organismic and evolutionary biology at Harvard University, he studied with Edward O. Wilson, founder of the field of sociobiology, and traveled across Asia studying ants. Subsequently, Moffett served as a curator at Harvard's Museum of Comparative Zoology and held a research position for several years at the University of California, Berkeley. In addition to having written more than one hundred articles, he is the author of *The High Frontier: Exploring the Tropical Forest Canopy* and *Adventures among Ants: A Global Safari with a Cast of Trillions* (winner of a National Outdoor Book Award in 2010) and the children's book *Face to Face with Frogs*. Moffett has appeared on *The Tonight Show with Conan O'Brien* and *The Colbert Report* and has received the Lowell Thomas Award from the Explorers Club, the Distinguished Explorer Award from the Roy Chapman Andrews Society, Yale University's Poynter Fellowship in Journalism, and Harvard's Bowdoin Prize for writing. In this interview, Moffett reflects on his study of ants, on their social organization, and on the similarities and differences between these mindless and playless creatures and humans. **Key words**: ants, army ants, sociobiology, superorganisms

American Journal of Play: When did you first become interested in ants?

Mark Moffett: It seems like I was watching ants while still in diapers. Heck, weren't you? In my case, this included feeding them prey and disrupting their trails to see which way they headed. I was conducting elementary experiments like these by the age of four. For me ant watching and manipulating the natural world was my primary form of play. (Baseball seemed repetitive by comparison.) But then many kids show this kind of hunting instinct. They learn about creatures by tracking them down in stream beds and treetops.

AJP: Does a child who plays like that resemble a hunter?

Moffett: A South African friend, Louis Liebenberg, who introduced me to the San Bushmen, has written books about how scientific thinking originated from the hunters' need to predict and understand their prey—to get inside the head of a gazelle, for example. Tracking animal spoor, pace by pace, takes skill. But that turns out to be the facile part—equivalent to the talents

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of a workaday scientist, proficient at the tools of his trade, who cranks out small contributions to the field. The truly skilled hunter looks at the footprints of the animal and surprises us by taking a different route, skipping the tracking phase entirely by anticipating the actions of his quarry and heading directly to its location. Think of Einstein's inferential leaps. Anthropomorphism done shrewdly turns out to be a productive skill, part of our cognitive tool set. Most of us build that tool set as children then put it aside to join other grown-ups in a civilized world.

AJP: What advice do you give to young naturalists?

Moffett: Do what you like, have fun with it, never stop treating it as play. Everything else follows.

AJP: Does every future entomologist begin as a bug-collecting kid?

Moffett: I have met a few entomologists who later in life came to realize the power of insects to solve interesting questions. But most of them developed this knowledge as children, yes.

AJP: What do children miss these days by spending so much time indoors?

Moffett: Learning about the world is interactive; it involves the immersion of both mind and body in nature. Googling only gets you so far, because the apple actually needs to fall on someone's head before gravity becomes an idea. That may turn out to be a general principle for how all minds work. Both monkeys and little spiders called jumping spiders need to grow up in complex three-dimensional environments to develop the cognitive skills to navigate through a forest or a meadow (in the case of the spider). Without that experience, they are stumped by the world. The brain needs reality to realize its potential, even for a spider.

AJP: Can the benefits of virtual play compare to outdoor, physical play?

Moffett: I suppose virtual play could be designed to replicate the real world, but our entire bodies will need to be involved for our minds to reap the proper benefits. But why take such an approach? Simply connecting with reality would save a lot of engineering. There once was a humorous column in *The New Yorker* about a phone app called Reality, which ironically didn't require the app.

AJP: But reality isn't always so easy to sort out.

Moffett: No, it isn't. But our minds are wired to find patterns, which is what a hunter-gatherer tracker did when he thought like his prey, or a physicist does to ponder the electron. The trick to success is to not only perceive the pattern, but to realize when no pattern is there. Unfortunately for Ein-

stein, God can play dice with the world, and one must separate out the meaningless.

AJP: Your career has invited comparison to Indiana Jones. Do you see yourself that way?

Moffett: In fact, I grew up reading the books of nineteenth-century explorers and then became one myself. My goal, like theirs, is to find new species and behaviors and turn these discoveries into stories about nature. There are still amazing new stories to be had from remote places. Many kids who grew up loving nature and the outdoors are being routed into lab science because of a belief that the essential facts about the natural world are already mapped out; these poor kids end up sitting for hours in front of high-tech gear, then wander out of their building at the end of the day, bump into a tree, and wonder what hit them. In short, too often biologists are becoming disconnected from nature. The truth is that meaningful adventures and a life of discovery can still be had out in the real world—even for ants, which for me were an easy choice. Because ants are always busy, you can gather more information on an ant colony in a week than a chimpanzee researcher can obtain in years.

AJP: Have you ever faced any physical dangers?

Moffett: I have been chased by both African and Indian elephants within a three-day period, used Indian blowguns in defense against drug lords, and found Aztec burial chambers while searching for cave tarantulas. There's always something.

AJP: Could you give us a sense of the worldwide census of ants?

Moffett: There are probably a million billion ants, weighing—in aggregate—as much as all human beings.

AJP: Why does the study of ants figure so prominently in the field of sociobiology?

Moffett: I wrote *Adventures among Ants* to show that even though modern humans are closely related to chimpanzees, ants are really much more like us than any chimpanzee. What chimpanzee has to deal with public health and environmental safety issues? Traffic rules, highways, and infrastructure? Market economics and voting? Assembly lines and complex teamwork? Slavery and mass warfare? Public health and safety issues? These issues arise only in human society and among a few social insects—especially certain ants—because they are the only species with societies that can grow into the millions and sometimes the billions or more. They represent problems that can be expected to emerge in large-scale societies, and so have noth-

ing to do with intelligence per se. Most experts have been reticent about making these comparisons, perhaps because of the backlash E. O. Wilson experienced when he published the book *Sociobiology*. But I think this is an essential truth, and when I frame my argument this way, the psychologists and sociologists I talk to find the similarities intriguing. Of course, I don't mean that ants solve these problems the same way we do; but, then again, no two human societies will be likely to deal with such issues in exactly the same way, either.

AJP: Tell us something of your experience of studying with E. O. Wilson. Is he a teacher who encourages students to be comfortable with uncertainty?

Moffett: Ed shows the key attribute of the most successful scientists—his childhood spirit, energy, and inquisitiveness remain inside his very grown-up brain. A capacity for creative play, of course, is part of that picture for him—his mind is constantly tinkering with ideas. Did I say tinkering? It's more of a dazzling whirl. Tinkering and play are ways to get past uncertainty and find solutions. I try to follow that lead.

AJP: Does that make you different from other biologists?

Moffett: Well, Ed Wilson is different from most other biologists in terms of this attitude and spirit, and I try to emulate that. It's not possible to duplicate his brainpower and creative range. One can only stand back and admire what he's done.

AJP: Tell us about a key concept in sociobiology—superorganisms. How are they different from organisms?

Moffett: People talk about superorganisms in different ways, most of which I find unconvincing—they speak of the importance of division of labor, complexity, cooperation, or other traits. But if you look at organisms—and the idea of a superorganism is after all based on perceived parallels between a society and an organism—organisms don't need to have any of these characteristics to a marked degree. For example, there can be breakdowns in cooperation in our bodies between the desired outcomes of our different genes, something studied by Robert Trivers and others. Also some organisms are not at all complex—a few are downright simple, or show little or no division of labor, including in reproduction. So these traits shouldn't be seen as essential to organisms—and therefore to superorganisms. I think people need to find a more meaningful approach.

AJP: What is your solution? Is there a better way to compare societies to organisms?

Moffett: Societies come to be most parallel to organisms, in my view, when their

members develop a strong social identity; they have to belong together, absolutely, and recognize outsiders. So the cells of your body have hydrocarbon molecules on their surfaces; an invading cell (say a pathogen) without this "national flag" will be attacked by your immune system. Similarly, ant workers have a hydrocarbon "national flag" on their body surfaces and will attack an ant that lacks that flag, which would be a foreigner from another colony. An ant colony is in this regard very much like an organism. What this means, in practice, is that an ant is either part of its society, or it's dead, just like one of your skin cells can't wander off and form another you. (The only exception is that the young queen and male ants that depart a nest form new societies—they're equivalent to the eggs and sperm produced by an organism to create the next generation.) For this reason, no ant worker can choose to defect the way humans can go to Canada when they don't like what's happening at home.

Because we can defect, or live out our life as a hermit, we have more options than ants in a colony or cells in a body. That means human societies are less tightly bound together than ant societies, and, in my view, not comparable to organisms. I imagine most of us would nevertheless prefer our individual freedoms to being part of an ant-style superorganism—our personal imperfections and shortcomings be damned.

AJP: If ants can cooperatively farm, build, and wage war, can they play?

Moffett: No, not really. I can think of a couple of reasons for this that apply to the massive populations of many ant colonies. First, ants are total nationalists. They devote themselves to their societies, or they are dead—that's the superorganism idea. Because of this, they don't need to build their relationships and social skills with other society members the way we do through play as we grow up. Also, the most dominant ant species operate at vast scale. Think of how lions or dogs practice their hunting behaviors through play as pups. Becoming skilled as a good hunter makes all the difference to success when you belong to a pride or pack of a few individuals. But if the lions were like many ants and poured over the hillside toward their prey by the hundreds or thousands, the fact that most individuals are sloppy—had never practiced hunting behavior through play—wouldn't matter any more. In fact, ants can use this sloppiness to their advantage: if you have watched ants long enough, you've probably seen one clearly going the wrong way. But as long as enough individuals are doing roughly the right thing to complete the job, the few who make a bad choice might dis-

cover things everyone else misses. Mistakes become a form of creativity, as they do in human play. Though calling a dumb ant *playful* would be pushing my luck! Still, my belief is that it doesn't necessarily take a large brain to show behavior we would recognize as play. You could probably write a computer program that shows elements of play without that much code.

AJP: Okay then, let's ask the question another way. Can a superorganism play?

Moffett: That's another way at which we could look at the possibilities for play and creativity in ants—not at the individual, but at the level of the superorganism. Rather than seeking playfulness in individual ants, could it exist in the colony as a whole? A ginormous society of African army ants, catching prey in well-orchestrated swarms of millions, weighs more than a person and has, in aggregate, distributed among the brains of all those workers, far more neurons than a human brain. In a sense that's a far better way of making a man-sized organism than building a man: no single bullet can take down an army ant colony, as it could a person. And a swarm of ants that weighs as much as you can survive by gleaning bits of food in places where a person would starve. But can it be creative? We know a swarm of army ants can track the richest areas of food, based on bits of information gathered by its myriad of ants, even though it has no leader to tell it where to go. We know *colonies* of ants can improve their performance over time, say in moving their nest from place to place. But no one has looked for play in a superorganism.

AJP: What would ant behavior need to look like to qualify as play?

Moffett: Perhaps the best we might do would be to find an ant increasing her skill set through practice. This is poorly investigated but seems plausible. For example, a leafcutter ant might grow increasingly skilled at slicing through a particular kind of tree foliage and come to prefer collecting more foliage of that tree species. Some ant workers are known to return day after day to a particular area to forage and get to know the food there very well, which may make them more proficient hunters. But such activities seem too functional to be called play, and it would certainly be hard to tell when an ant is having a good time at doing them. Ants always look so serious about everything, but who knows?

AJP: Sherlock Holmes solved a case by noting the absence of a clue—the dog not barking. What do we make of the ant not playing? What can a playless species tell us about those that do play?

Moffett: I think of play as a tool for refining our interactions with the world. An

"underbuilt" creature like an ant, and an "overbuilt" creature like a super robot that does everything right the first time round—they might not need to play. It's not for us to judge whether the ant or the super robot isn't having a fine life without play. We happen to be raised to love the idea of play, though, in truth, not all generations of humans have been equally playful.

AJP: If ants don't play, and playfulness in animals is linked to their capacity to adapt to changing environments, how can playless ants adapt?

Moffett: I talked about ants making mistakes that might lead them to unexpected solutions, such as finding food that the other ants have missed. I also mentioned ants improving performance through practice, which is something the experts still need to properly document. But ground-up innovation in the human sense seems outside the ant realm. Like most species, ants rely on a long haul of biological evolution to adapt to truly novel situations. Though, of course, evolution is also play of a kind—albeit one with life and death consequences!

AJP: What does the absence of play in ants tell you about play itself?

Moffett: That it isn't needed, and that there probably are more efficient ways to get things done. But heck, I like being human! As with my comment about being glad I'm not a part of a superorganism, our imperfections are one pleasure of human life. That's not to say that space aliens might not find play a bizarre notion, a waste of time, and consider their life all the better for not having it; and, indeed, perhaps the aliens could be right. But still, in some sense, these aliens would need to have ways of understanding the universe and solving problems, and these (we might argue with them) have some commonality with the human sense of play.

AJP: Are storytelling and photography forms of play for you?

Moffett: I play through storytelling. A camera is a tool to get the story told. Kind of a boring tool, actually. People who realize this fact are the best photographers. Certainly if your mind is on the equipment when you are pressing the camera button, get yourself another job. If that's the case for you, it isn't play!

AJP: Is research play for you?

Moffett: Only when done properly. Running over ideas in the mind until one finds a result that works and even surprises—that's a common theme of successful scientific research. And that's play.

AJP: A final question: where does the explorer-researcher dream of going next?

Moffett: A new place. That's always the goal. Mongolia sounds good.