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THE ORIGINS OF ALTRUISM

We are not just rather like animals; we *are* animals.

—MARY MIDGLEY, *Beast and Man*

A NEW LOOK AT ETHICS

Human beings are social animals. We were social before we were human. The French philosopher Jean-Jacques Rousseau once wrote that in the state of nature human beings had "no fixed home, no need of one another; they met perhaps twice in their lives, without knowing each other and without speaking." Rousseau was wrong. Fossil finds show that five million years ago our ancestor, the half-human, half-ape creature known to anthropologists as *Australopithecus africanus,* lived in groups, as our nearest living relatives—the gorillas and chimpanzees—still do. As *Australopithecus* evolved into the first truly human being, *Homo habilis,* and then into our own species, *Homo sapiens,* we remained social beings.

In rejecting Rousseau's fantasy of isolation as the original or natural condition of human existence, we must also reject his account of the origin of ethics, and that of the school of social contract theorists to which he belonged. The social contract theory of ethics held that our rules of right and wrong sprang from some distant Foundation Day on which previously independent rational human beings came together to hammer out a basis for setting up the first human society. Two hundred years ago this seemed a plausible alternative to the then orthodox idea that morality represented the decrees of a divine lawgiver. It attracted some of the sharpest and most skeptical thinkers in Western social philosophy. If, however, we now know that we have lived in groups longer than we have been rational human beings, we can also be sure that we restrained our behavior toward our fellows before we were rational human beings. Social life requires some degree of restraint. A social grouping cannot stay together if its members make frequent and unrestrained attacks on one another. Just when a pattern of restraint toward other members of the group becomes a social ethic is hard to say; but ethics probably began in these pre-human patterns of behavior rather than in the deliberate choices of fully fledged, rational human beings.

Eighteenth-century philosophers like Rousseau had little information to draw on about the social behavior of nonhuman animals; and they knew even less about the evolution of human beings. Even after Darwin these topics were little studied, and what was known about animals came from the hostile perspective of the hunter, the exaggerated tales of adventurers, or accurate reports of the unnatural behavior of zoo animals. Only in recent years have both the study of animal behavior in the wild and the study of human evolution advanced to the point at which we can claim with some confidence to know something about ourselves and our animal ancestors and relatives. The most impressive attempt to bring all this new information together is Edward O. Wilson's huge book, *Sociobiology: The New Synthesis,* which appeared in 1975. Wilson defines sociobiology as "the systematic study of the biological basis of all social behavior." Since ethics is a form of social behavior—more than that, no doubt, but that at least—ethics falls within the scope of sociobiology. One might, of course, raise questions about the extent to which ethics has a biological basis; but if the origins of ethics lie in a past which we share with many non-human animals, evolutionary theory and observations of non-human social animals should have some bearing on the nature of ethics. So what does sociobiology offer us in place of the historical myth of the social contract?

Sociobiology bears on ethics indirectly, through what it says about the development of altruism, rather than by a direct study of ethics. Since it is difficult to decide when a chimpanzee or a gazelle is behaving ethically, this is a wise strategy. If we define altruistic behavior as behavior which benefits others at some cost to oneself, altruism in non-human animals is well documented. (This is not altruism in the usual sense, and in the next chapter we shall modify this definition; but for the moment it will do.) Understanding the development of altruism in animals will improve our understanding of the development of ethics in human beings, for our present ethical systems have their roots in the altruistic behavior of our early human and pre-human ancestors.

Altruism intrigues sociobiologists. Wilson calls it "the central theoretical problem of sociobiology." It is a problem because it has to be accounted for within the framework of Darwin's theory of evolution. If evolution is a struggle for survival, why hasn't it ruthlessly eliminated altruists, who seem to increase another's prospects of survival at the cost of their own?

ANIMAL ALTRUISM

Let us look at some examples of altruistic behavior in non-human animals. We can start with the warning calls given by blackbirds and thrushes when hawks fly overhead. These calls benefit other members of the flock, who can take evasive action; but giving a warning call presumably also gives away the location of the bird giving the call, thus exposing it to additional risk. (The calls are, acoustically, much harder to locate than other calls made by the same birds, but they must still make the bird easier to find than it would be if the bird were to hide itself without making any call at all.) If, as we would expect, birds who give warning calls are eaten at a higher rate than birds who act to save themselves without warning the rest of the flock, how does such altruism survive?

Another illustration comes from the behavior of Thomson's gazelles, a species of small antelope that is hunted by packs of African wild dogs. When a gazelle notices a dog pack, it bounds away in a curious, stiff-legged gait known as "stotting." Here is a description of this behavior and an indication of the puzzle it suggests:

> Undoubtedly a warning signal it [stotting] spread wavelike in advance of the pack. Apparently in response to the stotting, practically every gazelle in sight fled the immediate vicinity. Adaptive as the warning display may seem, it nonetheless appears to have its drawbacks; for even after being singled out by the pack, every gazelle began the run for its life by stotting, and appeared to lose precious ground in the process . . . time and again we have watched the lead dog closing the gap until the quarry settled to its full running gait, when it was capable of making slightly better speed than its pursuer for the first half mile or so. It is therefore hard to see any advantage to the individual in stotting when chased, since individu-

als that made no display at all might be thought to have a better chance of surviving and reproducing.

Nor is altruism limited to warnings. Some animals threaten or attack predators to protect other members of their species. African wild dogs have been observed attacking a cheetah at considerable risk to their own lives in order to save a pup. Male baboons threaten predators, and cover the rear as the troop retreats. Parent birds frequently lead predators away from their nests with bizarre dances and displays which distract the predator's attention from the nest to the parent itself.

Food sharing is another form of altruism. Wolves and wild dogs bring meat back to members of the pack who were not in on the kill. Gibbons and chimpanzees without food gesture for, and usually receive, a portion of the food that another ape has. Chimpanzees also lead each other to trees with ripe fruit; indeed, their altruism extends beyond their own group, for when a whole group of chimpanzees is at a good tree, they make a loud booming noise which attracts other groups up to a kilometer away.

Several species help injured animals survive. Dolphins need to reach the surface of the water to breathe. If a dolphin is wounded so severely that it cannot swim to the surface by itself, other dolphins group themselves under it, pushing it upward to the air. If necessary they will keep doing this for several hours. The same kind of thing happens among elephants. A fallen elephant is likely to suffocate from its own weight, or it may overheat in the sun. Many elephant hunters have reported that when an elephant is felled, other members of the group try to raise it to its feet.

Finally, the restraint shown by many animals in combat with their fellows might also be a form of altruism. Fights between members of the same social group rarely end in death or even injury. When one wolf gets the better of another, the beaten wolf makes a submissive gesture, exposing the soft underside of its neck to the fangs of the victor. Instead of taking the opportunity to rip out the jugular vein of his foe, the victor trots off, content with the symbolic victory. From a purely selfish point of view, this seems foolish. How is it that wolves who fight to kill, never giving a beaten enemy a second chance, have not eliminated those who pass up opportunities to rid themselves of their rivals forever?

EVOLUTION AND ALTRUISM

Many people think of evolution as a competition between different species; successful species survive and increase, unsuccessful ones become extinct. If evolution really worked mainly on the level of whole species, altruistic behavior between members of the same species would be easy to explain. The individual blackbird, taken by the hawk because of its warning call, dies to save the blackbird flock, thus increasing the survival prospects of the species as a whole. The wolf who accepts the submissive gesture of a defeated opponent exhibits an inhibition without which there would be no more wolves. And so on, for the other instances of altruism among animals.

The flaw in this simple explanation is that it is hard to see how, except under very special and rare conditions, the evolution of altruism could occur on so general a level as the survival or extinction of whole species. The real basis of selection is not the species, nor some smaller group, nor even the individual. It is the gene. Genes are responsible for the characteristics we inherit. If a gene leads individuals to have some feature which enhances their prospects of surviving and reproducing, that type of gene will itself survive into the next generation; if a gene reduces the prospects of leaving offspring for those individuals who carry it, that type of gene will itself die out with the death of the individual carrier.

For selection at the level of whole species to counteract this individual selection of genes, evolution would have to select species at something like the rate at which it selects genes. This means that old species would have to become extinct, and new species come into existence, nearly as often as individuals either succeed or fail in reproducing. But of course nature does not work like that; species evolve slowly, over many, many generations. Hence any genes that lead to altruism will normally lose out, in competition between members of the *same* species, to genes that lead to more selfish behavior, before the altruistic genes could spread through the species and so benefit the species as a whole in its competition with *other* species. And even if, under special circumstances, altruistic behavior did lead one species to survive where others without the genes for altruism became extinct, competition within the species would still work against the persistence of altruistic behavior in the surviving species, once the external competition was over.

That, at least, is the broad account of evolution now accepted by many scientists working in this area. It is easy to see how it undermines the simple account of the evolution of altruism in terms of the survival of the species. Giving warning calls is a form of behavior with a genetic basis. Blackbirds do not have to be taught to warn of predators. Now the question is: How could the genes for such self-sacrificing behavior get established? How is it that, as soon as the combination of genes necessary for giving warning calls appears, this type of combination is not rapidly wiped out along with the individual birds who, by giving the warning, reduce their own prospects of living long enough to leave descendants? It may be true that if this happened the species as a whole would be less likely to survive; but all this shows is that there is a real puzzle as to how the species does survive, since the species as a whole is powerless to prevent the elimination of altruism within it.

The same problem arises in explaining other altruistic acts. Suppose that some wolves have genes which inhibit them against killing opponents who make submissive gestures, while other wolves, lacking these genes, finish off their defeated opponents. How will the inhibiting genes spread? If a killer wolf defeats an inhibited wolf in a fight, that will be the end of that particular set of inhibiting genes; if, on the other hand, an inhibited wolf defeats a killer wolf, the killer genes still survive and may reproduce. Over a long series of combats, it would seem that the killer genes ought to come to predominate among wolves. Why hasn't this happened?

Darwin himself was aware of this difficulty in the way of an evolutionary account of social and moral traits in humans. In *The Descent of Man* he wrote:

> But it may be asked, how within the limits of the same tribe did a large number of members first become endowed with these social and moral qualities, and how was the standard of excellence raised?
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> It is extremely doubtful whether the offspring of the more sympathetic and benevolent parents, or of those who were the most faithful to their comrades, would be reared in greater numbers than the children of selfish and treacherous

> parents belonging to the same tribe. He who was ready to sacrifice his life, as many a savage has been, rather than betray his comrades, would often leave no offspring to inherit his noble nature. The bravest men, who were always willing to come to the front in war, and who freely risked their lives for others, would on an average perish in larger numbers than other men. Therefore it hardly seems probable that the number of men gifted with such virtues, or the standard of their excellence, could be increased through natural selection, that is, by the survival of the fittest; for we are not here speaking of one tribe being victorious over another.

Darwin thought that part of the explanation was that as human reasoning powers increased, early humans would learn that if they helped their fellows, they would receive help in return; the remainder of his explanation was that virtuous behavior was fostered by the praise and blame of other members of the group. Sociobiologists do not invoke the institution of praise and blame for an explanation of altruism, since altruism occurs among non-human animals who do not praise or blame as we do. Sociobiologists have, however, developed Darwin's suggestion of the importance of the principle of reciprocity. They have suggested that two forms of altruism can be explained in terms of natural selection: kin altruism and reciprocal altruism. Some also allow a minor role for group altruism, but this is more controversial.

KIN ALTRUISM

Evolution can, as we have seen, be regarded as a competition for survival among genes. "Gene" as I use the term does not refer to the physical bits of DNA—which cannot survive any longer than the individual wolf, blackbird, or human in which they are present—but to the type of DNA. In this sense, genes can survive indefinitely, for one bit of DNA in one generation can lead to the existence of similar bits of DNA in the next. The most obvious way in which this can be done is by reproduction. Each sperm I produce contains a random sample of half my genes; therefore each time I fertilize an egg which grows into a child, a set of half my genes takes on an independent existence, with a chance of surviving my death and in turn passing some of its genes on down through the generations. So, for example, by "the gene for brown eyes" I do not mean the particular bit of biological matter I carry which will cause my child to have brown eyes; I mean the type of biological matter which, passed on in reproduction, leads human beings to have brown eyes.

Thus strictly selfish behavior—behavior aimed at furthering my own survival without regard for anyone else—will not be favored by evolution. I am doomed in any case. The survival of my genes depends largely on my having children, and on my children having children, and so forth. Evolution will favor, other things being equal, behavior which improves the prospects of my children surviving and reproducing.* Thus the first and most obvious way in which evolution can produce altruism is the concern of parents for their children. This is so widespread and natural a form of altruism that we do not usually think of it as altruism at all. Yet the

* I say "other things being equal" because under certain conditions there could be alternative strategies—like producing a larger number of children, and letting them take their chances. In mammals this option is not likely to be viable for females, since they must invest a lot of time in each offspring if any are to survive; but it could work for males, who can pass their genes on with much less labor. Sociobiologists argue that this accounts for the greater concern of females with child care, and the greater desire of males for casual sexual relationships with a variety of partners.

sacrifices that humans as well as many non-human animals constantly make for their children represent a tremendous effort for the benefit of beings other than themselves. Thus they must count as altruism, as we have defined the term so far. (In the case of humans, these sacrifices are well known to most parents, and to those who watch them; that they have not persuaded huge numbers of people against having children would be hard to explain if it were true that most people are selfish.)

So genes that lead parents to take care of their children are, other things being equal, more likely to survive than genes that lead parents to abandon their children. But taking care of one's children is only one way of increasing the chances of one's genes surviving. When I reproduce, my children do not have all the genes I have. (For that we will have to wait until we can clone genetic carbon copies.) Each child I produce contains half my genes; the other half of my children's genes comes, of course, from their mother. Each of my sisters and brothers will also, on average, have 50 percent of the same genes as I have, since, like me, they have half of my mother's and half of my father's genes. (This 50 percent is an average figure because, depending on how the genetic lottery fell out, they could have anything from all to none of their genes in common with me—but the huge number of genes involved makes either extreme fantastically unlikely.) Therefore in genetic terms my siblings are as closely related to me as my children; there is no special significance in the fact that the genes my children share with me replicate through my own body, whereas those I share with my sister did not. Assisting my brothers and sisters will enhance the prospects of my genes surviving, in much the same way as assisting my children will. (That care for siblings is not ordinarily as intense as care for offspring may be due to the fact that the difference in age makes parents able to care for their offspring when the offspring most need it, whereas siblings usually are too young to do so. In addition, in non-monogamous species full siblings are the exception, and half siblings—where the genetic relationship is only 25 percent—the rule.)

This is the basis of kin altruism: the genetically based tendency to help one's relatives. The relationship does not have to be as close as that of parents to their children or siblings to each other. The proportion of genes in common does fall off sharply as it becomes more distant—between aunts (or uncles) and their nieces (or nephews) it is 25 percent; between first cousins 12½ percent—but what is lacking in quality can be made up for by an increased quantity. Risking my life will not harm the prospects of my genes surviving if it eliminates a similar risk to the lives of two of my children, four of my nieces, or eight of my first cousins. Thus kin selection can explain why altruism should extend beyond the immediate family. In close-knit groups, where most members are related to other members, kin selection may explain altruistic behavior like giving the alarm when predators are near, which benefits the entire group.

Kin altruism does not imply that animals know how closely related they are to each other—that they can distinguish full sisters from half sisters, or cousins from unrelated animals. The theory says only that animals can be expected to act roughly *as if* they were aware of these relationships. In fact, since we are talking about complex living beings, there are many instances where animals do not behave in accordance with the nicely calculated fractions of genetic relationships. A female chimpanzee with many reproductive years ahead of her may sacrifice her life for a single child. African wild dogs have been observed risking their lives by attacking a cheetah that was threatening a pup that was at most a nephew to them. Evolved behavioral tendencies are not as predictable as the motions of the planets. Nevertheless, kin selection can explain some otherwise mysterious facts. For instance, why do adult zebras defend any calf in the herd attacked by a predator, whereas wildebeest do not? The reason could be that zebras live in family groups, so that adults and calves would generally all be related; wildebeest interbreed much more with other groups and adults would not be related to randomly selected calves. More startling still is the infanticide practiced by male langur monkeys. Female langurs live in groups, each under the control of a dominant male who prevents any other male from breeding with them. The other males, being unwilling bachelors, try to overthrow the dominant male and take his harem. If one should succeed, he will set about killing all the infants in his newly acquired group. This may not be good for the species as a whole, but the killer is not related to his victims; moreover, females nursing infants do not ovulate, so by removing the infants the male is able to have his own children earlier than would otherwise be possible. To these children he will be a better father. In the difference between his behavior toward infants genetically related to him and his behavior toward those that are not, the langur monkey demonstrates in a brutally clear form the kind of "altruism" that may evolve through kin selection. (Male lions have also been observed to kill infants on taking over a pride. Is there a human parallel in the wicked stepparents so common in fairy tales? Or in the mass rapes that for centuries have characterized military conquests?)

RECIPROCAL ALTRUISM

Kin altruism exists because it promotes the survival of one's relatives; but not all altruistic acts help relatives. Monkeys spend a lot of their time grooming each other, removing parasites from those awkward places a monkey cannot itself reach. Monkeys grooming each other are not always related. Here reciprocal altruism offers an explanation: you scratch my back and I'll scratch yours.

Here's another example: I see a stranger drowning and I jump in to save her. Suppose that in so doing I run a 5 percent risk of drowning myself; suppose too that without my help the stranger would run a 50 percent risk of drowning, but that with my help she will be saved, except in the 5 percent of cases in which we both drown. At first glance, jumping in seems to be a purely altruistic act. I run a 5 percent risk of death in order to help a stranger. But suppose that one day I myself will need to be rescued, and the person I saved this time will then jump in and help me. Suppose that without help I would have a 50 percent chance of drowning, but with help my prospects improve to 95 percent. Then, taking the two acts together, it is in my interest to save the drowning stranger, for I thus exchange two separate small risks (the 5 percent risk I incur when I help the stranger and also when I am helped) for one large risk (the 50 percent risk I would have if I were not helped). Obviously two 5 percent risks are better than one 50 percent risk.

This is an artificial example, with the risks made precisely measurable in order to make the benefit clear. One might question the example on that ground; but there is a more important question that needs to be asked about the example: What is the link between rescuing a stranger and being rescued oneself? If one can arrange to get rescued without having to do any rescuing oneself, that seems the best strategy, from a self-interested standpoint. Why isn't that what happens? What ensures that this form of altruism is reciprocal?

On one level, the answer to this question could be that individuals can remember who has helped them and who has not, and they will not help anyone who has refused to help them. Cheats—those who take help but refuse to give it—never prosper, for their cheating is noticed and punished. If this is right we would expect reciprocal altruism only among creatures capable of recognizing other individuals, sorting them into those who help and those who do not. Reciprocity may not require human reasoning powers, but it would require intelligence. It would also be more likely in species with a relatively long life span, living in small, stable groups. For in this way, opportunities for repeated reciprocal acts would occur more frequently.

The evidence supports this conclusion. Reciprocal altruism is most common among, and perhaps limited to, birds and mammals; its clearest cases come from highly intelligent social animals like wolves, wild dogs, dolphins, baboons, chimpanzees, and human beings. In addition to grooming each other, members of these species often share food on a reciprocal basis and help each other when threatened by predators or other enemies.

On another level, there is still a problem: How did this reciprocal altruism get going? After all, reciprocal altruism looks rather like the social contract model of ethics, which we have already dismissed as a historical fantasy—and the idea of a contract becomes even more fantastic if it is extended to non-human animals. But if there was no deliberate contract of the "you scratch my back and I'll scratch yours" kind, the first animals to risk their lives for other, unrelated members of their species were risking their lives without much prospect of anything in return. If reciprocal altruism is widely practiced, it pays to take part—chances are, you'll benefit later. But if reciprocal altruism is rare, it might be better, from the self-interested point of view, not to put yourself out. In the drowning example just given, it would not pay to rescue another, running a 5 percent risk of drowning oneself, unless by doing so one significantly raises the chances that one will oneself be rescued when the need arises. So it is not quite true that cheats never prosper. Cheats prosper until there are enough who bear grudges against them to make sure they do not prosper. If we imagine a group consisting partly of those who accept help but give none—"cheats"—and partly of those who accept help and give help to all except those who have refused to help—call them "grudgers"—there is a critical number of how many grudgers there must be before it pays to be a grudger rather than a cheat. One grudger in a population of cheats will get cheated often and never be helped; but the more grudgers and fewer cheats there are, the more often the grudger will be repaid for her help and the more rarely she will be cheated. So while we can understand why reciprocal altruism should prosper after it gets established, it is less easy to see why the genes leading to this form of behavior did not get eliminated as soon as they appeared.

GROUP ALTRUISM

It may be that to explain how reciprocal altruism can get established, we need to allow a limited role for a form of group selection. Imagine that a species is divided into several isolated groups—perhaps they are monkeys whose terrain is divided by rivers which, except in rare droughts, are too swift to cross. Now suppose that reciprocal altruism somehow appears from time to time in each of these groups. Let us say that one monkey grooms another monkey, searching for disease-carrying parasites; when it has finished it presents its own back to be groomed. If the genes that make this behavior probable are rare mutations, in most cases the altruistic monkey would find its kindness unrewarded; the groomed monkey would simply move away. Grooming strangers would therefore bring no advantage, and since it leads the monkey to spend its time helping strangers instead of looking after itself, in time this behavior would be eliminated. This elimination may not be good for the group as a whole, but as we have seen, within the group it is individual rather than group selection that dominates.

Now suppose that in one of these isolated groups it just happens that a lot of monkeys have genes leading them to initiate grooming exchanges. (In a small, closely related group, kin altruism might bring this about.) Then, as we have seen, those who reciprocate could be better off than those who do not. They will groom and be groomed, remaining healthy while other members of the group succumb to the parasites. Thus in this particular isolated group, possessing the genes for reciprocal grooming will be a distinct advantage. In time, all the group would have them.

There is one final step. The reciprocal grooming group now has an advantage, as a group, over other groups who do not have any way of ridding themselves of parasites. If the parasites get really bad, the other groups may become extinct, and one dry summer the pressure of population growth in the recripocal grooming group will push some of its members across the rivers into the territories formerly occupied by the other groups. In this way group selection could have a limited role—limited because the required conditions would not often occur—in the spread of reciprocal altruism.

If we are prepared to allow group selection a role in the inception of reciprocal altruism, we can hardly deny that the survival of some groups rather than others can provide an evolutionary explanation for a more general tendency for altruistic behavior toward other members of a group. This is still quite distinct from the popular view of traits evolving because they help the species survive—groups are far smaller units than species, and come in and out of existence much more frequently, so group selection is more likely to be an effective counterweight to individual selection than is species selection. Nevertheless, a group would have to keep itself distinct from other groups for group altruism to work—otherwise more egoistically inclined outsiders would work their way into the group, taking advantage of the altruism of members of the group without offering anything in return. They would then outbreed the more altruistic members of the group and so begin to outnumber them, until the group would cease to be more altruistic than any other group of the same species. Although this would cost it its evolutionary advantage over other groups, there would be no mechanism for stopping this. If the group altruism had been essential to the group's survival, the group would simply die out.

This suggests that group altruism would work best when coupled with a degree of hostility to outsiders, which would protect the altruism within the group from penetration and subversion from outside. Hostility to outsiders is, in fact, a very common phenomenon in social animals. Although there is a popular myth that human beings are the only animals who kill members of their own species, other species can be as unpleasant toward foreigners as we are. Many social animals, from ants through chickens to rats, will attack and often kill outsiders placed in their midst. In a series of experiments conducted on rhesus monkeys, it has been shown that introducing a strange rhesus monkey into an established group aroused much more aggression than either crowding the monkeys or reducing their food supply. Admittedly, keeping strangers away could just be a means of protecting one's own food supply and that of one's kin; but it could also be that this behavior serves the same role as geographical isolation in protecting the altruism of the group from debasement.

It may be objected that in a small, isolated group of the kind I have described, there will be so much interbreeding that all members of the group will be related to each other, and so what we have is not group selection at all, but rather kin selection in the special case in which all the group are kin to each other. This may be so; certainly kin and non-kin selection will be hard to distinguish in this situation. Nevertheless, when members of the group behave in certain ways toward all other members of the group—irrespective of whether they are full siblings or very distant cousins—and when this behavior gives the entire group a selective advantage over other groups, it is reasonable to describe what is going on as "group selection" even if it may ultimately be possible to explain what is going on in terms of kin selection.

Keeping outsiders away would not be enough to prevent erosion of high levels of self-sacrificing behavior for the benefit of the group. Evolutionary theory would lead us to expect a drift back toward selfishness within the group, since individuals who behaved selfishly would reap the benefits of the sacrifices of others without making any sacrifices themselves. Perhaps, though, a group could develop a way of dealing with a small number of free-riders who emerge within it. Human societies, at least, have institutions which serve this end; but here we are beginning to look beyond the development of altruism in non-human animals to its existence in our own species.