

# A Guide to Constructing and Understanding Synonymies for Mammalian Species.

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## INTRODUCTION

The following guidelines are organized in 3 major sections. First, we provide information on the format for genus- and species-level synonymies and information the editors may require when you submit a manuscript for consideration as a *Mammalian Species* publication. Next, we discuss understanding, researching, and constructing synonymies; this is the main body of the guidelines and each section and subsection is preceded by codes that facilitate cross-reference. Finally, we have included information that should be useful for finding names, locating literature, and understanding terminology.

A number of colleagues have read and commented on various drafts during the development of these guidelines, and its present form reflects their valuable contributions. We are especially grateful to F. Christian Thompson, USDA Systematic Entomology Laboratory, National Museum of Natural History, for numerous discussions and valuable advice. Others whose comment and criticisms are greatly appreciated are Richard C. Banks, Robert D. Fisher, Robert P. Reynolds, and Neal Woodman of the Biological Survey Unit, USGS Patuxent Wildlife Research Center, National Museum of Natural History; Robert S. Hoffmann and Don E. Wilson of the Division of Mammals, National Museum of Natural History; Judith L. Eger, Department of Mammalogy, Royal Ontario Museum, Toronto; and members of the Nomenclature Committee of the American Society of Mammalogists.

## FORMAT FOR LISTINGS IN GENERIC SYNONYMY

### **Genus[:]** Author, year:page. Comment.

One (or more) of the following phrases should be in the comment section for each name. All other phrasing or information should be justified in your cover letter to the editor of *Mammalian Species*. Clarifications and amplifications of this terminology as well as its logical background and context are included in the text of this guide.

**Type species** *Genus species* Author, year by choose 1 of the following as appropriate: **original designation** [discussion: IV.3.A; examples: IV.3.A], **subsequent designation** [discussion: IV.3.C; examples: IV.2.A(a), IV.3.C, IV.4.A], **monotypy** [discussion: IV.3.B; examples: IV.2.A(b), IV.3.B], **absolute tautonomy** [discussion: IV.3.D; examples: IV.3.D], or **Linnaean tautonomy** [discussion: IV.3.E; examples: IV.3.E].

**No type species selected** [discussion: IV.3.F; examples: IV.2.A(a), IV.3.F].

**Justified emendation** for changes to names required by the Code [discussion: IV.5]. Insert colon between genus and author.

**Unjustified emendation** for deliberate changes not required by the Code [discussion: IV.4.C; examples: IV.4.C].

**Incorrect subsequent spelling** for all inadvertent name changes [discussion: IV.4.B; examples: IV.4.B].

**Unavailable name** for vernacular names, nomina nuda, or names that are cited from works rejected for nomenclatural purposes. Cite opinion or direction of the Commission (ICZN) when appropriate [discussion: IV.4; example: IV.4.A].

**Replacement name for Genus Author, year** for instances where a previous name was preoccupied.

**Part, not Genus Author, year** for names used more inclusively by another author, but the genus-group name is not in current use for the subject species [IV.2.A(a), IV.2.A(b), IV.4.A, IV.4.C]. Insert colon between genus and author.

**Not, Genus Author, year** for a genus-group name that is not in current use for the subject taxon. The name may be in use (valid) for another taxon [IV.2.A(a), IV.2.A(b)]. Insert colon between genus and author.

## FORMAT FOR LISTINGS IN SPECIES SYNONYMY

### **Genus species[:]** Author, year:page. Comment.

One (or more) of the phrases below should be in the comment section for each name. All other phrasing or information should be justified in your cover letter to the editor of *Mammalian Species*.

Clarifications and amplifications of the terminology below as well as its logical background and context are included in the text of this guide. Punctuation must exactly follow the guide (V).

**Type locality(ies) “exactly quoted”** for original names whose authors indicated the locations where the type specimens were collected [discussion: II.3.C(a); examples: II.2.A(a), II.2.A(b), II.2.A(d), II.2.A(e), II.2.A(f), II.2.A(g), II.2.A(h), II.2.A(l), II.2.A(m), II.2.B(e), II.3.C(a)].

**No type locality specified** for original names whose authors did not indicate where the type specimen was collected. [II.2.A(c), II.2.A(d)].

**Justified emendation** for changes to an original spelling as required by the Code [II.2.A(i), II.2.A(l)].

**Unjustified emendation** for deliberate changes not sanctioned by the Code [II.2.A(k)].

**Incorrect original spelling** for names misspelled in the original publication [II.2.A(i), II.2.A(j)].

**Corrected spelling** for corrected spelling of names misspelled in the original publication [II.2.A(i)].

**Incorrect subsequent spelling** for all errors in spelling, whatever their origin [II.2.B(e), II.3.C(b.3)].

**Name combination** for new combinations of genus and species names [discussion: II.3.C(b); examples: II.2.A(c), II.2.A(d), II.3.C(b), II.3.C(b.2)]. Must insert colon between species and author.

**First use of current name combination** for the 1st time the

currently recognized name combination was used for the subject species when the subject species was described earlier under a different genus-group name [discussion: II.3.C(b.2); examples: II.2.A(l), II.2.A(m), II.3.C(b.2)]. Must insert colon between species and author.

**Replacement name for Genus species Author, year** for instances where a previous name was preoccupied [discussion: II.3.C(b.1); examples: II.2.A(f), II.3.C(b.1)].

**Nomen nudum** for names not recognized as published because they were not accompanied by a description, illustration, or a reference to such [II.2.A(h), II.2.B(c)].

**Unavailable name** for vernacular names [II.2.A(d)] or for names suppressed by action of the Commission (ICZN); if the latter, you must cite the reference [II.2.B(d)].

**Not Genus species Author, year** for misidentifications [II.2.B(b)].

## CITATION INFORMATION

The editor of *Mammalian Species* may request copies of papers whose citations are complex, usually those from the late 1700s to 1900, in order to determine a format for the bibliographic entry that will conform best to style. Therefore, authors should be prepared to send photocopies of the title page, front matter, and any quoted material; and they should always include the full pagination of all articles and the numbers of unpaginated tables and illustrations. See the General References section of this guide for how to cite some commonly used, early sources (e.g., Linnaeus 1758).

To avoid ambiguity, a 1st initial may be necessary in the authority name. Two such cases are Étienne Geoffroy St.-Hilaire and his son Isidore Geoffroy St.-Hilaire and George Cuvier and his brother Frederick Cuvier. The surnames Allen and Smith often require 1st initials to eliminate ambiguity.

## UNDERSTANDING, RESEARCHING, AND CONSTRUCTING SYNONYMIES

Nomenclature is a system of names, with rules and guidelines for their formation and use. Synonymies reflect the use of these names and the results of the different and often conflicting practices of those who have applied them. A synonymy provides a historical chronology of names that have been applied to the taxon (genus, species, or subspecies) under study. A well-constructed synonymy identifies available names, emendations, variant spellings, unavailable names, misidentifications, and nomenclatural acts that influence the taxonomist when determining the valid name for the subject taxon. A synonymy also facilitates compilation and synthesis of information from earlier literature when that information was provided under name combinations no longer current for the subject taxon.

The “bible” for nomenclature is the *International Code of Zoological Nomenclature*, hereafter referred to as the Code. The 4th edition (ICZN 1999) is the most recent. The goal of the Articles (mandatory rules) and recommendations of the Code is to provide maximal universality and continuity in the formation and use of scientific names yet allow scientists the freedom to classify animals according to their taxonomic judgment. The Code is an evolving document and future editions will deal with nomenclatural issues whose treatment is unsatisfactory at present as well as with other issues that arise. The Code provides no guidance for constructing a synonymy and, with the exception of the Principle of Priority and rulings concerning the availability of certain names, leaves the determination of the valid name for an organism up to the taxonomist.

The 1st step in writing a synonymy for *Mammalian Species* is to ascertain the scientific name or names that apply to, or have been applied to, the subject organism. We emphasize that authors must examine the original literature. This can be a problem when local library resources are meager, and even the best libraries do not have everything. Although you can prevail upon colleagues at institutions having more extensive library holdings, the best sources of assistance often are the librarians at your own institution who, with electronic access to libraries around the world, usually can help you find the literature you need. First, however, you must know what literature is needed before a librarian can locate and retrieve it. Information is provided later in this guide to help identify and find pertinent literature.

Each *Mammalian Species* account includes a taxonomic synonymy of the subject species. Some accounts begin with a taxonomic synonymy for the genus, which is required if the genus is monotypic. Otherwise, a generic synonymy usually is provided only when the species account is the 1st written for that genus. If the species is polytypic, a list of the subspecies with their synonyms also is required. The discussion below applies generally to generic, specific, and subspecific synonymies, because all are governed by similar principles.

A complete taxonomic synonymy is a chronological listing of each instance the subject taxon has been referred to in the literature by its scientific name (including synonyms, misspellings, and emendations), unavailable names, and, when known, misidentifications. For *Mammalian Species*, this synonymy is a complete chronological listing of the 1st use of any scientific name and the 1st use of any unique name combinations (including misspellings, lapses, emendations, and unavailable and invalid names) that have been applied to that taxon. Each unique name combination is listed with the author, date, and page number of that use, followed by the type locality when the name is a newly described taxon, or by a statement describing the nomenclatural context for the use cited.

Modern zoological nomenclature begins with the publication in 1758 of the 10th edition of Linnaeus's *Systema Naturae* and Clerck's *Aranei Svecici*. These 2 works are considered for nomenclatural purposes to be the 1st in which binomial nomenclature was applied consistently. Except for typification of Linnaean species and the few indications based on pre-Linnaean literature, mammalogists need be concerned only with Linnaeus's *Systema Naturae*. The 1st name listed in most synonymies will date from sometime after 1758, because Linnaeus (1758) included only a small fraction of the mammalian names in use today. Although not obligatory and often discouraged, the researcher also may list a common name (usually a French vernacular) referring to the subject species if that name was used in an important early reference.

Except for the subspecies synonymy, names are ordered chronologically from earliest to most recently used. Entries in the subspecies synonymy are ordered alphabetically. Constructing a generic synonymy is easier after the species and subspecies synonymies have been completed. Normally, we would suggest examining previously published *Mammalian Species* to determine style and the correct format for constructing synonyms. However, many of these synonymies contain errors. We were motivated to prepare this guide to help solve that problem. We begin with a general discussion of nomenclatural concepts and issues, followed by guidance for interpreting and writing species, subspecies, and generic synonymies. This in turn is followed by useful references for finding names, verifying publication dates, and identifying and locating literature. We end with a glossary.

## I. SCIENTIFIC NAMES AND NOMENCLATURE

### I.1. INTRODUCTION

Several nomenclatural issues and concepts should be understood by anyone writing an account for *Mammalian Species*. Principal among these are understanding what constitutes a scientific name, which names are available, which names are valid, and what constitutes a type species.

**I.1.A. SCIENTIFIC NAME.** Full reference to a scientific name has 3 elements of critical importance: 1) the scientific name (name or name combination), followed by 2) the name(s) of the author(s) who made the name available, and 3) the date the name became available. Genus-group names consist of the generic or subgeneric name followed by the author(s) and date. Species-group names include names for species and subspecies. The name of a species is a binomial consisting of the generic and specific name, usually followed by the author(s) and date. A subgeneric name inserted between the generic and specific name (e.g., *Sturnira (Corvira) bidens* Thomas, 1915) does not alter the status of the species name as a binomial. A subspecies name is a trinomial consisting of the genus, species, and subspecies epithets, usually followed by the author(s) and date. Again, a subgeneric name inserted between the generic and specific name (e.g., *Sciurus (Guerringtonus) granatensis chiriquensis* Bangs, 1902) does not alter the status of the subspecies name as a trinomial.

**I.1.B. AVAILABILITY.** Certain provisions of the Code must be satisfied for a name to be available. First, the name must be spelled in the letters of the Latin alphabet and treated as a latinized word. Second, the name must be accompanied by a description, definition, or an indication (a reference to an illustration, description, or definition; permissible in the pre-1931 literature) that purports to differentiate the taxon from other taxa, or be proposed expressly as a replacement name (*nomen novum*) for a preoccupied available name. Finally, the name must be published after 1757 in a work issued for the purpose of providing a public and permanent scientific record and in which the Principle of Binomial Nomenclature has been consistently applied. Articles 10 through 20 of the 4th edition of the Code (ICZN 1999) review the requirements for availability of names published before 1931 and review those conditions required for names published after 1930, after 1960, and after 1999. These dates represent changes in nomenclatural rules and conventions adopted with each new edition of the Code (e.g., compare ICZN 1961, 1985, and 1999).

**I.1.C. VALIDITY.** A valid name in nomenclature is the name by which the taxon in question is currently known. Many confuse the concept "valid name" with the concept "available name." Available means the name can be used for a taxon; valid means the name is in current use for a taxon. With few exceptions, the valid name for any taxon is the oldest available name (Principle of Priority). Most exceptions occur when the earliest available name is a forgotten name (*nomen oblitum*) or when a name has been overlooked, usually because it was treated as a synonym of the name of another taxon. Occasionally, the International Commission on Zoological Nomenclature (hereafter referred to as the Commission) will make a ruling favoring a name not normally considered available, or favoring a name that is junior synonym of a senior name, because of special circumstances stated in a petition submitted to the Commission requesting a suspension of the rules. Opinions rendered by the Commission on these petitions clearly state which names are available for the subject taxon (or taxa), and which are not. A compilation of these opinions can be found in the *Official Lists and Indexes of Names and Works in Zoology* (ICZN 1987) and the *Supplement 1986–2000* (ICZN 2001). However, for the full text explaining the opinions, declarations, and directions issued by the Commission before 1960 on the nomenclatural status of certain names and works, refer to ICZN 1943–1959, *Opinions and Declarations Rendered by the International Commission on Zoological Nomenclature* (see below under General References). The full text for opinions after 1959 can be found in the *Bulletin of Zoological Nomenclature*.

**I.1.D. CONCEPT OF TYPE.** One should understand the concept of type in the genus- and species-groups (ICZN 1999:Art. 61. Principle of Typification), including the difference between a type species and a type specimen, as well as the function of type specimens in the biological sciences. A genus-group name has a type species that fixes the identity of that genus-group name. The genus-group name always must include its type species and can be applied only to the biological species represented by the type species or to the group of species that includes the biological species represented by the type species. The name of the type species must be an available name, but does not have to be the currently recognized (valid) name for that species.

A type specimen objectively anchors the identity of the taxon represented by its species-group name. The species-group name applies only to the biological species or subspecies represented by its type specimen. These and other terms used here are defined in the Glossary and examples are included in the appropriate sections that follow.

## II. SPECIES SYNONYMY

### II.1. INTRODUCTION

A species synonymy is a chronological listing of the 1st use of any name combination applied to that species. This includes all names applied to the subject species even if these names were proposed for taxa (species and subspecies) originally believed to represent different species and subspecies, but now considered to represent the subject species. Based on the Principle of Priority, the species is known by the earliest available name used for that taxon. Generally, exceptions are based on decisions by the Com-

mission concerning petitions to set aside priority for particular situations. Refer to the *Official Lists and Indexes of Names and Works in Zoology* (ICZN 1987, 2001) and to the *Bulletin of Zoological Nomenclature* for opinions handed down by the Commission.

## II.2. NAMES IN A SPECIES SYNONYMY

**II.2.A. AVAILABLE NAMES.** All names correctly applied to the subject species that satisfy the requirements of availability are listed in the synonymy with their author, date, page number, and type locality. With few exceptions, the 1st (oldest) available name correctly applied to the subject species will be the valid name in use for the species and will be the name used as the title of the account for *Mammalian Species*.

**II.2.A(a). Available Names and Synonyms.** Citation of the oldest available (valid) name and its synonyms follows the same format. Any name proposed for a taxon originally described as a species, but now believed to have been based on a representative of the subject species, is a synonym. The following is an example of the citation of the original name combination of the valid name, an unavailable name, and 2 synonyms from a partial synonymy for the vampire bat, *Desmodus rotundus* (É. Geoffroy St.-Hilaire, 1810).

*Phyllostoma rotundum* É. Geoffroy St.-Hilaire, 1810:181. Type locality "Paraguay"; restricted to Asunción by Cabrera (1958: 93); based on Azara's (1801) *Chauve-souris troisième*.

*Phyllostoma rotundifolium* Oken, 1816:918. Unavailable name (ICZN 1956, Opinion 417).

*Rhino[lo]ph[us]. ecaudatus* Schinz, 1821:168. Type locality "Ostküste von Brasilien."

*D[esmodus]. rufus* Wied-Neuwied, 1826:233. Type locality "Fazenda von Muribeca am Flusse Itabapuaana," Espírito Santo, Brazil.

*Note:* Quotation marks surround those portions of the type locality that are exactly as given in the original text. *Rhinolophus* and *Desmodus* were abbreviated in the original text; missing parts are enclosed in brackets to reflect the original spelling.

This example was taken from an account in which Isidore Geoffroy St.-Hilaire also is cited; therefore, the initial É. is used with the name to avoid confusion between Etienne Geoffroy St.-Hilaire and his son Isidore.

**II.2.A(b). Subspecies Names.** Two categories of subspecies names are included in the species synonymy. The 1st is any name originally proposed for a taxon described as a subspecies of a different species, but now believed to have been based on a representative of the subject species. The 2nd is any name originally proposed as a subspecies of the subject species, but now believed to be a junior synonym of a recognized subspecies. The subspecies name is listed in its original trinomial form, and placed in the appropriate chronological order in the species synonymy. The following is an example from the synonymy for *Myotis atacamensis* (Lataste, 1892).

*Vespertilio atacamensis* Lataste, 1892:79. Type locality "[San Pedro de] Atacama," Antofagasta, Chile.

*Myotis nigriceps nicholsoni* Sanborn, 1941:382. Type locality "Hacienda Chucarapi, Tambo Valley, Department of Arequipa, Peru."

*Note:* (Lataste, 1892) is enclosed by parentheses to indicate that he described *Myotis atacamensis* in a different genus (i.e., in *Vespertilio*, not in *Myotis*). [San Pedro de] is enclosed in brackets because it is within the quotation marks, but was not part of the original statement of type locality.

**II.2.A(c). Names Proposed for or Used as a Variety or Form.** Names cited as varieties or forms are equivalent to subspecies in most cases. Exceptions are names proposed as synonyms of then-valid names, or, after 1960, proposed conditionally or as a variety or form; these names are unavailable. Names proposed as a variety or form after 1960 are considered infrasubspecific names and, as such, are not regulated by the Code (ICZN 1999:Art. 15.2). Two examples of names provided as varieties follow.

[*Atalapha cinerea*] Var.  $\alpha$  (*Atalapha grayi*): Dobson, 1878:273. Part; name combination.

*Gamba aurita*, var. *brasiliensis* Liais, 1872:239. No type locality given; implied type locality is Brazil.

*Note:* In the 1st example, a colon is used to separate the name combination from the author's name because Dobson's use (Var.  $\alpha$ ) is not an available name and he did not describe *Atalapha grayi*. Dobson was citing *Atalapha grayi*, based on *Lasiurus grayi* Tomes, 1857, as a variety of *Atalapha cinerea* (Palisot de Beauvois, 1796). The taxon is known today as *Lasiurus cinereus grayi* Tomes, 1857.

In the 2nd example, no punctuation is used to separate the name combination from the author's name because *brasiliensis* is an available name, and Liais is responsible for both the name and the conditions under which the name became available. *Gamba aurita*, var. *brasiliensis* Liais, 1872, is a synonym of *Didelphis aurito* Wied-Neuwied, 1826 (currently considered monotypic).

**II.2.A(d). Indications.** Before 1931, a name for a new species could be based on a citation (an indication) to information in another publication. These names, when proposed, did not have an accompanying description. Instead, the name was associated with an illustration or was accompanied by a citation (indication) to a description, definition, or illustration in an earlier publication. The reader should be aware that earlier publications containing the descriptive information can include unavailable works (names contained are unavailable for nomenclatural purposes). Unavailable works also include pre-Linnaean (1758) publications. The cited work is simply a reference and the name based on the indication does not take authorship or date from that earlier work. The following is an example of an indication from a partial synonymy for the North American bat *Myotis septentrionalis* Trouessart, 1897.

Var. (b) Northern form of *Vespertilio gryphus* H. Allen, 1893:80. Vernacular, unavailable name.

[*Vespertilio (Vespertilio) gryphus*] Var. *septentrionalis* Trouessart, 1897:131. Type localities "Ab Alaska, Canada, ad New York, Wisconsin;" type locality restricted to Halifax, Nova Scotia, Canada, by Miller and Allen (1928:106).

*Myotis keenii septentrionalis*: Miller and Allen, 1928:105. Name combination.

*Note:* Trouessart credited "H. Allen, l.c., 1893, p. 80" (the indication) as the source of the name *septentrionalis*, but an examination of page 80 in Allen's monograph reveals that Allen did not coin the name *septentrionalis*, but did provide a brief description of his "Northern form of *Vespertilio gryphus*." Therefore, the name must be credited to Trouessart, who used a Latin word meaning "belonging to the north" in reference to Allen's phrase "Northern form." Trouessart's *Catalogus* is a list of names arranged according to the taxonomy of the day and does not contain descriptions. The following examples are names based on Azara (1801a, 1801b), who used only vernacular names for the species he described.

*Das[ypus]. gilvipes* Lichtenstein, 1818:215. Type locality not given; based on Azara's (1801a:142) *Tatou-poyou* from Paraguay; therefore, the type locality is Paraguay.

*Molossus crossi-coudatus* É. Geoffroy St.-Hilaire, 1805:279. Type locality not given; based on Azara's (1801b) *la dixième chauve-souris* from Paraguay; type locality restricted to Asunción, Central, Paraguay, by Cabrera (1958).

**II.2.A(e). Preoccupied Names (Homonyms).** A name preoccupied by an earlier name of the same spelling applied to a different taxon is a homonym. The following is an example of a preoccupied name.

*Didelphis cinerea* Temminck, 1824b:46. Type locality "Brésil"; restricted to "Rio Mucurf, southern Bahia near the northern boundary of Espírito Santo, Brazil" (Tate 1933:55); further restricted to "Morro de Arará" (Ávila Pires 1965:5); preoccupied by *Didelphis cinerea* Goldfuss, 1812:220.

*Note:* This is an example of a primary homonym (genus and species names identical for both applications; *Didelphis* is an unjustified emendation of *Didelphis* Linnaeus, 1758). With very few exceptions (see ICZN 1999:Art. 57.2), a junior homonym such as

*Didelphis cinerea* Temminck, is permanently invalid. The next available name for this taxon is *Marmosa cinerea paraguayana* Tate, 1931, and the species is known today as *Micoureus paraguayana* (Tate, 1931). Parentheses around the author and date with the name combination *Micoureus paraguayana* indicate that Tate did not combine his species-group name *paraguayana* with the generic name *Micoureus* in the original publication.

*Marmosa muscula* Shamel, 1930:83. Type locality "Kilometro 182" (= Riacho Pilaga, 10 miles northwest of Km 182), Formosa, Argentina; preoccupied by *Didelphis (Marmosa) musculus* Cabanis, 1848.

**Note:** This is an example of a secondary homonym (genus and species names not identical in both original applications, but became identical when *Marmosa* was elevated from a subgenus to a genus). With few exceptions (see ICZN 1999:Art. 57.3), a junior secondary homonym such as *Marmosa muscula* Shamel, 1930, is permanently invalid.

Sometimes the name may be preoccupied by an earlier name of the same spelling (a homonym) applied to the same taxon (a synonym; i.e., belongs to the same species). The preoccupied name based on the same taxon can be replaced and the replacement name would compete in priority with other synonyms. The following is an unusual example of an available name followed by 2 unavailable names that are both primary homonyms and objective synonyms (based on the same type), each originally described independently without any reference to previous use.

*Nasua rufa* É. Geoffroy St.-Hilaire, 1803:85. Type locality "L'Amérique."

[*Nasua*] *rufa* Fischer von Waldheim, 1814:175. Type locality "in regionibus calidis Americae;" primary homonym and objective synonym of *Nasua rufa* É. Geoffroy St.-Hilaire, 1803.

*Nasua rufa* Desmarest, 1820:170. Type locality "L'Amérique meridionale;" primary homonym and objective synonym of *Nasua rufa* É. Geoffroy St.-Hilaire, 1803, and *Nasua rufa* Fischer von Waldheim, 1814.

**Note:** These 3 names were independently based on the *coati roux* of Buffon; therefore, they have the same type. Each of the last 2 entries is both a primary homonym and junior objective synonym of *Nasua rufa* É. Geoffroy St.-Hilaire, 1803, and there was no reason to provide replacement names.

**II.2.A(f). Replacement Names.** Sometimes called a new name or substitute name, a replacement name replaces a junior homonym (see II.1.A(e)). The following are 2 examples of a replacement name (nomen novum) for a previously preoccupied available name applied to the subject species.

*Marmosa muscula* Shamel, 1930:83. Type locality "Kilometro 182" (= Riacho Pilaga, 10 miles northwest of Km 182), Formosa, Argentina; preoccupied by *Didelphis (Marmosa) musculus* Cabanis, 1848.

*Marmosa formosa* Shamel, 1930:311. Replacement name for *Marmosa muscula* Shamel, 1930.

**Note:** In this example, Shamel realized his mistake immediately and was able to provide the replacement name quickly enough to have it published in the same year as his preoccupied name (also see II.2.A(e)).

*Vespertilio brasiliensis* Spix, 1823:63. Type locality "Brasil"; preoccupied by *Vespertilio brasiliensis* Desmarest, 1822.

*Vespertilio spixii* Fischer, 1829:111. Replacement name for *Vespertilio brasiliensis* Spix, 1823.

**Note:** No type locality is provided for either *Marmosa formosa* Shamel, 1930, or *Vespertilio spixii* Fischer, 1829, because a replacement name takes the same type specimen and type locality originally identified for the name replaced. However, a replacement name has its own author and date.

**II.2.A(g). Available Names Based on Previously Unavailable Names.** The following is an example of a previously unavailable name made available through subsequent use.

*Didelphis paraguayensis* J. A. Allen, 1902:251. Type locality "Asuncion, Paraguay" (J. A. Allen, 1902:268); based on *Didelphis paraguayensis* Oken (1816; not available from Oken),

which in turn was based on Azara's (1801) *Le Micouré premier* from Paraguay.

**Note:** No punctuation separates *paraguayensis* from Allen, thereby indicating that Allen is the author of the available name. Allen described his specimens of this opossum under the name *Did. paraguayensis* Oken, 1816, because he believed the name was available from Oken's Lehrbuch, which the Commission has subsequently ruled was not consistently binomial (ICZN 1956); therefore, the names contained therein are not available. *Didelphis paraguayensis* J. A. Allen, 1902, is a synonym of *Didelphis albiventris* Lund, 1840.

**II.2.A(h). Former Nomina Nuda Made Available Through Subsequent Use.** The following is an example in which a name is a nomen nudum as used by Illiger (1815), but as used subsequently is an available name (see II.2.B(c)).

[*Didelphys*] *crassicaudis* Illiger, 1815:107. Nomen nudum.

*Didelphys crassicaudis* Olfers, 1818:206. Type locality "Paraguay"; based on Azara's (1801) *Micouré à queue grosse*; objective synonym of *Didelphis crassicaudata* Desmarest, 1804.

**Note:** No punctuation separates *crassicaudis* from Olfers, thereby indicating that Olfers is the author of the available name. Desmarest also based his description of *Didelphis crassicaudata* on Azara's *Micouré à queue grosse*; therefore Olfers's name and Desmarest's name are objective synonyms because each is based on the same indication (= type). Desmarest's name, in the combination *Lutroolina crassicaudata*, is the senior synonym and is the valid name for this opossum.

**II.2.A(i). Justified Emendations (Corrected Incorrect Original Spellings).** When an author inadvertently misspells a name in the original publication, and internal evidence of the misspelling exists, the error is to be corrected. The original author sometimes corrects the spelling in an errata sheet accompanying the original publication (see ICZN 1999:Art. 32.5.1.1). Most often, however, the error is corrected at a later date.

*Phyllostomus hastatus caurae* J. A. Allen, 1904:234. Incorrect original spelling of *Phyllostomus hastatus cauae* J. A. Allen, 1904; type locality "Cali, upper Cauca Valley," Valle del Cauca, Colombia.

*Phyllostomus hastatus cauae*: J. A. Allen, 1916:225. Corrected spelling of *Phyllostomus hastatus caurae* J. A. Allen, 1904.

**Note:** In the original publication, Allen's spelling *caurae* was an obvious misspelling for *cauae* (although *caurae* could have been a typesetter's error, Allen was responsible for reviewing the proof). Based on internal evidence in the original publication, the name clearly was in reference to the Cauca Valley where the holotype was collected.

The correction of an incorrect original spelling is a justified emendation and the corrected name retains the authorship and date of the original spelling (ICZN 1999:Arts. 32.4, 32.5, 33.2.2). Therefore, a colon is used between *cauae* and J. A. Allen, 1916, to show that he is using the corrected original spelling, which dates from 1904.

**II.2.A(j). Multiple Original Spellings (Selection by First Reviser).** Sometimes a name is spelled in 2 or more ways in the original publication. The term "protolog" refers to all of the information about the taxon being described, found in the original publication. Different spellings might be found anywhere in the original publication including the index, figures, tables, table of contents, the description itself, and in any discussion about the taxon elsewhere in the text. Only 1 can be the correct spelling. Selection of the correct spelling is accomplished by the 1st person who demonstrates awareness that more than 1 spelling is available and makes a choice among them. The following example illustrates selection of the correct original spelling by the 1st reviser (see ICZN 1999:Arts. 24.2.3, 32.2.1).

*Molossus barnesi* Thomas, 1905:585. Type locality "Cayenne," French Guiana; correct original spelling of *M. burnesi* Thomas, 1905, by selection (Cabrera 1958:129).

*Molossus Burnesi* Thomas, 1905:584. Incorrect original spelling of *Molossus barnesi* Thomas, 1905.

*Note:* Thomas headed the description of his new species with the name combination *Molossus Burnesi*. However, in the text he used the spelling *Molossus Barnesi* and said the specimen was received from a Mr. Barnes. The 1st author to select the spelling *Molossus barnesi* (1 of 2 spellings in the original publication) was Cabrera in his 1958–1961 *Catálogo de los Mamíferos de América del Sur*.

**II.2.A(k). Unjustified Emendations.** Despite the implication, an unjustified emendation is an available name. An emendation is a spelling that is demonstrably intentional, as opposed to simply an error in spelling. The only justifiable emendations are the correction of an incorrect original spelling (see II.2.A(i)) and mandatory changes in spelling (see II.2.A(l)). An unjustified emendation is available with its own author and date and is a junior objective synonym of the name as originally spelled, can enter into homonymy, and can be used as a replacement name (ICZN 1999: Art. 33.2.3). The following example is an unjustified emendation from the synonymy of *Lasiurus blossevillii* (Lesson 1826).

[*Nycticejus* (*Atalapha*)] *bonaërensis* Burmeister, 1879:93. Unjustified emendation of *Vespertilio bonariensis* Lesson, 1827.

*Note:* Burmeister considered *Atalapha* to be a subgenus of *Nycticejus* (a variant spelling of *Nycticeius*) and wrote the name as *Atalapha bonaërensis*, but clearly as a species of *Nycticejus*. Therefore, the fully spelled out name as implied by Burmeister would be *Nycticejus (Atalapha) bonaërensis*.

**II.2.A(l). Mandatory Changes in Spelling.** A Latin or latinized word that does not agree in gender with the generic name, or a name based on a personal name with an incorrect termination (either the wrong number or gender) is to be corrected by any subsequent user who is aware of the error. However, the incorrect original spelling is included in the synonymy. The following is an example where a change of termination was required to make the generic name and specific name agree in gender.

*Didelphis albiventris imperfectus* Mondolfi and Pérez-Hernández, 1984:407. Type locality “km 125, Carretera El Dorado-Santa Elena, Estado Bolívar, Venezuela.”

*Didelphis imperfecta*: Voss and Emmons, 1996:43. First use of current name combination and correction of gender agreement.

*Note:* A colon is inserted between *imperfecta* and Voss and Emmons to indicate that they are not the authors of the name. Voss and Emmons were the 1st to use the name combination *Didelphis imperfecta*. They corrected the termination from *-us* to *-a*, required because the name *Didelphis* is feminine. When a generic name and a subgeneric name do not have the same gender, the specific name must always agree in gender with the generic name (ICZN 1999: Arts. 31.2, 34.2), unless the specific name is treated as a noun in the nominative singular standing in apposition to the generic name (ICZN 1999: Arts. 11.9.1.2, 31.2.1; see II.2.A(l)), is a noun in the genitive case (ICZN 1999: Art. 11.9.1.3), or is an adjective used as a substantive in the genitive case and derived from the specific name of an organism with which the animal in question is associated (ICZN 1999: Art. 11.9.1.4).

Occasionally, an author using a personal name for a new species-group taxon will use the wrong termination (e.g., *smithi* [masculine singular] when the author states that the species is named in honor of the Smith brothers; or states that the species or subspecies was named in honor of Joan Smith). The Code requires that subsequent users correct the termination to reflect the appropriate gender or number attributed to the name (e.g., *smithi* corrected to *smithae* [feminine singular]; to *smitharum* [feminine plural]; or to *smithorum* [masculine plural]). If the author states that the name honors a family, the correct termination is masculine plural (*-orum*). These changes also are justified emendations and do not affect the original authorship or date.

Other spellings may require mandatory changes, although the original spelling is included in the species synonymy. A name originally published with a diacritical mark, apostrophe, diphthong, or hyphen, or as separate words, is to be corrected (ICZN 1999: Art. 32.5.2). The diacritical mark is to be removed (e.g., *muñezi* becomes *nunezi*), except when the umlaut is used in a German word, in which case the umlaut is removed from the vowel and an *e* is inserted after the vowel (e.g., *mülleri* becomes *muelleri*). An apostrophe is removed (*d'urvillei* becomes *durvillei*), letters in a diph-

thong are separated (*venezuelæ* becomes *venezuelae*), compound words are united (e.g., *cinereo argenteus* becomes *cinereoargenteus*), and abbreviations are spelled out (*st. johannis* becomes *sanc-tijohannis* and *10-lineatus* becomes *decemlineatus*).

**II.2.A(m). Nouns in Apposition.** A specific name that is a simple or compound noun, or noun phrase (may be a unique combination of letters the author treats as a noun) in apposition need not show gender agreement with the generic name. The original spelling and the gender ending are maintained (ICZN 1999: Art. 31.2.1). In the following example, the feminine species-group name “*neblina*” is a noun in apposition to *Marmosops* (all generic names ending in *-ops* are masculine; ICZN 1999: Art. 30.1.4.3).

*Marmosops impavidus neblina* Gardner, 1990:414. Type locality “Camp VII (00°50'40"N, 65°58'10"W), 1800 m, Cerro de la Neblina, Territorio Federal Amazonas, Venezuela.”

*M[armosops]. neblina*: Mustrangi and Patton, 1997:22. First use of current name combination.

*Note:* In the original description, Gardner said that *neblina* was a noun in apposition to *Marmosops*; therefore, the feminine termination used with a masculine genus is not an error.

**II.2.B. UNAVAILABLE NAMES.** The following are examples of names that are not available names. If any of these unavailable names has been applied to the subject species, that name is included (in chronological order) in the synonymy. These names are listed and their status described because, although always unavailable for the subject species, these names often are uncritically and erroneously used in the literature. Some of these unavailable names may become available in the future.

**II.2.B(a). Vernacular Names (Not Obligatory).** In the early scientific literature a common name (often a French vernacular) often was the 1st name applied to a genus or species. These names are unavailable and must be identified as vernacular, unavailable names if used. Some authors may wish to cite a common name because the name and associated information was the basis for a scientific name. For example, common names of the mammals described and illustrated in Buffon's 18th century series of volumes on natural history often were cited (an indication) from 1 of Buffon's volumes as the basis for a new scientific name by some 18th and 19th century authors.

**II.2.B(b). Misidentifications.** Sometimes an available name is misapplied to the subject species because of a misidentification (the name may or may not be valid for another taxon). These names are not available and cannot be valid for the species to which they are misapplied. Although most misidentifications are extremely difficult to verify, the following example was easy because the misidentified species had not yet been described.

*Choloepus didactylus*: Sclater, 1856:139. Not *Bradypus didactylus* Linnaeus, 1758.

*Note:* *Choloepus didactylus*: Sclater, 1856 (a valid name for an already established species) was the name 1st applied to the species later named *Choloepus hoffmanni* Peters, 1858. The statement “Not *Bradypus didactylus* Linnaeus, 1758” identifies Sclater's use as a misidentification based on our understanding of the species today. Usually, however, an author simply misidentifies an already-described species. These instances are difficult to ascertain, are usually ignored, and the name is not included in the synonymy unless misidentification is verified. Misidentifications can be relatively easy to identify when, for example, an author identifies an *Eptesicus* from southeastern Brazil as *E. fuscus*, a North American species that barely reaches the Andes of Colombia and Venezuela. Sometimes additional information, such as from personal examination of specimens documented by the author (e.g., identified by catalog number) or from some other sources, can help determine what material the author had available. Most misidentifications, even those based on geographic probability, are extremely difficult to verify from the literature. The following is another citation of a name based on a misidentification.

*Didelphis azarae*: Tschudi, 1845:143. Not *Didelphis azarae* Temminck, 1824.

*Note:* A colon separates *azarae* from Tschudi, thereby indicating that Tschudi is not the author of *Didelphis azarae*. The correct name for the species referred to by Tschudi is *Didelphis pernigra* J. A. Allen, 1900.

**II.2.B(c). Nomina Nuda.** A name is a nomen nudum (literally a naked name) if, when 1st used, the name lacked either an accompanying description or a reference (indication, permissible in pre-1931 literature) to a description, diagnosis, or image that differentiated that taxon from other taxa. If the nomen nudum becomes available at a later date, the name is credited to the 1st author who used it in a manner that satisfies the criteria necessary to make the name available. The following is an example of a nomen nudum.

[*Didelphys*] *crassicaudis* Illiger, 1815:107. Nomen nudum.

*Note:* No punctuation separates *crassicaudis* from Illiger, thereby indicating that Illiger is credited with coining the name, even though the name is unavailable with that author and date because he failed to describe the taxon or cite a reference to a description or illustration. If *Didelphis crassicaudis* had been used anywhere in Illiger's text in association with a description or indication, it would be an available name, not a nomen nudum. This and other names appearing in the list on Illiger's page 107 were previously unpublished names apparently copied from labels of specimens on display in the Berlin Museum. Some nomina nuda subsequently become available (see II.2.A(h)) with the author and date of that subsequent use.

**II.2.B(d). Names from Unavailable Works.** Although included in the synonymy, the name may not be available from its original author because it appeared in a pre-Linnaean (1758) publication or in a work in which the Principles of Binominal Nomenclature were not consistently applied (an unavailable work; ICZN 1999:Art. 11.4). Some of these names may become available from subsequent use, in which case they are cited with the author and date of that later use. The following is an example of an unavailable name.

*Didelphis paraguayensis* Oken, 1816:1147. Unavailable name (ICZN 1956, Opinion 417).

*Note:* No punctuation separates *paraguayensis* from Oken, thereby indicating that Oken coined the name, even though the name is unavailable with that author and date. Oken was not consistently binomial in his 1815–1816 *Lehrbuch*, hence names in that work have been ruled unavailable. Consult the *Official Lists and Indexes of Names and Works in Zoology* (ICZN 1987) and the *Supplement 1986–2000* (ICZN 2001) for works that are unavailable for nomenclatural purposes. Compare with II.2.A(g).

**II.2.B(e). Incorrect Subsequent Spellings.** A misspelling of an available name (sometimes referred to as a misprint, typographical error, author's error, or lapsus) is always referred to as an incorrect subsequent spelling unless clear from the content that the author purposely emended the spelling (see sections II.2.A(i) and II.2.A(k)). Spelling errors are common. One must identify these spellings as incorrect or the misspelling could be misinterpreted as an available name. With 1 exception, an incorrect subsequent spelling is not an available name, cannot be treated as a homonym, and cannot be used as a replacement name. **Exception:** When an incorrect subsequent spelling is in prevailing use and is attributed to the original publication of the correct spelling, the subsequent spelling and attribution are to be preserved and the spelling is deemed to be a correct original spelling (ICZN 1999:Art. 33.3.1).

[*Tatusia*]. *leptorhinus* Gray, 1874:246. Incorrect subsequent spelling of *Tatusia leptorhynchus* Gray, 1873.

*Dasyopus villerosus* Grandier and Neveu-Lemaire, 1908:6. Incorrect subsequent spelling of *Dasyopus villerosus* Gray, 1865.

*Philander calmensis* Vieira, 1955:347. Incorrect subsequent spelling of *Didelphis (Micoureus) calyensis* Matschie, 1917.

*Note:* The term "incorrect subsequent spelling" is used for these situations because, with the exception of unjustified emendations, determining the circumstances that caused the error is almost impossible (see ICZN 1999:Art. 33.5). As you can see in the 1st entry, the same author is not immune to these errors. The reader should not be confused by the use of Matschie's original name combination in the 3rd entry. The incorrect subsequent spelling in

this example refers only to the specific name. Any incorrect spellings of the generic name are included only in the generic synonymy.

An inadvertent error by the author, often called a lapsus calami, also is identified as an incorrect subsequent spelling. The following is an example from the synonymy of *Lycalopex gymnocercus* (Fischer, 1814).

*Vulpes fulvipes* Martin, 1837:11. Type locality "island of Chiloe"; restricted by Darwin (in Waterhouse 1839) to the seabeach at the southern point of the island, which is near San Pedro channel, Chiloé, Chile.

*Canis rufipes* Philippi, 1901:168. Incorrect subsequent spelling of *Vulpes fulvipes* Martin, 1837.

*Note:* Philippi used the name *rufipes* in the same context in which he earlier used the name *fulvipes*. The only alternative to treating *rufipes* as an incorrect subsequent spelling of *fulvipes* is to treat the name as a nomen nudum. The reader should not be confused by the use of Martin's original name combination in the 2nd entry. Again, different names, misspellings, and emendations of the generic name would be included in the generic synonymy. The name combinations *Vulpes fulvipes* Martin, 1837 and *Canis rufipes* Philippi, 1901 are in the synonymy of *Lycalopex gymnocercus fulvipes* (Martin, 1837) as currently understood, although some workers believe that *fulvipes* warrants species recognition.

### II.3. ELEMENTS IN EACH SYNONYMY ENTRY

For clarity, in this section we divide each species synonymy entry into 3 elements and discuss each separately. These elements are: 1) the name combination; 2) the author, date, and page number (citation); and 3) the descriptive phrase explaining the context of the first 2 elements. The reader should keep in mind that the **proper citation of any scientific name includes the name, author, date, and (for a synonymy) the page number.**

**II.3.A. NAME COMBINATION.** The 1st element comprises the generic and specific names. These names should be spelled as used in the original publication, including abbreviations, capitalization, diacritical marks, and hyphenation. The following are examples of different forms for the 1st element based on original use.

*Dysopes glaucinus*

*Note:* The complete name combination was spelled out.

*Vampyrops Caraccioli*

*Note:* This name combination included the outdated practice of capitalizing a specific name based on a personal name.

*Platymops (Sauromys) petrophilus*

*Note:* This name combination included the subgeneric name.

V[*ampirus*]. *auricularis*

*Note:* The generic name was abbreviated as V.

*Phyllost[oma]. Macrophyllum*

*Phyllostomus]. crenulatus*

*Note:* Part of the generic name was abbreviated in these name combinations.

[*Tonatia*] *bidens*

*Note:* The author used only the specific name, but clearly presented it as a species of *Tonatia*.

[*Didelphis* (*Micoureus*)] *ornatus*

*Note:* The author used the name in combination with the subgeneric name (*Micoureus ornatus*), but not with the generic name *Didelphis*, although the name was clearly treated as a species of that genus. The author used the masculine ending for gender agreement with *Micoureus*, which is not appropriate with the feminine name *Didelphis*. The brackets indicate that, if written out in full, the name would have been *Didelphis (Micoureus) ornata*. Species-group names must agree in gender with the generic name, not with the subgeneric name, with exceptions noted previously under II.2.A(l).

[*Didelphis (Caluromys)*] *germana*

*Note:* The author used the specific name alone, but clearly as a species in the subgenus *Caluromys*, genus *Didelphis*. This example is from a report in which the author 1st discussed the genus *Didelphis*, then provided a key to the subgenera (which included *Caluromys*) he recognized under *Didelphis*, followed by a list of specific names headed by *Caluromys*. Citation of most of the name combinations in Trouessart's (1897–1899) *Catalogus*, and his *Quinquennale Supplementum* (1904–1905) would follow this format.

**II.3.B. CITATION.** The 2nd element includes the author, date, and page number. The following examples also include the 1st element (species name), some examples of which have been provided above.

*Madataeus Lewisi* Leach, 1821:81.

*Note:* No punctuation occurs between the scientific name and author when the citation represents an original description. The page number is the 1st page on which the name (or name combination) satisfies the criteria for availability, usually the page containing the most information, such as the description. Although many people cite the page where the name 1st appears, that may not be the page on which criteria for availability are met.

*Vampyrops bidens*: Thomas, 1900:270.

*Note:* The colon between the name combination and the author indicates that Thomas is not the author of *bidens* (originally described as *Chiroderma bidens* Dobson, 1878), but was the 1st to use that name combination.

*Sorex merriami* Dobson, 1890:part 3, fasc. 1, pl. 23, fig. 6.

*Note:* The name combination appeared on an illustration (plate). Some names are based on figures or plates.

*D[idelphys]. dimidiata* Wagner, 1847:151, footnote.

*Note:* This name originally appeared in a footnote.

**II.3.C. CONTEXT.** The 3rd element is an independent phrase or statement that either identifies the type locality for a new species or describes the context in which the preceding 2 elements were used.

**II.3.C(a). Type Locality.** When the synonymy entry represents an original description of an available name, the 3rd element is the type locality.

**II.3.C(a.1). Simple type localities.** The following 5 statements of type locality are examples of simple localities with the exact original locality information enclosed in quotation marks. Any information not part of the quoted information is enclosed in brackets. Additional explanatory information may be enclosed in parentheses. Information necessary to identify and place the locality is added after the quoted material.

Type locality "Papagayo, Guerrero," Mexico.

Type locality "Angaba" (= Cuiabá), Mato Grosso, Brazil.

Type locality "Mindó, [Pichincha.] Ecuador."

Type locality "Barrancas del Río Primero, en los alrededores de la Ciudad de Córdoba," Córdoba, Argentina.

Type locality "Hacienda Cadena, Marcapata, 13°20'S, 70°46'W, Cuzco, Peru, 890 m."

*Note:* Use quotation marks only for the exact locality as given in the original description, followed by what ever additional information is required to complete the locality. **Do not use quotation marks around a translation, transliteration, or any other modification of the type locality. Also do not use quotation marks around any words that were not part of the original statement unless these words are enclosed in brackets.**

**II.3.C(a.2). Compound type localities.** Sometimes the type locality is compound (e.g., "Suriname and Brasil"). When the locality includes 2 or more geographic sites, any subsequent author may restrict the type locality to 1 of the places named (e.g., Brazil, in the example above) or to a more specific locality within 1 of the places named; again, the restricted locality is not placed within

quotation marks. Each of the following 2 examples represents a complete synonymy entry where 2 or more localities (compound type locality) were given in the original description. The type locality was subsequently restricted to a place included in the original statement.

*Bradypus dorsalis* Fitzinger, 1871:355. Type localities "Süd-Amerika, Nordost-Brasilien, woselbst diese Art nicht nur zwischen dem Rio San Francisco und der Provinz Rio Grande ange-troffen wird, sondern auch noch weiter nordwärts bis in die Provinz Pará hinaufreicht"; restricted to Pernambuco, Brazil, by Thomas (1917:354).

*Note:* A translation of Fitzinger's compound locality is not necessary and, in fact, the taxon may not occur in all of the places he named. Nevertheless, the taxon must have occurred in Thomas's restricted locality for his restriction to be valid.

[*Tamandua bivittata*] Var. 3. *Opistholecua* Gray, 1873a:27. Type locality restricted to Colombia (New Grenada of Gray 1873a) by Wetzel (1975:104) based on selection as lectotype the first (not second as stated by Wetzel 1975) of the several syntypes listed.

*Note:* Under *opistholecua*, Gray listed 2 specimens from New Granada and 1 each from the following places: Nicoya, Costa Rica; Duénas, Guatemala; Guatemala; Vera Paz, Guatemala; Tropical America; Amazons; Brazils; and S. America. Wetzel restricted the type locality to Colombia (New Granada) with his selection of the lectotype.

The following example illustrates a problem when the investigator does not carefully check the original literature and, therefore, is unaware that 2 or more specimens representing different localities were attributed to the new species-group taxon. In this example the authors incorrectly assumed an available name was based on only 1 specimen.

*Tatusia brevirostris* Gray, 1873:15. Type localities "Rio de Janeiro" and "Bolivia"; selection of type locality as Rio de Janeiro, Brazil, by Wetzel and Mondolfi (1979) is invalid because of incorrect assumption of holotype.

*Note:* Wetzel and Mondolfi said the specimen from Rio de Janeiro was the holotype. This is an invalid lectotype designation by assumption of holotype (ICZN 1999:Art. 74.5). If they had said the specimen from Rio de Janeiro was the lectotype, the selection of the type and the restriction of type locality would be valid.

**II.3.C(a.3). Erroneous type localities.** Occasionally, an author was mistaken about the geographic source of the specimens, as illustrated in the following examples.

[*Dasybus septemcinctus* Linnaeus, 1758:51. Type locality "in Indiis"; corrected to "Brasilia" by Erxleben (1777:108); restricted to Pernambuco, Brazil, by Cabrera (1958:226).

[*Bradypus didactylus* Linnaeus, 1758:35. Type locality "Zeylona"; corrected to Surinam by Thomas (1911:132); not British Guiana as stated by Tate (1939).

*Arctopithecus griseus* Gray, 1871:302. Type locality "Costa Rica"; corrected to Cordillera del Chucu, Veragua, Panama, by Alston (1880:183).

*Didelphis pernigra* J. A. Allen, 1900:191. Type locality "Juliaca," Puno, Perú; corrected to Inca Mines (= Santo Domingo) by J. A. Allen (1901:41).

*Note:* The first 2 examples illustrate the ambiguities surrounding the source of some specimens in European collections acquired during the 17th and 18th century. In the last example, Allen mistook Juliaca as the source of a collection from Peru. The specimens had been collected at Inca Mines, known today as Santo Domingo, and mailed to Allen at the American Museum from Juliaca. Thomas (1901:186), realizing that the mammals could not have come from Juliaca because he had received specimens from the same region, also commented on the error.

**II.3.C(a.4). Unknown type localities.** The following are examples where the type locality was unknown (either not mentioned or stated as unknown by the author). In the first 2 examples the type locality was subsequently restricted on the basis of additional information.



*Didelphys Derbiana* Waterhouse, 1841:97. Type locality unknown; restricted to Valle del Cauca, Colombia, by Cabrera (1958:2) based on similarities noted by Allen (1904:57) and Thomas (1913:358) between the type and specimens from that region.

*Phyllostoma crenulata* É. Geoffroy St.-Hilaire, 1803:61. Type locality unknown; stated as Brasilien by Schinz (1844:235) and further restricted to Bafa (= Bahia) by Cabrera (1958:66).

[*Didelphis* (*Micoureus*)] *pulcher* Matschie, 1917:281. Type locality unknown; name based on a zoo specimen.

**II.3.C(b). Context for Name Combinations.** The following are descriptions of the context when a unique combination of the name is cited, except when the name combination refers to a new species.

**II.3.C(b.1). Replacement names.** An available name that is a junior homonym can be replaced by a new name (nomen novum) by any author aware of the homonymy. If the junior homonym also is a junior synonym of the senior homonym, proposing a replacement name is not required, and under the latest Code (ICZN 1999:Art. 60), replacement names are not proposed if synonyms exist. The following is an example of the language used when the name combination is a replacement name.

[*Vespertilio*]. *Maximiliani* J. B. Fischer, 1829:112. Replacement name for *Vespertilio calcaratus* Schinz, 1821, preoccupied by *Vespertilio calcaratus* Rafinesque, 1818.

*Note:* A replacement name replaces a preoccupied name (homonym) and always takes the same type specimen and type locality as the name replaced. A replacement name is sometimes called a new name or a “renaming”; but, to avoid ambiguity, always use the term “replacement name.” See II.2.A(e) for examples of preoccupied names.

**II.3.C(b.2). First use of unique name combinations.** The following 2 examples are from the synonymy of *Centronycteris maximiliani* (J. B. Fischer, 1829) and demonstrate the descriptive phrase used when the name, author, date, and page combination refer to the 1st use of a unique name combination.

[*Saccopteryx* (*Centronycteris*)] *wiedi*: Trouessart, 1904:98. Name combination.

*Centronycteris maximiliani*: Miller, 1907:91. First use of current name combination.

*Note:* The phrase “name combination” is used for each unique name combination when 1st applied to the subject species. If the name combination is the same as the one in use today, the phrase “first use of current name combination” is used. **Any previously cited name combination is not cited again in the synonymy solely because the same name combination was used by a different author.**

**II.3.C(b.3). Incorrect subsequent spellings.** This phrase is used when the name combination constitutes an incorrect subsequent spelling of an available name. The following example was taken from the synonymy of *Lasiurus blossevillii* (Lesson, 1826).

[*Lasiurus*]. *borealis blossevillii* Barquez and Ojeda, 1992:248. Incorrect subsequent spelling of *Vespertilio blossevillii* Lesson, 1826.

*Note:* Also refer to the examples in II.2.B(e).

### III. SUBSPECIES SYNONYMY

#### III.1. INTRODUCTION

The subspecies synonymy is a listing of the trinomials of each recognized subspecies in the subject species. In *Mammalian Species* the subspecies synonymy is placed under the heading “CONTEXT AND CONTENT” because it provides the taxonomic content of the subject species.

**III.1.A. ENTRY FORMAT.** Each entry for a recognized subspecies follows the same format as that for original descriptions and synonyms for the subject species, with 4 exceptions as described as follows.

**III.1.A(a). Abbreviations.** The generic and specific names in the trinomen are abbreviated. For example, *Lepus townsendii campanius* is written:

*L. t. campanius*.

**III.1.A(b). Type Localities.** Subspecies names originally applied to full species, to subspecies originally described as belonging to other genera or species, or to subspecies that are now considered to be junior synonyms of a recognized subspecies, have already been listed in the species synonymy; therefore, the information on the type locality already has been provided and the statement “see above” is substituted in its place. For example, *Lepus americanus virginianus* is written:

*L. a. virginianus* Harlan, 1825:196; see above.

**III.1.A(c). Synonyms.** Names that are synonyms of each recognized subspecies are listed by only the specific or subspecific name with its original author. These are arranged alphabetically without date in single running-sentence format. The date is not necessary here because it has already been included in the species synonymy. For example, the full entry for *Lepus americanus virginianus* is written:

*L. a. virginianus* Harlan, 1825:196; see above; *borealis* Schinz and *wardii* Schinz are synonyms.

**III.1.A(d). Order of Sequence.** Subspecies names and their synonyms are placed in alphabetical, not chronological, order.

**III.1.B. Treatment of Synonyms.** Those synonyms of recognized subspecies that were originally described as species, or as subspecies in other species, have already been included in the species synonymy; therefore, information such as date, page number, and type locality is not repeated. Unavailable names for the subject species and its subspecies, or synonyms of subspecies (vernaculars, misidentifications, nomina nuda, and incorrect spellings) are not included in the subspecies synonymy.

#### III.2. EXAMPLES OF SUBSPECIES SYNONYMIES

**III.2.A. Example 1.** Synonymy for *Anoura geoffroyi* Gray, 1838:

*A. g. geoffroyi* Gray, 1838:490; see above; *wiedii* Peters is a synonym.

*A. g. lasiopyga* (Peters, 1868:365); see above.

*A. g. peruana* (Tschudi, 1844:71); see above; *antricola* Anthony and *apolinari* (J. A. Allen) are synonyms.

*Note:* *A. g. lasiopyga* (the 2nd entry) was originally described as *Glossonycteris lasiopyga*; therefore, Peters’s name, date, and page number are enclosed in parentheses to show that Peters described the taxon in a genus other than *Anoura*. This taxon already has been cited in full in the species synonymy.

*A. g. peruana* (the 3rd entry) was originally described as *Glossophaga (Choeronycteris) peruana*; therefore, Tschudi’s name, date, and page number are enclosed in parentheses to show that Tschudi described the taxon in a genus other than *Anoura*. J. A. Allen is in parentheses because he originally described the taxon as *Glossophaga apolinari*, not as a species of *Anoura*. However, Anthony originally described *antricola* as a species of *Anoura*. The synonyms *antricola*, *apolinari*, and *wiedii* have already been cited in the species synonymy. The reason for indicating that Allen did not name *apolinari* in *Anoura* is because without the parentheses around his name, the entry must be interpreted as equivalent to citing the name combination [*Anoura*] *apolinari* J. A. Allen, 1916, which is incorrect.

The nominate subspecies is always cited in the species synonymy. Therefore, the phrase “see above” is substituted where type locality information would be given.

**III.2.B. Example 2.** Synonymy for *Noctilio albiventris* Desmarest, 1818:

*N. a. albiventris* Desmarest, 1818:15; see above; *affinis* d’Orbigny, *albiventer* Desmarest, *irex* Thomas, and *zaparo* Cabrera, are synonyms.

*N. a. cabrerai* Davis, 1976:701. Type locality “Fuerte Olimpo, Depto. de Olimpo [= Alto Paraguay], Paraguay.”

*N. a. minor* Osgood, 1910:30, see above.

**Note:** The name *Noctilio albiventris* Desmarest, 1818, was included in the species synonymy; therefore, the type locality is not given here and the phrase “see above” is substituted in its place. The name *N. a. cabrerai* Davis, 1976, was described as a subspecies of *Noctilio albiventris* Desmarest, 1818, not as a separate species; therefore, the name was not included in the species synonymy and the type locality is provided in the subspecies list. *Noctilio albiventer* Desmarest, 1820, already has been included in the species synonymy along with the other names listed as synonyms of the nominate subspecies. *Noctilio albiventer* Spix, 1823, based on a specimen from Bahia, Brazil, is a junior primary homonym of *albiventer* Desmarest, 1820, and is not included in the subspecies synonymy of *albiventris* Desmarest, 1818, because the name is invalid in its present form. However, Spix’s name is included in the species synonymy. A replacement name for *albiventer* Spix, 1823, cannot be proposed according to the Code (ICZN 1999: Art. 60.2) because junior synonyms exist. **Mammalian Species is intended to provide a synopsis of available information on the subject species and is not the place to propose replacement names or other nomenclatural acts.**

## IV. GENERIC SYNONYMY

### IV.1. INTRODUCTION

After having gathered and examined the literature on the use and history of the species and subspecies names, researchers should be familiar with most if not all of the generic names that have been applied to the subject species. Linnaeus divided all of the species of mammals he recognized in the 10th edition (1758) of the *Systema Naturae* among 39 genera. Linnaeus’s genera were highly composite by today’s standards. For example, all marsupials were included in the genus *Didelphis*; all bats in *Vespertilio*; all armadillos in *Dasyurus*; all cats in *Felis*; and spotted, non-cat carnivores in *Viverra*. Even as the number of genera proliferated, some generic names (e.g., among bats, *Phyllostomus*, *Phyllostoma*, and *Vesperugo*) continued to be applied in a broad sense and are common in the earlier literature. When constructing a generic synonymy, the author must be aware of the following information.

### IV.2. CITATION OF GENERIC NAME AND SYNONYMS

The full citation of a generic name consists of the name, the author of that name, the date the name became available, and the name of its type species. The page number in the original publication also is included in the generic synonymy.

**IV.2.A. CITATION OF NONSYNONYMS.** If the 1st generic name used for the subject species in the older literature is not the generic name in current use for that species, the subject species is unlikely to be the type species of that genus. The reader must be able to distinguish between a generic name used in a name combination for the subject species and the same generic name used with its original author and date. The following examples illustrate this important point.

**IV.2.A(a). Example 1.** Kerr (1792) included 32 species in the genus *Viverra*. One of these was *Viverra maculata* Kerr, 1792: 170, which is the original description of the marsupial carnivore known today as *Dasyurus maculatus* (Kerr, 1792). The next name combination applied to this species was *Mustela novæ-hollandiæ* Meyer, 1793:27. This was followed by *Dasyurus macrourus* É. Geoffroy St.-Hilaire, 1804:358. *Dasyurus maculatus*: Fischer von Waldheim, 1813, was the 1st application of the current name combination to this marsupial. The specific name *maculatus* has been combined with at least 3 generic names, but is not the type species of any of them. The generic synonymy for *Dasyurus maculatus* (Kerr, 1792) would include the following names.

*Viverra*: Kerr, 1792:170. Part, not *Viverra* Linnaeus, 1758.

*Mustela*: Meyer, 1793:27. Not *Mustela* Linnaeus, 1758.

*Dasyurus* É. Geoffroy St.-Hilaire, 1804:358. No type species mentioned; based on the “Spotted opossum” of Phillips (1789), and the *Topoa tafa* of White (1792); type species *Didelphis viverrinus* Shaw, 1800, by subsequent designation (Thomas 1888).

**Note:** The 1st entry indicates that only part (the description of 1 species in this case) of *Viverra*, as used and understood by Kerr (1792), is applicable to the genus *Dasyurus*, and that Kerr’s use of *Viverra* is not equivalent to *Viverra* Linnaeus, 1758, as interpreted today. The colon makes clear that Kerr is not the author of *Viverra*. The 2nd entry indicates that Meyer simply used the name *Mustela* in a name combination for 1 or more species now under *Dasyurus*, and the colon makes clear that Mayer is not the author of *Mustela*.

**IV.2.A(b). Example 2.** The following example is the complete generic synonymy of the bat genus *Lophostoma* d’Orbigny, 1836. Until recently, *Lophostoma* had been considered a synonym of *Tonatia* Gray, in Griffith, Hamilton-Smith, and Pidgeon (1827).

*Lophostoma* d’Orbigny, 1836: pl. 6. Type species *Lophostoma silvicolum* d’Orbigny, 1836: pl. 6, by monotypy.

*Phyllostoma*: J. A. Wagner, 1843:365. Part, not *Phyllostoma* G. Cuvier, 1800.

*Vampyrus*: Pelzeln, 1883:32. Not *Vampyrus* Leach, 1821.

*Tonatia*: Palmer, 1898:110. Part, not *Tonatia* Gray, in Griffith, Hamilton-Smith, and Pidgeon (1827).

*Chrotopterus*: J. A. Allen, 1910:147. Part, not *Chrotopterus* Peters, 1865.

*Tonatia*: Thomas, 1910:184. Part, not *Tonatia* Gray, in Griffith, Hamilton-Smith, and Pidgeon (1827).

*Tonatia*: Goodwin, 1942:205, 209. Part, not *Tonatia* Gray, in Griffith, Hamilton-Smith, and Pidgeon (1827).

*Tonatia*: Davis and Carter, 1978:6. Part, not *Tonatia* Gray, in Griffith, Hamilton-Smith, and Pidgeon (1827).

*Tonatia*: Genoways and Williams, 1980:205. Part, not *Tonatia* Gray, in Griffith, Hamilton-Smith, and Pidgeon (1827).

**Note:** In the 4 citations of *Tonatia* beginning with Thomas (1910) each author described taxa as species of *Tonatia*. These species currently are considered members of the genus *Lophostoma*. Therefore, the repetitious inclusion of *Tonatia* in the synonymy is to show each author’s concept of the generic relationship when describing these species. The 2 page numbers in Goodwin (1942) reflect the description of 2 species in the same publication. A colon separates each author’s name from the generic name in all entries except the 1st, because none of these uses were original generic descriptions. *Chrotopterus* Peters, 1865, and *Tonatia* Gray, 1827, are valid generic names. *Vampyrus* Leach, 1821, is a synonym of *Vampyrus* Rafinesque, 1815. *Phyllostoma* G. Cuvier, 1800, is an unjustified emendation of *Phyllostomus* Lacépède, 1799.

### IV.3. TYPE SPECIES

Each genus has a type species that fixes the application of that genus (see ICZN 1999:Arts. 66–69). Normally the type species will be chosen in the 1st publication to provide a name for the genus. This is called the original designation. To qualify as an available name after 1930, a genus-group name must have its type species fixed in the original publication (ICZN 1999:Art 67.4.1). The designation must be explicit, not simply the mention of a species as an example of a genus or subgenus, nor the mention of a particular character or structure as type or typical of a genus or subgenus, or by any other ambiguous or conditional manner. Thus, for a genus-level name authored after 1930 to be available, its type species must be specified by original designation. For genus-level names authored before 1930, the type species may be set by other mechanisms: monotypy, subsequent designation, absolute tautonymy, or Linnaean tautonymy. If a species of a nominal genus or subgenus is clearly but not explicitly identified as the type in the original publication, that species may be the type species by **monotypy** (see below). If neither an implicit nor explicit species is identified as the type, a type species may be chosen by a subsequent author (**subsequent designation**). Such a species can be fixed as the type species only if that species was originally included in the nominal genus or subgenus. The name of the type species must be an available name but does not have to be the valid name for that species. When listing a subsequent designation in a synonymy you must provide the citation in which that subsequent designation was made. Type designations by absolute and Linnaean tautonomies are described below. Rarely, no type species may have ever been specified for a pre-1930 generic name. The following

phrases describe the determination of type species from actual examples.

#### IV.3.A. ORIGINAL DESIGNATION.

*Choeroniscus* Thomas, 1928:122. Type species *Choeronycteris minor* Peters, 1868, by original designation.

*Neoplatymops* Peterson, 1965:3. Type species *Molossops matto-grossensis* Vieira, 1942, by original designation.

*Note:* Thomas explicitly identified *Choeronycteris minor* Peters, 1868, as the type species of *Choeroniscus* by using the word *genotype* in association with the name. Peterson used the term *type species*. If an author uses the term *type*, *type species*, or *genotype* or a language equivalent (e.g., *typus* in German and *tipo* in Spanish) with a species name when describing a new genus, the author has designated the type species.

**IV.3.B. MONOTYPY.** When a description of a new genus mentions only 1 species, but lacks any language (e.g., type, genotype, or type species) clearly stating that the species is the type species of that genus, the species is type by monotypy as in the following examples.

*Lutreolina* Thomas, 1910:247. Type species *Lutreolina crassicaudata* (Desmarest 1804) [= *Didelphis crassicaudata* Desmarest, 1804], by monotypy.

*Note:* *Lutreolina crassicaudata* (Desmarest, 1804) was the only species mentioned by Thomas in his new genus, but he did not explicitly say it was the type species, nor did he use any other terminology to indicate that it was the type species.

*Mormopterus* Peters, 1865:258. Type species [*Dysopes* (*M*[*ormopterus*])]. *jugularis* Peters, 1865, by monotypy; described as a subgenus of *Dysopes* Illiger, 1811.

*Note:* Peters listed the name *Mormopterus* (marked with a superscript reference to a footnote) among other names as a subgenus of *Dysopes*. The footnote included only the statement "*M. jugularis* aus Madagascar" followed by a brief description. Brackets and parentheses demonstrate the implied original name combination, *Dysopes* (*Mormopterus*) *jugularis*, Peters used in the original publication.

#### IV.3.C. SUBSEQUENT DESIGNATION.

*Ateles* É. Geoffroy St.-Hilaire, 1806:262. Type species *Simia paniscus* Linnaeus, 1758, by subsequent designation (Miller and Rehn 1901).

*Viverra* Linnaeus, 1758:43. Type species *Viverra zibetha* Linnaeus, 1758, by subsequent designation (Sclater 1900).

*Note:* Geoffroy included 5 species under his new generic name *Ateles*, but did not designate a type species. Miller and Rehn said the type of *Ateles* was *Simia paniscus* Linnaeus, thereby selecting the type species by subsequent designation. Sclater used the term *type* to select *V. zibetha* as the type species of *Viverra*.

Originally *Viverra* Linnaeus, 1758, included *V. ichneumon* (now in *Herpestes* Illiger, 1811), *V. memphitis* (not determinable, a nomen dubium), *V. putoris* (now in *Spilogale* Gray, 1865), *V. zibetha* (designated as the type species by Sclater 1900), and *V. genetta* (now in *Genetta* Cuvier, 1816).

**IV.3.D. ABSOLUTE TAUTONOMY.** If a valid species-group name, or its available synonym cited in the original publication, was among the species originally included in a genus-group taxon, and that name is identical with the name of that genus-group taxon, the species bearing that name is the type species by absolute tautonomy.

*Bison* Hamilton-Smith, 1827:373. Type species *Bos Bison* Linnaeus, 1758, by absolute tautonomy; described as a subgenus of *Bos* Linnaeus, 1758.

**IV.3.E. LINNAEAN TAUTONOMY.** If in the synonymy of 1 of the species included under a genus established before 1931 a pre-1758, 1-word name of the same spelling as the generic name exists, that species is the type species by Linnaean tautonomy. The following example illustrates type species by Linnaean tautonomy.

*Vespertilio* Linnaeus, 1758:31. Type species *Vespertilio murinus* Linnaeus, 1758, by Linnaean tautonomy.

*Note:* Originally, the genus *Vespertilio* Linnaeus, 1758, included *V. vampyrus* (now in *Pteropus* Brisson, 1762), *V. spectrum* (now in *Vampyrum* Rafinesque, 1815), *V. perspicillatus* (now in *Carollia* Gray, 1838), *V. spasma* (now in *Megaderma* É. Geoffroy, 1810), *V. leporinus* (now in *Noctilio* Linnaeus, 1766), *V. auritus* (now in *Plecotus* É. Geoffroy, 1818), and *V. murinus*. On page 32 in the synonymy of *Vespertilio murinus* a 1-word synonym "Vespertilio" is attributed to Bell. Therefore, *Vespertilio murinus* is the type species of *Vespertilio* Linnaeus, 1758, by Linnaean tautonomy. Linnaean tautonomy is not limited to Linnaeus's names.

#### IV.3.F. NO TYPE SPECIES SELECTED.

*Sycophaga* Winge, 1892:10. No type species selected; described as a subgenus of *Phyllostoma* G. Cuvier, 1800; included *Stenoderma humerale* Winge, 1892, *Chiroderma villosum* Peters, 1860, *Phyllostoma lineatum* É. Geoffroy St.-Hilaire, 1810, and *P. lilium* É. Geoffroy St.-Hilaire, 1810; preoccupied by *Sycophaga* Westwood, 1840 (a hymenopteran).

*Note:* Occasionally a researcher will find a generic name that included 2 or more species when the genus was originally described, but a type species was not identified at the time of the description, nor subsequently has one been selected. In these situations, any 1 of the originally contained taxa could be designated as the type species. In the example above, *Sycophaga* Winge is preoccupied by *Sycophaga* Westwood, and the coining of a replacement name would serve no purpose because it would immediately become a junior synonym of any 1 of 4 already established genera, each represented by 1 of the 4 species included by Winge. Although not a problem here, the designation of a type species for genera lacking one should be left to a specialist because of possible unforeseen consequences if an inappropriate species is selected.

### IV.4. UNAVAILABLE NAMES

**IV.4.A. VERNACULAR NAMES.** As was true for the species synonymy, an author may wish to cite a vernacular name. This is justified in certain generic synonymies because a few 19th century authors used names in their latinized form but dated the name from its 1st appearance as a French common name. These situations can be clarified if the researcher cites the vernacular name and clearly states that it is a vernacular, unavailable name. The following is an example from part of the generic synonymy for *Arctocephalus* É. Geoffroy St.-Hilaire and F. Cuvier, 1826.

*Phoca*: Schreber, 1775:pl. 85. Part, not *Phoca* Linnaeus, 1758.

*Otaria*: Desmarest, 1817:590. Part, not *Otaria* Péron, 1816.

*Arctocéphale* F. Cuvier, 1824:205. Part, vernacular, unavailable name.

*Arctocephalus* É. Geoffroy St.-Hilaire and F. Cuvier, 1826. Type species *Phoca pusilla* Schreber, 1775, by subsequent designation under plenary powers of the International Commission on Zoological Nomenclature (ICZN 2000).

*Note:* Authors consistently cited *Arctocephalus* from F. Cuvier (1824). However, an examination of F. Cuvier (1824) revealed the French vernacular spelling, *Arctocéphale*, but nowhere does *Arctocephalus* appear. The latinized form *Arctocephalus* 1st appeared in É. Geoffroy St.-Hilaire and F. Cuvier (1826).

**IV.4.B. INCORRECT SUBSEQUENT SPELLINGS.** As pointed out under the species synonymy, misspelled scientific names are common. An incorrect subsequent spelling is not an available name, cannot enter into homonymy, and cannot be used as a replacement (substitute) name. The following are examples from the literature.

*Mallodelphis* Gilmore, 1941:317. Incorrect subsequent spelling of *Mallodelphys* Thomas, 1920.

*Caluromys* Ávila Pires, 1964:11. Incorrect subsequent spelling of *Caluromys* J. A. Allen, 1900.

*Cheronectes* Fleming, 1822:212. Incorrect subsequent spelling of *Chironectes* Illiger, 1811.

*Chlamydephorus* Lenz, 1831:xi. Incorrect subsequent spelling of *Chlamyphorus* Harlan, 1825.

*Lonchohyna* Villa-R., 1967:467. Incorrect subsequent spelling of *Lonchorhina* Tomes, 1863.

*Note:* No punctuation separates the misspelled name and the author's name because that person "coined" the misspelling.

**IV.4.C. UNJUSTIFIED EMENDATIONS.** The original spelling of a name is to be preserved as the correct original spelling. The following are examples from the literature.

*Didelphys* Schreber, 1777:532. Part, unjustified emendation of *Didelphis* Linnaeus, 1758.

*Cholopus* Agassiz, 1847:83. Unjustified emendation of *Choloepus* Illiger, 1811.

*Mormops* F. Cuvier, 1829:422. Unjustified emendation of *Mormoops* Leach, 1821; placed on Official Index of Rejected and Invalid Generic Names in Zoology (ICZN 1957; Opinion 462).

*Histiophorus* Agassiz, 1847:183. Unjustified emendation of *Istio-phorus* Gray, 1825.

*Note:* Emendations are more common for generic names than for specific names, perhaps because most generic names are latinized words from the Greek. Controversy often arises when someone, based on a strictly classical interpretation, considers an original spelling to have been incorrectly derived. In the last example above, Agassiz used the Latin abbreviation *Scr.* (for *Scribe*) with the name *Histiophorus*, meaning that he believed *Histiophorus* to be the correct spelling of *Istio-phorus* Gray, 1825.

#### IV.5. MANDATORY CHANGES IN SPELLING

Some original spellings require mandatory changes, although the original spelling is included in the generic synonymy. For example, a name originally published with a diacritical mark, apostrophe, diphthong, or hyphen is to be corrected (ICZN 1999:Art. 32.5.2). Relatively few mandatory changes are necessary for genera, perhaps because most generic names are latinized words from the Greek. An example of a generic name that required change is *Rhogeëssa*, which became *Rhogeessa*.

### V. PUNCTUATION

#### V.1. COMMAS

Use a comma between the author of the name and the year in which the name was published. All the scientific names presented in this guide illustrate this placement.

#### V.2. COLONS

A colon placed after the specific name indicates that the author of the name combination (genus and species in this case) did not coin the species name. Some authors have used a comma after the specific name to indicate the same meaning. Examples are given in II.2.A(c), II.2.A(d), II.2.A(i), II.2.A(l), II.2.A(m), II.2.B(b), II.3.B, and II.3.C(b.2).

In the generic synonymy, a colon placed after the generic name indicates that the author applied the name to the genus in question but did not create the name itself. Examples are given in IV.2.A(a), IV.2.A(b), and IV.4.A.

Colons also are used to separate the year from the page number in the authority portion of a name.

#### V.3. PARENTHESES

Parentheses around an author's name and date indicate that the author was the 1st person to describe and name the species or subspecies but did so under a different generic name. Examples are given in II.2.A(a), II.2.A(b), II.2.B(e), II.3.C(b.2), III.2.A, and III.3.B.

Parentheses may be used to indicate the subgenus to which the species has been classified. Examples are given in I.1.A, II.2.A(d), II.2.A(e), II.2.A(f), II.2.A(k), II.2.B(e), II.3.A, II.3.C(a.4), and II.3.C(b.2).

Parentheses may be used to indicate additional information about the type locality when that information is not within quotation marks. Examples are given in II.2.A(e), II.2.A(f), II.3.C(a.1), II.3.C(a.2), II.3.C(a.3), and II.3.C(a.4).

Parentheses may be used around an authority in the text of the account. In complicated situations parentheses may be used for clarity.

#### V.4. SQUARE BRACKETS

Brackets are used to indicate that the material within the brackets was not part of the material quoted. Examples are given in II.2.A(b), III.2.B, and IV.3.B.

Brackets are used around missing elements such as when a name is abbreviated or when the generic and subgeneric names are implied but not given in the name combination. Examples are given in II.2.A(a), II.2.A(c), II.2.A(d), II.2.A(e), II.2.A(g), II.2.A(h), II.2.A(k), II.2.A(m), II.2.B(c), II.2.B(e), II.3.A, II.3.B, II.3.C(a.2), II.3.C(a.3), II.3.C(a.4), II.3.C(b.1), II.3.C(b.2), II.3.C(b.3), III.2.B, and IV.3.B.

Brackets may be used to indicate information not present in the original work. Examples are given in IV.3.B.

Brackets also are used to indicate parenthetical material included with in parentheses.

### VI. FINDING NAMES AND VERIFYING DATES

#### VI.1. INTRODUCTION

Among the problems faced by a researcher when constructing a synonymy are determining the earliest use (with correct author and date), determining the type species for a genus-group name, and determining the type locality for a species-group name. Some problems arise because of the lack of uniformity in the manner in which scientific literature historically has been published. Lack of familiarity with the older literature and with nomenclatural terms contributes to the difficulty in preparing accurate synonymies.

#### VI.2. PREPRINTS

Historically, published articles often were preceded by preprints bearing an earlier date and usually with different pagination. These are separates of the article printed before the publication of the book, journal, or periodical in which the work ultimately appeared. Galley proofs, which still are unpublished manuscripts, should not be confused with preprinted separates. Authors must be aware that scientific names may date from the distribution of preprints and separates. The following is an example of an earlier date of publication based on the distribution of preprints.

LUND, P. W. 1839. Pattedyrene. Kongelige Dansre Videnskabernes Selskabs Naturvidenskabelige og Mathematiske Afhandlingler 2:1–82, 13 pls. [Preprint of: Lund, P. W. 1841. Blik paa Brasiliens Dyreverden for sidste Jordomvaeltning. Anden Afhandling: Pattedyrene. Kongelige Dansre Videnskabernes Selskabs Naturvidenskabelige og Mathematiske Afhandlingler 8: 61–144, pls. 1–13.]

#### VI.3. DATES OF PUBLICATION

Authors also should be aware that the date on the cover page of a book or on a complete volume of a journal or serial may not be the correct date for all of the articles or parts contained therein. The correct date of publication is critical in nomenclature because of the Principle of Priority (see Glossary). The following references are examples of literature in which the date of publication appearing on a book, a reprint, or on the cover page of a volume of a serial is not the correct date.

GARDNER, A. L. 1990. Two new mammals from southern Venezuela and comments on the affinities of the highland fauna of Cerro de la Neblina. Pp. 411–424 in *Advances in Neotropical mammalogy* (K. H. Redford and J. F. Eisenberg, eds.). The Sandhill Crane Press, Inc., Gainesville, Florida, x + 614 pp. [Volume is dated 1989, but was published 6 February 1990.]

GEOFFROY ST.-HILAIRE, É. 1818. Description des mammifères qui se trouvent en Egypte. Pp. 99–144 in *Description de l'Égypte, ou recueil des observations et des recherches qui ont été faites en Égypt pendant l'Expédition de l'Armée Française, publié par les ordres de sa Majesté l'Empereur Napoléon Le Grand. Histoire Naturelle. Commission D'Égypte, L'Imprimerie Impériale, Paris 2:1–750.* [Dated 1812; see Sherborn, 1897, for date of publication.]

GRAY, J. E. 1849. Observations on some Brazilian bats with the description of a new genus. *Proceedings of the Zoological So-*

- ciety of London, for 1848:57–58. [Published 30 January 1849; see Duncan 1937, for dates of publication for the Proceedings.]
- HILL, J. E. 1965. Notes on bats from British Guiana, with the description of a new genus and species of *Phyllostomidae*. *Mammalia* 28:553–572. [Volume 28 is dated 1964, but issue number 4 containing this paper was published in 1965.]
- PETERS, W. 1866. Über die Brasilianischen, von Spix beschriebenen Flederthiere. *Monatsberichte Königlich Preussischen Akademie der Wissenschaften zu Berlin*, for 1866:568–583, 1 pl. [The title page for volume 1866 contains the phrase “Aus dem Jahre 1865,” which is the year separate papers were published covering pages 1–562; however, pages 563 to end of volume were published in 1866.]
- #### VI.4. SOURCES FOR NAMES AND DATE VERIFICATION
- The following is a partial list of nomenclators and other references that should be consulted when looking for names and verifying dates of publication. Most of these reference resources contain names, authors, and (usually) the date and publication where names can be found. Information must be checked against the original literature because these references may contain errors and omissions. The reader should also be aware that more than 1 edition may exist, each with the same title, but in a different format, published in the same year (see Wied-Neuwied [1820], under General References).
- CABRERA, A. 1958–1961. Catálogo de los mamíferos de América del Sur. *Revista del Museo Argentino de Ciencias Naturales «Bernardino Rivadavia»*, *Ciencias Zoológicas* 4(1):xvi [+ i–iv], 1–308, 1957 [dated 1957; published 27 March 1958—see notice on p. 308]; 4(2):frontispiece + xvii–xxii + 309–732 [dated 1961]. [This otherwise valuable reference is marred by a few omissions and many typographical errors.]
- CONISBEE, L. R. 1953. A list of the names proposed for genera and subgenera of Recent mammals from the publication of T. S. Palmer's “Index generum mammalium” 1904 to the end of 1951. *British Museum (Natural History)*, London, England, 109 pp.
- CONISBEE, L. R. 1953. Newly proposed genera, 1957–1961. *Journal of Mammalogy* 45:474–475.
- CONISBEE, L. R. 1970. Newly proposed genera, 1962–1966. *Journal of Mammalogy* 51:639–640.
- DUNCAN, F. M. 1937. On the dates of publication of the Society's ‘Proceedings,’ 1859–1926. With an appendix containing the dates of publication of ‘Proceedings,’ 1830–1858, compiled by the late F. H. Waterhouse, and of the ‘Transactions,’ 1833–1869, by the late Henry Peavot, originally published in P. Z. S. 1893, 1913. *Proceedings of the Zoological Society of London* 107(Series A):71–84.
- ELLERMAN, J. R., AND T. C. S. MORRISON-SCOTT. 1966. Checklist of Palaearctic and Indian mammals 1758–1946. Second edition. *British Museum (Natural History)*, London, England, 310 pp.
- HALL, E. R. 1981. *The mammals of North America*. Second edition. John Wiley and Sons, New York 1:xviii + 1–600 + 90 pp; 2:vi + 601–1181 + 90 pp.
- HILL, J. E. 1990. A memoir and bibliography of Michael Rogers Oldfield Thomas, F.R.S. *Bulletin of the British Museum of Natural History (History Series)* 18:25–113.
- KRETZOI, M., AND M. KRETZOI. 2000. *Index generum et subgenerum mammalium*. Part 137. *Fossilium catalogus I: Animalia*. Backhuys Publishers, Leiden, Section 1:xvi + 1–433; Section 2:434–726. [Unfortunately, this work contains archaic names for most higher taxa and ignores all Opinions, Declarations, and Directions issues by the International Commission on Zoological Nomenclature.]
- MCKENNA, M. C., AND S. K. BELL. 1997. *Classification of mammals above the species level*. Columbia University Press, New York, xii + 631 pp.
- MEESTER, J., AND H. W. SETZER (EDS.). 1971. *The mammals of Africa. An identification manual*. Parts 1–15.1. Smithsonian Institution Press, Washington, D.C. [Parts are independently paginated and dated.]
- NEAVE, S. A. (ED.). 1939–1940. *Nomenclator zoologicus*. A list of the names of genera and subgenera in zoology from the tenth edition of Linnaeus, 1758 to the end of 1935. *The Zoological Society of London* 1(A–C):xiv + 1–957, 1939; 2(D–L):1–1025, 1939; 3(M–P):1–1065, 1940; 4(Q–Z and supplement):1–758, 1940.
- NEAVE, S. A. (ED.). 1950. *Nomenclator zoologicus*. 1936–1945. *The Zoological Society of London* 5:1–308.
- NEAVE, S. A. [M. A. EDWARDS AND A. T. HOPWOOD, EDs.]. 1966. *Nomenclator zoologicus*. 1946–1955. *The Zoological Society of London* 6:1–329.
- NEAVE, S. A. [M. A. EDWARDS AND H. G. VEVERS, EDs.]. 1975. *Nomenclator zoologicus*. 1956–1965. *The Zoological Society of London* 7:1–374.
- NEAVE, S. A. [M. A. EDWARDS AND M. A. TOBIAS, EDs.]. 1993. *Nomenclator zoologicus*. 1966–1977. *The Zoological Society of London* 8:1–620.
- NEAVE, S. A. [M. A. EDWARDS P. MANLY, AND M. A. TOBIAS, EDs.]. 1996. *Nomenclator zoologicus*. 1978–1994. *The Zoological Society of London* 9:1–747.
- PALMER, T. S. 1904. *Index generum mammalium: a list of the genera and families of mammals*. *North American Fauna* 23:1–984. [An important source of information.]
- SCHULZE, F. E., W. KÜKENTHAL, AND K. HEIDER. 1926–1940. *Nomenclator animalium generum et subgenerum*. *Verlage der Preussischen Akademie der Wissenschaften*, Berlin 1–5:1–3692 + I–CCCXXXVI. [Issued in many fascicles in 5 volumes; Volume 1, fascicles 4 and 5 (pages I–CCCXXXVI) contains methods, organization, and literature sources for names. An excellent nomenclator.]
- SHERBORN, C. D. 1891. On the dates of the parts, plates, and text of Schreber's ‘Säugethiere’. *Proceedings of the Zoological Society of London*, for 1891:587–592.
- SHERBORN, C. D. 1897a. On the dates of the natural history portion of Savigny's ‘Description de l'Égypte.’ *Proceedings of the Zoological Society of London*, for 1897:285–288.
- SHERBORN, C. D. 1897b. Note on the dates of “The zoology of the ‘Beagle.’” *Annals and Magazine of Natural History*, Series 6, 20:483.
- SHERBORN, C. D. 1898. Dates of Blainville's ‘Ostéographie.’ *Annals and Magazine of Natural History*, Series 7, 2:76.
- SHERBORN, C. D. 1902. *Index animalium sive index nominum quae ab A.D. MDCCCLVIII generibus et speciebus animalium imposita sunt*. J. and C. F. Clay, Cambridge University Press, London, England, lx + 1195 pp. [Covers names in the pre-1800 literature.]
- SHERBORN, C. D. 1922–1933. *Index animalium sive index nominum quae ab A.D. MDCCCLVIII generibus et speciebus animalium imposita sunt*. 1801–1850. *British Museum (Natural History)*, London, Parts 1–28, cxxxii + 7056 pp. Parts 29–33, 1098 pp. [Part 1 also contains a bibliography of the literature basis for the names. Part 29 contains additional bibliographic information. This is an extremely important source of information.]
- SHERBORN, C. D., AND F. J. GRIFFIN. 1934. On the dates of publication of the natural history portions of Alcide d'Orbigny's ‘Voyage Amérique méridionale.’ *Annals and Magazine of Natural History*, Series 10, 13:130–134.
- SHERBORN, C. D., AND B. B. WOODWARD. 1893. On the dates of the ‘Encyclopédie Méthodique’ (Zoology). *Proceedings of the Zoological Society of London*, for 1893:582–584.
- SHERBORN, C. D., AND B. B. WOODWARD. 1901. Dates of publication of the zoological and botanical portions of some French voyages. Part II. Ferret and Galinier's ‘Voyage en Abyssinie’; Lefebvre's ‘Voyage en Abyssinie’; ‘Exploration scientifique de l'Algérie’; Castelnau's ‘Amérique du Sud’; Dumont d'Urville's ‘Voyage de l'Astrolabe’; Laplace's ‘Voyage sur la Favorite’; Jacquemont's ‘Voyage dans l'Inde’; Tréhouart's ‘Commission scientifique d'Islande’; Cailliaud, ‘Voyage à Méroé’; ‘Expédition scientifique de Morée’; Fabre, ‘Commission scientifique du Nord’; Du Petit-Thouars, ‘Voyage de la Vénus’; and on the dates of the ‘Faune Française.’ *Annals and Magazine of Natural History*, Series 7, 8:161–164, 333–336, and 491–494.
- SMITH, J. C. 1993. *Georges Cuvier: an annotated bibliography of his published works*. Smithsonian Institution Press, Washington, D.C.
- TROUSSERT, E.-L. 1897–1899. *Catalogus mammalium tam viventium quam fossilium*. R. Friedländer and Sohn, Berolini lvi

+ 1-664; 2:vi + 665-1469. [Volume 1 was printed in fascicles 1 and 2 (both dated 1897); volume 2 was printed in fascicles 3 (dated 1897), 4 and 5 (both dated 1898), and 6 (dated 1899). One example from each volume follows.]

- TROUËSSART, E.-L. 1897. *Catalogus mammalium tam viventium quam fossilium. Fasciculus I. Primates, Prosimiae, Chiroptera, Insectivora*. R. Friedländer and Sohn, Berolini l:vi + 1-218.
- TROUËSSART, E.-L. 1898. *Catalogus mammalium tam viventium quam fossilium. Fasciculus V. Sirenia, Cetacea, Edentata, Marsupialia, Allotheria, Monotremata*. R. Friedländer and Sohn, Berolini 2:999-1264.
- TROUËSSART, E.-L. 1904-1905. *Catalogus mammalium tam viventium quam fossilium. Quinquennale supplementum, anno 1904*. R. Friedländer and Sohn, Berolini, vii + 929 pp. [The supplementum was issued in 4 fascicles; 1 and 2 are dated 1904, 3 and 4 are dated 1905. An example from each year follows.]
- TROUËSSART, E.-L. 1904. *Catalogus mammalium tam viventium quam fossilium. Quinquennale supplementum, anno 1904, Fasciculus I. Primates, Prosimiae, Chiroptera, Insectivora, Carnivora, Pinnipedia*. R. Friedländer and Sohn, Berolini, vii + 1-288.
- TROUËSSART, E.-L. 1905. *Catalogus mammalium tam viventium quam fossilium. Quinquennale supplementum (1899-1904). Fasciculus IV. Cetacia, Edentata, Marsupialia, Allotheria, Monotremata.—Index alphabeticus*. R. Friedländer and Sohn, Berolini, 753-929.
- WILSON, D. E., AND D. M. REEDER, (EDS.). 1993. *Mammal species of the world*. Second edition. Smithsonian Institution Press, Washington, D.C., xviii + 1207 pp. [The 3rd edition is in the final phase of preparation and will appear in 2005.]

## VII. FINDING LITERATURE

The following resources will help in identifying and locating references that may be needed to research synonymies for *Mammalian Species*.

- ALKIRE, L. G., JR. (ED.). 1994a. *Periodical title abbreviations: by abbreviation*. Volume 1. Ninth edition. Gale Research Inc., Detroit, Michigan.
- ALKIRE, L. G., JR. (ED.). 1994. *Periodical title abbreviations: by title*. Volume 2. Ninth edition. Gale Research Inc., Detroit, Michigan.
- AMERICAN LIBRARY ASSOCIATION. 1968-1981. *The National Union Catalog, pre-1965 imprints*. A cumulative author list representing Library of Congress printed cards and titles reported by other American libraries. 754 volumes. Mansell Information/Publishing Limited. London, United Kingdom.
- ARCHIV FÜR NATURGESCHICHTE, BERLIN. Published 1835-1994. [The second volume for each year contains a summary review of the biological literature for the preceding year.]
- BRITISH MUSEUM OF NATURAL HISTORY. 1980. *Serial publications in the British Museum (Natural History) library*. Third edition. British Museum (Natural History) I(A-F):1-479; 2(G-Q):480-980; 3(R-Z):981-1436.
- ROYAL SOCIETY OF LONDON. 1867-1925. *Catalog of scientific papers [various years]*. 19 volumes. Royal Society of London, England. [This catalog covers papers published from 1800 to 1900.]
- TITUS, E. B. (ED.). 1965. *Union list of serials in libraries of the United States and Canada*. Third edition. 5 volumes. The H. W. Wilson Company, New York.
- WOODWARD, B. B. (ED.). 1903. *Catalog of the books, manuscripts and drawings in the British Museum*. Volumes 1-5. British Museum (Natural History), London, England.
1922. Volume 6, Supplement.
1933. Volume 7, Supplement.
1940. Volume 8, Supplement.
- ZOOLOGICAL RECORD. Covers the zoological literature from 1864 to present. [Unfortunately, it does not contain everything published in any single year. Researchers may find the following list useful: "Alphabetical list of the abbreviations used in the Zoological Record, Vol. XL, 1903, for the titles of the journals, transaction, etc. that contain zoological papers; with indications of some of the principal libraries in which the books are current."]

## VIII. GENERAL REFERENCES

The following list of references includes a few citations the reader may find useful, including citations of some of the older literature. Full pagination, including prepage materials and unpaginated tables, plates, and figures, is included because these bibliographic details can be extremely helpful when trying to locate information, especially when located in a table, appendix, or table of contents. Unfortunately, these details usually are omitted in literature cited sections.

- AZARA, F. DE. 1801a. *Essais sur l'histoire naturelle des quadrupèdes de la province du Paraguay*. Traduits sur le manuscrit inédit de l'auteur. Pra. M. L. E. Moreau-Saint-Méry. Charles Pougens, Paris, France 1:xxx + 1-366.
- AZARA, F. DE. 1801b. *Essais sur l'histoire naturelle des quadrupèdes de la province du Paraguay*. Traduits sur le manuscrit inédit de l'auteur. Pra. M. L. E. Moreau-Saint-Méry. Charles Pougens, Paris, France 2:1-499.
- BAIRD, S. F. 1857. *Mammals*. In Reports of explorations and surveys, to ascertain the most practicable and economical route for a railroad from the Mississippi River to the Pacific Ocean. A. O. P. Nicholson, Washington, D.C. 8(1):xlvi + 1-757, pls. 17-60. [Researchers may find the "List of authorities," on pages 686-703, useful. It is a list of references cited in the text.]
- BLACKWELDER, R. E. 1972. *Guide to the taxonomic literature of vertebrates*. Iowa State University Press, Ames, xx + 259 pp.
- BRISSON, M. J. 1762. *Regnum animale in classes IX*. Theodorum Haak, Leiden, The Netherlands 1-7 + 296 pp.
- BUFFON, G. L. LE CLERC. 1763. *Histoire naturelle, générale et particulière, avec la description du cabinet du Roi*. L'Imprimerie Royale, Paris, France 10:6 (unnumbered) + 1-368, 57 pls.
- BUFFON, G. L. LE CLERC. 1767. *Histoire naturelle, générale et particulière, avec la description du cabinet du Roi*. L'Imprimerie Royale, Paris, France 15:5 (unnumbered) + 1-207, 17 pls.
- BUFFON, G. L. LE CLERC. 1782. *Histoire naturelle générale et particulière, servant de suite à l'histoire des animaux quadrupèdes*. In *Histoire naturelle, avec la description du cabinet du Roi*. G. L. L. de Buffon. L'Imprimerie Royale, Paris, France Supplément 6:viii + 1-405 + xxv, 49 pls.
- BUFFON, G. L. LE CLERC. 1789. *Histoire naturelle générale et particulière, servant de suite à l'histoire des animaux quadrupèdes*. In *Histoire naturelle, avec la description du cabinet du Roi*. G. L. L. de Buffon. L'Imprimerie Royale, Paris, France Supplément 7:1-8, ix-xx, + 1-364, 81 pls.
- BURMEISTER, H. 1854. *Systematische Uebersicht der Thiere Brasiliens, welche während einer Reise durch die Provinzen von Rio de Janeiro und Minas Geraës gesammelt oder beobachtet wurden von Dr. Hermann Burmeister. Säugethiere (Mammalia)*. Georg Reimer, Berlin, Germany 1:x + 1-342.
- BURMEISTER, H. 1856. *Erläuterungen zur Fauna Brasiliens, enthaltend Abbildungen und ausführliche Beschreibungen neuer oder ungenügend bekannter Thier-Arten*. Georg Reimer, Berlin, Germany, ix + 115 pp, 32 pls.
- CARUS, J. V., AND W. ENGELMANN. 1861. *Bibliotheca Zoologica. Verzeichniss der Schriften über Zoologie*. Verlag von Wilhelm Engelmann, Leipzig, Germany 1:x + 1-50; 2:xi-xiv + 951-144.
- GMELIN, J. F. 1788. *Caroli a Linné . . . Systema naturae per regna tria naturae secundum classes ordines, genera, species cum characteribus, differentiis, synonymis, locis. Editio decima tertia, aucta, reformata*. Georg. Emanuel. Beer, Lipsiae, Germany 1(1-2):1-2 + 10 (unnumbered), 3-1032. [This work also was published in 1789, printed by J. B. Delamolliere, Lyons, France.]
- GRAY, J. E. 1827. A synopsis of the species of the class Mammalia. Pp. 1-296, in *The animal kingdom arranged in conformity with its organization, by the Baron Cuvier, . . . with additional descriptions of all the species hitherto named, and of many not before noticed, by Edward Griffith . . . and others*. Geo. B. Whittaker, London, England 5:1-392.
- ICZN. 1929. *Opinions rendered by the International Commission on Zoological Nomenclature*. Smithsonian Miscellaneous Collections 73(6):1-18.
- ICZN. 1943-1959. *Opinions and declarations rendered by the International Commission on Zoological Nomenclature*. Volumes

- 1A–1F, + 2–20. International Trust for Zoological Nomenclature, London, England.
- 1943–1945. Volume 1A, Declarations 1–9, Opinions 1–16. xxii + 380 pp.
1958. Volume 1B, Opinions 1–133. xx + 508 pp.
- 1955–1956. Volume 1C, Directions 10–35. xiv + 434 pp.
- 1956–1957. Volume 1D, Directions 36–57. xiv + 470 pp.
- 1957–1958. Volume 1E, Directions 60–86. xvi + 460 pp.
1958. Volume 1F, Directions 87–103. xiv + 248 pp.
- 1939–1945. Volume 2, Declarations 10–12, Opinions 134–160. xxii + 767 pp.
- 1944–1954. Volume 3, Opinions 182–210, Directions 1, 3. xiv + 448 pp.
1954. Volume 4, Opinions 211–239. xiv + 396 pp.
1954. Volume 5, Opinions 240–268. xiv + 426 pp.
- 1954–1955. Volume 6, Declarations 18, 19, Opinions 269–282. xx + 288 pp.
1954. Volume 7, Opinion 283. 225 pp. + 5 facsimile documents.
- 1954–1955. Volume 8, Opinions 284–311. xiv + 404 pp.
- 1954–1955. Volume 9, Declarations 13–17, Opinions 312–333. xxiv + 416 pp.
- 1955–1956. Volume 10, Declaration 20, Opinions 389–400, Directions 14, 27, 28. vii + 562 pp.
- 1955–1956. Volume 11, Opinions 351–379, Direction 41. xvii + 480 pp.
- 1956–1957. Volume 12, Declarations 21, 22, Opinions 389–400, Directions 46, 53–56. xxiv + 524 pp.
- 1956–1957. Volume 13, Declarations 23–26, Opinions 401–416, Directions 58, 75. xii + 336 pp.
- 1956–1957. Volume 14, Declarations 27–29, Opinions 417–435, Direction 62. xix + 518 pp.
1957. Volume 15, Declaration 30, Opinions 436–461, Direction 59. xix + 530 pp.
1958. Volume 16, Declarations 31–33, Opinions 462–480, Directions 70, 79. xvii + 528 pp.
- 1957–1958. Volume 17, Declarations 34, 35, Opinions 481–500. xii + 452 pp.
- 1958–1959. Volume 18, Declarations 36–38, Opinions 501–515, Directions 91, 95. xii + 356 pp.
- 1958–1959. Volume 19, Declarations 39–41, Opinions 516–533, Direction 96. xii + 436 pp.
1959. Volume 20, Opinions 534–568. xiii + 448 pp.
- ICZN. 1956. Opinion 417. Rejection for nomenclatural purposes of volume 3 (*Zoologie*) of the work by Lorenz Oken entitled *Oken's Lehrbuch der Naturgeschichte* published in 1815–1816. Opinions and declarations rendered by the International Commission on Zoological Nomenclature, London, England 14(1):1–42.
- ICZN. 1957. Opinion 462. Addition to the Official List of Generic Names in Zoology of the generic name *Mormoops* Leach, 1820 (class Mammalia). Opinions and declarations rendered by the International Commission on Zoological Nomenclature, London, England 16(1):1–12.
- ICZN. 1961 International Code of Zoological Nomenclature adopted by the XV International Congress of Zoology. The International Trust for Zoological Nomenclature, London, England, xviii + 176 pp.
- ICZN. 1985. International Code of Zoological Nomenclature adopted by the XX General Assembly of the International Union of Biological Sciences. Third edition. The International Trust for Zoological Nomenclature, London, England, xx + 338 pp.
- ICZN. 1987. Official lists and indexes of names and works in zoology. The International Trust for Zoological Nomenclature, London, England, 4 (unnumbered) + 365 pp.
- ICZN. 1999 International code of zoological nomenclature. Fourth edition. International Trust for Zoological Nomenclature, London, England, xxix + 306 pp.
- ICZN. 2000 Opinion 1962. *Arctocephalus* F. Cuvier, 1826 and *Calorhinus* Gray, 1859 (Mammalia, Pinnipedia): conserved by the designation of *Phoca pusilla* Schreber, 1775 as the type species of *Arctocephalus*: and *Otaria* Péron, 1816 and *Eumetopias* Gill, 1866: conserved by the designation of *Phoca leonina* Molina, 1782 as the type species of *Otaria*. Bulletin of Zoological Nomenclature 57:193–195.
- ICZN. 2001. Official lists and indexes of names and works in zoology. Supplement 1986–2000. The International Trust for Zoological Nomenclature, London, England, 4 (unnumbered) + 136 pp.
- ILLIGER, J. K. W. 1811. *Prodromus systematis mammalium et avium additis terminis zoographicis utriusque classis, eorumque versione germanica*. C. Salfeld, Berolini, Germany, xviii + 302 pp.
- ILLIGER, J. K. W. 1815. *Ueberblick der Säugthiere nach ihrer Vertheilung über die Welttheile*. Abhandlungen der Königl. Akademie der Wissenschaften in Berlin 1804–1811:39–159.
- KERR, R. 1792. *The animal kingdom or zoological system, of the celebrated Sir Charles Linnaeus*. Class I. Mammalia: containing a complete systematic description, arrangement, and nomenclature, of all the known species and varieties of the Mammalia, or animals which give suck to their young; being a translation of that part of the *Systema Naturae*, as lately published, with great improvements, by Professor Gmelin of Goettingen. Together with numerous additions from more recent zoological writers, and illustrated with copperplates. A. Strahan, T. Cadell, and W. Creech, Edinburgh, Scotland, xii + 1–32 + 30 (unnumbered) + 33–400 pp., 7 pls.
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## IX. GLOSSARY

The following is a list of terms encountered either in this guide or in taxonomic, nomenclatural, and bibliographic citations and references. Most of these terms are based on the 4th edition of the Code (ICZN 1999).

**Absolute tautonymy:** The identical spelling of a generic or subgeneric name and the specific or subspecific name of 1 of its originally included species or subspecies.

**Abtheilung (Abtheil.):** Part (German).

**Available name:** A scientific name that satisfies the nomenclatural requirements set forth in the International Code of Zoological

- Nomenclature, International Commission on Zoological Nomenclature (the current Code is the 4th edition, 1999; see ICZN in References). An available name may or may not be the valid name for a taxon.
- Band (Bd.): Volume (German).
- Berolini: Berlin, Germany (Latin).
- Binominal (binomial) name: The combination of 2 names, the 1st being the generic name and the 2nd being the specific name, that together constitute the scientific name of a species. Any interpolated name (i.e., subgeneric name) is not counted as a component of a binominal name.
- The Code: International Code of Zoological Nomenclature. First edition, 1961; 2nd edition, 1964; 3rd edition, 1985; 4th edition, 1999.
- The Commission: International Commission on Zoological Nomenclature. Executive Secretary, % The Natural History Museum, Cromwell Road, London SW7 5BD, United Kingdom; email: iczn@nhm.ac.uk.
- Conditionally proposed names (or nomenclatural acts): Conditional proposal of a name means that the author used language to the effect that if the subject specimen or sample proved in the future to represent a different taxon, it should be known as (*Scientific name*). Names or nomenclatural acts proposed conditionally after 1960 are not thereby made available (ICZN 1999:Art. 15.1).
- Definition: A statement in words that purports to give those characters that, in combination, uniquely distinguishes a taxon.
- Description: A statement in words of taxonomic characters of a specimen or a taxon. A description of a nominal taxon when it is established is an original description.
- Diagnosis: A statement in words that purports to give those characters that differentiates the taxon from other taxa with which it is likely to be confused.
- Editio: Edition (Latin).
- Emendation: Any intentional change in the original spelling of an available name that is not mandated by the Code.
- First reviser: The 1st author to subsequently cite names (including different original spellings of the same name) or nomenclatural acts published on the same date and to select 1 of them to have precedence over the other(s).
- First use of a name: The oldest use of a name.
- Genus group: In the hierarchy of classification the group of taxa ranked between the family group and the species group. Contains taxa at the ranks of genus and subgenus.
- Holmiae: Stockholm, Sweden (Latin).
- Homonym: 1) in the genus group, each of 2 or more available names having the same spelling, but denoting different nominal taxa; or 2) in the species group, each of 2 or more available specific or subspecific names having the same spelling (or spellings deemed under ICZN 1999:Art. 58 to be the same) and established for different taxa, and either originally (primary homonymy) or subsequently (secondary homonymy) combined with the same generic name.
- ICZN: International Commission on Zoological Nomenclature (see the Commission).
- Incorrect original spelling: An original spelling that is incorrect because of a misspelling or printer's error, 1 of 2 or more different spellings of the same name in the original description, or a spelling requiring a mandatory change.
- Incorrect subsequent spelling: Any change in the spelling of an available name other than a mandatory change or emendation (ICZN 1999:Art. 33.3). An inadvertent alteration of an available name. Incorrect subsequent spellings are not available names unless an author purposely uses the misspelling for a previously undescribed taxon.
- Indication: A reference to a description, definition, or figure in another publication, including pre-Linnaean (pre-1758) works. Using a reference in place of a description was a common practice in the late 18th century and during the 19th century, but is not permissible in literature after 1930.
- Infrasubspecific name: A general term for any name below the rank of subspecies. As proposed, these are unavailable names and are not regulated by the Code.
- Invalid name: An available name that is not in current use.
- Junior: A more recent name, comparative to previous use or older name.
- Justified emendation: The correction of an incorrect original spelling.
- Lapsus calami (pl. lapsus calamarum): "A slip of the pen"; when an author uses a name other than the name intended as opposed to a misspelling, typographical error, or printer's error.
- Lectotype: A syntype designated as the single name-bearing type specimen subsequent to the establishment of a nominal species or subspecies. If the original description of a species-group name was based on 2 or more specimens, and no specimen was identified as the holotype, these specimens are syntypes (previously referred to as cotypes). When 1 of these syntypes is selected as the name-bearing type specimen, it is referred to as the lectotype.
- Lieferung (Lfg.): Fascicle (German).
- Linnaean tautonymy: The identical spelling of a new generic or subgeneric name established before 1931 and a pre-1758, 1-word name cited as a synonym of 1 of the species or subspecies originally included in that genus.
- Lugduni: Lyons, France (Latin).
- Mandatory change: A change in the original spelling mandated by the Code: 1) a change in the ending of a specific or subspecific name (such as agreement in gender with the generic name or in number such as a change from *-ii* to *-orum* when the species-group name was intended to honor 2 or more individuals of the same name instead of a single individual); or 2) the dropping of hyphens or diacritical marks such as accents, the separation of diphthongs (e.g., *æ* or *œ*), or a change of spelling required (for names published before 1985) such as converting *-i-* to *-ue-* (e.g., *mülleri* to *muelleri*).
- Monotypic: Represented by a single taxon. A taxon that includes only 1 subordinate taxon of the next lower rank.
- Monotypy: A situation where: 1) the author does not explicitly indicate a type species for a genus or subgenus but lists a single species by an available name (type species by monotypy), or 2) when a species description is based on a single specimen not explicitly designated the holotype (holotype by monotypy). Identification of holotypes is not included in *Mammalian Species* accounts.
- Multiple original spellings: Two or more different original spellings for the same name (ICZN 1999:Art. 32.2.1).
- Neotype: The single specimen designated as the name-bearing type of a nominal species or subspecies when a need arises to objectively define the nominal taxon and no name-bearing type is believed to exist.
- Nomenclatural act: Any published act that affects the status of a scientific name or its type. Description of a taxon, revision of a species, designation of a type species, restriction of a type locality, designation of a neotype, selection of a lectotype, and so on, are examples of a nomenclatural act.
- Nomen dubium (pl. nomina dubia): A Latin term meaning a name of unknown or doubtful application.
- Nomen novum (pl. nomina nova): A Latin term used for a new replacement name.
- Nomen nudum (pl. nomina nuda): Literally a naked name; a name that has not met the criteria for availability as outlined in the International Code of Zoological Nomenclature. A Latin term referring to a name that, if published before 1931, fails to conform to Article 12 (ICZN 1999). It is not an available name; therefore, the same name may be made available later for the same or a different concept; in such a case it would take authorship and date from that act of establishment, not from any earlier publication as a *nonnen nudum*.
- Nomen oblitum (pl. nomina oblita): A Latin term meaning a forgotten name.
- Nominal taxon: A taxon denoted by an available name.
- Objective synonym: A name based on the same type specimen as another, earlier name.
- Original description: See Description.
- Polytypic: A taxon represented by 2 or more subordinate taxa of the next lower rank.
- Preoccupied name: A name that is unavailable because it is: 1) a generic name of the same spelling (junior homonym) as a generic name previously used for a different organism; or 2) a species or subspecies name of the same spelling originally combined with the same generic name as an earlier described name, even if that species-level name is now used with a different genus.



**Preprint:** A work published with its own specified date of publication (imprint date) in advance of its later reissue as part of a collective or cumulative work. Also see *separates*.

**Primary homonym:** See *Homonym*.

**Principle of Priority:** The principle that the valid name of a taxon is the oldest available name applied to it provided that the name is not invalidated by any provision of the Code or by any ruling by the Commission.

**Protolog:** All of the critical information in the original publication about a scientific name (a term commonly used in botanical nomenclature).

**Renaming:** The act of providing a replacement name for a preoccupied name. Note that a different name combination does not constitute a renaming.

**Scientific name:** A name treated as a latinized name for a taxon (usually cited in combination with the author and date of publication).

**Secondary homonym:** See *Homonym*.

**Senior:** An older name, comparative with a more recent name

**Separate:** A copy (reprint or offprint) of an article printed separately from the journal or periodical in which the article appears. If separates are printed and distributed before the printing and distribution of the journal or periodical, they are referred to as preprints and usually bear an earlier date and different pagination. Today scientific publications normally print separates (usually called reprints) after the printing and distribution of the book, journal, or periodical in which the article appears. Separates qualifying as reprints have the same pagination found in the publication in which they appear. The advance distribution of separates after 1999 does not constitute publication for the purposes of zoological nomenclature.

**Species group:** In zoological classification, the lowest-ranking group of taxa, the names of which are regulated by the Code. The species group includes all taxa at the ranks of species and subspecies.

**Subjective synonym:** A name based on a type specimen belonging to the same taxon as another earlier name.

**Subsequent designation:** Designation of type species for a genus-group taxon in another publication after the genus-group taxon was described.

**Subsequent spelling:** A subsequent spelling that is not the same as the original spelling is either an emendation, an incorrect subsequent spelling, or a mandated change.

**Syntype:** Each specimen of a type series from which a holotype (at

time of publication) or a lectotype (subsequent to publication) has not been selected. The syntypes collectively constitute the name-bearing type. Syntypes are sometimes referred to as *co-types*, a term that should not now be used in zoological nomenclature.

**Tautonymy:** The use of the same word for the name of a genus-group name and for 1 of its species, subspecies, or both.

**Taxon (pl. taxa):** A taxonomic unit, whether named or not, considered to comprise a population or group of populations of organisms usually inferred to be phylogenetically related and have characters in common that differentiate the unit from other such units. A taxon encompassing all included taxa of lower rank.

**Tome:** Volume (French).

**Tomus:** Volume (Latin).

**Unavailable work:** A publication in which names and nomenclatural acts are rejected for nomenclatural purposes. The work may be unavailable because it was published before 1758, or because the author was not consistently binomial, or (after 1950) was published anonymously, or contained a disclaimer, or because the Commission has ruled it to be unavailable. Information in unavailable works can be cited and, in the pre-1931 literature, descriptions, definitions, and illustrations can be cited (an indication) as the basis for genus-group and species-group names.

**Unjustified emendation:** An intentional alteration of the original spelling of an available name that is not mandated.

**Valid name:** An available name that is used as the current name for a taxon. A valid name is a term applied in nomenclature to mean only the name by which a taxon is currently identified.

**Vernacular name:** A name of an animal or animals in a language used for general purposes as opposed to a latinized name proposed only for zoological nomenclature.

**Virtual tautonymy:** The nearly identical spelling, or of the same origin or meaning, of a generic or subgeneric name and the specific or subspecific name in a binomen or trinomen. The term virtual tautonymy is not regulated by the Code.

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