

Nature's Bad Boys: What is Kleptoparasitism?

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You're sit on a college campus eating lunch. A brave furry little creature approaches and tries to take your sandwich. It's a bizarre and sometimes humorous experience to you, but it's no joke to the squirrel. In fact, thieving is an essential and evolved behavior for many animals. This theft of food or prey from another animal is known as kleptoparasitism, *klepto* coming from the Greek root "to steal" and *parasitism* meaning a dependency on a host. From seabirds to hyenas, many animals steal to make ends meet. Such human-like behavior has fascinated researchers who study animal behavior for decades, sparking many questions. How do these animals steal? What drives this behavior? What inspires them to steal from specific animals?

Let's start with what kleptoparasitism is. Animals that are kleptoparasites steal food from a host. For instance, some house sparrows will specialize as thieves, following fellow, hard-working house sparrows around and stealing their food [2]. Kleptoparasitism can be described as interspecific (inter meaning "between," specific referring to "species") or intraspecific kleptoparasitism (intra meaning "within," specific referring to species) [1]. Kleptoparasitism can also be described as obligate and facultative [1]. Obligate kleptoparasites are required to steal food. Most commonly found in spiders, insects, and crustaceans, one notable example of an obligate kleptoparasite is the lemon bee in Central America [3]. Unable to take pollen from flowers themselves, lemon bees pillage rival beehives, raiding them of honey. On the other hand, facultative kleptoparasites do not *need* to steal to survive. Instead, theft is an additional strategy to acquire food. Most examples of kleptoparasites, from hyenas to sea birds, are facultative kleptoparasites, capable of finding food themselves.

One of the most fascinating examples of kleptoparasitism is that of the ant mite (*Antennophorus sp.*) [4]. Mites enter the nests of *Lasius* ants and cling to the worker *Lasius* ants. This allows them to not only drink water droplets passed between worker ants, but also annoy the host worker ants and induce vomiting, allowing the mites to eat the worker ants' vomit! While the ants are at first unhappy with this arrangement, they seem to adjust to the arrangement [4]. Of course, most host animals, regardless of species or habitat, may react much differently. Many host animals may decide to fight back, attempting to discourage future theft efforts. For instance, when hyenas attempt to steal food caught by cheetahs and lions, they may try to stand their ground against the big cats.



An ant mite attached to the mid-leg of a Lasius worker ant (taken by Alexander Wild). These ant mites participate in interspecific kleptoparasitism. [8]

However, stealing is more than just a cheap way to acquire nutrients. In fact, it may be an adaptive advantage. Behaviors that improve an organism's chance to have more offspring will be favored. This follows the principle of natural selection, in which traits that lead to more offspring are favored (or selected for) by nature. The ability to have more offspring is called reproductive fitness, which is the fitness that is often cited in the age-old adage "survival of the fittest". For instance, when the Industrial Revolution began in England, black moths were able to camouflage better in soot than their white counterparts. This allowed black moths to better hide from predators and, in turn, have more offspring. This meant that the black moths were more reproductively fit, and over time, black became a more common color of moth. Similarly, kleptoparasitism can also be described as an adaptive social behavior. One study by David Shealer at Loras College investigated parent roseate terns (*Sterna dougallii*), a type of coastal bird that stole food from other parent roseate terns (a form of intraspecific kleptoparasitism) [5]. By observing the parent pairs of terns over ten years off the coast of Connecticut and measuring the number of offspring and how healthy the offspring were, Shealer and his colleagues discovered that parents that stole were more likely to have more offspring. This effect was especially significant in times of low food availability and in the success of a pair's second offspring, with honest parent terns more likely to fall behind their thieving counterparts.



A pair of roseate terns (taken by Kersti Nebelsiek). These birds were studied as an example of intraspecific kleptoparasitism. [9]

This then begs the question, why don't all organisms participate in kleptoparasitism? For instance, frogs and toads are not known to be frequent kleptoparasites. This may be the result of different feeding styles: frogs and toads often consume their food in one swallow from the air, which prevents others from stealing their food. In addition, in any species of kleptoparasite, there will be individuals that are less likely to steal. What drives this difference in social behavior? As far as we know, animals don't have an explicit sense of morality or laws that they abide by to prevent theft. Rather, stealing isn't always the most profitable behavior. For one, if every individual is stealing from each other, there won't be anyone focused on collecting food and then no food to go around. Additionally, stealing can be risky. Like a robber stealing from a house where the resident may be armed, stealing is often an inherently risky behavior, even for animals. In fact, like a robber and homeowner constantly upgrading their technology, there is often an arms race between host and theft. Returning to the example of the hyena, lions will often organize in packs and fight thieving hyenas, injuring and even killing them [6]. In response, hyenas will respond by organizing in even larger packs themselves [7]. This tit-for-tat conflict will continue indefinitely, as both lions and hyenas want to have a stable supply of food. In summary, the theft doesn't go unpunished. There's really a war that erupts between the species!

Contrary to popular belief, the animal kingdom isn't as peaceful as a Disney animated movie. Rather, there's constant stealing between and among species. Kleptoparasitism is an interesting human-like behavior, giving us interesting insight into the behavior of animals.

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