

SCIENTIFIC NOMENCLATURE & FISH COLLECTION TOUR

PURPOSE

This “lab” is meant to serve (hopefully) as a review of the Linnaean hierarchy of classification, and of the basics of scientific nomenclature.

NOTE: Future labs will typically contain less background material, and will be accompanied by questions and/or exercises that must be answered in your laboratory notebook. For today’s “lab,” it is not necessary to answer questions (as there are none), or take detailed notes, but to simply make note of the things you are not familiar with.

OVERVIEW

Scientific nomenclature

- *Linnaean hierarchy of classification*
- *Rules on names and naming (i.e. endings in zoological nomenclature, Linnaean binomials, word origins)*
- *Authorship*
- *Purpose*

UW Fish Collection tour

LINNAEAN HIERARCHY OF CLASSIFICATION

The distinction between a hierarchy and a key, and consideration of the relationships between the two, are essential to understanding either one of them. Nevertheless, in FISH/BIOL 311 we will be concerned almost exclusively with classifications in the form of hierarchies (i.e., interested sets of taxonomic categories and names; see “Rules on Names and Naming” below). Throughout the course, we shall be using a single form of hierarchy that has been adopted by general agreement for most all zoological classifications and which is the basis for most all zoological nomenclature. This hierarchy first developed in the late seventeenth and early eighteenth centuries and reached nearly definitive form (at least for zoologists) in the tenth edition of the *Systema Naturae* published by Carolus Linnaeus in 1758, for which reason it is called the Linnaean hierarchy. Its basic feature is a sequence of seven levels:

Kingdom
 Phylum
 Class
 Order
 Family
 Genus
 Species

The sequence from top to bottom and the customary indentations indicate a decreasing scope or inclusiveness of the various levels. The number of kinds of organisms to be classified has

now become so enormous that seven levels are rarely enough in practice. The deficiency has been made up, for the most part, by adding additional levels designated as *super-* lying above the various basic levels and as, successively, *sub-* and *infra-* lying below them. Numerous proposals to add to the seven basic levels have also been made, but these have not been standardized and are not in general use. It is unnecessary to list all of them, and the use by any particular taxonomist can be picked up readily enough in his or her own work. Those in widest use are probably *cohort*, placed between class and order, and *tribe*, usually, but not always, placed between family and genus. An example of a complete hierarchy used in the classification of a large group of animals (e.g., mammals) is as follows:

Kingdom
 Phylum
 Subphylum
 Superclass
 Class
 Subclass
 Infraclass
 Cohort
 Superorder
 Order
 Suborder
 Infraorder
 Superfamily
 Family
 Subfamily
 Tribe
 Subtribe
 Genus
 Subgenus
 Species
 Subspecies

This example has twenty-one levels. Use of all possible super-, sub-, and infra- levels between kingdom and subspecies would give thirty-four, probably more than is ever really needed in practice.

RULES ON NAMES AND NAMING

Latinized scientific names ending in *-morph* are nearly always class or superclass.

Latinized scientific names ending in *-morpha* are nearly always superorder.

Latinized scientific names ending in *-iformes* are always orders.

Latinized scientific names ending in *-oidei* are always suborders.

Latinized scientific names ending in *-idae* are always families.

Latinized scientific names ending in *-inae* are always subfamilies.

Latinized scientific names ending in *-ini* are always tribes.

Names of species are always binomial, that is, they consist of two, and only two, Latinized words, a generic name that is always capitalized and a specific name that is never capitalized, for example, *Linophryne quinquerosus*.

Names of subspecies are always trinomial, that is, they consist of three, and only three, Latinized words, a generic name that is always capitalized, a specific name that is never capitalized, and a subspecific name that is never capitalized, for example, *Gasterosteus aculeatus aculeatus*.

The Latinized names of higher taxonomic groups such as families and orders are always capitalized because they are proper nouns. Sometimes the name of a family or order is converted into English as an adjective, in which case the name is no longer capitalized; for example, Acipenseridae becomes acipenserid, Lophiiformes becomes lophiiform.

Family names are always derived from a generic name, thus every family, without exception, must contain one genus that bears the same root, for example, *Salmo* is the basis for Salmonidae, *Cyprinus* is the basis for Cyprinidae, and *Thaumatichthys* is the basis for Thaumatchthyidae.

Generic, specific, and subspecific names should always be italicized. All other scientific names, from kingdom to tribe and all categories in between, are never italicized.

The word “genus” is singular, “genera” is plural—never, ever say “genuses” or “genre”!

The word “species” is singular and plural—never, ever say “specie”!

A specific name ending in –i or –ii is a patronym, that is, a name honoring a male; for example, if you want to name a new species of the fish genus *Apogon* after your boyfriend and his name is Alexander, you would say *Apogon alexanderi*.

A specific name ending in –ae is a matronym, that is, a name honoring a female; for example, if you want to name a new species of the fish genus *Rasbora* after your girlfriend and her name is Rosalind, you would say *Rasbora rosalindae*.

A specific name ending in –ensis refers to a place, usually the place where the organism was first discovered, for example, a fish bearing the name *Heterodontus omanensis* is a species first found in Oman, *Triphoturus californiensis* is from California.

AUTHORSHIP

Who is given authorship? Authorship is given to the person or persons who *first* creates and makes the name available by using it in a scientific publication with a description of the taxon to which it applies. This means that if Joe Schmo describes a new species in 2000, and John Doe describes the same species as new in 2001, Joe Schmo’s species name is the one that will be used, and Schmo is the rightful author, and thus it his name that follows the scientific name.

While seemingly trivial, including the authorship and date is extremely important when writing out a scientific name. Providing the author of the scientific name and the year it was first

used provides the reader with valuable information should they care to investigate the validity of the name, or to learn more about the species in question. If a scientific name is followed by the author and date *without* parentheses, then the species has remained in the genus under which it was first classified. The inverse of this, the author and date *within* parentheses (see example below), tells the reader that the classification has changed since the publication (i.e., naming) of the species.

Photostomias goodyeari Kenaley & Hartel, 2005

versus

Rhinoliparis barbulifer (Gilbert, 1895)

PURPOSE

The nomenclatural system made popular by Linnaeus serves two main purposes. First, it (often) provides an informative description of an organism, e.g. *Heterodontus omanensis* refers to a shark possessing two kinds of, or different, teeth (“hetero-“ and “-dont”), and that is from Oman. Second, the nomenclatural system ensures the relative stability and universality of the name. By stability, it is meant that names are consistent throughout time, i.e. those names given by Linnaeus (at least those that are still valid) are exactly the same today, e.g. *Tinca tinca*, the tench (found in Lake Washington) was described by Linnaeus, its name is still the same. This stability is important as it allows clear communication of what an organism is in publications over the years. By universality, it is meant that the scientific names are used by scientists from all over the world. Most species have different *common* names in different regions. Even within the United States, “red snapper” can mean one of at least four different species of fish from at least two separate *orders* of fishes. What we “commonly” (as in the common name sense) call the grand snailfish in the United States, the Japanese call hira-inkiuo. Scientists from both countries, however, know it scientifically as *Paraliparis grandis*, thus providing common ground for communication about the species.