

What is a cat?

Cats represent many different things to many different people. History records that for some people, cats represented deities. Others believed cats to be familiars associated with those practicing witchcraft. Today cats are a popular pet - acting as warm and furry companions for people who fancy their company. To modern biologists, cats are a fairly typical example of a type of multi-cellular animal known as mammals.

As a mammal, a cat reproduces sexually with the young being carried inside the mother until they are ready to breathe on their own. At this point the kittens are expelled from the mother's body, but she continues to nourish her offspring by secreting milk from glands known as mammarys. The mother cat will eventually bring prey animals to her growing kittens and they will soon adjust to an adult diet. When the kittens are sufficiently developed to live independently, the mother cat will stop providing food for them. By this time she may have already mated again, and thus continued a cycle that she will repeat until she herself becomes prey or succumbs to old age.

Others might describe or define a feline in any number of similar ways. But we are going to define our felines in a way that will be entirely new to most readers. For our purposes, felines will be considered primarily as copying machines for feline DNA. This idea will certainly clash with many people's understanding of the theory of evolution. A typical understanding of the theory of evolution is based on the idea of survival of the fittest. Therefore, in the interest of accuracy, we will first restate the idea of "survival of the fittest" in more accurate terms.

For our purposes, fitness does not mean good health or athletic ability. We will use the term "fitness" as a measure of the ability to replicate and forward genetic instructions to another generation. An organism with greater fitness will, on average, be more successful at getting its instructions represented in the next generation. An organism that is less fit will, on average, pass fewer of its genes to the next generation - if it is successful in passing along any genes at all.

A second important point is that the organism is not the unit of selection. The unit of selection is the set of instructions for creating the organism. Natural selection may appear to act upon organisms, but as we shall see natural selection is really acting upon the blueprints. To illustrate the point, let us examine an extreme example. A virus consists of little more than a can of instructions for making more viruses. In this case natural selection has essentially dispensed with the creature. In this example it is easy to see that natural selection acts on the instructions - because there is no organism. If the organism were the unit of selection, we would expect to observe at least one

example of an organism that existed without instructions or blueprints for replicating the organism. Instead we see a common encoding scheme in all organisms.

With this understanding, it is obvious that we must restate “survival of the fittest.” The idea can be restated in a number of ways. For example, we can restate the idea as survival of the instructions that describe the fittest creatures. The idea may also be restated in more general terms: Things that copy themselves are self-replicators. Self-replicators will replicate until all resources are fully utilized. If resources were unlimited then replication would proceed infinitely without competition. However, things like space, materials, and energy sources generally have limits. The result is competition for those resources. With competition, less efficient replicators are consumed, starved, or crowded out of existence. As a consequence, replicators which are best at exploiting resources to copy themselves will be best represented in subsequent generations of the replicator.

So our feline is a replicating machine for the instructions which describe a feline. Let’s take a closer look at those instructions. The instructions include an incredible amount of information. This information is duplicated in every cell of the feline’s body. There are instructions for constructing every type of cell in the feline body as well as instructions for organizing all those types of cells into the structures and systems that make up the feline body.

The feline body is a highly integrated and amazing thing. There are many functions needed to support the primary function of copying feline DNA. The feline body must identify and capture the energy and materials to build and maintain itself while avoiding becoming a food source for all manner of other predators. The feline body must protect itself from all manner of predators. Exploitation by predators could be on several scales: microscopic viruses and bacteria; biting and sucking insects; or other carnivores. The instructions for defending against each type of exploitation are carried within each and every cell in the feline body. All the parts of the feline body work together to achieve the final goal of copying the blueprints.

This idea is echoed at the level of the DNA. The DNA is an integrated package of instructions. By this I mean that DNA “travels” with compatible DNA. It would make no sense to package DNA for bright feathers with DNA describing a creature that required stealth and camouflage to capture prey. Consequently, DNA coding for bright feathers is not compatible with feline DNA and does not “travel” with it. This is an important concept, so you may expect to see it again in later chapters.

One feline structure bears closer examination before moving to the next chapter. The feline brain has many functions that support the primary function

of replicating feline DNA. There are some very basic functions performed by the feline brain such as regulating breathing. However, we will primarily consider the feline brain as a stimulus sorter. The feline DNA copying machine receives lots of stimuli. These stimuli may be from external sources. For example the eyes may detect a source of energy. The ears may detect a predator. The nose may detect the recent passing of another feline. Other stimuli are from internal sources. Hunger signals the stimulus sorter that obtaining food should be assigned a higher priority. Hormones may signal that it is time to advertise for a suitable mate. The feline brain must prioritize all these stimuli in such a way as to ensure self-preservation and to maximize procreation. The feline brain is remarkable in many ways. For example, a domestic cat many generations removed from the wilds still “knows” a great deal about birds. The feline brain may be considered to be “hardwired” to identify birds. The feline brain is “hardwired” for far more than merely identifying birds. It is also “hardwired” to direct the feline body to crouch, stalk, and pounce. These behaviors can be readily observed even in kittens and cats that have never had hunting demonstrated by another cat. All these responses to stimuli are also encoded in feline DNA. All these responses should be considered as “good tricks” and are retained in the collective “memory” of the gene pool. The concept of a “good trick” is borrowed from Daniel Dennett’s book *Breaking the Spell*. The concept can be considered to describe any mechanism or behavior which has evolved as a good solution to some problem.

Carrying this line of thought one step further one may consider the stimulus sorter itself to be a “good trick” and each link to a particular action in response to a particular combination of stimuli to be another “good trick”. So the feline brain is a collection of “good tricks” which have succeeded over generations. Each of those “good tricks” is hardwired in the structure of the feline brain - the blueprints of which are stored in feline DNA.

Cats are more than mere copying machines for feline DNA. Collectively, cats are the ultimate sorter and cleanser of the collective pool of feline DNA. By this I mean that less fit or defective blueprints are constantly sorted and removed from the feline gene pool. This is another important concept that you may expect to see again in later chapters.