Animal epistemology:  
On the truthfulness of scientific and literary sources

Hub Zwart  
University of Nijmegen  
Faculty of Science  
Department of Philosophy and Science Studies  
haezwart@sci.kun.nl  
P.O. Box 9010  
NL-6500 GL Nijmegen  
http://www.sci.kun.nl/filosofie

1 Introduction
In the course of history, humans have described and studied animal behaviour in various ways. As a result, various types of discourse on human relationships with animals can be distinguished. To begin with, scientific research practices involving animals have been documented (often quite accurately and extensively) by scientific authors. The writings of researchers like Charles Darwin or Ivan Pavlov for example are not only important because of the wealth of research data they contain, but also because they include many interesting details regarding the ways in which researchers and their research animals interact, within the confines of a laboratory or in other research settings. Likewise, biographical and autobiographical sources on human individuals often contain interesting information on the relationship between the human beings involved and the (wild or domesticated) animals they came to know. And finally, literary documents (such as novels and plays) inform us about the ways in which relationships between human beings and animals may evolve.

There is chronic dispute, however, over the comparative value of literary and scientific sources: which of both types of discourse represents animals in a more truthful and realistic manner? In certain respects, scientific sources seem more reliable and adequate, but in other respects literary sources are seen as more revealing and true to life. It would be a mistake to try to answer this question once and for all in a general way. Rather we must concede that several types of literary and scientific documents can be distinguished. They all shed some light on the question of “animalhood”, on what it means to be an animal, but they all have their limits and restrictions as well.

In this contribution, some important examples of literary sources on animals will be discussed and compared to scientific sources. Do they enhance or rather blur our understanding of animal life? I will start with some very influential and paradigmatic documents on animals produced in the classical era, but eventually the focus will shift to the modern period, notably the 1850s, when the tension between scientific and literary views on animalhood reached a climax. In the final section, Charles Darwin’s writings will be regarded as scientific documents that have a literary significance as well, as textual materials situated on the borderline between science and literature. The basic contention of my contribution is that a comparative analysis of scientific and literary sources will allow us to assess their epistemological value more carefully.

2 Humans and animals: the comical, the tragic and the biblical view on human-animal relationships
In 405 B.C. Aristophanes’ comedy The Frogs was performed for the first time. The first Chorus of the play begins as follows:
This is generally considered the first effort in history to capture animal sounds phonetically. In Aristophanes’ play *The Birds* a similar effort is made, and a similar chorus line can be encountered:

\[\text{Tio tio tio tiotinx}\]

These plays constitute examples of the ways in which literary texts may contribute to our knowledge of animals and animal behaviour. The plays as such, however, are not very interesting for readers who are explicitly interested in animals. The frogs and bird are depicted in a rather anthropomorphic fashion. They are human beings in bird-like and frog-like costumes (both literally and figuratively). They speak a human language and are guided by human motives and objectives. We hear their animal voices very briefly – but alas, before long they switch to a human tongue. Thus, in Aristophanes’ plays, animals enter into a truly “human” dialogue with humans. The birds in his play are not nesting in the clouds, but rather involved in establishing a *polis*, a Greek colony in the air. In short, they are not at all behaving in an animal-like or bird-like fashion.

Whereas these literary documents hardly distinguish between humans and animals, scientists of the same period tend to emphasize the difference as much as possible. Aristotle, the most important biologist of the epoch, did much to enhance the practice of classifying animals. He described and classified some 520 species (notably marine animals), while his teacher Plato had already introduced the dichotomous classification in terms of species and genera that is still in use today (providing all species with a first name and a surname so to speak). As a philosopher, however, Aristotle stresses the uniqueness of man. Dialogue and polis-building are possibilities (or lines of action) that are principally denied to animals. In his book on politics, Aristotle claims that, of all animals, only man is by nature a *political* animal in the sense that man alone of all animals possesses speech (1932/1967; 1253 a 3). Although animals are able to produce sounds, they do not have a voice. Although they are able to shriek and howl and bellow and whistle and wail, they do not produce meaningful words. Although they are able to signal pain or fear, the possibility of conveying meaning is denied to them. Therefore, rather than truly describing a relationship between human heroes and animal communities, the “animality” of animals is erased and obscured in Aristophanes’ plays (if read from the point of view of science). In other words, Aristophanes voices a popular, non-scientific view on animal behaviour and human-animal relationships.

The same goes for the literary genre of the fable that originated in Greece as well (a genre that more or less began with the fables of Aesopus, 620-560 BC). The animals involved act and think like human beings, rather than as animals, although some of their stereotypical character traits are borrowed from the behavioural repertoires of the species they are said to represent (such as the proverbial cunning of the fox). Yet, these stereotypical features are often of an anecdotal nature and highly dependent on observer biases and cultural traditions. They do not always correspond in a recognizable manner to actual animal behaviour as it would be studied and described by professional ethologists. Fables contain moral lessons for humans. These lessons concern the way we humans should behave, not with regard to animals, but rather among ourselves.
The ‘fable view’ on animals continues to exist during the Christian era and beyond. A well-known legend of Christian origin, *Androcles and the lion*, is written along these lines. It is set in the Roman Empire during the early Christian period. Androcles, a meek Christian, encounters a lion in the desert who is suffering from a painful thorn in his paw. Androcles removes the thorn, and thus the lion becomes his friend. Later, Androcles is captured and taken to the Colosseum with a group of Christian prisoners. He is sent into the arena to face a lion, who turns out to be the same lion he befriended. The lion joyfully licks Androcles' face in recognition. It is a nice and charming story, but at the same time it is clear that, rather than describing real life interactions, it conceals and prettifies extremely violent human-animal relationships. In the ‘real’ Colloseum, thousands of animals (notably lions) were slaughtered, and the real contemporaries of this friendly but imaginary lion suffered a much bleaker fate than his. Real animal practices did not display much caritas in those days.

Another, apparently more realistic genre that originated in ancient Greece is the tragedy. *Antigone* by Sophocles contains a famous chorus devoted to the relationship between human beings and nature in general, and between human beings and animals in particular. In this chorus, nature is represented as *deinos* – that is: frightening, overwhelming, grand, immense. Yet, mightier even than nature is man. According to Sophocles, our relationship with animals always and by necessity contains an element of violence. We behave violently and aggressively towards nature and natural entities, and cannot do otherwise. We force animals to do things they would not do on their own accord and in the end our relationship usually ends with killing them. Even animals that are superior to us in terms of physical agility or strength (such as horses or bulls) are captured and subdued by us. For thousands of years, the relationship between humans and animals was dominated by cunning and aggression, by clubs, whips, nets, knots and ropes. This is, so to speak, the tragic view on human-animal interaction. Although domestication involves patience, observation and experience as well it is, in the end, not a very friendly process. There is a clear contrast between the cordial (but anthropomorphic) attitude of Androcles towards his frightening (that is: ‘deinos’), but eventually friendly lion, and the grim picture of human-animal relationship that is outlined by Sophocles in his chorus.

A much more friendly and congenial account of human-animal interactions can be encountered in *Genesis*. Man is appointed as a resort manager in Paradise and the basic message of the story of the Arc is that animals depend on human beings for their well-being and, eventually, for their survival. We, as stewards, are responsible for their extinction as well as for their flourishing. According to Genesis, animals entered our Arc from the very outset, long before some of them were formally recognised as “endangered species”. The idea of peaceful coexistence between humans and animals can be encountered in later documents emerging in Christian cultural environments as well, not only in novels, but also in works of art. In the landscapes of Paulus Potter, to mention just one example, only happy and contented animals can be encountered. They simply want to be left in peace. This understanding (more or less Genesis-based) of human-animal relationships in terms of *harmony* and peaceful co-existence still flourishes in the nineteenth century, when biology is often practiced by theologians and generally regarded a “clerical hobby”, a practical form of religious reverence – until Darwin makes his appearance. Suddenly, nature is perceived in a completely different light, in terms of violence and relentless struggle. In the final sections of this contribution, I will consider the 19th century – the age of Darwin – more closely.

### 3 Science and literature: two cultures
The fable literature described above is based on a moral classification of animals, highly stylised and conventional as a rule. It involves a limited number of species, displaying fixed character traits determined by literary conventions. These animals have more in common with heraldic representations of animals, for example, than with the animals one is likely to encounter in the real world. The classification inherent in fables does not seem able to do justice to animals as they really are. And yet, this type of literature continued to flourish during the medieval period, that is: in a period when many people, notably in rural areas, must have been involved in intense relationships with animals (notably farm animals) and must have acquired a fairly extensive repertoire of knowledge of animal behaviour. This knowledge was usually tacit knowledge, however, passed on to subsequent generations in oral formats. But more realistic forms of written discourse on animals were produced as well. Often, they relied on practical experiences with animals, on long-standing human-animal interactions. A beautiful example of this genre is De arte venandi cum avibus (“On the art of falconry”) by Emperor Frederik II von Hohenstaufen (1194-1250). The falcon was a courtly animal par excellence, the symbol of nobility, and hunting with falcons was for centuries a favourite pastime of medieval aristocrats. It was an intricate and refined art. It involved patience, knowledge and skill. Frederik II von Hohenstaufen, moreover, was a gifted artist and scientist. His book on falconry contains important information on the behaviour and anatomy of birds of prey and can be regarded as a highlight of medieval ornithology.

Frederic’s courtly science can be seen as the scholarly counterpart of the medieval fable literature. Nonetheless, the fable literature on animals, and the fable-perspective on animal life it entails, continued to flourish for many centuries to come. The fable-atmosphere remained intact, in popular as well as in courtly circles. As Morus (1953) points out, the fable-like view on animals was reinforced rather than weakened when, during the dawn of the modern era, Europeans started to explore the world on a larger scale. Reports written by these early explorers contain many fabulous accounts of gigantic whales, sharks and sea-snakes for example. Apparently, they were based on traditional cultural stereotypes rather than on observation. And when in the 17th Century the French courtier La Fontaine (1621-1695) composes his charming poetic stories, he writes about animals he hardly knows from personal experience. His “zoology”, so to speak, is based on literary tradition and literary sources, rather than on personal observation or scientific research.

In the period of Enlightenment, the fable literature is challenged and finally dethroned by serious, scholarly, research-based views on animal life. Naturalists start to study the fauna of old and new continents in a systematic manner. Linnaeus (1707-1778) and others produce a scientific classification of animal species, much more detailed and precise, much more “critical” and realistic so to speak than its literary counterpart. These systems of classification were based on specific morphological features rather than on literary conventions. Therefore, they seem more real, they seem to do more justice to the prolific richness of animal nature, to the way animals really are. On the other hand, from Linnaeus onwards, species are described and determined in terms of an extremely technical language, in accordance with prescribed formats and procedures. And it was precisely for this reason that the classifications and descriptions of enlightened scholarship came to be challenged in their turn by new forms of literary discourse that emerged in the 19th century. The literary authors involved in this movement all gave voice to one and the same basic concern: the technical language of classification basically entails an impoverishment of the real-life world. Nature as such, and animal nature in particular, brimming with creativity, with life, is subdued and eclipsed by a life-less system of formal distinctions.
In Melville’s novel *Moby-Dick* for example (published in 1851), the concepts and classifications of established biological discourse (on animals in general and on whales in particular) are explicitly challenge by Ishmael, who claims to represent the whale-man’s point of view, based on experiential knowledge, on “the real living experience of living men”, on a life spent at sea rather than in a scholarly study (Zwart 2000). It is “only on the profound unbounded sea”, Ishmael assures us, that the whale can be “truly and livingly” found out (Melville, 1851/1931, p. 1032). Many are the men who have written of whales, but only a few of them ever really saw one (apart from the stranded whales they – or others – dissected). Indeed, the only way to do justice to a whale, to acquire reliable knowledge about whales, is to sign up as a sailor on a whale-ship in order to hunt them. Experiential knowledge is preferred to knowledge that is derived from reading books. On the other hand, in order to produce his competitive view, Ishmael resorts to the old stereotypical (or even archetypical) image of the giant whale, a species he addresses with names borrowed from traditional sources, such as ‘Leviathan’. Moreover, the human-animal relationship that provides us with these lively, concrete and valuable experiences of whalehood is an extremely violent animal practice, namely whaling, which entails a rather barbarous and merciless slaughtering of the sublime animal Ishmael claims to admire so much. In other words, *Moby-Dick* subscribes to the tragic view articulated by Sophocles. Experience tells us that basically, man and nature are at war with one another. The whale, this huge and fascinating animal, *deinos* par excellence, is classified and dissected by scholars, transformed into literary stereotypes by poets, and eventually butchered by practical men. An overwhelming animal is finally overwhelmed by human cunning and intelligence. And this raises several moral issues, such as the possibility of extinction, extensively discussed in Melville’s lively novel.

Another example of this type of literary discourse that tries to challenge the scientific view on animals is *Hard Times* by Charles Dickens, written in the same period (published in 1854). It contains the following quotation:

> “Now, what I want is, Facts. Teach these boys and girls nothing but Facts. Facts alone are wanted in life. Plant nothing else, and root out everything else. You can only form the minds of reasoning animals upon Facts” (1974, p. 5).

Those are the words of the horrible teacher Gradgrind who, being informed that the father of a girl called Sissy (“girl number twenty”) is a horsebreaker, demands her to give the definition of a horse. Although Sissy (due to her daily companionship with them) is intimately acquainted with horses, she is nevertheless startled by the question and unable to answer it. “Girl number twenty unable to define a horse! Girl number twenty possessed of no facts, in reference to one of the commonest of animals!” Gradgrind exclaims, and passes the question over to a boy who perhaps never so much as touched a horse, but who produces the perfect answer right away: “Quadruped. Graminivorous. Forty teeth, namely twenty-four grinders, four eye-teeth, and twelve incisive. Sheds coat in spring... [etc.]” (1974, p. 5).

It goes without saying that “girl number twenty”, because of her silence, is Dickens’s heroine. She knows too much about horses, about their way of being-in-the-world to force her understanding of them into a bookish, factual definition (Zwart 1997). That is, she refuses to become someone who defines the world in objective, factual terms, in terms of biological classifications. She seems to realize that such a language will not allow her to articulate what horses really are. The animal’s way of being is obscured rather than brought to light by the restricted and impoverished language of facts and definitions. Rather than allowing us to understand them, it is bound to estrange us from them.
The contrast between these novels, challenging the life-less, schoolish and technical procedures of academic classifications, and traditional biology constitutes the back-drop for what was perhaps the most decisive scientific event of the 19th Century, the publication of Darwin’s *On the origin of species* in 1859. The interesting thing about this book is, first of all, that it to a considerable extent relies on *experiential* knowledge, on practical experiences with animals; secondly, that it is a tale of adventure, a narrative of a journey around the world and, finally, that it reads like a novel – a fascinating, carefully composed story, with a compelling story line and plot - according to Ilse Bulhof (1988) who emphasises the exceptional literary qualities of Darwin's book. It is full of fresh air and the author takes his readers with him on a fascinating endeavour through overwhelming landscapes, described in a compelling way. It does not present the results of experimental research. Rather it is an exercise in scientific *imagination*. It starts from a wealth of observations, but eventually the reader is invited (or rather: compelled) to see the world in a new light. It recommends and fleshes out a new way of looking at natural entities. “*The Origin* gives a sense of nature in the open air rather than in the museum or on the dissecting table. It has a sensitivity to animals and their environment which was lost as biology became more professional and retreated into the laboratory” (Burrow, 1985, p. 14). Let us look at the literary qualities of Darwin’s best-seller in more detail.

4 Darwin: prelude, climax and aftermath

According to De Beer (1964/1976, p. 138) three stages can be distinguished in Darwin’s scientific biography, each with its own style, its own methodological profile. During the first stage, Darwin was an amateur naturalist who took a special interest in collecting beetles and a number of other hobbies typical of the clergyman he was supposed to become. He was invited to join the *Beagle* expedition because, besides being an experienced naturalist, he was a well-educated *gentleman*, that is: someone who would not only examine interesting sites (while Captain Robert FitzRoy and his crew would be doing their hydrographical surveys), but who would also be able to mess and converse with the captain in a civilised manner.

The second stage involved his travel around the world (as a naturalist without pay) on board of H.M.S. Beagle. Darwin was clearly overwhelmed by the sheer luxuriance of tropical vegetations, the bleak but sublime coastlines of Tierra del Fuego and the pristine conditions of the Gallapagos Islands. But first and foremost, the *Beagle*-experience entailed an epistemological leap in terms of *scale*. Before going on his journey, Darwin tells his readers, he had not realised how *large* the world is, in terms of space, but even more so in terms of time. Indeed, this is what he stresses in *The Origin of species* time and again: human time pales into insignificance in comparison with the overwhelming time of nature. ‘Wide intervals of time…’, ‘Vast intervals of time …’, ‘Vast lapses of time…’ are the phrases often used by Darwin in this context. The ‘lapses of time involved in the process of evolution are so great as to be utterly inappreciable by the human intellect’ (p. 439). This is what Darwin means when at the end of his books he emphasises that there is grandeur in the new view of life he took home with him (p. 459). In other words, Darwin’s book does not merely convey certain data or “facts”. Even evolution itself is not a fact, but rather a perspective, a (highly revealing and challenging) way of looking at natural processes. Darwin’s book invites us to look at the world in which we live *in a certain manner*. And for this reason, we can read it like a work of art. It opens up possibilities for experience. Reading Darwin’s book amounts to being trained in a new style of perception. It is an epistemological event that makes a certain form of experience, a certain style of research possible.
Finally, there is a third stage in Darwin’s work, completely different from the previous one, notably in terms of scale. The large world of his Beagle adventure gives way, once again, to a micro-cosmos: a house and garden: his Down estate, where he was to spend decades of research on species like barnacles and earthworms, while taking part in practices (such as keeping pigeons and cultivating flowers) that flourished in his social environment, the English leisure class. These practices provided him with insights in the possibilities and limits for humans to change the species at their disposal. What he learned from this was that, although it is possible to produce new varieties, it is beyond our power (given the limited time-scale of human interventions) to produce new species. Species as such remain what they are – they are immutable, and a pigeon will always remain a pigeon, whatever its colours. It is only on a much larger, natural scale that evolution (through the gradual accumulation of minor changes) becomes feasible.

These different settings are reflected in The Origin of Species, as well as in his subsequent publications. In the first chapter of his book (“Variation under domestication”) Darwin stresses the practical and experiential nature of the type of knowledge on which he relies, notably assembled during his ‘third’ stage of his career: “I have kept every breed [of pigeons] which I could purchase or obtain... I have associated with several eminent fanciers, and have been permitted to join two of the London Pigeon Clubs... (p. 82). But the experience gained from this and similar animal practices would not suffice to alter the traditional faith in the immutability of species.

The next chapter, however, is devoted to “Variation in nature”. And it is here, as well as in subsequent chapters, that the difference in scale becomes important. Nature has millions of years at her disposal and this explains how even minute changes may eventually lead to astonishing results. Thus, whereas humans working in their pens and gardens are only able to produce new varieties, nature is able to produce new species. Nature grants “vast periods of time for the work of natural selection” (p. 147). Indeed: ‘incomprehensibly vast have been the periods of time that produced new species (p. 293).

When his book was about to be published, there was a difficulty over the title. Darwin wanted it to be called An abstract of an essay on the origin of species and varieties through natural selection (De Beer, p. 155), but the publisher objected. Nonetheless, it was Darwin’s firm intention to devote the remainder of his life to the elaboration of this mere “abstract” into a series of extended studies. Because of bad health, it is said, only the first part of this huge and ambitious project was finished. In 1868 he published Variation of animals and plants under Domestication, basically a follow-up of the first chapter of The origin of species. Another possible reason for the failure of his project was that the setting of his research had so drastically changed: English countryside instead of vast horizons. Darwin is now interested in human-animal relationships evolving in a homely context (such as daily observation and domestication). He now lives in a very small world again and his object of study no longer is evolution on a grand scale, but rather the behaviour of modest, unspectacular organisms, such as earth worms in his own back yard.

"The subject may appear an insignificant one", Darwin (1881) acknowledges in the Introduction to his monograph on worms, but eventually he concludes that these unassuming animals have played “a more important part in the history of the world than most people would at first suppose". The vegetable mould has past many times through, and will pass many times through, the intestinal canals of worms. And without this labour of the worms the earth would become sterile. In this treatise, Darwin’s world has become an extremely calm,
small-scale and peaceful place again. It lacks the stylistic grandeur and drama of *The Origin of Species*, but still it invites us to view and explore the world in a certain manner.

Darwin’s somewhat naïve enthusiasm and lack of restraint when it comes to praising the intelligence, dedication and zeal of earthworms sometimes raises a smile in contemporary readers. Yet, this type of discourse has literary qualities in its own right. It breathes the atmosphere of common, practical, everyday experiences with animals. It is both systematic and anecdotal. Whereas *The origin of species* is the scientific counterpart of books of travel written in the 19th Century (by literary as well as by scientific authors), his book on the life and significance of earthworms is the scientific counterpart of similar studies written by men of letters, such as the famous monograph on the life of bees by Maurice Maeterlinck (1901), winner of the Nobel Prize for literature, a book that may stand out as an example of a prolific genre. Like Darwin, Maeterlinck is intrigued by phenomena that bear witness, not only to the zeal, but most of all to the intelligence of bees. The intelligence of his target species is emphasized throughout the book. It is a source of enthusiasm. Why? Whenever we discover the existence of intelligent organisms anywhere in nature, Maeterlinck tells us (1901, p. 133), we seem to experience an emotion similar to the one that befell Robinson Crusoe when he discovered a human footprint on the beach. It means that we, as intelligent human beings, are not as exceptional (and therefore not as lonesome) as we had expected.

**5 Conclusion**

From a scientific perspective, literary views on animals are often biased in a stereotypical manner. As a rule, animals are used to represent typically human conflicts and desires. For centuries moreover, popular zoology continued to believe in the existence of fabulous animals such as monstrous sea-snakes, long after these fictitious species were rejected by professional naturalists. Indeed, scholarly discourse on animals tends to be much more reliable, critical and precise. From a literary perspective, however, the concern is often brought forward that scientific procedures for studying and describing animals are too technical and sterile to capture the animal as a living being. It would be wrong of course to give up science on behalf of literature, or vice versa. Rather we are confronted with different genres that offer different possibilities and entail different constraints. Sometimes, these types of discourse can be seen as mutually challenging, that is: as rivalling accounts. On other occasions they should rather be seen as complementary. And finally we must acknowledge that a clear demarcation between literature and science is not possible. Even Darwin’s work, for example, has definite literary qualities, besides its obvious scientific significance. A confrontation of literary and scientific sources is useful in the sense that helps us to clarify and assess their epistemological profiles. It is precisely in the confrontation between literary stories and scientific accounts that the relative strengths and weaknesses of both types of discourses can be specified and clarified.

**Bibliography**


Darwin Ch. (1881) The formation of the vegetable mould through the action of worms, with observations on their habits. London: Murray.


