Introduction

Every day for many years I watched our three female cats, Silver, Tiger, and Gomer. Silver and Tiger were best buddies but Gomer was a loner. Actually, Silver and Tiger were half-sisters, although how would they know this? Silver, named by my young daughter Mary (although the cat was black with a white throat patch) came first, as a kitten given to our family of five by friends who had a sexually too-active female. A year later they gave us Tiger, with gray tabby markings, also as a kitten. Silver cuddled and licked her new young friend as they snuggled together. But when full-grown, both ignored the calico cat Gomer who arrived at our house as an older adult. Gomer retaliated by hissing and striking out at them with her paws. Did Silver and Tiger know somehow that they were related, which cemented their lifelong bond? Was it because Tiger came as a kitten whom Silver could mother, while Gomer (also known fittingly as Crosspatch) did not? Is it impossible for cats to become friends as adults, even though they live for years together in the same house?

Because these cats daily reminded me that animal friendships have been under-studied and under-reported, I decided to make this my next book's topic: not alliances involving youngsters that are highly instinctual – mothers and their nursing young or siblings growing up together; not matings between males and females that are short-term; but friendships between adult individuals in the wild, perhaps for evolutionary reasons or just because a duo has bonded and wants to spend much time together relaxing, feeding side by side, or grooming each other – and not all animals either, as at present we know little about the sensibilities of cold-blooded species. However, there is recent proof that three-spined stickleback fish recognize by olfaction and like to hang out with individuals from their own neighborhood (Ward *et al.*, 2007), that lizards kept as pets can distinguish between different human family members (Lee Harding, personal communication, 2010), and that

dominant male hissing cockroaches from Madagascar defend a territory against other males within which they court several females who are free to come and go as they wish (Bullington, no date). Perhaps in a few decades, after far more research has been done, we will have to acknowledge that, like birds and mammals, individuals of cold-blooded vertebrates and invertebrates can also have sophisticated social systems and special friendships.

I hope this book will encourage my colleagues in behavioral sciences to look more broadly and deeply into animal friendships, the better to understand the evolutionary basis of sociality in general. In addition, a book about friendships of mammals and birds, particularly special bonds between duos, should appeal not only to scholars of animal behavior (because all the information it contains is fully referenced), but also to all people who love animals and value friendship. Men and women have adult friends for a variety of reasons: they had been early playmates, school or university chums, workmates, relatives, and/or had mutual experiences such as arise from being in the military, enduring long-term hospital stays, or sharing hobbies or common interests. Our human friends are familiar to us and compatible. (We must except, in general, "friends" featured on Facebook and MySpace who are not necessarily good friends at all and are, on occasion, forcibly "unfriended" by being removed from a site.)

There are three reasons why preferred friendships may not be present, or at least cannot be detected in a species. One is that the animals in a group are *so* closely bonded together that it is impossible to detect extra-friendly couples. Such animals are elephants and orcas (killer whales), both species considered in the chapter: *Family and group tight bonds*. The second is that many species live solitary rather than social lives, such as leopards, cheetahs, cougars, duikers, okapi, and orangutans.[1] The third category includes social species, but not social in a way that seems to need or allow special friendships to develop; the subject of the chapter: *Social but seldom sociable animals*.

What about individuals who like to stay close together? We may not know exactly what friendship means to them, or why they favor one individual above another, but in any case, it is a pleasure to know, write, and read about the caring intimacy of chimpanzee mother and grown daughter Flo and Fifi; the camaraderie of male baboons Boz and Alexander who spent much time greeting each other every morning and fighting each other's battles; and the easy companionship of Baggage and Mrs Brown, the female hyena pair in the Ngorongoro Crater who raised their youngsters together almost like family.

STUDYING ANIMAL EMOTIONS

The idea that non-human animals have feelings as we do and may even have close friendships among themselves has a checkered history. Human beings in the Neolithic Period, who were the first to domesticate animals, would probably have agreed that animals could be friends. Farmers living close to their livestock would have seen pairs of horses who especially liked to be near and to groom each other, or pig duos who spent most of their time together while resting or rooting for food. I am sure they would have acknowledged that animals have feelings and can suffer, even as people today who have companion animals such as dogs and cats would agree. Aesop's fables, for example, from the sixth century BC, explore the similarity between animal and human emotions and behavior.

With the rise of Western modern religions, however, spiritual leaders have defined all living beings except humans as inferior, and therefore subject to any form of control that people wish to have over them. Early professional scientists took especial advantage of this bias so that they could differentiate themselves from amateurs; it was important for professionals not to be seen as anthropomorphic. René Descartes (1596–1650), for example, considered animals as machines or robots, without feelings or senses as we know them. Scientists are still taught to avoid anthropomorphizing, with any inference that non-human animals have feelings, or self-awareness, or even consciousness often challenged by peers. This has surely stifled research into non-human animal social interactions.

Disdain for animals continues to be widespread, even today, in many animal-related activities where workers, sport hunters, and fishers insist that vertebrates do not have emotions or senses like our own. They must take this stand, otherwise researchers would be forced to be far more selective when they do painful experiments on live animals (Dagg 2008); zoos would be morally unable to keep social animals in barren, small cages; circuses would have to admit that training tigers and elephants is a hurtful enterprise; hunters and fishers would not be able to consider their activities as sporting fun; and rodeo workers would be unable to rationalize the roping and torment of calves as entertainment – in 2009 at least one columnist wrote, about a rodeo, that animals do not have "feelings" and have no memory of pain imposed upon them, so that infliction of pain is acceptable (Gunter, 2009).

Early research into animal behavior took place in zoos, but results could not reflect real-life conditions. For example, Michael

Chance (1956), who studied rhesus monkey activity in the London Zoo, devised an experiment that was itself biased. For his methodology, he identified the adult males in the colony "by the letters D1, D2 and D3 etc., indicating their position in the male hierarchy. The adult females were not similarly identified, but mentioned only as and when they were observed in association with particular males." Not surprisingly, Chance concluded that the social life of these monkeys revolved around the dominant males. What other conclusion could he have made? There was little concern about what females were up to or the importance of female choice of a mating partner, even though, as early as the 1850s, Charles Darwin had thought this to be vital.[2]

In the late 1950s, zoologists interested in studying animal behavior began to leave laboratories and zoos to go overseas to carry out research. I was one of the first, observing giraffe behavior in South Africa in 1956–1957 (Dagg, 2006). Other early researchers were Japanese zoologists anxious to study the activities of chimpanzees and gorillas, our close relatives, believing that their social behavior would shed light on that of our early human ancestors (Nishida, 1990). When they realized by 1966 that the behaviors of peoples and apes were quite different, they decided to carry on research of chimpanzees anyway to learn more about "another unique species." Intense interest in our closest relatives continues, with over 40 African research sites on chimpanzees and bonobos now in existence (Stumpf, 2007).

All zoologists in the field keep copious notes and records of what animals are doing each day, but these have tended toward documentation of aggression and reproduction. From my own research on giraffe, I find it easy to understand why fights and other exciting behaviors have been more likely to be noted and recorded for a social species than the simple fact of some individuals hanging out together in a congenial fashion (Dagg, 2006). Grazing, resting, chewing their cud, and walking are the norm for giraffe, but such activities hardly seemed to me worth documenting in great detail compared to the much rarer fights, male necking sessions, and reproductive behavior. It was also difficult to tell individuals apart in that low-technological age, so early research focused on the behavior of animals by sex and age class, with interest in individual relationships flowering only later after methods of identifying individuals were perfected, whether through the recognition of natural, unique markings or physical features, or by festooning individuals with rings, bands, tags, tattoos, brands, paint, or collars.

One example relates to a large international conference on ungulate behavior I attended in 1971, where there was almost no

information in the many presentations about friendly activities (Geist and Walther, 1974). Instead, researchers delved at length into such topics as feeding, maternity, courtship and reproduction, territoriality, and aggression in a wide variety of hoofed animals.

As another example, some populations that would seem ideal for the study of friendship have been largely ignored until recently. In their book *Social Structure in Farm Animals* published in 1979, authors G. J. Syme and L. A. Syme note that "Investigation of 'prosocial' behaviour, for example, is almost entirely neglected in the farm animal literature." Their index lists 96 percent more line items on information about aggression, territoriality, competition, and dominance compared to line items on social attachment, social preference, and familiarity. The authors argue the urgent need for more detailed information about social behaviors, which is slowly being addressed.

Although up until the 1960s publications touching on behavior were not based on extensive field research, there was an assumption that our early human ancestors were aggressive hunters and that aggression was central to human evolution (Dagg, 2005). After Raymond Dart discovered the first *Australopithecus* fossil in South Africa in 1924, he envisioned killer apes that slaked their "ravenous thirst with the hot blood of victims and greedily [devoured] livid writhing flesh" (Johanson, 2009). The books *African Genesis: A Personal Investigation into the Animal Origins and Nature of Man* (1961), and *The Territorial Imperative: A Personal Inquiry into the Animal Origins of Property and Nations* (1966) by Robert Ardrey, *The Naked Ape* by Desmond Morris (1967), and *The Imperial Animal* by Lionel Tiger and Robin Fox (1971) valorized our "cousins" the baboons for their supposed fierceness rather than chimpanzees (then wrongly seen as much more pacific) in our evolutionary history. The activities of females, who are virtually always more friendly than males no matter what the species, were largely ignored (Kappeler, 2000).

Nature red in tooth and claw? Actually, no. Today, sociality rather than aggression is seen as the basic behavior of our early human ancestors who evolved, because of their small size, as lowly vegetarians and scavengers, not mighty hunters (Sussman and Chapman, 2004; Hart and Sussman, 2005). In the past for monkeys and apes, the most-studied species, aggression was considered as far more important (as well as more exciting) than pacific activities. "Researchers have focused their attention on competitive and aggressive behaviors, and have tended to overlook the importance of cooperative and affiliative behaviors" (Sussman *et al.*, 2005). Robert Sussman

and his colleagues (2005), after surveying 81 behavioral studies of primates involving 60 species, found that diurnal group-living prosimians, New World monkeys, Old World monkeys, and apes had an exceedingly low rate of aggressive behaviors within their communities, normally less than one percent of their activity budget. By contrast, they spent on average between 85 to 96 percent of their activity time in affiliative behavior – grooming, playing, huddling, cooperative infant care, food sharing, alliances, coordinated hunting, and defense of infants and resources. Obviously, many primatologists have been intent on studying uncommon behaviors while largely ignoring common ones.

Within the past few decades, I am glad to report, there has been a swing toward regarding non-human animals as similar to ourselves in that they not only have feelings, senses, and suffer when hurt, but they may scheme to improve their own conditions by forming coalitions and alliances with other individuals. The importance of close friendships in animals was initially showcased in 1985 by Barbara Smuts when she published *Sex and Friendship in Baboons*. This book detailed the central role that non-sexual friendships between males and females play in olive baboon (*Papio cynocephalus anubis*) society. Relationships between group members of various species, especially primates, continue to be researched and the results published. Recently too, Marc Bekoff, Jeffrey Moussaieff Masson, and Frans de Waal have all written less academic but exciting books about similar traits that have a huge audience; these men are not ashamed of being anthropomorphic, but delight to depict animals as the thinking, feeling individuals they are. An international group of primatologists, psychologists, ethicists, and other experts has founded the Great Ape Project, the aim of which is to confer basic legal rights on the great apes so that they will no longer be killed, tortured in experimentation, or held in confinement.

AGGREGATIONS AND SOCIALITY

An animal "aggregation" is a general term, indicating that many individuals of a species tend to gather together although they do not interact in any significant way. Being around others of one's own kind is obviously immensely important to many species. Why else would snow geese form flocks of 42,000 for example, and Pacific black brant flocks of 175,000 (Masson, 2003)? Why else would wildebeest and zebra in East Africa choose to migrate together in herds of tens of thousands?

A "social" group, by contrast, is one of limited size in which animals *do* interact and treat each other as the individuals they are,

taking into account their age, sex, reproductive condition, and personal histories. Usually, all members of a social group are at least neutral toward each other; if a duo were enemies (as two males are most likely to be), the stronger would probably have driven the other away.

Generalities about sociality are both positive and negative, but always involve tension for group members because of the pull of his or her own inclinations against the push of group needs. Being social is beneficial because it allows individuals to be friendly rather than aggressive with each other; for herbivores, it increases the likelihood of predators being detected (and for predators, such as lions, to detect them); and it increases the number of animals who might discover resources of food and water for the benefit of all. In addition, for species in which individuals groom each other, it improves their psychic and bodily health and reduces their parasite load. Herbert Prins (1996) notes that because perfect information is hardly ever available to any one individual, sharing information such as occurs in African buffalo leads to better decisions for the group, just as it does in human beings (see the chapter: *Social but seldom sociable animals*).

Social life can be negative because of increased competition for food, water, mates, and resting or sleeping sites; a greater likelihood that disease and parasites will spread among group members; and the need to defend individual space. To counter the problem of competition over limited resources, most social species (but not olive baboon males) have dominance hierarchies to prevent constant squabbles. The most aggressive individuals become the most dominant (alpha) animals who take the best of what is on offer, while those who are subordinate give way to them and to other animals more dominant than they are. This ranking reduces fighting and therefore injuries within a group. The main benefit for a dominance hierarchy in females and their offspring is access to food resources, while that for males is access to females in estrus with whom to mate.

Sociality is so central to the lives of many species that enforced isolation for individuals may make them sick (House *et al.*, 1988). It presumably evolved because it made members of a group more reproductively successful than they would have been otherwise. It also changed them anatomically. Dorothy Cheney and Robert Seyfarth (2007) from the University of Pennsylvania argue, from their lengthy research on wild chacma baboons in Botswana, that as a consequence of social interactions, the primate brain has undergone significant enlargement and increase in complexity over time.[3] In a non-social species such as the leopard or hare, a member has only itself and

perhaps its young to consider. If it can find enough to eat, water to drink, a mate with whom to copulate, and can avoid predation, it is doing well. In a social species, a member has these mandates, but also must understand social relationships among all individuals of the group, which he or she can sometimes manipulate to support his or her activities.[4] Other social species have sophisticated mental powers, too: sheep subject to experimental testing were able to recognize the faces of 50 other sheep, and remember these faces individually for over two years (Kendrick *et al.*, 2001). Michael Ghiglieri (1988) agrees that keeping track of social relationships has been important in the evolution of the primate brain, but feels that the necessity to retain information pertaining to the environment has also been vital. He notes that for chimpanzees living in the Kibale Forest of Uganda to thrive, individuals must remember the location of hundreds of fruit trees (78 percent of the diet of the Ngogo chimpanzees comes from fruit) and the random times at which each bears fruit, as they do not do so in synchrony.

ENVIRONMENTAL FACTORS AND FRIENDSHIPS

The likelihood of close bonds being present in dyads of a social species may depend in part on three external factors: food, predation, and infanticide. For social hoofed animals that spread out to browse and graze, there is always tension between the need to find forage and the compulsion to stay close enough together to keep an effective watch for predators. When herds move from site to site, they do so as a group, but they lack close bonds between individuals.

If food is "clumped," meaning that it exists in quantity in limited areas that can be defended, then social behavior is more complex:

- Individuals may form coalitions, even close bonds, to try to keep food for themselves at the expense of other group members.
- Groups may have a dominance hierarchy where the strongest individuals have first dibs on available food; however, hierarchies do not tend to foster friendships except, often, for individuals related genetically to each other.
- Lions survive on an extremely "clumped" food, meat, yet the sexes form close friendships within each pride. The females bond into a hunting sisterhood in order to bring down large game animals that could not be taken by a single lion, and the males form a close brotherhood that hopes to defeat previous pride males in battle to become members of a pride themselves.

Infanticide is an insidious factor because it may occur within a group where one might have thought one would be safe. It is difficult to research because it happens rarely (and usually not at all) depending on the species (van Noordwijk and van Schaik, 2000). Indeed, sometimes infanticide is said to occur as an evolutionary strategy, when it may not be at all.[5] Recently much research has been dedicated to the topic not only of rarely seen infanticide itself, but to the *possibility* of infanticide, which is presumed to have affected the behavior of both males and females.

The focus has been on infanticide by males, especially in primates. Theoretically, such killing indicates that the female will come into estrus sooner than otherwise and will then mate with the male to produce his young. This scenario suits the new males, but is negative for the female who has wasted her energy on progeny she has produced and nursed. Infants are deemed not vulnerable to infanticide if their mothers conceive shortly after giving birth so that the period of lactation overlaps the subsequent gestation – if she is already pregnant, there is no point in killing her infant. Nor are the infants vulnerable if breeding is seasonal; if all the females copulate each year at about the same time, then no female will be receptive again until the next season. Infants of a species are deemed vulnerable to infanticide by males if the females have no set breeding period and if their lactation period is greater than the length of gestation (van Schaik, 2000).

Here are three examples of how possible infanticide by males might have fostered friendly behaviors through evolution (Paul *et al.*, 2000):

- Females of both olive baboons and chacma baboons form sociable pairs with specific males; should a male new to the troop threaten a female's young, her male friend will help protect it (Smuts, 1985; Palombit, 2000; see the chapter: *Male and female pals – not just for sex!*). For chacma baboons at least, the male shares close genetic ties with his friend's infant, usually as its father (Huchard *et al.*, 2010).
- In multimale groups of hanuman langurs, infants are protected by males who are their genetic fathers or long-time troop residents; newcomer males do not defend infants. Statistically, rates of infanticide decline as the number of males in a group increases; when a female copulates with many males, in what is called "confusing paternity," this behavior dramatically reduces the incentive of a newly dominant male to commit infanticide (Janson and van Schaik, 2000).

- Cooperating in the handling of an infant by two males presumably helps prevent infanticide, as seemed to be the case for Tibetan macaques *Macaca thibetana* (Ogawa, 1995; see the chapter: *In brotherhood*). Infanticide is obviously reduced when males interact frequently with infants because they are likely to be present if an aggressive male tries to attack a youngster.

Infanticide by females has been an overlooked topic of research,[6] but it, too, may be responsible for the bonding of individuals. Theoretical counterstrategies to the threat of infanticide from females within the same group and from other groups include (Digby, 2000):

- mothers forming coalitions to protect their young,
- females banding together to defend a territory against females from other groups,
- females remaining in their natal troop surrounded by their lifelong buddies rather than emigrating at puberty to another group,
- females harassing immigrant females lest they harm their young, and
- dominant females suppressing reproduction of subordinate ones.

But it is impossible to know for sure if these behaviors have evolved because of the threat of infanticide.

BENEFITS OF A SPECIAL FRIENDSHIP[7]

This book is about friendship, but particularly special friendships between two or among a few individuals. How does such a friendship benefit adult animals (Cords, 1997)?

- They frequently offer egalitarian companionship.
- Friends can alert each other to danger, or a water or superior food source.
- They may share food.
- They support each other in conflict or possible infanticide.
- They may groom each other, offering sensory pleasure and the removal of dead skin and parasites.
- They can perhaps "teach" each other something new, such as sharing recent information.
- They can help reduce emotional distress.
- They can take advantage of altruistic behavior.