

Sidedoor

Episode 4: Masters of Disguise

MD: I'm Megan Detrie and this is Sidedoor, a podcast from the Smithsonian. Today, we bring you three stories about trickery. Imposters who misrepresent themselves, take over, all to get what they want. My co-host Tony Cohn is going to begin with an unexpected expert in sexual deception: the orchid.

TC: These wily plants are masters of disguise, coming in all kinds of unique -- sometimes even weird -- forms.

TM: A friend of Charles Darwin sent him one of these plants...

TC: That's Tom Mirenda, an orchid specialist. He's showing us around the greenhouses of the Smithsonian Gardens.

TM: And when he took it out of the box he famously uttered, "Good heavens! What insect could suck it?" because of the long nectar tubes right here on the bottom.

TC: Tom knows all about why orchids have these strange devices. There's almost 30,000 species of them: some have big beautiful flowers, and some don't look like flowers at all. But there's a good reason for that. It's because orchids have co-evolved to attract a specific pollinator, so each species of Orchid uses its own trick -- through scents or color or look to bring in a bug or bird. And Tom has seen plenty of different adaptations. The Smithsonian is home to some 9,000 orchids. But the best place to see them may actually be his garage; that's where Tom keeps his own collection, which has been as many as 2,000.

TM: I'm told the police department comes by my house regularly to check and see what may be under those the grow lights that they can see from the street. But what they don't realize is that orchids are far more addictive than marijuana.

TC: There's a huge of variety of orchids on display at the Smithsonian too, and that's not a surprise. Orchids are the most diverse family in the plant kingdom. They can grow almost anywhere. And they employ a whole bunch of tactics to get attention. Let's look at the hammer orchid in Australia. Its flower is shaped to look exactly like this female wasp that spends its whole life on the ground. This wasp will crawl up to the top of a blade of grass when she's ready to mate.

TM: The male will come and he will clasp her from behind and they'll fly up together and mate in mid-air.

TC: Some orchids release a scent that mimics female insects. So these dopey male insects attempt to mate with a flower. And during the act, they pick up a piece of pollen that they then drop off at another sexy smelling plant.

TM: These orchids are actually also emitting the same pheromone the female emits in order to attract the male there in the first place. These wasps can smell these flowers over very, very great distances. But they've only been deceived.

TC: The flower itself is mounted on a hinge and on the other side is a sticky pad with pollen sacs.

TM: They're mimicking that female on the tip of the blade of grass, but when the male comes to fly off with her it's not actually a female. So when he tries to pick her up and fly off, the hammer orchid will actually bonk him on the head in return for that and leave pollen on him.

TC: Instead of mating, the male wasp just hurls himself into the awaiting sticky pads, which deposit the pollen. Eventually he gives up and flies off.

The only way it works, is for that wasp to get tricked again by another hammer orchid releasing wasp perfume. It goes through the same failed ritual again, depositing pollen.

TM: There's a whole group of orchids called the buldefillum. The kind of deception they're engaging in is mostly for females. Females are targeted by deceptive orchids by looking like a good place to lay eggs.

TC: These orchids have these hairy, reddish flowers and smell a lot like rotting flesh.

TM: If you're a carrion fly or a fungus gnat, you're going to be looking for something that looks like a dead rotting carcass or rotting wood.

TC: That rotting smell is so real that sometimes the flies will even deposit their eggs on the flowers. If this seems like overkill, it's not. Being super-specific in what pollinators they attract actually reduces the risk that their pollen gets lost or dropped off at the wrong plant. That means a better chance of getting pollinated.

TM: You can look at the flowers and make pretty well educated guesses about what it is trying to attract based on how that flower looks. But some of them are so outlandish that there's clearly things about it that you can't unlock. They're just from outer space.

TC: As good as they are at hoodwinking bugs, Tom thinks they may have found an even better mark: humans.

TM: Orchids are masters of manipulation. I'm convinced this is their nefarious plan to enslave humanity into cultivating them and help them through climate change. What a great strategy, right?: to become the pet of the most successful creature on the planet.

TC: Deception can mean a lot of things, but to orchids it means a better chance to get pollinated, which translates to more plants for Tom and others like him to obsess over. So we've seen that some impostors want to hide in plain sight. But what if you don't want to hide something, but rather you want people to see something that's not really there? And in world war two that meant employing a group of soldiers that never truly existed at all.

MD: By early 1944 there were 150,000 soldiers in Southern England. Both Americans and Brits. They were preparing to invade Nazi-occupied Europe.

The Germans knew the Allies would invade, but they couldn't tell when or where it would happen. Would they launch from Scotland and attack Nazi-held Norway? Would they land in Normandy? Or would they take the short and easy route, from Dover to Calais in northern France? Allied commanders realized the Germans would have to guess. So they figured if you can't surprise the enemy, you may as well mess with their heads. And so began Operation Fortitude. The Allies created not one, but two fake armies. The big one was across from Calais, where the Nazis figured the invasion would probably come from. Brian Nicklas, an archivist at the National Air and Space Museum says that spot in Northern France worried the Germans the most.

BN: The Germans were convinced, well, at least some were convinced, that they were going to cross at the narrowest point of the channel. So at the British side at this point they made a fake army. The fake army had inflatable tanks and inflatable trucks.

MD: And a dummy airfield and a dummy landing craft. They sent out endless fake radio transmissions, giving the movements and supply information...

BN: They would set up loud speakers to make the sound – play records of the sound – of trucks and tanks being driven across the landscape.

<SFX of tanks comes up>

MD: And if any recon caught it, they would report back.

BN: “There’s lots of enemy activity going on. They’re massing for the invasion at this point.” In reality the forces are miles and miles away.

MD: That fictional army rubber tanks and blasting speakers was headed with a very real general: George Patton. He was a legend for Americans and Germans and Hitler respected his skills. So if Patton was involved, it had to be serious. Meanwhile, there was another fictional army posted up in Scotland. The British media helped out... broadcasting fake wedding announcements and football scores to non-existent troops. The Allies even found an impersonator, this boozy Australian actor who looked a bit like Field Marshal Bernard Montgomery, the general in charge of the real invasion. There was one problem: the Aussie had lost a finger in World War One, but Montgomery still had all of his. So they fixed fake Monty up with a fake finger and made sure he got spotted just before D-Day somewhere far from Normandy. Even the night before the invasion...

BN: The allied forces made up these puppets that looked like a paratrooper and they had a parachute that was scaled to size.

MD: These mannequins were a foot, foot and a half. So as the cargo planes carried paratroopers in for D-Day passed...

BN: Before they would get to their drop zone, they would let loose a bunch of these small mannequins – these puppets. To an observer on the ground, a German soldier; it would look like these paratroopers were landing a mile away. Well, in reality they’re landing in the field next door and it’s just the perspective and the moonlight is all off. And the cargo plane would fly on for another several miles before the paratroopers would actually jump out of the plane and take their objectives.

MD: Imagine all these little soldier puppets just fluttering down the night sky.

BN: And it worked. That definitely worked. A lot of the German commanders, supposedly even Hitler, said ‘no no, they’re not landing in Normandy. They’re gonna cross at Calais. Keep the emergency tank forces in Calais – Normandy is just a diversion.’

MD: In fact, Hitler kept forces there for seven weeks.

BN: By the time they realized it was not a fake it was too late. We’d already established a strong foothold.

MD: The U.S. Army went on to create a 1,100-man unit called “23rd Headquarters Special Troops.” These guys carried out deceptions at over

20 battlefields, and were kept classified for 40 years. The army even created training movies on how to use sonic deception which, by the way, is the source of those tank noises you heard earlier. Here the sonic deception guys take you through how they created soundscapes of bridge construction.

<SFX_Excerpt from training video>

TC: So we've actually got the story of another invasion for you, but this one doesn't have anything to do with battlefields. It's in Maryland's Chesapeake Bay right now, where scientists are trying to halt a zombie takeover...

MD: On Sunday afternoon Tony and I head to the Smithsonian Environmental Research Center on the Chesapeake Bay. We pull up to a group of docks. Here, volunteers with a citizen science project are helping scientists pick through crab traps filled with oyster shells. They're on the lookout for zombie mud crabs. Or at least mud crabs that have been taken over by an invasion of parasites.

CT: So we have this cute little mud crab about the size of your thumbnail. They're white finger mudcrabs.

MD: That's Carolyn Tepolt, a fellow at the center.

CT: They're actually really common even if you haven't seen one. Lots of things like to eat them - they're small, they're vulnerable. They're like little undersea popcorn essentially, and so they hide a lot.

MD: Unfortunately, they can't hide from a parasite that the scientists call Loxo.

CT: It's actually a barnacle although you'd never know by looking at it, and basically, when it's very young - when it's a larvae- swims around, finds a newly-molted mud crab when it's nice and soft and vulnerable and actually burrows into the mud crab, grows all throughout the inside of the crab..

MD: Scientists think Loxo came to Maryland in the 1950s as hitchhikers on healthy oysters imported from the Gulf of Mexico. Every summer, the research center plants traps throughout the Chesapeake, to try to get a better sense of how far the infection has spread and how bad it is.

TC: For any individual crab, it's pretty bad. Loxo creeps its way through the circulatory system like the roots of a plant, hijacking the crab and turning them into parasite breeding factories.

CT: It's not making any more crabs – now all of its energy is essentially going to making baby parasite.

MD: That's both male and female crabs. The parasite neuters the crabs, and actually changes the shape of a male crab to look more like female crabs. So now both bodies are able to carry these sacs of baby parasites that'll grow out of their abdomen.

CT: So crabs that have been infected for a while, it's actually really hard for us to tell, even with a microscope, sometimes the male from the female crabs.

MD: And these naive little crabs don't realize they've been duped.

CT: And they'll kind of take care of the parasite sack the way that a female crab would take care of her eggs. So they kind of keep it clean and make sure it's aerated and keep it in good shape and sometimes, even if you pick up a parasitized crab, it will put its little legs over its abdomen as if it's almost trying to protect the parasite.

MD: The parasites keep laying millions and millions of baby parasites in those sacs which the crabs protect over and over until they die.

CT: Seems like a pretty bad deal for those poor little crabs.

<SFX_People scraping off buckets and searching for infected crabs as they work, some ambient chatter>

MD: Today, about 15 volunteers and staff are sifting through oyster shells, poking through the grit and in the crevices, trying to shake out these tiny crabs.

CT: You pick up all these little crabs just to look at the back of them. It just looks like this nice little community of crabs. But in an area that's really infected, you flip them over and start to see more and more parasites and those crabs are not dead, they're still there in the population. They're almost ghosts or zombies. They are not part of the gene pool anymore, they're not in the gene pool anymore. They're effectively parasites in crab clothing walking around and reproducing for themselves.

TC: The center has been tracking infection rates for 15 years and it ebbs and flows. Some areas have higher infected populations and they see fewer babies, but they aren't worried about crabs dying out. Instead, researchers like Carolyn are trying to understand whether the crabs can evolve to fight the parasite.

CT: 50 years isn't a lot of time and so these parasites have evolved over potentially millennia to be really good at infecting mud crabs. It's actually a concept called a co-evolutionary arms race. That might be part of this. So the crab adapts to resist the parasite, the parasite adapts to infect the crab, the crab adapts to resist the better parasite, the parasite adapts to infect the better crab: better just being more "infectable" at this point.

TC: To test this Carolyn has taken data from various sites across the east coast. She's found that in Florida, where the parasite is native, only about one percent of crabs are castrated, while here in Maryland, up to 80 percent of crabs can be affected.

CT: It's all pointing to there maybe being some evolution of resistance so that maybe part of the reason that those crabs in the native range aren't being hit very hard is because they've evolved a relationship with the parasites. They've potentially evolved to resist parasitization whereas our crabs here are pretty naïve.

MD: Now, she's looking for evidence in the genome -- individual genes in the crab's DNA that affects something specific -- to prove just that.

CT: One of the cool things with evolution is that evolution is changes in your DNA over time. And we can actually sometimes, if you have really strong pressure for something to evolve, sometimes you can see little signatures of selection in the genome. You can see changes in the genome that kind of pop out at you and suggest that "hey, maybe this gene has been under evolution. It seems to be changing a little faster than everything around it."

TC: Mud crabs major food source for lots of fish, so losing mud crabs means a big loss for the overall ecosystem. And the parasites that infect these mud crabs are similar to the ones that kill bigger crabs like the ones humans eat. So learning how the parasite evolves could be an important step towards keeping our food supplies safe.

MD: And if I've learned anything from sci-fi movies, it's that scientific discovery is a great tool for fighting alien invasions.