Scientific Names, Common Names

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Dr. John Richard Schrock received his doctorate in entomology from the University of Kansas and is Professor of Biology at Emporia State University. The drawings in this issue are by the author.

THE KANSAS SCHOOL NATURALIST

WHY HAVE SCIENTIFIC NAMES

It does not take a biologist specializing in insects to recognize scientific names are included on a sheet covering an excerpt from Entomotaxonomia, a journal that specializes in descriptions of new species of Chinese insects. The Latin scientific names are as meaningless to most Western readers as the Chinese characters, but they would be recognized by biologists even though they did not read Chinese. Such latinized scientific names are recognized worldwide and contain elements that provide much more information to the scientist; some of these features are explained further in this booklet.

Scientific names have two major functions. First, they provide a hand on organisms. Named organisms can be alphabetically stored and retrieved from large collections by assistants totally unaware of the classification system. And further research on the life history, behavior and other biology of a plant or animal can be assembled under the name until a complex understanding of the species is gained.

A scientific name of a plant or animal also places it within a complete classification system that reflects what is currently understood about evolutionary relationships. This system takes into account external and internal structures.

John Richard Schrock is an assistant professor of biology education program, teaches zoology and School Naturalist. Much thanks is due to the broad discussion: Drs. E.O. Wiley, Robert T. Laurie Robbins, and Peter Hoch. Also thanks to Alex Slater for reading the manuscript and in this booklet were summarized in the Feh zoologist R.E. Blackwelder. All opinions exp
SCIENTIFIC NAMES, COMMON NAMES

John Richard Schrock

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A scientific name of a plant or animal also places it within a complex classification system that reflects what is currently understood about evolutionary relationships. This system takes into account external and internal structures, physiology, DNA, and all we can piece together about the biogeography and fossil record of ancestors.

WHO ESTABLISHED SCIENTIFIC NAMES?

European biologists in the Middle Ages studied and communicated in Latin. At that time, organisms were distinguished by long Latin phrases and paragraphs. Peter Sneath gives one example in the most recent edition of Bergey's Manual: "Tulipa minor luteo itala folia latiore" which translates "the little yellow Italian tulip with broader leaves." Carol Linnaeus, a Swedish naturalist with a latinized name of Carolus Linnaeus, reduced Latin descriptions to just two words. For the above tulip, the species name would be Tulipa lutea or "yellow tulip." Even if other colors of this tulip were found to be more common, the species name remained constant because it was more important as a stable name than as a description.

Often, our whole system of nomenclature is called "binominal," and indeed the Linnaean system is binominal at the species level. However, the names of groups (taxa) at higher levels in the hierarchy are single names. And where subspecies of animals are recognized, the scientific name becomes a trinomial.
WHAT ARE THE PARTS OF A SCIENTIFIC NAME?

The rules for naming (nomenclature) are outlined in the International Code of Zoological Nomenclature for animals, International Code of Nomenclature of Bacteria for bacteria, and the International Code of Botanical Nomenclature for plants, fungi and lichens. In all cases, scientific names are latinized but may be a name from any romanized language. Many names are Latin or Greek words that describe some feature of the organism. Scientific names are always printed in italics; if handwritten or typed, they are underlined which indicates italics to a printer. The purpose is to make the scientific name stand out from the text; so sometimes when an article title is in italics, the scientific name in the title is in plain Roman.

Didelphis virginiana Kerr, 1792

The scientific name above is a binomial made up of a capitalized genus name and the lower case specific epithet. It names a species of opossum and includes the author (Kerr) who first recognized it was distinct and named and adequately described it, and the year of its publication (1792). As teachers, we probably call the specific epithet "virginiana" the "species name" but this is a problem because it leads students to equate such a "species name" with scientific name.

A HIERARCHY OF GROUPS IS NOT A CLASSIFICATION

Many high school and college biology texts illustrate "classification" by showing a listing similar to this for some organism:

<table>
<thead>
<tr>
<th>Categories</th>
<th>Taxa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kingdom</td>
<td>Animalia</td>
</tr>
<tr>
<td>Phylum</td>
<td>Chordata</td>
</tr>
<tr>
<td>Class</td>
<td>Mammalia</td>
</tr>
<tr>
<td>Order</td>
<td>Carnivora</td>
</tr>
<tr>
<td>Family</td>
<td>Felidae</td>
</tr>
<tr>
<td>Genus</td>
<td>Felis</td>
</tr>
<tr>
<td>[Wrong!] Species</td>
<td>concolor</td>
</tr>
</tbody>
</table>

There are at least two errors. First, this list does not classify or group anything; it simply lists the hierarchy of groups to which this animal has been assigned.

The second error is calling "concolor" the species name. The name of the species is the full scientific name and the correct listing for this bottom line is:

Species Felis concolor

No animal belongs to concolor, but the cougar can be said to belong to Felis concolor. The adjective "concolor" could be used with many generic names.

A third common error in textbooks is the statement that a class is divided into orders, an order into families, and a genus into species. In actual practice, a genus is made by combining species, and most families by combining genera. Families are rarely formed by dividing an order.

In spite of extensive efforts in the 1960s by Dr. R.E. Blackwelder to correct this fuzzy thinking, the confusion continues today, indeed becoming even more rampant as botanists and zoologists disappear from many university biology departments.

EXTENDED HIERARCHIES

In large groups of organisms, many distinctions may be made requiring additional categories (levels) to hold more taxa (groups).

CATEGORIES BELOW SPECIES

The Zoological Code recognizes a three-part scientific name or trinomial. The third segment is the subspecies name. Subspecies indicate distinct variation in species with ranges that usually do not overlap. Yet since they are close enough related that gene flow might flow back and forth, they remain the same species. If some geographic barrier isolates the subspecies, they could diverge over time until they cannot interbreed when rejoined, at which time they would acquire the status of species.

Many "varieties" of plants are named, although this does not constitute a trinomial under the Botanical Code. Some varieties can exist in the same range.

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INTENDED HIERARCHIES

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"Forma" is also used for plants and fungi; one species of fungi where different strains are parasitic on different host plants would have several forma names.

One species of bacteria may occur in variations called biovars (different biochemical properties), serovars (distinct antigens), pathovars (causing variable diseases or in different hosts), phagovars (vulnerable to different viruses) or morphovars (with unique structures).

ARE CATEGORIES "NATURAL"?

Does a "phylum" exist in nature, waiting to be discovered? Do several species naturally cling together to form a genus? Not all biologists will agree with this author, but generally only the species exists in nature. There is good reason to believe that for sexual organisms, they operate in such a fashion that they recognize others of their own species, and as with asexual organisms, they share an evolutionary fate separate from that of other species. However, higher categories are strictly mental constructions that help scientists understand relationships. Classes and orders and families do not naturally exist in nature apart from our imagination.

ABBREVIATIONS

Many scientific names are very long. Considering that there ultimately may be as many as 10 million species, and there is a need to keep names distinct and meaningful, it is impossible to keep them all short anyway. In the case of the malaria-carrying mosquito *Aneopheles quadrimaculatus*, can a biologist avoid using the full name repeatedly in an article? We have already ruled out using "quadrimaculatus" alone since it is only a fragment and can occur in other insect's names as well. But once the full name is used in an article, the author may abbreviate it to *A. quadrimaculatus* thereafter. However, if there is another mosquito genus that starts with that...
letter, and species of both are discussed, as would be the case with the yellow-fever mosquito *Aedes aegypti*, then the abbreviations that follow the use of the full names are kept distinct: *Ae. aegypti* and *An. quadrimaculatus*.

Sometimes a specimen can be identified as belonging within a genus, but the worker is not expert enough to determine which species it is. Or it may be an undescribed species in that genus. For example, a single unknown species of mosquito might be "*Aedes sp.*" while several undetermined species in this genus could be referred to as "*Aedes spp.*"

**NEITHER TYPICAL NOR REPRESENTATIVE**

Many teachers and textbooks provide simplified diagrams of an organism such as follows:

![Daphnia](image)

Blackwelder long ago pointed out that the label is of a genus, and the genus *Daphnia* can not have eyespots or a tail. What a teacher or author means is this is a "diagram of a specimen of some unspecified species of *Daphnia*." Authors and teachers will continue to short-cut by abbreviating this to *Daphnia* but real specimens that vary from this averaged diagram will cause some students to misidentify organisms. Since such generic labels are not self-explanatory to students, teachers should take a moment to clarify "it is a generalized example of . . . ."

A similar error is to state that any one species is "typical" or "representative" of a particular family or order. Stating the pigworm in the genus *Ascaris* is "representative" of roundworms is equivalent to saying the blue whale is "representative" of mammals—both are giants compared with other roundworms and mammals respectively. But would a human or a dog or a mouse be any more "typical" or "representative" of mammals? The more biology students learn about these organisms, the more they become aware of the diversity and uniqueness of mammals. In virtually all cases where we use "representative of" and "typical of" in textbooks and discussion, we can be more accurate in saying "this is an EXAMPLE of . . . ." and imply no more.

**A FEW TERMS**

Biology teachers often ask students "Can you classify this?" when what they really are asking is "Can you identify this?" Just as science teachers avoid confusing "temperature" and "heat," we must be careful not to confuse the processes of identification and classification. To clarify these different concepts, consider the three objects drawn below:

![Objects](image)

If you asked students to identify them, students would reply "bolt, nail, and screw." They have identified the objects by common name, but they have not classified them. The question "Can you classify these?" asks the students to place them into groups showing which are closely related. Classification requires three items so two closely-related items can be compared with a distantly related third. Most students would probably "classify" the three objects with the bolt and screw "related" because they both are manufactured with threads which the more "distant" nail lacks. In biology, of course, classification is based on our best idea of how organisms evolved to share patterns of traits. Such a "family tree" trace phylogeny has tremendous explanatory powers for addressing many biological questions.

**Identification** is simply the process of determining the correct name and current usage to go with an organism. Usually aided with identification keys, a crop scout may identify the difference between grasshopper and assay its numbers in corn field to determine if spraying is needed. However, he may have no idea of the classification of the grasshopper or how it was named.

**Nomenclature** is the use of appropriate rules in applying names.

**Classification** is the process of grouping organisms, usually to reflect the maximum shared characteristics and also evolutionary relationships. Classification is also the product of this process.

**Taxonomy** is the study of the principles, procedures, rules and theories of classification.

**Systematics** is the science that encompasses all that is known about organisms’ structures, physiology, ecology, behavior, and biogeography to classify them. Should students know all of the distinctions? Or is this just "splitting?" The progress of education, intellectual growth, can be assessed how carefully our students use words. There is a misguided effort current underway in science education to drastically reduce the number of "technical words" in biology texts, based on the observation that first-year biology introduces more terms than introductory foreign language courses. Much of this cutback targets taxonomy names and comparative anatomy. Sad
"representative" of roundworms is equivalent to saying the blue whale is "representative" of mammals—both are giants compared with other roundworms and mammals respectively. But would a human or a dog or a mouse be any more "typical" or "representative" of mammals? The more biology students learn about these organisms, the more they become aware of the diversity and uniqueness of mammals. In virtually all cases where we use "representative of" and "typical of" in textbooks and discussion, we can be more accurate in saying "this is an EXAMPLE of . . ." and imply no more.

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Taxonomy is the study of the principles, procedures, rules and theories of classification.

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Should students know all of these distinctions? Or is this just "hair splitting?" The progress of education, of intellectual growth, can be assessed by how carefully our students use words. One species of plant or animal can have but one correct name; other names given to a species are rejected synonyms. However, if the "correct" name has to be changed for some reason, a name rejected earlier may

WHO DESCRIBED THE MOST SPECIES?

Entomologists have the most organisms to work with and some far exceed other biologists in describing new species. The American dipterist C.P. Alexander described more than 10,000 species of flies. But the record is held by a British entomologist, Francis Walker (1809-1874), who named about 20,000 new species across many insect orders. The British Museum paid him one shilling for each new species and one pound for each new genus he erected, and some considered him a "... mere describing machine." Some descriptions consisted of but two or three lines and by today's standards were terrible. However, many of Walker's names are still valid today and no careful modern entomologist is likely to want to challenge his "record."

WHAT IS A "REJECTED SYNONYM"?

Sometimes one species is given two or more names. This may result when the organisms are highly variable and one taxonomist gives a name to each color form. More often, two researchers describe and name the same species, unaware of the other's work. According to the rule of priority, the name accompanying the first description published is the accepted scientific name.

One species of plant or animal can have but one correct name; other names given to a species are rejected synonyms. However, if the "correct" name has to be changed for some reason, a name rejected earlier may
"Ballpark estimates" of the numbers of named and yet-to-be-described species reveal the diversity of arthropods, plants, fungi and molluscs. Estimates for mammals, birds, and U.S. insects and arachnids (see Kostarab and Schaefer's "Systematics of N. American Insects and Arachnids: Status and Needs," 1990) are likely to be fairly close to actual numbers. Other estimates, particularly the extrapolation of tropical arthropods, are highly subjective. Naming and describing one stage of each species is not the end but the beginning of systematic biology. Many organisms will require further work to discover and describe quite different stages (e.g., eggs, larvae or juveniles, pupae, sexual forms). It is estimated that less than two percent of insect larvae have been described.
become the new name. In zoology and botany, rejected synonyms are not "available" for use in naming new species. Therefore, specialists have to know much about the earlier work on their group of organisms. Bacteriologists however, have established a baseline list of accepted names as of January 1, 1980 and some rejected names can be used to name future new species of bacteria.

Checklists and major revisions of groups note the commonly-used rejected synonyms (sometimes called "junior synonyms") so readers will be less confused by name changes that have occurred over time in scientific literature.

WHAT DO THE INTERNATIONAL COMMISSIONS ON NOMENCLATURE DO?

There are three separate commissions on nomenclature with jurisdiction over animals, bacteria, and plants and fungi. Generally the commissions perform three functions: 1) recommend changes in the Code, 2) render opinions on interpretation, and 3) may suspend rules under certain conditions. How does this operate for animals? If the International Commission on Zoological Nomenclature recommends a change in rules or a new rule, it must be approved by the International Congress of Zoology. They keep watch for new developments that may require interpretation and they occasionally must consider the problem that can be caused by the "rule of priority." For example, a common organism may have been known for a long time by a well-known scientific name. Then a researcher discovers the species was described under another name even earlier, but in an obscure journal everyone overlooked. While the rule of priority directs that the newly-discovered older name be used, a substantial body of literature would then cite a rejected synonym. And it might be impractical to retrain scientists worldwide if this was a well known species. In some cases, international commissions will suppress the name with priority to avoid wholesale confusion.

WHO ENFORCES THE RULES OF NOMENCLATURE?

Neither the international commissions nor congresses can enforce the rules. There are no uniformed "science cops" and there is no formal policing of scientific journals and presentations. Only the weight of opinion of practicing systematists, editors and colleagues in peer review produce the orderliness of the classification system. Dictionaries and checklists are not lawbooks that compel usage but history books that reflect how names are used. Textbooks and teachers often overstate the powers of the international commissions.

WHAT IS A "SPECIES"?

How does a biologist know that the organism he or she is working with is different from others in a biologically-important way? What makes it a different species?

One modern definition is that: a species is a group of interbreeding natural populations that are reproductively isolated from other groups. This "biological species concept" elaborated by Dr. Ernst Mayr of Harvard University provides a test for sexual organisms: if they can successfully mate and produce fertile offspring, they are one species. However, successful mating is generally inferred by observations of populations in the wild, and is rarely put to a laboratory test. Some organisms propagate asexually; many others can be reared to conduct such mating tests.

Dr. E.O. Wiley of the University of Kansas has proposed the evolution species concept: an evolutionary species is a single lineage of ancestral descendant populations that maintains its identity from other such lineages. Only it has its own evolutionary tendency and historical fate. Simply, if an organism has a separate evolutionary future from another lineage, it is a separate species.

In practice, taxonomists work with preserved material and must base their decisions mostly on morphological structures.

WHEN THEY ALL LOOK ALIKE

Sometimes organisms look identical and are named one species. What is thought to be one species of cricket was found to have populations that sang distinct songs. Since each group attracted its own mates, this meant the groups were reproductively isolated and were two species.

In another case, "one" salamander was found to be several species by simply looking at differences in their eggs. Although we do not know how the seemingly identical salamanders select the proper mates, their distinct proteins indicate they are different species. Other species, with a separate evolutionary future, are different species.

WHAT IS A "TYPE SPECIMEN"?

Type specimens serve as nomenclature bearers. The type carries a myriad of external and internal features that are not all written in the original description. Indeed, new techniques come along that will allow for the examination of a specimen or culture. Types are also used to compare
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In another case, "one" salamander was found to be several species based only on differences in the allozymes. Although we do not know how these seemingly identical salamanders select the proper mates, their distinctly different proteins indicate they select only their groups, and with a separate evolutionary future, they are different species.

WHAT IS A "TYPE SPECIMEN"?
Type specimens serve as namebearers. The type carries a myriad of external and internal features that were not all written into the original description. Indeed, new techniques may come along that will allow further examination of a specimen or culture. Types are also used to compare with potential new species. When what was thought to be one species is found to be two separate species, the original name stays with the original type specimen.

ARE "TYPES" TYPICAL?
Types are not "typical." Early workers had the idea that a type specimen was selected as a "perfect" representative of the species and variations from the type were "imperfect." This is called the typological species concept. Today, we understand that members of populations vary widely and that no individual is representative or typical of any species, just as no one person is "typical" of Homo sapiens. If a biologist wishes to study the variation in a species, the population must be sampled and the single type (namebearer) holds no special value.

WHAT ARE VOUCHER SPECIMENS?
Studying the ecology of a grass? Perhaps the metabolism of a frog? If the research is related to a particular species, it is nearly always vital to place preserved specimens from the study in an appropriate collection and publish the location along with the research. Such a specimen is called a voucher. Future researchers can then locate a sample and confirm its identity in case the species is split in the future. The number one error in current biological research is the failure to recognize the need for vouchers.

WHY DO THEY KEEP CHANGING SCIENTIFIC NAMES AND CLASSIFICATIONS?
This is a question heard not only from laypersons but also from biologists who are not trained in organismic biology and systematics. Why Cnidaria instead of Coelenterata? Why is our
trusted laboratory frog *Rana pipiens* now 20 species? Some of the changes are discoveries of prior names. But systematics is a dynamic science that refines our understanding of species and their evolutionary relationships. If changes were never made, we would still be grouping birds and bats together as creatures of the air in Aristotle’s ancient system.

**HOW DOES THE BOTANICAL CODE DIFFER?**

Unlike zoologists, botanists retain both the name of the original author and the revising author in a full citation. 

*Ipomoea pandurata* (Linnaeus)  
G.F.W. Meyer var. rubescens Choisy

This citation for the bigroot morningglory is quite lengthy. The species was originally named by Linnaeus but in another genus. G.F.W. Meyer relocated it in *Ipomoea*. Then Choisy recognized a variety with a shiny leaf different from the standard form with hair under the leaf. While zoologists use subspecies to form a category "division" in place of "phylum" in their hierarchy, botanists preserve author names and do not recognize trinomials. Botanists also use the category "division" in their hierarchy.

**BACTERIOLOGY**

Bacterial names are regulated by the International Code of Nomenclature of Bacteria last published in 1975 and sometimes called the Revised Code. It differs from the codes for botany and zoology in establishing an official list of names current through January 1, 1980. This bold attempt to stabilize the nomenclature eliminates the need for searching remote literature for published names and descriptions before that date. The Approved List of Bacterial Names published in 1980 compiles all valid bacterial names up to that year. After that date, all new bacteria are to be described in the *International Journal of Systematic Bacteriology*, or if they are described elsewhere, they must also be announced in this journal.

Bacteria differ from other organisms in presenting very few structural features. Instead they show their great variability in physiology by growing in various media and responding to biochemical tests. When bacteria cannot be grown in an artificial culture, they must be studied in the natural environment or in tissue cultures. This limits detectable traits to observable structures, stain reactions, and ability to cause disease. In complete contrast to zoology and botany, the bacteriological code specifies that living type strains accompany each species and that these be available in cultures. Identification of pure cultures then rests on consistent traits such as the ability of live bacteria to digest various sugars. Since culture strains are easily contaminated over time, and pure cultures may soon lose traits when grown on selective media, type culture collections take care to maintain the characteristics of the original culture. For this reason, bacteriologists never relied heavily on descriptions of organisms isolated before 1900 when pure culture techniques began. The major collection in the U.S. today is the American Type Culture Collection (ATCC).

Bacterial taxonomy mostly serves the practical application function of labeling an organism; the evolution of bacteria is far less known than that of plants and animals. And because of rapid generation times, the evolution of microorganisms (change over time) can be very fast. Therefore, new techniques that compare DNA of different organisms may cause more changes in the taxonomy of bacteria than what they are applied to plants or animals.

*Yersinia pestis* (Lehmann and Neuman 1896) Van Loghem 1897

The full citation for the plague bacterium *Yersinia pestis* above, reveals that it was first recognized as a species by Lehmann and Neuman in 1896 under another generic name. It was originally placed in a genus *Bacterium* which contained such a wide variety of bacteria it soon was split. It finally was placed in *Yersinia* in 1914 and the names of the original and revision authors are preserved in the citation similar to botany but not zoology. Also, with a citation is the note that the type strain is at the American Type Culture Collection, number 19428. The
This may suffice for the
biology and botany, the
standard reference
Ainsworth's and Bisley's

Categories
Kingdom Prokaryotae
Division Gracilicutes
Family Enterobacteriaceae
Genus Yersinia
Species Yersinia pestis

The shortened hierarchy of categories
to which the plague organism belongs,
according to Bergey's Manual of
Systematic Bacteriology, indicates the
higher taxonomy is in a state of change.

One last difference in the Revised
Code is that it allows synonyms
different names based on the same
type) to be officially listed in order to
give taxonomists the freedom to follow
different classification schemes. Again
this reflects how little we know about
classification compared to the
evolution of plants and animals.

WHAT ABOUT VIRUSES?
An International Committee on
Taxonomy of Viruses (ICTV) was
founded in 1974 to carry on the charge
to develop an official naming system for
viruses. No Code has yet been approved
but virologists generally work from a set
of rules. Technically names only become
official when approved by the ICTV.

In discussing viruses with students,
it is important to note that they differ
from the other groups here insofar as
they are not independent living entities
but gain their life-like ability to

"biovars" exist of this species; these are
variations in biochemical reactions
making strains found in the U.S.S.R.,
Central Africa and Asia, and elsewhere
all slightly different. Such distinctions in
biochemistry, antigens, and hosts made
below the level of species have no
official standing in bacterial
nomenclature but are very useful in
practice. All of them cause the "black
plague" in rodents and man.

The full citation for the plague
bacterium Yersinia pestis above, reveals
that it was first recognized as a species
by Lehmann and Neuman in 1895 but
under another generic name. It was
originally placed in a genus Bacterium
which contained such a wide variety of
bacteria it soon was split. It finally
was placed in Yersinia in 1944 and the
names of the original and revisionary
authors are preserved in the citation,
similar to botany but not zoology. Along
with a citation is the note that the type
strain is at the American Type Culture
Collection, number 19428. Three

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propagate and evolve only from their incorporation into host cells. They are not so much "living" or "dead" as activated or inactivated. Much of their morphology is at a molecular level. Therefore their names may reflect their chemical makeup or their host and the disease it produces.

LICHENS
Lichens represent a relatively small group of organisms, each made of an alga and a fungus living together. This symbiosis is so evolved and dependent that either component cannot survive alone in the natural environment. Since their evolutionary fate is linked together, they constitute but one species, and they have been classified based on the structures of the fungus.

ALPHA, BETA, AND GAMMA TAXONOMY
Students will sometimes encounter the term "alpha taxonomy." Specialists will often publish descriptions of new species as soon as they are discovered. This establishes the existence of the organism (and credits the author, of course). As related species become known, and as ranges are filled in, the relationships of a number of species may be published as "beta taxonomy." Eventually, the variation of each species will be measured, the probable evolution worked out, and the cause of this variation over time will be somewhat understood; this is sometimes called "gamma taxonomy." For the general biology student, it is usually enough to understand that alpha taxonomy serves as an initial pigeonholing of the world’s diversity, and subsequent revisions gather together the accumulating web of information and provide ever-more-powerful causal explanations for all the diversity. For this reason, systematics has been called the "queen of the biological sciences."

NOTE: There is a current trend to base the value of research articles on the number of times they are cited in the years immediately after they are published. However, good systematic revisions that often take years to complete may have the opposite effect of "mining out" or "cleaning up" the field for some time to come. Indeed, for a major revision to be followed by a flurry of additional revisions and articles might be an indication the revision was poorly done. Citation indices, if they do have any validity, are not appropriate in the field of systematics.

WHY COMMON NAMES?
Cougar, mountain lion, or puruá—three names but one species. Locusts—both cicadas and some grasshoppers. Mudpuppy or waterdog? And would you recognize these names translated into other languages?

The need to be precise and universal makes vernacular names of organisms nearly useless in science. Yet there are many non-scientists who deal with living organisms but are not in a position to learn complex nomenclatures and classifications:

- the general public is interested in the local wildlife and garden species
- amateur birdwatchers keep checklists and note fluctuations in populations
- tropical fish hobbyists raise and breed exotic species
- industry workers utilize plant and animal products
- journalists chronicle interesting life histories and explain developments such as Lyme disease to the public
- import-export laws attempt to regulate trade
- fish and game laws must be enforced

and government regulations protect endangered and threatened species are critical to their survival
In each case, trained workers must communicate with everyday folk who are not going to know the scientific nomenclature. Simply, a farmer who goes "possum-hunting" with his dog is unlikely to realize he is going Didelphis virginiana-hunting with his Canis familiaris.

SHOULD COMMON NAMES BE STANDARDIZED?
Ever stop at the entrance to a grocery store where a sign says "animals allowed"? After all, you are a biological sense an "animal." Other comments about "insects and animals," "plants and trees" as if they were separate. In some states, a bullfrog classified as aquatic game and requires a fishing license, but of course isn’t fish! Indeed, traveling across a state line nearly guarantees that the definition of "game animal" will change. There is a tremendous amount of fuzzy thinking and inaccurate communicating using varying common names of both species and higher taxa. Because of this, various groups of biologists have proposed "official" common names for the subset of organisms that the public commonly discusses. And there are generally-recognized-but-not-always-followed rules that help a reader understand more about an organism when common names are used properly.

GENERAL PRINCIPLES
"Vernacular names" consist of the whole constellation of names used to identify species and groups of organisms across the countryside. "Official" common names are selected by various professional bodies on a one-name-one-species basis. Prior publication has no status and the sets of rules...
...and government regulations of endangered and threatened species are critical to their survival. In each case, trained workers must communicate with everyday folk who are not going to know the scientific nomenclature. Simply, a farmer who goes "possum-hunting" with his dog is unlikely to realize he is going Didelphis virginiana-hunting with his Canis familiaris.

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There is no universal common name code of nomenclature. American entomologists have a procedure where common names are proposed before the entomology community. This provides an opportunity for others to comment and detect potential problems before the name is added to the official list. Some lists are established more-or-less by the decree of one or a few authors. The "validity" of such names ultimately rests upon the extent they are accepted.

Common names of organisms should be in lower case except when incorporaring a proper name; this usually conveys more information. For instance, if this rule is used, a "Red River snail" would have been named because it was from the Red River, and could be distinguished from a "red river snail" that was named as a red-colored river snail. To use upper case (Red River Snail) hides this difference. The lists of insect and mollusk common names (by the Entomological Society of America and the American Malacological Union respectively) recognize this advantage, but the American Ornithological Union checklist of birds and Standardized Plant Names capitalize their common names.

SCIENTIFICALLY "COMMON"

The commonly-used name for some plants is taken from the scientific name. You probably recognize hibiscus, aster, cosmos, magnolia, iris, trillium, impatiens, rhododendron, phlox, eclemanis, sassafras, and nasturtium. These common names are also the generic name (genus) for those plants.
Project Learning Tree: An Environmental Education Workshop
Saturday, December 1 8:30 a.m. - 3:30 p.m.

This workshop for teachers of students K-12 allows participants to take part in hands-on activities, indoors and out, to help children think creatively, solve problems, and have fun while learning. Included is a PLT Activity Guide and a subscription to the PLT newsletter. John Strickler, Extension Forester at Kansas State University and State Coordinator of Project Learning Tree, will be the facilitator. The registration deadline is November 1. The fee is $20.00. For registration information, call the Office of Public Education at (913) 864-4173.

Life on Earth hosted by David Attenborough is the best survey of animal and plant diversity ever filmed. While supplies last, a 232-minute short version is available as VHS 755963 for $39.95 plus $4.95 shipping from Publisher's Central Bureau, One Champion Avenue, Dept. 271, Avenel, NJ 07112; (201) 382-7960. However, many of the excellent teaching examples are edited out. The full series is available in 27 30-minute segments on VHS format for $995 total from Films Incorporated, 5547 North Ravenswood Avenue, Chicago, IL 60640-1199; phone (800) 323-4222 (occasional special offers may halve this price).

TRUE BUGS AND FALSEFLIES

Common names can give valuable clues about an organism. Not all insects are "bugs." Indeed, only those insects with a beak and some other features of the order Hemiptera are "bugs." When you read a common name such as bed bug, stink bug, and lace bug, you know it belongs to the Hemiptera or true bugs because the names are separate. The lightningbug and Junebug are beetles and the sowbug is not even an insect. True flies in the order Diptera have one pair of developed wings and include the house fly, horse fly, and screwworm fly. The dragonfly, dobsonfly, sawfly, and firefly are not flies, and the common name shows that.

COMMON NAME LISTS

To assist the scientific community in developing public awareness and more careful use of common names, we can "clean up" our lectures and writing by adopting standardized common names.