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# JUSTIFICATION FOR A STANDARDISED ZOOLOGICAL NOMENCLATURE: THE FASCINATING WORLD OF ANIMAL COMMON NAMES

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**Abstract**

Historically, animals had been referred to by common or vernacular names, which varied from country to country, and even among different regions within the same country. Such vernacular names often provided no clues as to the animal under reference, with some animals sometimes being named using descriptors which are common names of other animals because of some resemblance in appearance or behaviour rather than any known taxonomic relationship. In other cases, vernacular names of two taxonomically different animals were so similar in spelling or pronunciation that non-zoologists were likely to be confused when referring to either animal. As more and more animals began to be identified and named around the 17th century, it became imperative to choose a language like Latin, which was universally acceptable because it was a "dead" language not subject to frequent changes, as well as being widely-used by scholars of the time. Early attempts at using a polynomial system of nomenclature (use of long descriptive Latin names), met with little success during the 17th century because the names were thought to be too cumbersome. A binomial system of nomenclature, introduced by Carl Linné during the mid-18th century, greatly shortened the Latin polynomials into two-part names or binomens (comprising a genus name and a specific descriptor) and ensured uniformity and universality in zoological nomenclature worldwide. An International Code of Zoological Nomenclature (ICZN), established by the beginning of the 19th century, became the final authority on naming animals worldwide. The paper adduces some reasons why animals require a standardised nomenclature, and traces the history of zoological nomenclature from biblical times to the present.

## Introduction

In allusion to the importance or otherwise of names for living things, William Shakespeare, in *Romeo and Juliet* wrote "What's in a name?" That which we call a rose by any other name will smell as sweet" (Shimek, 2003). Lewis Carroll, in *Through the Looking Glass*, also reported a conversation between the Gnat and Alice, where the former asked, "What's the use of their (animals) having names, if they won't answer to them?", and the latter answered, "No use to them, but it's useful to the people that name them, I suppose"*(http://www.ric.edu/jmontvilo/109files(14)nomenclature.htm.* Biblical accounts indicated the importance of naming living creatures when in Genesis 2:20 "…..Adam gave names to all cattle and to the fowl of the air, and to every living beast of the field" (Mozeson, 2006). The importance of an efficient and stable system of naming the world's animal species for an effective information exchange among biologists cannot be over-emphasised because of the vast animal biodiversity currently inhabiting the earth (Polaszek, 2005).

Originally, animals were referred to by their common or vernacular names invented by inhabitants of a particular locality to describe certain peculiar characteristics they possessed, their relationships to other animals, the way they were identified in native folklore, and their importance to the daily lives of the people (Anon., 2000). For example, the spitting cobra *(Naja nigricollis)* got its name from its habit of "spitting" venom at potential victims, vampire

bats (*Desmodus rotundus*) from feeding on the blood of their human and animal victims, and the praying mantis *(Mantis religiosa)* is named for the "prayerful" position of its forelimbs. The royal python *(Python regius)* is held in reverence and worshipped in some parts of Africa. Common names are, therefore, quite useful but only known locally.*(http://www.mountainnature.com/Articles/scientific_names.htm.).*

**Justification for a standardised animal nomenclature**

The variety of animal species on earth can only be described if each one of them is given a universally-recognised name (Webb & Elgood, 1955; Storer *et al.*, 1972; Raven & Johnson, 1995). Common or vernacular names do not serve this purpose because zoologists of different nationalities need to refer to the same animal using a single recognised name to avoid ambiguity in making comparisons and communicating research results (Webb & Elgood, 1955). A standard scientific name ensures consistency among zoologist who may not have physically encountered the animal under reference. Any two zoologists could, thus, be sure of what organism they were talking about to enable comparison and communication of research results over regional or national boundaries (Rudman, 2007). This is especially important, considering that over one million estimated animal species have been currently identified, and millions more still await discovery and identification (Mader, 1988).

The multiplicity of the world's languages and dialects is one of the main reasons why animals require a standardised system of nomenclature. Referring to animals only by their vernacular names, one animal could, therefore, have several different names in any number of languages. For example, the lion *(Panthera leo)* is known as "lowe" in German, "simba" in Swahili, and "dzata" in most Ghanaian languages. It is also a fact that majority of animals which are not showy, popular or charismatic, do not have common names in any language. In most languages also, common names do not differentiate several species of the same type of animal, and one common name may refer to several different types of animals which may or may not be closely-related taxonomically (Rey, 2007). For example, several green snakes in Ghana are referred to as "tree snakes", even though they differ markedly in terms of venom availability and rating. Thus, the green tree snake (*Philothamnus* sp.), emerald tree snake *(Hapsidophrys smaragdina)*, boomslang (*Dispholidus typus*), and green mamba (*Dendroaspis viridis*) are all green tree snakes in Ghana, but the first two are non-venomous (lacks fangs), the third moderately to highly venomous (back-fanged), and the fourth, dangerously venomous (front-fanged). The Ga-speaking communities of Accra use the name "otserebeng" for all the above green snakes (Kropp-Dakubu, 1999), and the same applies to the Twi-speaking communities of Ghana, who refer to any green snake as "okyereben", even though the name often specifically refers to the green mamba. Any of the five species of vipers or adders in Ghana can be referred to as "nanka" or "onanka" in the Twi and Ga languages, respectively, but the term can also be used to describe any dangerous snake (Kropp-Dakubu, 1999).

Some common names often do not provide clues to the animal being referred to. The name may be so rarely used that most lay people may find it difficult to identify it as belonging to a particular group of animals. For example, the sergeant-major *(Abudefduf saxatilis)*, Alewife *(Alosa pseudoharengus)*, and john dory *(Zeus faber)* are all fishes, even though their common names have human connotations (Leftwich, 1983; Allaby, 1999). There are snakes called water moccasin *(Agkistrodon piscivorus)* and river jack *(Bitis nasicornis)*. The former is an American rattlesnake, while the latter is more commonly known as the rhinoceros viper and occurs in West African rain forests (Allaby, 1999). Chiff-chaffs *(Phylloscopus collybita*) and cordon-bleus

*(Estrilda bengala)* are birds, as well as the jaco *(Psittacus erithacus)* whose more familiar name is the African grey parrot. The ojam *(Galago senegalensis)* is also better known as the common bush baby or galago, an African primate (mammal). One would be hard put to identify the reremouse, guenon or cusimanse as a bat, monkey, or mongoose, respectively.

There can be nomenclatural confusion when some animals are named using the names of other animals to which they may not be related taxonomically, except for some resemblance in appearance and or behaviour. A typical example is the reference to some North American squirrels as praire dogs *(Cynomys parvidens)* simply because they make noises like dogs barking. Bombay ducks *(Harpodon nehereus)* and geoducks *(Panopea generosa)* are neither birds nor ducks; they are fishes and molluscs (clams), respectively (Allaby, 1999). Guinea-pigs *(Cavia* sp.*)* are not pigs and do not originate from West Africa; they are rodents, native to South America and closely-related to porcupines. The congo eel or congo snake *(Amphiuma means)* is neither a fish, snake nor African; it is a North American amphibian (salamander) (Leftwich, 1983; Allaby, 1999), and horny toads *(Phrynosoma platyrhinos)* are actually lizards (Campbell, 1999).

Sometimes, two or more animals described using the same name because of similar behavioural or physical traits may be placed in different and unrelated taxonomic groups with the addition of an adjective to the name common to all of them. For example, some mammals are referred to as "anteaters" because they feed largely on ants and other insects. They are, however, classified into three different mammalian orders. The anteater *(Myrmecophaga tridactyla)* is a toothless South American mammal from the order Xenarthra, and the spiny anteater *(Tachyglossus aculeatus)* is a primitive egg-laying Australian echidna belonging to the Monotremata. In Ghana, the pangolin is also known as the scaly anteater *(Phataginus tricuspis)* which belongs to the order Pholidota (Leftwich, 1983; Allaby, 1999). Referring to such animals by their universally-acknowledged scientific names prevents confusion. Some snakes and leg-less lizards are referred to as "worms", for obvious reasons, even though they are not invertebrates. Thus, they are slow worms *(Anguis fragilis)* and worm lizards *(Amhpisbaenia kraussi)*, the latter being primitive legless lizards also called amphisbaenids, and worm snakes *(Leptotyphlops bicolor*) which are also known as thread snakes, and are the world's smallest snakes.

Nomenclatural problems could also arise when one animal's name is used as an adjective to describe another animal. To appreciate this confusion, one should consider that a kangaroo rat *(Dipodomys* sp.*)* is a North American desert rat, while a rat kangaroo *(Hypsiprymnodon moschatus)* is a small Australian kangaroo. Similarly, a bird snake *(Thelothornis kirtlandii)* is a West African reptile, and a snake bird *(Anhinga* sp.*)* is an African bird related to woodpeckers. The Asiatic mouse deer *(Moschiola* sp.*)* is the world's smallest artiodactyl, and a deer mouse *(Peromyscus maniculatus)* is a temperate forest rodent ((Manchester, 1990; Allaby, 1999). Clearly, using the corresponding scientific names will make it easier to tell each pair of species apart.

Numerous examples of animal names exist that are spelt and, or pronounced almost the same, even though the animals involved are taxonomically or geographically unrelated. For example, The African Nile rat *(Arvicanthis niloticus)* or kusu is unrelated to the kudu *(Tragelaphus strepsiceros)*, a native African social antelope, or a pudu *(Pudu mephistophylus)*, a small South American deer. Table 1 shows other closely-spelt or pronounced animal common name pairs:

### The search for a standard: A history of zoological nomenclature

Zoological nomenclature, the assigning of names to animals, is a component of taxonomy,

TABLE 1
*Closely-spelt or pronounced animal common names*

| *Common name pairs* | *Scientific names* | *Description* |
|---|---|---|
| Gorilla | *Gorilla gorilla* | Forest ape of the order Primates |
| Zorilla | *Ictonyx striatus* | Carnivore also known as a striped polecat |
| Skunk | *Mephitis mephitis* | North American weasel-like mammal |
| Skink | *Mabuya* sp. | Common African snake-lizard (reptile) |
| Mouse | *Mus* sp. | Cosmopolitan small rodent |
| Moose | *Alces alces* | North American deer |
| Thresher | *Alopias* sp. | A large shark |
| Thrassher | *Mimus polyglottos* | American mockingbird |
| Chickadee | *Parus* sp. | A sparrow-like bird |
| Chickaree | *.Tamiasciurus hudsonicus* | Red squirrel (rodent) or chipmunk. |
| Marten | *Martes* sp. | Weasel-like mammal |
| Martin | *.Progne* sp. | Swallow-like bird |
| Barbel | *Barbus* sp. | A type of fish |
| Barbet | *Lybius* sp. | A type of bird |
| Wrasse | *Coris julis* | A type of fish |
| Rasse | *Viverricula indica* | Asian civet (carnivorous mammal) |
| Titi | *Callicebus moloch* | South American monkey |
| Tit | *Parus* sp. | Sparrow-like bird |
| Caribe | *Serrasalmus* sp. | Small ferocious South American piranha (fish) |
| Carib | *Eulampis* sp. | A type of bird |
| Jackal | *Canis* sp. | Afro-Asian wild dog |
| Jacksaa | *Equus asinus* or | Male ass/donkey or an Australian bird |
| | *Dacelo novaeguiniae* | Australian laughing kookaburra (bird) |
| Marmoset | *Callithrix* sp. | Squirrel-like monkeys (order: Primates) |
| Marmots | *Marmota* sp. | Burrowing squirrels (order: Rodentia) |
| Ibis | *Endocinus* sp. | Stork-like bird with a long curved beak |
| Ibex | *Capra ibex* | Wild mountain goat of Asia, Europe and Africa |
| Hawk | *Urotriorchis* sp. | Common bird of prey in Ghana |
| Auk | *Alle alle* | Penguin-like seabirds of the North Atlantic |
| Bustard | *Otis* sp. | Long-legged wading bird related to cranes |
| Buzzard | *Buteo* sp. | Hawk- or eagle-like bird of prey |
| Boa | *Eryx* sp. | Large-sized non-poisonous constricting snake |
| Boar | *Sus* sp. | Wild tusked male pigs or hogs |

Source: Leftwich (1983), Manchester (1990), Allaby (1999), Rooney (1999).

the theory and practice of classifying organisms (Gk: *taxis*, arrangement; Lat: *nominalis*, belonging to a name). It is a system which attempts to designate exactly and conveniently the animals which exist now or are known to have existed (Encyclopaedia Brittanica, 1911). The Greek philosopher and scientist, Aristotle (384-322 BC), was the first to demonstrate interest in the taxonomy and nomenclature of animals by classifying various animals and arranging them on a scale of increasing complexity which he referred to as *scala naturae* or "scale of nature" (Eschenberger, 1999).

Much later in the 17th century, the eminent British naturalist, philosopher and theologian, John Ray (1627-1705), published systematic works on animal and plant groups, and was credited with bringing order to the otherwise chaotic situation where naturalists of his time did not follow any rules in naming animals (Mader, 1988). What was then needed was the introduction of a workable system of zoological nomenclature which utilised a universally acceptable and unambiguous language. Latin was the language of choice, because it was a "dead" language which was not spoken by any country and was, therefore, no longer subject to the dynamics of form and meaning that characterised active spoken languages (Johnson, 1997). It was also considered a language of "mutual understanding" because its use involved no nationalistic conceit or bias, and, thus, averted any potential squabbling among the various countries of the world.

Latin was also the fundamental universal language of scholars of the time, and the language in which most books and manuscripts were written or printed. This made it ideal for use in a universal system of animal nomenclature, and provided the international recognition needed for accurate identification of animals and scientific research (Vines & Rees, 1974; Campbell, 1999). Sometimes, ancient or classical Greek, which is also a dead language is used. (*http.//en. wikipedia. org/w/index.php*).

Before 1750, taxonomists chose one Latin name for an animal, the genus, to which they added a series of descriptive Latin terms to represent a particular kind of animal, the species. Such names, referred to as polynomials, could consist of up to 15 Latin words (Raven & Johnson, 1995; Johnson, 1997). The American naturalist, Mark Catesby (1683-1749), employed Latin polynomials in his popular treatise, *The Natural History of Carolina, Florida and the Bahamas Islands*. He gave each species a descriptive Latin name in addition to English and French names. Thus, the ivory-billed woodpecker was named *Picus maximus rostro-albo* (largest woodpecker with a white bill), while the mockingbird became *Turdus minor cenereo-albus non maculatus* (small spotless greyish-white thrush) (Storer *et al.*, 1972).

The red-winged blackbird was *Sturnus niger alis superne rubentibus*, while the European bee was *Apis pubescens thorace subgriseo abdomine fusco pedibus posticis glabris utrinque margine ciliatis*. Such descriptive "polynomials" were quite useful but unwieldy and cumbersome, apart from the fact that they could be altered at will by later authors. It was, thus, impossible for two scientists comparing descriptions of two animal species to tell which organisms were being referred to, since no animal species had a unique scientific name. Despite these setbacks, the polynomial system became increasingly popular (Vines & Rees, 1974; Leftwich, 1983; Johnson, 1997).

Around the early to mid-18th century, the Swedish botanist, taxonomist and physician, Carl von Linné (Carolus Linnaeus) (1707-1778), the "father of taxonomy", started using the polynomial system in his work. With the large influx of new species identified by naturalists on collecting trips to other continents, however, Linné found the polynomial system quite burdensome (Garrity & Lyons, 2006) and sought to shorten each polynomial to a simple two-part Latin scientific name or binomen. The binomen retained the original generic name of the

polynomial, while a "shorthand" for the descriptive polynomial name became the specific name (Read, 1999). Linné, thus, provided a unique, stable, and enduring list of names to enable effective communication and effective information retrieval in all fields of the life sciences. He used the binomial system of nomenclature for the first time in the 10th edition of his popular treatise, *Systema Naturae* in 1758 (Leftwich, 1983), which grew from a 13-page pamphlet to become a 3,000-page document by the 13th and last edition in 1770. In this document, the ivory-billed woodpecker was renamed *Campethera (Picus) principalis*, the American mockingbird became *Mimus polyglottos*, and the European bee was then known as *Apis mellifera*. Linné was, however, not the first to use binomial nomenclature, but the first to use it consistently in his later works. Indeed, the terms "genus" (Latin for "birth or "origin") and "species" (Latin for "appearance" or "kind") had been proposed by John Ray a century earlier (Campbell, 1999; Hankins, 2007; Rey, 2007). The binomial system has survived virtually unchanged for the past 230 years, because, with its simplicity and convenience of use, it introduced some order into an otherwise chaotic situation (Johnson, 1997).

**International code of zoological nomenclature (ICZN)**

Unfortunately, the binomial system was dogged by controversy around the mid-19th century because it was adopted with virtually no governing rules (Robertson, 2004). This resulted in taxonomists sometimes giving the same name to two different animals or different names to the same animal. For example, some zoologists refer to the lion as *Panthera leo,* while others prefer the original name *Felis leo*. Also, new names were proposed for animals already described, either through ignorance or the belief that an original description was inadequate (Ride, 1999). These and other serious difficulties necessitated the establishment of an International Code of Zoological Nomenclature (ICZN), which provided guidelines for naming animal species and settling disputes concerning zoological nomenclature.

In 1842, a proposal titled *Series of Propositions for Rendering the Nomenclature of Zoology Uniform and Permanent* was presented to the British Association for the Advancement of Science (BAAS) by Hugh Strickland, a British ornithologist (Ride, 1999). The proposal was later named the British Association Code or Stricklandian Code, translated and widely circulated in the United States, France and Italy. It was finally adopted by BAAS in 1846, becoming one of the earliest attempts at regulating zoological nomenclature. In 1889, the First International Congress of Zoology in Paris adopted, in part, rules drawn up by Prof. Raphael Blanchard, and this was discussed extensively at the Second International congress in Moscow. In 1895, the Third International Congress of Zoology (ICZ) at Leyden (Netherlands) established a five-member Permanent International Commission on Nomenclature to prepare rules of zoological nomenclature and to report to the fourth congress at Cambridge, England in 1898. After the inclusion of 10 more members, the Commission prepared a 338-page International Code of Zoological Nomenclature (ICZN), which consisted of a preamble, five appendices, an official glossary, a detailed index, and 86 articles. The ICZN was ratified in 1901 at the Fifth International Congress in Berlin. In 1905, the Code, with the official title *Regles Internationales de la Nomenclature Zoologie* was published in French, English and German. There were several amendments at subsequent congresses in 1907 (Boston), 1913 (Monaco), 1929 (Budapest), 1930 (Padua), and 1948 (Paris) (Robertson, 2004), culminating in the publication of the 1st edition of the ICZN in 1961. The 2nd edition in 1964 incorporated amendments made at the 1953 congress in Washington, with the 3rd and 4th editions published in 1985 and 1999, respectively (Robertson, 2004).

The aims of the ICZN were to promote stability and universality in zoological nomenclature to avoid ambiguity, and ensure that the scientific name of each animal is unique and distinct (Stoll *et al.*, 1964), and ratifying any required animal name changes. Even though its authority is final, the provisions of the ICZN could be waived or modified in their application to particular cases where strict adherence to the rules would cause confusion. The ICZN does not recognise case, law or precedent, each case being adjudicated on its own merits. The rules are, however, not legally-binding in natural or international law, enforcement depending solely on voluntary agreement of zoologists to abide by them.

Apart from the ICZN, which regulates zoological nomenclature, there are three other counterpart codes for plants, fungi, algae and photosynthetic protozoans (International Code of Botanical Nomenclature), for bacteria and archaea (International Code of Nomenclature of Bacteria and Viruses) (Rey, 2007), and for cultivated plants (International Code for the Nomenclature of Cultivated Plants). Even though these codes may have certain features in common, they are independent of each other in regulating the formation and use of scientific names of the organisms under their jurisdiction. Because of this independence, it is theoretically possible that an identically-spelled name could be used for the three taxa (i.e. plant, animal, or bacterium). The ICZN has six principles, two of which are pertinent to this article: (i) Principles of Zoological Nomenclature, and (ii) Principle of Priority (Robertson, 2003). Some of the rules of the ICZN, as they relate to zoological nomenclature and priority, are discussed below:

**Some principles of zoological nomenclature**

*Creating scientific names*

Using naming rules outlined by the ICZN, the origins of scientific names could be descriptive, geographical, personal, or from miscellaneous sources (Schenk & McMasters, 1956).

*Personal.* Animals could be named in honour of a scientist for discovering and classifying or working with a species, to honour someone or a group of people for some remarkable achievement in any human field of endeavour, particularly the sciences, entertainment, politics, the arts, etc. In the world of biology, a fly, *Wallacea darwini*, was named after the two co-discoverers of natural selection, Charles Darwin and Alfred Russell Wallace. In Africa, a rat, *Malacomys cansdalei* (Cansdale's long-footed rat), was named in honour of the British forester George Cansdale, who worked in the then Gold Coast (Ghana) Forestry Service for 14 years in the 1930s and 1940s, during which he made extensive collections of small mammals and reptiles for museums and zoos (Cansdale, 1955).

The music world honoured the two German pioneering classical music icons Wolfgang Mozart and Ludwig van Beethoven by naming a wasp *Mozartella beethoveni* (Milius, 2001). The popular British pop group, the Beatles, had a nematode *Greeffiella beatlei*, named after them, while the tree frog *Hyla stingi* was named after Sting, a popular British musician, for his interest in environmental issues. The trilobite *Avalanchurus garfunkeli* was named after Art Garfunkel of the music duo Simon and Garfunkel. From the world of literature, two spider species were named *Orsonwelles othello* and *O. macbeth.* Political honourees, George Bush (U.S. President) Nelson Mandela (former South African President), have a slime mold beetle, *Agathidium bushi* and sea slug, *Mandelia* sp. named after them, respectively. The Dalai Lama was honoured with a Tibetan moth named *Dalailama* sp., and a coral reef fish *(Mirolabrichthys imeldae)* was named after the former first lady of the Philippines, Imelda Marcos. In the world of show business, the famous Hollywood film actor Harrison Ford had a spider *(Calponia harrisonfordi)* named in his honour (The Economist, 2006), while for sports, the tennis star Boris Becker had a sea snail *(Bufonaria borisbeckeri)* named after him (*http://cache.ucr.edu/~heraty/yanega.html.*

*Geographical.* Some scientific names indicate the general location of first discovery of a species. For example, *Calabaria reinhardtii* (Calabar python), and *Hipposideros abae* (Aba leaf-nosed bat), were both named after the Nigerian cities Calabar and Aba, respectively. The bird *Francolinus ahantensis* **(**Ahanta francolin) was named after the Ahanta-speaking people of Ghana's Western Region. West African species like the burrowing asp (*Atractaspis dahomeyensis)*, puddle frog *(Phrynobatrachus accraensis)*, and *Bufo togoensis* were named after the West African countries of Dahomey (now Republic of Benin), Accra (Ghana's capital city), and Togo, respectively. The scientific name of the African elephant, *Loxodonta africana*, reflects its African origin *(http://www.ric.edu/jmontvilo/109files(14)nomenclature.htm.*

*Descriptive.* The scientific names of animals could be onomatopoeitic, describing the sounds or noises made by the animals. Most geckos, particularly the males, make chirping and clicking sounds when mating or defending territory. The sound "gekoh" made by the male of the species of a type of gecko gave it the generic name *Gekko.* The male tokay gecko *(Gekko gekko)* is thought to make noises sounding like "tokay" and "gekoh" which reflect in both its scientific and common names (McCarthy, 1991; Whitfield, 1998). The hoopoe bird *(Upupa epops)* is named after a character in Aristhophanes' *Birds*, whose song went like *"….epopoi popopopoi…"* (Isaak, 2003). Some names reflect the body colour of a whole animal or parts of its body as well as certain peculiar characteristics it possess in terms of size, habits, body structure and behaviour. Examples of common African animal species named descriptively include *Dendroaspis viridis* (green mamba), *Naja nigricollis* (black-necked spitting cobra), *Naja melanoleuca* (black-and-white forest cobra), *Erinaceus albiventris* (white-bellied hedgehog), *Ardea melanocephala* (black-headed heron), *Python regius* (royal python), *Malacomys longipes* (long-footed rats), *Smutsia gigantea* (giant pangolin), and *Typhlops punctatus* (spotted blind snake). The hippopotamus, *Hippopotamus amphibius* is named for its amphibious existence, while the wild cat, *Felis sylvestris,* is named for its wild forest habitat.

*Miscellaneous.* The scientific names of some animals are coined by scientists just for the fun of it, just to make a point, or to claim some dubious record. For example, the mollusc generic name *Aa* is the shortest and first in an alphabetical list of animal generic names while *Aadonta* is the second (Milius, 2001; Fountain, 2005). The generic names *Zyzzyx* (wasp) and *Zyzzyxdonta* (snail) arose from attempts to coin names that would appear at the very bottom of such a list (Isaak, 2003). An attempt at creating the world's longest binomial resulted in the naming of an invertebrate (amphipod) from Lake Baikal in Eurasia as *Gammaracanthuskytodermogammarus loricatobaicalensis*. This 50-letter name was however, later invalidated by the ICZN (Milius, 2001; Isaak, 2002). Other such curious and humorous names include *Ia io* (Chinese bat), *Oedipus complex* (salamander), *Kamera lens* (protist), *Enema pan* (rhinoceros beetle), *Labia minor* (earwig), *Chaos chaos* (protozoan), *Colon rectum* (beetle), *Caecum* (mollusc), *Alabama* (Lepidopteran), *Florida* (bird), *Argentina* (fish), *Batman* (fish), and *Scrotum humanum* (dinosaur) (Menke, 1993; Milius, 2001; Isaak, 2002, 2003; The Economist, 2006).

**Writing scientific names**

All zoological nomenclature must use the Linnaean binomial system (Article 5), with the binomen latinized, regardless of the language from which the name was originally derived. The generic name represents the organism's relationship with other organisms, and must have the form of a Latin noun with a defined gender (nominative singular). For example, a lion has the generic name *Panthera* (panther, or large cat*)*, which it shares with tigers and leopards, but a

specific name *leo*, which is Latin for lion, distinguishing it from the other two, *Panthera tigris* (tiger) and *Panthera pardus* (leopard). It is recommended that the generic name be adaptive to Latin pronunciation and not very long. In zoology it must be written as a single word, even if compounded. For example, William-Hart should be written as Williamhart.

The specific name may be an adjective, a genitive or a noun used as an adjective. If the epithet is an adjective, it must agree with the generic name in gender (e.g. *Cervus elaphus* - red deer, *Tamiasciurus hudsonicus* - chickaree, which are masculine, and *Viverricula indica*, which is feminine). Also, with a generic taxon having a masculine name *Cervus*, an included species would be spelled *africanus*, the masculine form of the adjective. If the species were transferred to the feminine genus *Loxodonta*, its ending would be changed to the feminine form *africana*. The specific name must be a descriptive adjective agreeing in gender with the generic name, and following the rules of Latin adjectives (nouns come before adjectives) (Article 11). If the specific name is a genitive, named after a country, collector, etc. of nouns listed in apposition, the specific name needs not agree with the generic name in gender.

The binomen must always be *italicised*, or in handwritten manuscript, underlined (Hole, 1994). For example, the spitting cobra is *Naja nigricollis* and the common toad is *Bufo regularis*. The first letter of the generic name must always be capitalised, while the whole of the specific name should be in lowercase, even when derived from the name of a person or place (e.g. *Python sebae*- African python; *Pan troglodytes* - chimpanzee). The specific or trivial name must never be written by itself (i.e. without a preceding generic name), because several other species could have the same epithet provided they are not of the same genus. For example, a zebra mouse is *Lemniscomys striatus* (not *striatus*), since there are other generic names with *striatus* as the specific epithet: *Butorides striatus* (green-backed heron), *Chaetodon striatus* (striped butterfly fish). Similarly, *Galago senegalensis* (bushbaby), a mammal, *Centropus senegalensis* (Senegal coucal), a bird, and *Scorpaena senegalensis* (scorpionfish), all possess the specific epithet *senegalensis* even though they belong to different taxonomic groups. It is often advisable to add the common or vernacular name (if available) to a written scientific name. The full scientific name can be capitalised when used in a capitalised title or main heading, with or without italics, using the same type font as the main heading. When used in the title or main heading of an article, the full scientific name should be written in block letters (capitalised) with or without italics, and the type font should be the same as that of the title or main heading. If the type font of the general text is in italics, the scientific name should be written in normal type to distinguish it from the rest of the text.

It is sometimes permissible to use the generic of a particular animal alone, if only one species of the genus is known, or the particular animal is popular enough to be referred to by its generic name only, which then doubles as its vernacular name. For example, the aardvark (*Orycteropus afer)*, ostrich *(Struthio camelus)*, and giraffe *(Giraffa camelopardalis)* are referred to by only their respective generic names in casual scientific discourse without any confusion. Some other African animals with identical generic and vernacular names include the galago (*Galago* sp.*)*, caracal (*Caracal* sp.), hippopotamus (*Hippopotamus* sp.*)*, agama lizard (*Agama* sp.*)* and python *(Python* sp.*)*. It is advisable, however, to write the whole binomen in serious scientific discourse, because the generic names of some animals could also refer to the specific names of others which may belong to different taxa. Examples include one-humped camel (*Camelus dromedarius)* which is a mammal, and the *ostrich (Struthio camelus)* a bird; horrible moloch (*Moloch horridus)*,a lizard, and the titi

(*Callicebus moloch),* a South American monkey (mammal); sparrow (*Hirundo abyssinica)* a bird, and a bat (*Scotoecus hirundo),* which is a mammal; helmet guinea - fowl (*Numida meleagris)* and turkey *(Meleagris gallopavo),* both birds.

Subspecific names arise when populations of some species differ from other populations in morphology, physiology, behaviour, etc., that may warrant a separate identification but do not justify introduction of a new species name. Such subspecific names require the use of a trinomen (three-part name) or trinomial system (Rey, 2007) (article 5). For example, the forest elephant *(Loxodonta africana cyclotis)* is differentiated from its savanna counterpart *(Loxodonta africana africana),* and Western gorillas (*Gorilla gorilla gorilla)* are also distinguished from Eastern gorillas (*Gorilla gorilla beringei)* (Rosenberger, 2006). Extant human beings now belong to the subspecies *Homo sapiens sapiens* because recently fossils of extinct subspecies of humans dated 160,000 years ago have been discovered in Ethiopia and named *Homo sapiens idaltu.*

*Using abbreviations*

Once the full binomen or trinomen of a species has been listed or cited in a particular text, the generic name of a binomen, or the first specific name of a trinomial, can be abbreviated to only its initial letter in subsequent citations provided ambiguities can be avoided (Rey, 2007). For example, if several generic names begin with the same letter, it may be necessary to write all generic names in full. For example, *Panthera leo* (lion) can be abbreviated to *P. leo*, and *Loxodonta africana cyclotis* (forest elephant) would become *L. a. cyclotis.* Lists of species from the same genus can also be abbreviated by writing the full name of the first species in the list and abbreviating the rest, since it could be tedious to constantly repeat the full binomen or trinomen in a text, especially if it is a long word or is difficult to pronounce.

A list of the large cats of the genus *Panthera* would thus read *Panthera leo* (lion), *P. pardus* (leopard), and *P. tigris* (tiger). A very well known genus name can be abbreviated using the first letter only (e.g. *H. sapiens*-human being, *E. coli-Escherichia coli*) even on first citation. Sometimes, when the actual specific name of an animal is not known or confirmed, or when the names of several species of a genus are not important to the subject under discussion, the abbreviations "sp." (singular) and "spp." (plural) are used after the generic name (Read, 1999; Rey, 2007). For example, *Panthera* sp., refers to one type of species of the genus *Panthera* or "great cats", and *Cercopithecus* spp. refers to more than one species of the genus *Cercopithecus* or true Old World monkeys.

*Type specimens*

At the same time that a species is named, the preserved remains of that particular specimen (or group of specimens) must be designated as the type specimen(s) and deposited in a recognized zoological museum or other systematic collection. This will serve as a biological entity or name bearer of the species to be available for study by qualified scientists. The scientist who first does this becomes the describing author.

*Authority citations (ICZN article 50, 51)*

It is normal but not mandatory, when using a binomen in scientific publications, to follow it with the last name of the describing author, or the scientist who assigned the name for the first time (Mozley, 2002). The name of the describing author should, however, be written in normal type. This facilitates reference to the original description, even though this rule is often ignored in non-taxonomic articles (Mozley, 2004). Authority citations are important for differentiating homonyms when identically-spelled generic names are given to taxonomically-different organisms, and the only way to tell them apart in writing is the authority citation. For example, *Potamophylax* Wallgren, 1891 is an insect, while *Potamophylax* Myers and Carvalho, 1955 is a fish.

*Cannabis* Blyth, 1850 is a bird (Neave, 1940), while *Cannabis* Linnaeus is a plant. The author's name should be written in full or abbreviated (e.g. *Linn.* or *L*. for Linne), together with the date of publication of the name. A full specific name of an animal should, therefore, comprise the binomen followed by the author's name (e.g. *Fasciola hepatica* Linne) without interposing a comma or other punctuation. The date of description is sometimes included after the authority name, from which it should be separated by a comma (e.g. *Nereis diversicolor* Muller, 1776).

Where there has been a change of genus name by another author, the name of the original author of the trivial name is retained but placed in parenthesis. However, if reference is made only to the generic name, then the new author's name is written after the generic name. For example, when Leach changed the genus name *Pediculus* (louse) in some species to *Haematopinnus*, the pig louse, which was originally *Pediculus suis*, was renamed *Haematopinnus suis.* Since Linne provided the original name, the species is properly named *H. suis* (L.). Rarely in zoology, a double citation is used to indicate which author renamed a species with a genus different from the one in which the species was originally described. For example, the binomen *Grammitis suspensa* (Linnaeus) Proctor indicates a species originally described by Linnaeus but which has been renamed by Proctor, whose genus name is the one in current usage. It is worth noting that when a species is moved to a new genus, the ending of the specific epithet changes to match the gender of the new genus name. Epithets are treated like adjectives in Latin and must, therefore, correspond with the modified noun in gender. For example, *Chironomus plumosus* (Linnaeus) was originally *Tipula plumosa* Linnaeus).

*Principle of priority (article 23)*

Probably the most important and controversial rule of the ICZN is the Principle of Priority, which states that "if an animal has been given several names, the binomen first given to a species holds priority over all others used later or the valid name of a genus or species can only be the name under which it was first designated, on the condition that: (i) prior to January 1, 1931, this name was published and accompanied by an indication or definition or description, (ii) the author applied the principles of binary nomenclature. Thus, the first published name of an organism or group, thus, takes priority, and later names for the same organism or group become invalid junior synonyms. For example, in 1955, John Edward Gray named a species of pronghorn as *Antilocapra anteflexa,* but the species was later found to be just an unusual individual of another species *Antilocapra americana*, named earlier by George Ord in 1915. The earlier name, thus, took priority *(http://www.answers.com/topic/international-code-of-zoological-nomenclature.*

The earliest names recognised are those published by Linné in his *Systema Naturae* (10th edition, 1758). Where confusion or even more serious consequences may result, or if a junior synonym has been used very widely for a long period of time, the rule of priority is sometimes ignored (Ride, 1999). For example, in 1758 the domestic cat was named *Felis catus* by Carl Linné , and later in 1775, Johann Christian Daniel von Schreber named the wild cat *Felis sylvestris*. Some taxonomists regarded the two cats as a single species, so the rule of priority required the wild cat to be named *F. catus.* In practice, however, most authors still refer to the wild cat as *F. sylvestris.* A solution to the problem was for the ICZN to allow the use of the trinomen *F. sylvestris catus* by taxonomists who consider the domestic cat as a subspecies of the wild cat, while those who consider the two to be different species should retain the name *F. catus* for the domestic cat *[http://www.answers.com/topic/international-code-of-zoological-nomenclature.*

## Conclusion

According to one author, "zoology is fun; it can enrich your life by helping you understand the fascinating diversity of creatures that share this planet with us, it can also save your life" (Jessop, 1988). Zoological nomenclature is fun to study, but it requires the student of zoology to deal with a plethora of animal names, which could be off-putting. However, a well-trained zoologist, whatever his special interest, must be adequately acquainted with the rules of zoological nomenclature and general taxonomic practice. Many research projects, especially in West Africa, are often hampered in their progress through lack of precise knowledge of the animals concerned. Thanks to Linné's binomial system of nomenclature which has stood the test of time, however, it is much easier to name animals uniformly all over the world, and research results can be easily communicated and compared worldwide without ambiguity. Admittedly, zoological nomenclature is not the most important aspect of learning about animals in the world, but scientific names provide interesting and pertinent information about animals that are indispensable to the practising zoologist.

Because of the importance attached to animal names that are unambiguous and universally acceptable, growing numbers of biologists and taxonomists have been advocating for the creation of a mandatory web register of names of currently-existing or newly-discovered animals (Polaszek, 2005). Even though such records already exist, they are scattered across many journals and other publications, which are often difficult to access. A web-based open-access ZooBank is one such initiative proposed to be established and administered by the ICZN, which already has a similar register for bacteria. Another initiative is the Encyclopaedia of Life, or an "interactive zoo", a compilation of all information available on the earth's 1.8 million known species at one easily-accessible Web site. *[http://news.yahoo.com/s/ap/20070508/ap_on_sc/encyclopedia_of-life&printer=1;_ylt=Am…]*

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