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Outline of Entity Groups

I. Entities that are taxonomic concepts
   BASIC TAXON, NOMEN NUDUM, FULL TAXON, FORMER NAME OF NOMEN
   TRANSLATUM, JUNIOR HOMONYM, SENIOR HOMONYM, FORMER NAME OF
   NOMEN CORRECTUM, ORIGINAL FORM OF CHANGED NAME OF TYPE SPECIES,
   SUBJECT TAXON, GENUS, SPECIES, TYPE SPECIES, SPECIES LIST

II. Entities that represent institutions, humans, or other organisms
    USER, AUTHOR, JOURNAL OR SERIES, PUBLISHER OR UNIVERSITY, SPECIMEN,
    REPOSITORY

III. Entities that represent pictures or written words
     KEY WORD, LANGUAGE, PUBLICATION, JOURNAL ARTICLE, MONOGRAPH, BOOK,
     OTHER PUBLICATION, ELECTRONIC PUBLICATION, PART OF PUBLICATION,
     ILLUSTRATION, PUBLISHED ILLUSTRATION

IV. Entities that describe or locate
    COUNTRY, STATE, CITY, MORPHOLOGY, STRATIGRAPHY, GEOGRAPHY, ECOLOGY,
    PLATE TECTONICS

V. Entities that associate other entities
    AUTHOR-PUBLICATION-TAXON, CITATION, MORPHOLOGY-SPECIES,
    MORPHOLOGY-GENUS, STRATIGRAPHY-GEOGRAPHY-SPECIES, STRATIGRAPHY-
    GEOGRAPHY-GENUS, ECOLOGY-SPECIES, ECOLOGY-GENUS, PLATE TECTONICS-
    SPECIES, PLATE TECTONICS-GENUS
Definitions of Terms for Business Rules

**authority list** A list that may be added to by CONTRIBUTOR or PI staff. The programmer will provide an array (pull-down list) of domain values, initializing one value to Ø (blank) for the initial default so that no value will be preselected; the zero-value default will be invisible to the user. See **semimanual**. The following PaleoBank entities are authority lists: BASIC TAXON and subtypes, SPECIES LIST, AUTHOR, KEY WORD, LANGUAGE, PUBLICATION and subtypes, STATE, CITY, JOURNAL OR SERIES, PUBLISHER OR UNIVERSITY, and REPOSITORY. Each authority list instance must include all its primary key members (the unique identifier); e.g. each instance of PUBLICATION must have values for the primary key attributes AUTHOR\*FAMILY NAME, YEAR, and TITLE.

**automatic** Computer-generated or computer-derived; implies **required**.

**logical attribute** A checkbox may be selected for only one of the two domain values yes (true=1) or no (false=Ø); the other value is the default and is assigned in business rules for the attribute. Logical attributes are **optional** and **semiautomatic**.

**manual** Entered manually (typed) by USER.

**optional** Data-entry USER is not required to enter a domain value manually or to select a domain value; there must be at least two domain values; there may be any number of domain values within practical limits; there must be an automatic default value.

**pick list** A list that cannot be changed by CONTRIBUTOR. A pick list is composed as the domain of an attribute; the programmer will provide an array (pull-down list) of domain values, initializing one value to Ø (programmed blank) for the initial default so that no other domain value will be preselected; the zero-value domain member will be invisible to the user; other domain values will be invisibly numbered beginning with 1 (one). See **semiautomatic**. The following are PaleoBank pick lists: entities COUNTRY, MORPHOLOGY, STRATIGRAPHY, GEOGRAPHY, ECOLOGY, and PLATE TECTONICS; all domains of **required** attributes having members programmed blank (=Ø), yes (=1), no (=2); and domains of miscellaneous attributes.

**required** Automatic (see above), or USER must either make a **manual** entry, select from an **authority list** (semimanual), or select from a **pick list** (semiautomatic) of domain values before transmission of completed record to Paleontological Institute; for selections from a **pick list** of domain values, there must be at least three domain values: blank=Ø (automatic preselected default value); yes, or some other domain member=1; no, or some other domain member=2. There may be any number of domain values within practical limits. Note: Some entities are optional (e.g. SPECIES LIST, KEY WORD); attributes listed as **required** in these optional entities are required only if USER chooses to enter records for these entities.

**semiautomatic** The selection of a domain value from a **pick list**; the selection of the nondefault domain value of a **logical attribute**.

**semimanual** The selection of a domain value from, or the entering of a domain value into, an **authority list**.
General Comments about Entity Documentation

PI = Paleontological Institute, The University of Kansas.

For all entities, the primary key must be completed before other data for the instance may be saved.

An attribute with an asterisk in its name is from another entity. For example, BASIC TAXON has a primary-key attribute that is from another entity: BASIC TAXON.AUTHOR*FAMILY NAME is the attribute FAMILY NAME from the entity AUTHOR.

The size of each attribute’s domain value is limited by the size of its field as specified in the Relational Database Design. For example, BASIC TAXON.NAME’s domain-value size is limited to 40 characters.

When the term *binomen* (or binomial) is used, it is intended to include cases in which there is a subgenus or a subspecies. In such cases, there may actually be four names in what is usually referred to as the *binomen*. 
Entity name. USER

Definition. Code name of person, such as database manager, PI staff member, coordinating author, CONTRIBUTOR, assistant to CONTRIBUTOR, or other user entering information into PaleoBank.

Primary key

Name. CODE NAME
Definition. Code name that functions as a password chosen by CONTRIBUTOR to restrict access to PaleoBank database and to identify USER and CONTRIBUTOR.
Domain. Programmed blank; cyclical redundancy checksums (case sensitive).
Business rules. 1. Required. 2. Manual. 3. CODE NAME should be two unrelated words separated by a nonalphabetic character, e.g. hill#Shoe.

Other relationship

A correlation table resolves USER’s many-to-many relationship with BASIC TAXON.

Other attributes

Name. REAL NAME
Definition. Name of database manager, PI staff member, CONTRIBUTOR, assistant to CONTRIBUTOR, or other user entering information into PaleoBank.
Domain. All names, written in roman characters.

Name. ROLE
Definition. Whether USER is database manager, PI staff member, CONTRIBUTOR, assistant to CONTRIBUTOR, or other.
Domain. Database manager, PI staff member, CONTRIBUTOR, assistant to CONTRIBUTOR, other.
Business rule. 1. Required. 2. Semiautomatic. 3. If other is selected as the domain value, USER may only view information, not edit or add.

Name. CONTRIBUTOR
Definition. Name of person, such as Treatise author or coordinating author, responsible for taxonomic revision of a group of organisms.
Domain. All names, written in roman characters.
Business rules. 1. Automatically same as USER if ROLE domain value is CONTRIBUTOR; otherwise, required and manual. 2. Last name, first name, middle initial.
Business rules for entity USER

1. USER enters attribute values during first use. Subsequent uses with the same CODE NAME, which functions as a log-on password, will bring up the same values for REAL NAME, ROLE, and CONTRIBUTOR.

2. Each USER has a unique CODE NAME for each CONTRIBUTOR. If two CONTRIBUTORs share an assistant, the assistant should have separate CODE NAMEs for each CONTRIBUTOR.

Entity name. BASIC TAXON (Supertype)

**Definition.** Authority list of names of animals or taxonomic concepts.

**Subtypes.** NOMEN NUDUM, FULL TAXON (mutually exclusive)

**Primary key**

**Name.** NAME

**Definition.** Name of the BASIC TAXON.

**Domain.** All names associated with animal taxa.

**Business rules.**

1. Required.  
2. Semimanual; automatic if SPECIES LIST Primary key is copied to BASIC TAXON.

**Name.** AUTHOR*FAMILY NAME

**Definition.** Family name(s) of individual(s) who named the BASIC TAXON. See AUTHOR Primary key.

**Domain.** AUTHOR authority list; all family names, written in roman characters.

**Business rules.**

1. Required.  
2. Semimanual.  
3. CONTRIBUTOR must select or enter a domain value through entity BASIC TAXON.  
4. When CONTRIBUTOR enters domain value manually (instead of selecting from AUTHOR authority list), the FAMILY NAME is entered into entity AUTHOR; CONTRIBUTOR must complete the Primary key for the new AUTHOR instance at this time.

**Comment about Primary key member.** AUTHOR is associated with BASIC TAXON through entity AUTHOR-PUBLICATION-TAXON in its role as the author of a BASIC TAXON.

**Name.** CITATION*YEAR ESTABLISHED

**Definition.** Year in which BASIC TAXON was first published (see Other attribute YEAR ESTABLISHED in associative entity CITATION).

**Domain.** PUBLICATION.YEAR from instance of PUBLICATION in CITATION Primary key if it is a single year (including single year plus alphanumeric character); years included in PUBLICATION.YEAR range of years from instance of PUBLICATION in CITATION Primary key (e.g. if PUBLICATION.YEAR = 1927–1931, then domain would be 1927, 1928, 1929, 1930, 1931).

**Business rules.**

1. Automatic if PUBLICATION.YEAR is a single year; otherwise required and semiautomatic.  
2. CONTRIBUTOR must select a
domain value through entity BASIC TAXON. 3. When CONTRIBUTOR enters domain value manually (instead of selecting from PUBLICATION authority list), CONTRIBUTOR must complete the **Primary key** for the new PUBLICATION instance at this time. 5. For this relationship, BASIC TAXON and PUBLICATION must be associated through an instance of CITATION that is flagged ORIGINAL.

**Business rule for Primary key**

The **Primary key** must be completed before other data for the instance may be saved. (See General Comments. This rule holds for all entities.)

**Foreign keys**

**Name.** BASIC TAXON **Primary key**

**Definition.** The next-higher BASIC TAXON (recursive).

**Domain.** BASIC TAXON **Primary keys; not applicable.**

**Business rules.** 1. Required if TAXONOMIC RANK is below domain value determined by coordinating authors and PI staff as the top of the hierarchy for each animal group, or if BASIC TAXON.JUNIOR SYNONYM domain value is **no** (see below); otherwise default to **not applicable.** 2. Semimanual. 3. If CONTRIBUTOR manually enters **Foreign key** BASIC TAXON instead of selecting it from BASIC TAXON authority list, CONTRIBUTOR must complete new BASIC TAXON **Primary key** and attribute TAXONOMIC RANK at this time.

**Name.** BASIC TAXON **Primary key**

**Definition.** The senior synonym (recursive).

**Domain.** BASIC TAXON **Primary keys; not applicable.**

**Business rules.** 1. Required if BASIC TAXON.JUNIOR SYNONYM domain value is **yes** (see below); otherwise default to **not applicable.** 2. Semimanual. 3. If CONTRIBUTOR manually enters **Foreign key** BASIC TAXON instead of selecting it from BASIC TAXON authority list, CONTRIBUTOR must complete new BASIC TAXON **Primary key** at this time.

**Comment about Foreign key.** Invisible to user unless JUNIOR SYNONYM domain value is **yes** (see below).

**Other relationships**

BASIC TAXON appears as a **Foreign key** in associative entities AUTHOR-PUBLICATION-TAXON and CITATION. (PUBLICATION is associated with BASIC TAXON through entity CITATION in its role as a PUBLICATION as well as in its **Primary key**-member role as the PUBLICATION containing the ORIGINAL CITATION of the BASIC TAXON.)

A correlation table resolves BASIC TAXON’s many-to-many relationship with USER.

**Other attributes**

**Name.** TAXONOMIC RANK

**Definition.** Category in the Linnaean hierarchy to which BASIC TAXON belongs.
Domain. Programmed blank; phylum, superclass, class, subclass, superorder, order, suborder, superfamily, family, subfamily, tribe, genus, subgenus, species, or subspecies.


Name. JUNIOR SYNONYM
Definition. Whether BASIC TAXON is a junior synonym (objective or subjective).
Domain. Programmed blank; yes, no.
Business rules. 1. Required. 2. Semiautomatic. 3. If domain value is yes, then BASIC TAXON cannot be an instance of entity SUBJECT TAXON, or a BASIC TAXON recursive Foreign key.

Name. AUTHOR*INITIALS OR OTHER NAMES
Definition. First, middle, and other names (or initials of these names) needed to identify AUTHOR of BASIC TAXON.
Domain. The AUTHOR*INITIALS OR OTHER NAMES from the same instance of AUTHOR as the Primary key member AUTHOR*FAMILY NAME, above.
Business rule. 1. Required if necessary to identify or distinguish AUTHOR from another with the same family name.

Name. NOMEN NUDUM
Definition. Whether BASIC TAXON is a nomen nudum.
Domain. Yes, no.
Business rules. 1. Optional; default value is no. 2. Semiautomatic. 3. If domain value is yes, BASIC TAXON is automatically entered into entity NOMEN NUDUM.
Comments about attribute. 1. Logical attribute. 2. CONTRIBUTOR is encouraged to enter reason that BASIC TAXON is a NOMEN NUDUM in BASIC TAXON.COMMENT BY CONTRIBUTOR field.

Name. COMMENT BY CONTRIBUTOR
Definition. Unstructured text about BASIC TAXON and its subtypes.
Domain. Blank; all alphanumeric character strings that form numbers or English words.

Name. REVISION DATE
Definition. Date on which the record was last altered.
Domain. Alphanumeric characters in specified format: MM/DD/YYYY.
Business rule. 1. Automatic.

Comment about entity BASIC TAXON
Need to be able to skip any categories of rank and perhaps add them later.

Entity name. NOMEN NUDUM (Subtype of BASIC TAXON)
Definition. A BASIC TAXON that is a nomen nudum as described by Articles 12 and 13 of the International Code of Zoological Nomenclature.
**Supertype.** BASIC TAXON

**Foreign key**

**Name.** FULL TAXON **Primary key**

**Definition.** The FULL TAXON that replaces the *nomen nudum*.

**Domain.** FULL TAXON **Primary keys**.

**Business rule.** 1. Required before revision is complete. 2. Semimanual.

**Other attribute**

**Name.** REPLACEMENT HEREIN

**Definition.** Whether replacement of NOMEN NUDUM is local to PaleoBank, i.e. not previously published, and, hence, informal until formally published.

**Domain.** Programmed blank; yes, no.

**Business rules.** 1. Required. 2. Semiautomatic.

**Comment about entity NOMEN NUDUM**

*Nomina nuda* do not satisfy the requirements of the *International Code of Zoological Nomenclature* for available names.

---

**Entity name.** FULL TAXON (Subtype of BASIC TAXON) (Supertype)

**Definition.** A BASIC TAXON with a complete taxonomic record.

**Supertype.** BASIC TAXON

**Subtypes.** FORMER NAME OF NOMEN TRANSLATUM, JUNIOR HOMONYM, and SENIOR HOMONYM are nonexclusive subtypes of FULL TAXON. Subtypes FORMER NAME OF NOMEN CORRECTUM, ORIGINAL FORM OF CHANGED NAME OF TYPE SPECIES, and SUBJECT TAXON are mutually exclusive. The last three subtypes are nonexclusive with respect to the first three.

**Other relationships**

FULL TAXON appears as a **Foreign key** in NOMEN NUDUM, ILLUSTRATION, and in subtypes of FULL TAXON in its various recursive roles: in FORMER NAME OF NOMEN TRANSLATUM in its role as the *nomen translatum*; in JUNIOR HOMONYM in its role as the *nomen novum*; and in FORMER NAME OF NOMEN CORRECTUM in its role as the *nomen correctum*.

**Other attributes**

**Name.** NOMEN TRANSLATUM

**Definition.** Whether FULL TAXON is the result of change of rank and concomitant change of ending of a family-group name based on the same nominotypical genus.

**Domain.** Programmed blank; yes, no.

**Business rules.** 1. Required. 2. Semiautomatic. 3. If domain value is *yes*, then CONTRIBUTOR must make an entry in entity FORMER NAME OF NOMEN TRANSLATUM. 4. BASIC TAXON.TAXONOMIC RANK domain value
must be *subfamily* or higher in order for FULL TAXON to be a NOMEN TRANSLATUM.

**Name.** NOMEN CORRECTUM  
**Definition.** Whether FULL TAXON is the result of a valid name change such as commonly involves correction of the stem of the nominotypical genus. Taxa affected by such changes commonly but not always belong to the rank of family.  
**Domain.** Programmed blank; yes, no.  
**Business rules.** 1. Required. 2. Semiautomatic. 3. If domain value is *yes*, then CONTRIBUTOR must make an entry in entity FORMER NAME OF NOMEN CORRECTUM. 4. BASIC TAXON.TAXONOMIC RANK domain value must be *subfamily* or higher in order for FULL TAXON to be a NOMEN CORRECTUM.

**Name.** JUNIOR HOMONYM  
**Definition.** Whether FULL TAXON is subtype JUNIOR HOMONYM.  
**Domain.** Programmed blank; yes, no.  
**Business rule.** 1. Required. 2. Semiautomatic. 3. If domain value is *yes*, FULL TAXON is automatically entered into subtype JUNIOR HOMONYM.

**Name.** SENIOR HOMONYM  
**Definition.** Whether FULL TAXON is subtype SENIOR HOMONYM.  
**Domain.** Programmed blank; yes, no.  
**Business rule.** 1. Required. 2. Semiautomatic. 3. If domain value is *yes*, FULL TAXON is automatically entered into subtype SENIOR HOMONYM.

**Name.** FORMER NAME OF NOMEN TRANSLATUM  
**Definition.** Whether FULL TAXON is subtype FORMER NAME OF NOMEN TRANSLATUM.  
**Domain.** Programmed blank; yes, no.  
**Business rule.** 1. Required. 2. Semiautomatic. 3. If domain value is *yes*, FULL TAXON is automatically entered into subtype FORMER NAME OF NOMEN TRANSLATUM.

**Name.** ORIGINAL FORM OF CHANGED NAME OF TYPE SPECIES  
**Definition.** Whether FULL TAXON is subtype ORIGINAL FORM OF CHANGED NAME OF TYPE SPECIES.  
**Domain.** Programmed blank; yes, no.  
**Business rule.** 1. Required. 2. Semiautomatic. 3. If domain value is *yes*, FULL TAXON is automatically entered into subtype ORIGINAL FORM OF CHANGED NAME OF TYPE SPECIES. 4. If domain value is *yes*, the domain value for attribute SUBJECT TAXON, below, is automatically *no*.

**Name.** FORMER NAME OF NOMEN CORRECTUM  
**Definition.** Whether FULL TAXON is subtype FORMER NAME OF NOMEN CORRECTUM.  
**Domain.** Programmed blank; yes, no.  
**Business rules.** 1. Required. 2. Semiautomatic. 3. If domain value is *yes*, FULL TAXON is entered into subtype FORMER NAME OF NOMEN CORRECTUM.
CORRECTUM. 4. If domain value is *yes*, the domain value for attribute SUBJECT TAXON, below, is automatically *no*.

**Name.** SUBJECT TAXON

**Definition.** Whether FULL TAXON is subtype SUBJECT TAXON.

**Domain.** Programmed blank; *yes*, *no*.

**Business rule.** 1. Required. 2. Semiautomatic. 3. If domain value is *yes*, FULL TAXON is entered into subtype SUBJECT TAXON. 4. If domain value is *yes*, domain values for ORIGINAL FORM OF CHANGED NAME OF TYPE SPECIES and FORMER NAME OF NOMEN CORRECTUM are automatically *no*.

**Name.** NOMEN NOVUM

**Definition.** Whether FULL TAXON is a new replacement name for a JUNIOR HOMONYM.

**Domain.** *Yes*, *no*.

**Business rules.** 1. Optional; default to *no*. 2. Semiautomatic. 3. If the domain value is *yes*, CONTRIBUTOR must select from entity JUNIOR HOMONYM or, if the junior homonym is not there, enter it in order to link the NOMEN NOVUM with the JUNIOR HOMONYM through the **Foreign key**.

**Comment about attribute.** Logical attribute.

---

**Entity name.** FORMER NAME OF NOMEN TRANSLATUM (Subtype of FULL TAXON)

**Definition.** A FULL TAXON that is the former name of a FULL TAXON that is a *nomen translatum*.

**Supertype.** FULL TAXON

**Foreign key**

**Name.** FULL TAXON **Primary key**

**Definition.** The FULL TAXON that is the *nomen translatum*.

**Domain.** FULL TAXON **Primary keys**.

**Business rule.** 1. Required. 2. Semimanual.

**Other attribute**

**Name.** TRANSFERRED HEREIN

**Definition.** Whether transfer of FORMER NAME OF NOMEN TRANSLATUM is local to PaleoBank, *i.e.* not previously published, and, hence, is informal until formally published.

**Domain.** Programmed blank; *yes*, *no*.

**Business rules.** 1. Required. 2. Semiautomatic.

**Business rule for entity FORMER NAME OF NOMEN TRANSLATUM**

BASIC TAXON.TAXONOMIC RANK must be subfamily or higher.

**Comment about entity FORMER NAME OF NOMEN TRANSLATUM**

FORMER NAME OF NOMEN TRANSLATUM may remain as an instance of SUBJECT TAXON; *e.g.* in Cytheracea Baird, 1850 [*nom. transl.* Ulrich & Bassler,
1923, p. 322, ex Cytheridae Baird, 1850, p. 162], Cytheridae remains a valid and useful family in the superfamily Cytheracea.

Entity name. JUNIOR HOMONYM (Subtype of FULL TAXON)

Definition. A FULL TAXON that is the most recently published of two or more available names having the same spelling (or differing only in suffix if a family-group name) and denoting different families, genera, or species. It has been or is to be replaced by a new replacement name (nomen novum).

Supertype. FULL TAXON

Foreign keys

Name. FULL TAXON Primary key
Definition. The FULL TAXON that is the nomen novum.
Domain. FULL TAXON Primary keys.
Business rule. 1. Required before revision is complete. 2. Semimanual.

Name. SENIOR HOMONYM Primary key
Definition. The FULL TAXON that is the SENIOR HOMONYM.
Domain. FULL TAXON Primary keys.
Business rule. 1. Required before revision is complete. 2. Semimanual.

Other attribute

Name. REPLACEMENT HEREIN
Definition. Whether replacement of JUNIOR HOMONYM is local to PaleoBank, i.e. not previously published, and, hence, is informal until formally published.
Domain. Programmed blank; yes, no.

Entity name. SENIOR HOMONYM (Subtype of FULL TAXON)

Definition. A FULL TAXON that is the first published of two or more available names having the same spelling (or differing only in suffix if a family-group name) and denoting different families, genera, or species.

Supertype. FULL TAXON

Other relationship

SENIOR HOMONYM appears as a Foreign key in entity JUNIOR HOMONYM.

Other attribute

Name. MEMBER OF DATABASE GROUP
Definition. Whether SENIOR HOMONYM is part of the higher taxon for which this PaleoBank database is being prepared.
Domain. Programmed blank; yes, no.
Business rules. 1. Required. 2. Semiautomatic. 3. If domain value is no, CONTRIBUTOR will be asked to what taxonomic group SENIOR
Comment about entity SENIOR HOMONYM

The only type of SENIOR HOMONYM that is notable is one that is listed along with a JUNIOR HOMONYM that has been replaced by a new taxonomic name (the FULL TAXON that is the *nomen novum*).

Entity name. FORMER NAME OF NOMEN CORRECTUM (Subtype of FULL TAXON)

**Definition.** A FULL TAXON that is the former name of a FULL TAXON that is a *nomen correctum*.

**Supertype.** FULL TAXON

**Foreign key**

- **Name.** FULL TAXON **Primary key**
  - **Definition.** The FULL TAXON that is the *nomen correctum*.
  - **Domain.** FULL TAXON **Primary keys**.
  - **Business rule.** 1. Required. 2. Semimanual.

**Other attribute**

- **Name.** CORRECTION HEREIN
  - **Definition.** Whether correction of FORMER NAME OF NOMEN CORRECTUM is local to PaleoBank, *i.e.* not previously published, and, hence, is informal until formally published.
  - **Domain.** Programmed blank; yes, no.
  - **Business rules.** 1. Required. 2. Semiautomatic.

**Business rules for entity FORMER NAME OF NOMEN CORRECTUM**

1. BASIC TAXON.TAXONOMIC RANK must be subfamily or higher.

2. FORMER NAME OF NOMEN CORRECTUM cannot be a member of SUBJECT TAXON. The two are mutually exclusive subtypes of FULL TAXON.

Entity name. ORIGINAL FORM OF CHANGED NAME OF TYPE SPECIES (Subtype of FULL TAXON)

**Definition.** A FULL TAXON that is the name of the type species in the exact form it had in the original publication prior to change(s).

**Supertype.** FULL TAXON

**Foreign keys**

- **Name.** TYPE SPECIES **Primary key**
  - **Definition.** The current form of the type species.
  - **Domain.** TYPE SPECIES **Primary keys**.
  - **Business rule.** 1. Required. 2. Semimanual.
Name. GENUS Primary key
Definition. The GENUS of the current form of the type species.
Domain. GENUS Primary keys.
Business rule. 1. Optional. 2. Semimanual.
Comment about Foreign key. This relationship exists so that CONTRIBUTOR can enter either original form of changed or current name of type species first.

Business rules for entity ORIGINAL FORM OF CHANGED NAME OF TYPE SPECIES
1. Domain value of attribute BASIC TAXON.TAXONOMIC RANK must be species.
2. Entity ORIGINAL FORM OF CHANGED NAME OF TYPE SPECIES cannot be a member of entity SUBJECT TAXON. The two are mutually exclusive subtypes of FULL TAXON.

Entity name. SUBJECT TAXON (Subtype of FULL TAXON) (Supertype)
Definition. A FULL TAXON that is advocated herein for use in the Linnaean hierarchy.
Supertype. FULL TAXON
Subtypes. GENUS, SPECIES (mutually exclusive)
Other attributes
Name. PHYLOGENETIC STATUS
Definition. The status of the SUBJECT TAXON with respect to phylogenetic analysis.
Domain. Programmed blank; monophyletic, paraphyletic, polyphyletic, plesion, other, unknown.
Comment about attribute. CONTRIBUTOR may define use of phylogenetic terms or cite a reference in BASIC TAXON.COMMENT BY CONTRIBUTOR field.

Name. UNREPLACED JUNIOR HOMONYM
Definition. Whether SUBJECT TAXON is a JUNIOR HOMONYM for which a new replacement name (nomen novum) has not yet been proposed.
Domain. Yes, no.
Business rules. 1. Optional; default to no. 2. Semiautomatic. 3. If domain value is yes, SUBJECT TAXON is entered into entity JUNIOR HOMONYM if it is not already there. 4. CONTRIBUTOR must propose a nomen novum before revision is complete. 5. When the CONTRIBUTOR does propose a nomen novum, the SUBJECT TAXON that is flagged as the UNREPLACED JUNIOR HOMONYM is deleted from entity SUBJECT TAXON but remains in entity JUNIOR HOMONYM where it is linked to the nomen novum through the Foreign key.
Comments about attribute. 1. Logical attribute. 2. This attribute allows CONTRIBUTOR to enter a JUNIOR HOMONYM in SUBJECT TAXON
before a new name is proposed. 3. If domain value is yes, then SUBJECT TAXON is not valid.

**Name.** SUBTYPE INDICATOR  
**Definition.** Whether SUBJECT TAXON is a subtype of SUBJECT TAXON.  
**Domain.** GENUS, SPECIES.  
**Business rules.** 1. Automatic. 2. If BASIC TAXON.TAXONOMIC RANK domain value is genus or subgenus, instance is entered into entity GENUS; if domain value is species or subspecies, instance is entered into entity SPECIES.

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**Entity name.** GENUS (Subtype of SUBJECT TAXON)  
**Definition.** A SUBJECT TAXON belonging to the category genus or subgenus.  
**Supertype.** SUBJECT TAXON  
**Foreign key**  
**Name.** TYPE SPECIES Primary key  
**Definition.** The type species of the GENUS.  
**Domain.** TYPE SPECIES Primary keys.  
**Business rule.** 1. Required. 2. Semimanual.

**Other relationships**  
GENUS appears as a Foreign key in entities ORIGINAL FORM OF CHANGED NAME OF TYPE SPECIES, SPECIES, SPECIES LIST, and associative entities MORPHOLOGY-GENUS, STRATIGRAPHY-GEOGRAPHY-GENUS, ECOLOGY-GENUS, and PLATE TECTONICS-GENUS.

**Business rule for entity GENUS**  
There must be at least one association in MORPHOLOGY-GENUS (other than with missing data) and at least one association in STRATIGRAPHY-GEOGRAPHY-GENUS for each valid GENUS.

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**Entity name.** SPECIES (Subtype of SUBJECT TAXON) (Supertype)  
**Definition.** A SUBJECT TAXON, binomial or indicating open nomenclature, belonging to the category species or subspecies.  
**Supertype.** SUBJECT TAXON  
**Subtype.** TYPE SPECIES  
**Foreign key**  
**Name.** GENUS Primary key  
**Definition.** The GENUS to which the SPECIES belongs.  
**Domain.** GENUS Primary keys.  
**Business rules.** 1. Required. 2. Semimanual. 3. The generic part of the SPECIES binomen must be the same as BASIC TAXON.NAME from the GENUS Primary key.
Other relationships

SPECIES appears as a **Foreign key** in entities SPECIMEN, and associative entities MORPHOLOGY SPECIES, STRATIGRAPHY GEOGRAPHY SPECIES, ECOLOGY SPECIES, and PLATE TECTONICS SPECIES.

Correlation tables resolve SPECIES’s many-to-many documentation relationships with associative entities MORPHOLOGY SPECIES, MORPHOLOGY GENUS, STRATIGRAPHY GEOGRAPHY SPECIES, STRATIGRAPHY GEOGRAPHY GENUS, ECOLOGY SPECIES, ECOLOGY GENUS, PLATE TECTONICS SPECIES, and PLATE TECTONICS GENUS.

Other attributes

**Name.** CHANGED GENUS  
**Definition.** Whether SPECIES is in the same genus as when originally erected.  
**Domain.** Programmed blank; yes, no.  
**Business rules.** 1. Required. 2. Semiautomatic. 3. If domain value is no, BASIC TAXON AUTHOR FAMILY NAME of SPECIES **Primary key** will be placed in parentheses.

**Name.** TYPE SPECIES OF GENUS  
**Definition.** Whether SPECIES is the type species of GENUS.  
**Domain.** Programmed blank; yes, no.  
**Business rules.** 1. Required. 2. Semiautomatic. 3. If domain value is yes, SPECIES is entered into entity TYPE SPECIES. 4. If domain value is yes, and if CHANGED GENUS domain value is also yes, yes is automatically selected for TYPE SPECIES.CHANGED NAME domain value.  
**Comment about attribute.** If domain value is yes, this is the current form of the TYPE SPECIES.

Business rule for entity SPECIES

A SPECIES that documents another SPECIES’s correlation with MORPHOLOGY, STRATIGRAPHY, GEOGRAPHY, ECOLOGY, or PLATE TECTONICS must have TAXONOMIC RANK domain value *subspecies*. Correlations of SPECIES that are of rank subspecies cannot be documented by a subspecies.

Entity name.  **TYPE SPECIES** *(Subtype of SPECIES)*  
**Definition.** A SPECIES that is the type species of a GENUS.  
**Supertype.** SPECIES  
**Other relationships**  
**Other attribute**  
**Name.** CHANGED NAME  
**Definition.** Whether original name of TYPE SPECIES has been changed.
Domain. Programmed blank; yes, no.

Business rules. 1. Required 2. Semiautomatic. 3. If domain value is yes, CONTRIBUTOR must enter original form of name into entity ORIGINAL FORM OF CHANGED NAME OF TYPE SPECIES and complete the new instance.

Entity name. SPECIES LIST (N.B. SPECIES LIST is not a subtype.)

Definition. Authority list of names of species that CONTRIBUTOR wishes to list by name only without providing other information. (Although CONTRIBUTOR may enter all other species information through the BASIC TAXON screen, such information is required only for type species.)

Primary key

Name. NAME
Definition. Name only of species to be listed.
Domain. All *binomina* and names in open nomenclature of animal species.
Business rules. 1. Required. 2. Semimanual. 3. Generic part of *binomen* must be the same as the name of the GENUS to which the SPECIES LIST instance belongs (see Foreign key below).

Foreign key

Name. GENUS Primary key
Definition. The GENUS to which the SPECIES LIST instance belongs.
Domain. GENUS Primary keys.
Business rule. 1. Required. 2. Semimanual. 3. The generic part of the SPECIES LIST *binomen* must be the same as BASIC TAXON.NAME from the GENUS Primary key.

Other attributes

Name. SPECIES LIST AUTHOR
Definition. Family name(s) of author(s) of species.
Domain. All family names, written in roman characters, with or without parentheses.
Business rule. 1. Optional. 2. Semimanual or manual. 3. All authors for an instance must be treated the same with respect to parentheses.
Comments about attribute. 1. This author may be selected from entity AUTHOR authority list, but there is no foreign-key relationship. 2. If the genus name of a SPECIES LIST instance has changed, CONTRIBUTOR should put the SPECIES LIST AUTHOR’s name in parentheses.

Name. SPECIES LIST YEAR
Definition. Year in which SPECIES LIST instance was first published.
Domain. All years or ranges of years from 1758 to the present.
Comment about attribute. This year is not related to entity PUBLICATION.
**Business rule for entity SPECIES LIST**

When other taxonomic information is entered through BASIC TAXON screen for a species named in SPECIES LIST, the instance will be deleted from SPECIES LIST; its **Primary key**, SPECIES LIST.NAME, will be copied to BASIC TAXON; and its **Foreign key**, GENUS Primary key, will be copied to SPECIES. At this time CONTRIBUTOR must complete BASIC TAXON **Primary key** and attribute TAXONOMIC RANK.

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**Entity name. AUTHOR**

**Definition.** Authority list of names of authors and editors of PUBLICATIONs and names of authors of BASIC TAXONs.

**Primary key**

**Name.** FAMILY NAME

**Definition.** The family name of AUTHOR.

**Domain.** All names written in roman characters.

**Business rules.** 1. Required. 2. Semimanual.

**Name.** INITIALS OR OTHER NAMES

**Definition.** First, middle, and other names (or initials of these names) needed to identify AUTHOR.

**Domain.** All names and all initials, written in roman characters.

**Business rules.** 1. Required. 2. Semimanual.

**Other relationship**

AUTHOR appears as a **Foreign key** in associative entity AUTHOR-PUBLICATION-TAXON.

**Other attribute**

**Name.** COMMENT BY CONTRIBUTOR

**Definition.** Unstructured text about AUTHOR.

**Domain.** Blank; all alphanumeric character strings that form numbers or English words.


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**Entity name. AUTHOR-PUBLICATION-TAXON (Associative)**

**Definition.** Associative entity correlating AUTHOR with PUBLICATION or with BASIC TAXON.

**Primary keys (Foreign keys)**

**Name.** AUTHOR Primary key

**Definition.** AUTHOR correlate of AUTHOR-PUBLICATION-TAXON instance.

**Domain.** AUTHOR Primary keys.

**Business rule.** 1. Required. 2. Semimanual.
Name. PUBLICATION or BASIC TAXON Primary key
Definition. PUBLICATION or BASIC TAXON correlate of AUTHOR-PUBLICATION-TAXON instance.

Domain. PUBLICATION or BASIC TAXON Primary keys.
Business rule. 1. PUBLICATION correlate required if ROLE domain value is author of PUBLICATION or editor of PUBLICATION; BASIC TAXON correlate required if ROLE domain value is author of BASIC TAXON. 2. Semimanual.

Other attributes
Name. ROLE
Definition. Identifies role of AUTHOR.
Domain. Programmed blank; author of PUBLICATION, editor of PUBLICATION, author of BASIC TAXON.
Business rules. 1. Required. 2. Semiautomatic; automatic if AUTHOR is correlated with BASIC TAXON.

Name. RANK
Definition. Identifies first and successive AUTHORS.
Domain. 1, 2, 3, . . . 99.
Comment about attribute. CONTRIBUTOR ranks AUTHORS by selecting them in the appropriate order.

Entity name. CITATION (Associative)
Definition. Associative entity that correlates BASIC TAXON with PUBLICATION.

Primary keys (Foreign keys)
Name. BASIC TAXON Primary key
Definition. BASIC TAXON correlate in CITATION instance.
Domain. BASIC TAXON Primary keys.
Business rule. 1. Automatic.

Name. PUBLICATION Primary key
Definition. PUBLICATION correlate in CITATION instance.
Domain. PUBLICATION Primary keys.
Business rule. 1. Required. 2. Semimanual.

Other attributes
Name. ORIGINAL CITATION
Definition. Whether PUBLICATION contains the original citation of BASIC TAXON.
Domain. Programmed blank; yes, no.
Business rules. 1. Required. 2. Semiautomatic. 3. If domain value is no, then domain values for Other attributes YEAR ESTABLISHED and PAGE OF ORIGINAL CITATION are automatically selected to be not applicable.
Comment about attribute. A domain value of no means the CITATION is subsequent to the ORIGINAL CITATION.
Name. YEAR ESTABLISHED
Definition. Year in which BASIC TAXON was first published; derived from PUBLICATION.YEAR of PUBLICATION Primary key instance, above.
Domain. PUBLICATION.YEAR from instance of PUBLICATION in Primary key, above, if it is a single year (including single year plus alphanumeric character); years included in PUBLICATION.YEAR range of years from instance of PUBLICATION in Primary key, above, (e.g. if PUBLICATION.YEAR = 1927–1931, then domain would be 1927, 1928, 1929, 1930, 1931); not applicable.
Business rules. 1. Required if ORIGINAL CITATION domain value is yes; automatic if ORIGINAL CITATION domain value is yes and PUBLICATION.YEAR is a single year (including single year plus alphanumeric character). 2. Semiautomatic; domain value not applicable is selected automatically if domain value for ORIGINAL CITATION is no.

Name. PAGE OF ORIGINAL CITATION
Definition. Page number on which BASIC TAXON was first published.
Domain. All positive integers (alphanumeric); positive integers preceded by an r to represent roman numerals; not applicable.
Business rules. 1. Required. 2. Manual; domain value not applicable is selected automatically if domain value for ORIGINAL CITATION is no. 3. If more than one page is involved, cite first page only. 4. Page number must be ≥ 1 and ≤ the last page number or number of total pages of PUBLICATION in Primary key, above (see PUBLICATION subtype attributes LAST PAGE or TOTAL PAGES).
Comment about attribute. Positive integers preceded by an r will be converted to roman numerals in reports generated from the database.

Entity name. KEY WORD
Definition. Authority list containing key words selected by coordinator of PaleoBank revision.

Primary key
Name. KEY WORD
Definition. Words that describe topics in references, to be used singly or in combination to select groups of records.
Domain. All alphanumeric character strings that form numbers or English words.
Business rules. 1. Required. 2. Semimanual. 3. Entries are subject to review and standardization by PI staff.

Other relationship
A correlation table resolves KEY WORD’s many-to-many relationship with entity PUBLICATION.
Entity name. LANGUAGE

**Definition.** Authority list of names of languages in which PUBLICATIONs are written.

**Primary key**

- **Name.** NAME
  - **Definition.** Name of written language.
  - **Domain.** Names of all written languages.
  - **Business rules.** 1. Required. 2. Semimanual.

**Other relationship**

LANGUAGE appears as a **Foreign key** in entity PUBLICATION.

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Entity name. PUBLICATION (Supertype)

**Definition.** Authority list of bibliographic references to published works or parts of published works.

**Subtypes.** Subtypes that are mutually exclusive with each other are JOURNAL ARTICLE, MONOGRAPH, BOOK, and OTHER PUBLICATION. Subtypes ELECTRONIC PUBLICATION and PART OF PUBLICATION are nonexclusive and must also be one of the first four; neither ELECTRONIC PUBLICATION nor PART OF PUBLICATION can stand alone.

**Primary key**

- **Name.** AUTHOR*FAMILY NAME
  - **Definition.** Family name(s) of individual(s) who authored or edited the PUBLICATION. See AUTHOR **Primary key**.
  - **Domain.** AUTHOR authority list; all family names, written in roman characters.
  - **Business rules.** 1. Required. 2. Semimanual. 3. CONTRIBUTOR must select or enter a domain value through entity PUBLICATION. 4. When CONTRIBUTOR enters domain value manually (instead of selecting from AUTHOR authority list), the FAMILY NAME is entered into entity AUTHOR; CONTRIBUTOR must complete the **Primary key** for the new AUTHOR instance at this time.
  - **Comment about Primary key member.** AUTHOR is associated with PUBLICATION through entity AUTHOR-PUBLICATION-TAXON in its role as the author or editor of a PUBLICATION.

- **Name.** YEAR
  - **Definition.** Year or range of years up to the present in which PUBLICATION was published, plus alphabetical designation assigned by the computer when duplicate AUTHOR, YEAR associates exist; otherwise, in press. In the case of ELECTRONIC DOCUMENTs, YEAR = year of ELECTRONIC PUBLICATION.DATE OF REVISION OR UPDATE.
Domain. All years or ranges of years up to the present plus a, b, c . . . where necessary (Examples: 1964; 1915a, 1915b; 1923–1926; 1901–1903a, 1901–1903b); In press.


Name. TITLE
Definition. Title of PUBLICATION.
Domain. All titles of published works or parts of published works, written in roman characters.
Comment about attribute. TITLE is transliteration if published in Cyrillic characters.

Foreign key

Name. LANGUAGE Primary key
Definition. The LANGUAGE in which PUBLICATION is written.
Domain. LANGUAGE Primary keys.
Business rule. 1. Required. 2. Semimanual.

Other relationships

PUBLICATION appears as a Foreign key in entities PUBLISHED ILLUSTRATION, subtype PART OF PUBLICATION, and associative entities AUTHOR-PUBLICATION-TAXON (see Primary key above) and CITATION.

Correlation tables resolve PUBLICATION’s many-to-many relationships with entities KEY WORD, SPECIMEN, and many-to-many documentation relationships with associative entities MORPHOLOGY-SPECIES, MORPHOLOGY-GENUS, STRATIGRAPHY-GEOGRAPHY-SPECIES, STRATIGRAPHY-GEOGRAPHY-GENUS, ECOLOGY-SPECIES, ECOLOGY-GENUS, PLATE TECTONICS-SPECIES, and PLATE TECTONICS-GENUS.

Other attributes

Name. SUBTYPE
Definition. Whether PUBLICATION is subtype JOURNAL ARTICLE, MONOGRAPH, BOOK, or OTHER PUBLICATION. These subtypes are mutually exclusive.
Domain. Programmed blank; JOURNAL ARTICLE, MONOGRAPH, BOOK, OTHER PUBLICATION.
Business rules. 1. Required. 2. Semiautomatic. 3. PUBLICATION is automatically entered into appropriate subtype entity.

Name. ELECTRONIC
Definition. Whether PUBLICATION is nonexclusive subtype ELECTRONIC PUBLICATION.
Domain. Programmed blank; yes, no.
Business rules. 1. Required. 2. Semiautomatic. 3. If domain value is yes, PUBLICATION is entered into subtype ELECTRONIC PUBLICATION.

Name. PART
**Definition.** Whether PUBLICATION is nonexclusive subtype PART OF PUBLICATION.

**Domain.** Programmed blank; yes, no.

**Business rules.** 1. Required. 2. Semiautomatic. 3. If domain value is yes, PUBLICATION is entered into subtype PART OF PUBLICATION.

**Name.** AUTHOR*INITIALS OR OTHER NAMES

**Definition.** First, middle, and other names (or initials of these names) needed to identify AUTHOR of PUBLICATION.

**Domain.** The AUTHOR*INITIALS OR OTHER NAMES from the same instance of AUTHOR as the Primary key member AUTHOR*FAMILY NAME, above.

**Business rule.** 1. Required if necessary to identify or distinguish AUTHOR from another with the same family name.

**Name.** ACCOMPANYING MATERIAL

**Definition.** User’s manuals for ELECTRONIC PUBLICATIONs or other printed matter, compact disks, tools, or other material that supplements PUBLICATION.

**Domain.** Blank; all alphanumeric strings.

**Business rules.** 1. Optional; default to blank. 2. Semimanual.

**Name.** CYRILLIC

**Definition.** Whether PUBLICATION is published in Cyrillic characters.

**Domain.** Yes, no.

**Business rules.** 1. Optional; default to no. 2. Semiautomatic.

**Comment about attribute.** Logical attribute.

**Name.** TRANSLATED TITLE

**Definition.** English translation of Cyrillic title of PUBLICATION.

**Domain.** Blank; all alphanumeric character strings that form numbers or English words.

**Business rules.** 1. Optional; default to blank. 2. Semimanual.

**Name.** ISSN or ISBN

**Definition.** ISSN or ISBN numbers of PUBLICATION.

**Domain.** Blank; all ISSN or ISBN numbers.

**Business rules.** 1. Optional; default to blank. 2. Semimanual.

**Name.** GOVERNMENT DOCUMENT NUMBER

**Definition.** Number assigned by U.S. Superintendent of Documents or equivalent office to PUBLICATION.

**Domain.** Blank; all Superintendent of Documents (SUDOC) numbers or equivalent numbers.

**Business rules.** 1. Optional; default to blank. 2. Semimanual.

**Comment about attribute.** Government documents are typically difficult to find. We would like to encourage CONTRIBUTORs to give as much extra information about the publication as they possibly can, using COMMENT BY CONTRIBUTOR field below.
Name. COMMENT BY CONTRIBUTOR  
Definition. Unstructured text about PUBLICATION and its subtypes.  
Domain. Blank; all alphanumeric character strings that form numbers or English words.  

Name. LC CALL NUMBER  
Definition. Library of Congress catalog number of PUBLICATION.  
Business rules. 1. Optional; default to blank. 2. Semimanual. 3. Only PI staff may enter domain value. 4. Attribute is invisible to user other than PI staff.

Name. INTERLIBRARY LOAN INFORMATION  
Definition. Information about borrowing PUBLICATION through University of Kansas Interlibrary Services Department.  
Domain. Blank; all alphanumeric character strings.  
Business rules. 1. Optional; default to blank. 2. Semimanual. 3. Only PI staff may enter domain value. 4. Attribute is invisible to user other than PI staff.

Name. CITED  
Definition. Whether PUBLICATION is cited and, therefore, is correlated with BASIC TAXON in associative entity CITATION.  
Domain. Yes, no.  
Business rules. 1. Automatic. 2. Default value is no. 3. PUBLICATION associated with BASIC TAXON through CITATION is automatically flagged CITED; domain value is automatically yes.  
Comment about attribute. Logical attribute.

Name. ADDED BY CONTRIBUTOR  
Definition. Indicates instance of PUBLICATION that is added to PUBLICATION authority list by CONTRIBUTOR.  
Domain. Yes, no.  
Business rules. 1. Automatic. 2. Default value is no.  
Comment about attribute. Logical attribute.

Business rule for entity PUBLICATION  
PUBLICATION must be one of the four mutually exclusive subtypes JOURNAL ARTICLE, MONOGRAPH, BOOK, or OTHER PUBLICATION. If PUBLICATION is nonexclusive subtype ELECTRONIC PUBLICATION it must also be one of the four mutually exclusive subtypes. If PUBLICATION is nonexclusive subtype PART OF PUBLICATION, it must also be one of the four mutually exclusive subtypes; it may also be nonexclusive subtype ELECTRONIC PUBLICATION.

Entity name. JOURNAL ARTICLE (Subtype of PUBLICATION)  
Definition. A PUBLICATION that is an article in a serial publication.  
Supertype. PUBLICATION
Foreign key

Name. JOURNAL OR SERIES Primary key
Definition. The JOURNAL OR SERIES in which the JOURNAL ARTICLE appears.
Domain. JOURNAL OR SERIES Primary keys.
Business rule. 1. Required. 2. Semimanual.

Other attributes

Name. VOLUME NUMBER
Definition. Volume number (or rarely some other kind of number) of a journal or series in which JOURNAL ARTICLE appears.
Domain. All alphanumeric characters or years from 1700 to the present year.

Name. FIRST PAGE OF ARTICLE
Definition. Page on which JOURNAL ARTICLE begins.
Domain. All positive integers.
Business rules. 1. Required; optional if JOURNAL ARTICLE is also subtype ELECTRONIC PUBLICATION. 2. Semimanual.

Name. LAST PAGE OF ARTICLE
Definition. Page on which JOURNAL ARTICLE ends.
Domain. All positive integers.
Business rules. 1. Required; optional if JOURNAL ARTICLE is also subtype ELECTRONIC PUBLICATION. 2. Semimanual.

Name. ISSUE NUMBER, ETC.
Definition. Issue or some other kind of number (memoir, bulletin, etc.) that follows the volume number of a journal or series in which JOURNAL ARTICLE appears.
Domain. Blank; all alphanumeric characters or dates.
Business rules. 1. Optional; default to blank. 2. Semimanual. 3. Put domain value in parentheses.
Comment about attribute. Additional, similar numbers may be entered and described in PUBLICATION.COMMENT BY CONTRIBUTOR field.

Name. NOMINAL YEAR
Definition. Year or range of years up to the present for which issues are collected or in which papers are read. If this year or range of years differs from the year or years in which JOURNAL ARTICLE is actually published, CONTRIBUTOR might wish to include the NOMINAL YEAR in a bibliographic citation. Treatise style is to place it near the end of a citation in parentheses.
Domain. All years or ranges of years up to the present.
Business rules. 1. Optional; default to blank. 2. Semimanual. 3. Put domain value in parentheses.
Comment about attribute. If NOMINAL YEAR is used as the volume number, see attribute VOLUME NUMBER. Additional information may be given in PUBLICATION.COMMENT BY CONTRIBUTOR field.

Name. FIRST FIGURE NUMBER
Definition. Number of first figure in JOURNAL ARTICLE, if any.
Domain. Blank; all alphanumeric character strings, including unnumbered.
Business rules. 1. Optional; default to blank. 2. Semimanual.

Name. LAST FIGURE NUMBER
Definition. Number of last figure in JOURNAL ARTICLE, if any.
Domain. Blank; all alphanumeric character strings, including unnumbered.
Business rules. 1. Optional; default to blank. 2. Semimanual.

Name. FIRST PLATE NUMBER
Definition. Number of first plate in JOURNAL ARTICLE, if any.
Domain. Blank; all alphanumeric character strings, including unnumbered.
Business rules. 1. Optional; default to blank. 2. Semimanual.

Name. LAST PLATE NUMBER
Definition. Number of last plate in JOURNAL ARTICLE, if any.
Domain. Blank; all alphanumeric character strings, including unnumbered.
Business rules. 1. Optional; default to blank. 2. Semimanual.

Entity name. MONOGRAPH (Subtype of PUBLICATION)
Definition. A PUBLICATION that is a monograph.
Supertype. PUBLICATION
Foreign key
Name. JOURNAL OR SERIES Primary key
Definition. The JOURNAL OR SERIES in which the MONOGRAPH appears.
Domain. JOURNAL OR SERIES Primary keys.
Business rule. 1. Required if there is no correlation with PUBLISHER OR UNIVERSITY; optional if there is a correlation with PUBLISHER OR UNIVERSITY. 2. Semimanual.

Other relationships
Correlation tables resolve MONOGRAPH’s many-to-many relationships with entities CITY and PUBLISHER OR UNIVERSITY.

Other attributes
Name. TOTAL PAGES
Definition. Number of pages in MONOGRAPH, exclusive of front matter.
Domain. All positive integers.
Business rules. 1. Required; optional if MONOGRAPH is also ELECTRONIC PUBLICATION. 2. Semimanual.
Name. VOLUME NUMBER

Definition. Volume number (or rarely some other kind of number) of a journal or series in which MONOGRAPH appears.

Domain. Blank; all alphanumeric characters or years from 1700 to the present year.

Business rules. 1. Optional; default to blank. 2. Semimanual.

Name. ISSUE NUMBER, ETC.

Definition. Issue or some other kind of number (memoir, bulletin, etc.) that follows the volume number of a journal or series in which MONOGRAPH appears.

Domain. Blank; all alphanumeric characters or dates.

Business rules. 1. Optional; default to blank. 2. Semimanual. 3. Put domain value in parentheses.

Name. NOMINAL YEAR

Definition. Year or range of years up to the present for which issues are collected or in which papers are read. If this year or range of years differs from the year or years in which MONOGRAPH is actually published, CONTRIBUTOR might wish to include the NOMINAL YEAR in a bibliographic citation. Treatise style is to place it near the end of a citation in parentheses.

Domain. All years or ranges of years up to the present.

Business rules. 1. Optional; default to blank. 2. Semimanual. 3. Put domain value in parentheses.

Comment about attribute. If NOMINAL YEAR is used as the volume number, see attribute VOLUME NUMBER. Additional information may be given in PUBLICATION.COMMENT BY CONTRIBUTOR field.

Name. TOTAL PAGES OF FRONT MATTER

Definition. Number of pages of front matter in MONOGRAPH, if any.

Domain. Blank; all positive integers, preceded by an r. (See comment below.)

Business rules. 1. Optional; default to blank. 2. Semimanual.

Comment about attribute. Positive integers preceded by an r will be converted to roman numerals in reports generated from the database.

Name. TOTAL NUMBER OF FIGURES

Definition. Number of figures in MONOGRAPH.

Domain. Blank; zero or all positive integers.

Business rules. 1. Optional; default to blank. 2. Semimanual.

Name. TOTAL NUMBER OF PLATES

Definition. Number of plates in MONOGRAPH.

Domain. Blank; zero or all positive integers.

Business rules. 1. Optional; default to blank. 2. Semimanual.
**Business rule for entity MONOGRAPH**

MONOGRAPH must be correlated with JOURNAL OR SERIES or PUBLISHER OR UNIVERSITY or may be correlated with both. MONOGRAPH must be correlated with CITY if it is correlated with PUBLISHER OR UNIVERSITY.

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**Entity name. BOOK (Subtype of PUBLICATION)**

**Definition.** A PUBLICATION that is a book, thesis, or dissertation.

**Supertype.** PUBLICATION

**Other relationship**

Correlation tables resolve BOOK’s many-to-many relationships with entities CITY and PUBLISHER OR UNIVERSITY.

**Other attributes**

- **Name.** KIND
  - **Definition.** Indicator of kind of BOOK.
  - **Business rules.** 1. Required. 2. Semiautomatic.

- **Name.** TOTAL PAGES
  - **Definition.** Number of pages in BOOK, exclusive of front matter.
  - **Domain.** All positive integers.
  - **Business rules.** 1. Required; optional if BOOK is also ELECTRONIC PUBLICATION. 2. Semimanual.

- **Name.** VOLUME NUMBER
  - **Definition.** Volume number of BOOK if part of a series.
  - **Domain.** Blank; all alphanumeric characters or years from 1700 to the present year.
  - **Business rules.** 1. Optional; default to blank. 2. Semimanual.

- **Name.** EDITION
  - **Definition.** Number of edition of BOOK, not date.
  - **Domain.** Blank; all positive integers.
  - **Business rules.** 1. Optional; default to blank. 2. Semimanual. 3. 1=1st, 2=2nd, etc.

- **Name.** TOTAL PAGES OF FRONT MATTER
  - **Definition.** Number of pages of front matter in BOOK, if any.
  - **Domain.** Blank; all positive integers, preceded by an r. (See comment below.)
  - **Business rules.** 1. Optional; default to blank. 2. Semimanual.
  - **Comment about attribute.** Positive integers preceded by an r will be converted to roman numerals in reports generated from the database.

- **Name.** TOTAL NUMBER OF FIGURES
  - **Definition.** Number of figures in BOOK.
  - **Domain.** Blank; zero and all positive integers.
Entity name. OTHER PUBLICATION (Subtype of PUBLICATION)

**Definition.** A PUBLICATION that is not a JOURNAL ARTICLE, MONOGRAPH, BOOK, or a part of any one of these.

**Supertype.** PUBLICATION

**Foreign key**

**Name.** JOURNAL OR SERIES **Primary key**

**Definition.** The JOURNAL OR SERIES in which the OTHER PUBLICATION appears.

**Domain.** JOURNAL OR SERIES **Primary keys**.

**Business rule.** 1. Required if there is no correlation with PUBLISHER OR UNIVERSITY. 2. Semimanual.

**Other relationships**

Correlation tables resolve OTHER PUBLICATION’s many-to-many relationship with entities CITY and PUBLISHER OR UNIVERSITY.

**Other attributes**

**Name.** VOLUME NUMBER

**Definition.** Volume number (or rarely some other kind of number).

**Domain.** Blank; all alphanumeric characters or years from 1700 to the present year.

**Business rules.** 1. Optional; default to blank. 2. Semimanual.

**Name.** ISSUE NUMBER, ETC.

**Definition.** Issue or some other kind of number (memoir, bulletin, etc.) that follows volume number.

**Domain.** Blank; all alphanumeric characters or dates; parentheses.

**Business rules.** 1. Optional; default to blank. 2. Semimanual. 3. Put domain value in parentheses.

**Comment about attribute.** Additional, similar numbers may be entered and described in PUBLICATION.COMMENT BY CONTRIBUTOR field.

**Name.** NOMINAL YEAR

**Definition.** Year or range of years up to the present for which issues are collected or in which papers are read. If this year or range of years differs from the year or years in which OTHER PUBLICATION is actually published, CONTRIBUTOR might wish to include the NOMINAL YEAR in a bibliographic citation. Treatise style is to place it near the end of a citation in parentheses.
Domain. All years or ranges of years up to the present.

Business rules. 1. Optional; default to blank. 2. Semimanual. 3. Put domain value in parentheses.

Comment about attribute. If NOMINAL YEAR is used as the volume number, see attribute VOLUME NUMBER. Additional information may be given in PUBLICATION.COMMENT BY CONTRIBUTOR field.

Name. EDITION
Definition. Number of edition, not date.
Domain. Blank; all positive integers.
Business rules. 1. Optional; default to blank. 2. Semimanual. 3. 1=1st, 2=2nd, etc.

Name. TOTAL PAGES OF FRONT MATTER
Definition. Number of pages of front matter, if any.
Domain. Blank; all positive integers, preceded by an r. (See comment below.)
Business rules. 1. Optional; default to blank. 2. Semimanual.
Comment about attribute. Positive integers preceded by an r will be converted to roman numerals in reports generated from the database.

Name. FIRST PAGE
Definition. Page on which OTHER PUBLICATION begins.
Domain. Blank; all positive integers.
Business rules. 1. Optional; default to blank; automatic default to blank if TOTAL PAGES domain value is other than blank. 2. Semimanual.

Name. LAST PAGE
Definition. Page on which OTHER PUBLICATION ends.
Domain. Blank; all positive integers.
Business rules. 1. Optional; default to blank; automatic default to blank if TOTAL PAGES domain value is other than blank. 2. Semimanual.

Name. TOTAL PAGES
Definition. Number of pages in OTHER PUBLICATION, exclusive of front matter.
Domain. Blank; all positive integers.
Business rules. 1. Optional; default to blank; automatic default to blank if FIRST PAGE or LAST PAGE domain values are other than blank. 2. Semimanual.

Name. FIRST FIGURE NUMBER
Definition. Number of first figure in OTHER PUBLICATION, if any.
Domain. Blank; zero and all alphanumeric character strings, including unnumbered.
Business rules. 1. Optional; default to blank; automatic default to blank if TOTAL NUMBER OF FIGURES domain value is other than blank. 2. Semimanual.

Name. LAST FIGURE NUMBER
Definition. Number of last figure in OTHER PUBLICATION, if any.
**Domain.** Blank; zero and all alphanumeric character strings, including unnumbered.

**Business rules.** 1. Optional; default to blank; automatic default to blank if TOTAL NUMBER OF FIGURES domain value is other than blank. 2. Semimanual.

**Name.** TOTAL NUMBER OF FIGURES

**Definition.** Number of figures in OTHER PUBLICATION.

**Domain.** Blank; zero and all positive integers.

**Business rules.** 1. Optional; default to blank; automatic default to blank if FIRST FIGURE NUMBER or LAST FIGURE NUMBER domain values are other than blank. 2. Semimanual.

**Name.** FIRST PLATE NUMBER

**Definition.** Number of first plate in OTHER PUBLICATION, if any.

**Domain.** Blank; zero and all alphanumeric character strings, including unnumbered.

**Business rules.** 1. Optional; default to blank; automatic default to blank if TOTAL NUMBER OF PLATES domain value is other than blank. 2. Semimanual.

**Name.** LAST PLATE NUMBER

**Definition.** Number of last plate in OTHER PUBLICATION, if any.

**Domain.** Blank; zero and all alphanumeric character strings, including unnumbered.

**Business rules.** 1. Optional; default to blank; automatic default to blank if TOTAL NUMBER OF PLATES domain value is other than blank. 2. Semimanual.

**Name.** TOTAL NUMBER OF PLATES

**Definition.** Number of plates in OTHER PUBLICATION.

**Domain.** Blank; zero and all positive integers.

**Business rules.** 1. Optional; default to blank; automatic default to blank if FIRST PLATE NUMBER or LAST PLATE NUMBER domain values are other than blank. 2. Semimanual.

**Business rule for entity OTHER PUBLICATION**

OTHER PUBLICATION must be correlated with either JOURNAL OR SERIES or PUBLISHER OR UNIVERSITY or may be correlated with both. OTHER PUBLICATION must be correlated with CITY if it is correlated with PUBLISHER OR UNIVERSITY.

**Entity name.** ELECTRONIC PUBLICATION (Subtype of PUBLICATION)

**Definition.** A PUBLICATION that is an electronic publication.

**Supertype.** PUBLICATION
Other attributes

**Name.** KIND OF OTHER PUBLICATION  
**Definition.** The kind of electronic publication if ELECTRONIC PUBLICATION is mutually exclusive subtype OTHER PUBLICATION.  
**Domain.** Blank; software, database, home page, other electronic form.  
**Business rules.** 1. Required if domain value of attribute SUBTYPE is OTHER PUBLICATION; otherwise automatic default to blank. 2. Semiautomatic.

**Name.** MEDIUM  
**Definition.** The medium in which ELECTRONIC PUBLICATION is published.  
**Domain.** Programmed blank; disk, magnetic tape, online, CD-ROM.  
**Business rules.** 1. Required. 2. Semiautomatic.

**Name.** REVISION OR UPDATE  
**Definition.** The revision, update, version, level, issue, or other edition designation of ELECTRONIC PUBLICATION.  
**Domain.** All alphanumeric character strings.  
**Business rules.** 1. Required. 2. Semiautomatic.

**Name.** DATE OF REVISION OR UPDATE  
**Definition.** Date of revision or update of ELECTRONIC PUBLICATION.  
**Domain.** Blank; all dates from 01/01/1980 to the present.  
**Business rules.** 1. Optional; default to blank. 2. Semimanual. 3. USER must format date as follows: MM/DD/YYYY.

**Name.** PLATFORM AND FORMAT  
**Definition.** Description by CONTRIBUTOR of operating system and native file format used for ELECTRONIC PUBLICATION.  
**Domain.** All alphanumeric character strings.  
**Business rules.** 1. Optional. 2. Semimanual.

**Name.** FREQUENCY OF PUBLICATION  
**Definition.** Designates frequency of regular updates of ELECTRONIC PUBLICATION.  
**Domain.** Blank; daily; weekly; monthly; annually; variably; all alphanumeric character strings.  
**Business rules.** 1. Optional; default to blank. 2. Semimanual.

**Name.** AVAILABILITY  
**Definition.** Electronic or geographic address, Universal Resource Locater (URL), phone number, or other access code of ELECTRONIC PUBLICATION.  
**Domain.** Blank; all alphanumeric strings.  
**Business rules.** 1. Optional; default to blank. 2. Semimanual.

**Business rule for entity ELECTRONIC PUBLICATION**  
ELECTRONIC PUBLICATION must also be one of the four mutually exclusive subtypes JOURNAL ARTICLE, MONOGRAPH, BOOK, or OTHER.
PUBLICATION. ELECTRONIC PUBLICATION may also be nonexclusive subtype PART OF PUBLICATION.

Entity name. PART OF PUBLICATION (Subtype of PUBLICATION)
Definition. A PUBLICATION that is part of another PUBLICATION.
Supertype. PUBLICATION

Foreign key

Name. PUBLICATION Primary key
   Definition. The PUBLICATION containing PART OF PUBLICATION.
   Domain. PUBLICATION Primary keys.
   Business rule. 1. Required. 2. Semimanual. 3. The Foreign key must be the same subtype(s) (excluding subtype PART) as PART OF PUBLICATION.

Other attributes

Name. FIRST PAGE
   Definition. Page on which PART OF PUBLICATION begins.
   Domain. All positive integers.
   Business rules. 1. Required; optional if PART OF PUBLICATION is subtype ELECTRONIC PUBLICATION. 2. Semimanual.

Name. LAST PAGE
   Definition. Page on which PART OF PUBLICATION ends.
   Domain. All positive integers.
   Business rules. 1. Required; optional if PART OF PUBLICATION is subtype ELECTRONIC PUBLICATION. 2. Semimanual.

Name. FIRST FIGURE NUMBER
   Definition. Number of first figure in PART OF PUBLICATION, if any.
   Domain. Blank; all alphanumeric character strings including unnumbered.
   Business rules. 1. Optional; default to blank. 2. Semimanual.

Name. LAST FIGURE NUMBER
   Definition. Number of last figure in PART OF PUBLICATION, if any.
   Domain. Blank; all alphanumeric character strings including unnumbered.
   Business rules. 1. Optional; default to blank. 2. Semimanual.

Name. FIRST PLATE NUMBER
   Definition. Number of first plate in PART OF PUBLICATION, if any.
   Domain. Blank; all alphanumeric character strings including unnumbered.
   Business rules. 1. Optional; default to blank. 2. Semimanual.

Name. LAST PLATE NUMBER
   Definition. Number of last plate in PART OF PUBLICATION, if any.
   Domain. Blank; all alphanumeric character strings including unnumbered.
   Business rules. 1. Optional; default to blank. 2. Semimanual.
**Name.** LOCATION WITHIN ELECTRONIC PUBLICATION  
**Definition.** List of links, a string for which to search, line numbers, record numbers, screens, or other information that indicates PART OF PUBLICATION’s location within an ELECTRONIC PUBLICATION.  
**Domain.** Blank; all alphanumeric character strings.  
**Business rules.** 1. Optional; default to blank. 2. Semimanual. 3. PART OF PUBLICATION must also be ELECTRONIC PUBLICATION if domain value is other than blank.

**Business rule for entity PART OF PUBLICATION**

PART OF PUBLICATION must also be one of the four mutually exclusive subtypes JOURNAL ARTICLE, MONOGRAPH, BOOK, or OTHER PUBLICATION. PART OF PUBLICATION may also be nonexclusive subtype ELECTRONIC PUBLICATION.

Only one recursion is allowed; that is, PART OF PUBLICATION may not be part of a PUBLICATION that is also subtype PART OF PUBLICATION.

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**Entity name.** COUNTRY  
**Definition.** Pick list of all geopolitical nation names based on GIS.  
**Primary key**  
**Name.** NAME  
**Definition.** Name of geopolitical nation.  
**Domain.** All names that are in the PaleoBank COUNTRY pick list.  
**Business rules.** 1. Required. 2. Semiautomatic.

**Other relationships**  
COUNTRY appears as a **Foreign key** in entities STATE, CITY, and REPOSITORY.

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**Entity name.** STATE  
**Definition.** Authority list of names of states and territories of the United States and Australia; the provinces and territories of Canada; and the states, territories, provinces, oblasts, or other divisions of any COUNTRY.  
**Primary key**  
**Name.** NAME  
**Definition.** Name of state or territory of the United States or Australia; a province or territory of Canada; or a state, territory, province, oblast, or other division of any COUNTRY.  
**Domain.** All names of states and territories of the United States and Australia; provinces and territories of Canada; and states, territories, provinces, oblasts, or other divisions of all COUNTRYs.  
**Business rules.** 1. Required. 2. Semimanual.
Foreign key

Name. COUNTRY Primary key
Definition. The geopolitical nation in which STATE is located.
Domain. COUNTRY Primary keys.
Business rule. 1. Required. 2. Semiautomatic.

Other relationship
STATE appears as a Foreign key in the entity CITY.

Entity name. CITY
Definition. Authority list of names of cities.

Primary key
Name. NAME
Definition. Name of city.
Domain. Names of all cities.

Foreign keys
Name. COUNTRY Primary key
Definition. The COUNTRY in which CITY is located.
Domain. COUNTRY Primary keys.
Business rule. 1. Optional. 2. Semiautomatic.

Name. STATE Primary key
Definition. The STATE in which CITY is located.
Domain. STATE Primary keys.
Business rule. 1. Optional. 2. Semimanual. 3. If a COUNTRY Foreign key has been chosen (above), STATE must have the same COUNTRY Foreign key.

Other relationships
CITY appears as a Foreign key in entity REPOSITORY.
Correlation tables resolve CITY’s many-to-many relationships with entities MONOGRAPH, BOOK, and OTHER PUBLICATION.

Entity name. JOURNAL OR SERIES
Definition. Authority list of complete, unabbreviated names of serial publications, transliterated if original names are in Cyrillic.

Primary key
Name. NAME
Definition. Complete, unabbreviated name of journal or serial publication, transliterated if original name is in Cyrillic.
Domain. All journal or series names, written in roman characters.
Other relationships

JOURNAL OR SERIES appears as a Foreign key in entities JOURNAL ARTICLE, MONOGRAPH, and OTHER PUBLICATION.

Other attribute

Name. COPYRIGHTED, BLANKET PERMISSION GRANTED
Definition. JOURNAL OR SERIES that has granted to the PI blanket permission for re-publication of illustrations.
Domain. Yes, no.
Business rules. 1. Optional; default to no. 2. Semiautomatic. 3. Only PI staff may select domain value yes. 4. Attribute is invisible to user other than PI staff.
Comment about attribute. Logical attribute.

Entity name. PUBLISHER OR UNIVERSITY

Definition. Authority list of complete, unabbreviated names of publishing houses, organizations, and universities, transliterated if original names are in Cyrillic.

Primary key

Name. NAME
Definition. Unabbreviated name of publishing house, organization, or university, transliterated if original name is in Cyrillic.
Domain. All names of publishing houses, organizations, and universities.

Other relationships

Correlation tables resolve PUBLISHER OR UNIVERSITY’s many-to-many relationships with entities MONOGRAPH, BOOK, and OTHER PUBLICATION.

Entity name. ILLUSTRATION (Supertype)

Definition. Drawings or photographs of specimen(s) or drawings of taxonomic concepts. PaleoBank accepts only illustrations of organisms. Note: CONTRIBUTOR must send originals unless PaleoBank database manager has approved electronic transfer format.

Subtype. PUBLISHED ILLUSTRATION

Primary key

Name. CONTRIBUTOR CONTROL NUMBER
Definition. The unique string of alphanumeric characters used by CONTRIBUTOR to identify ILLUSTRATION.
Domain. All alphanumeric character strings.
Foreign key

Name. FULL TAXON Primary key
Definition. The FULL TAXON that exists for each unpublished ILLUSTRATION of a taxonomic concept.
Domain. FULL TAXON Primary keys.
Business rule. 1. Required if both ILLUSTRATION.PREVIOUSLY PUBLISHED and ILLUSTRATION.SPECIMEN domain values are no. 2. Semimanual.

Other relationship
A correlation table resolves ILLUSTRATION’s many-to-many relationship with entity SPECIMEN.

Other attributes

Name. PREVIOUSLY PUBLISHED
Definition. Whether ILLUSTRATION is previously published.
Domain. Programmed blank; yes, no.
Business rules. 1. Required. 2. Semiautomatic. 3. If domain value is yes, then ILLUSTRATION is entered into subtype PUBLISHED ILLUSTRATION.

Name. SPECIMEN
Definition. Whether the ILLUSTRATION is of a SPECIMEN.
Domain. Programmed blank; yes, no.
Business rules. 1. Required. 2. Semiautomatic. 3. If domain value is no, and PREVIOUSLY PUBLISHED domain value is no, then ILLUSTRATION is related directly to entity FULL TAXON (see Foreign key above).

Name. BIT MAP FILE
Definition. The name and extension (showing type) of the computer file where the ILLUSTRATION is stored.
Domain. All alphanumeric character strings compatible with computer system; not applicable.
Business rules. 1. Required if ILLUSTRATION is submitted in electronic format; otherwise default to not applicable. 2. Manual.
Comment about attribute. N.B. CONTRIBUTOR may send electronically stored ILLUSTRATIONs only if PaleoBank database manager has approved electronic transfer format.

Entity name. PUBLISHED ILLUSTRATION (Subtype of ILLUSTRATION)
Definition. ILLUSTRATIONs that have been published.
Supertype. ILLUSTRATION.
Foreign key

Name. PUBLICATION Primary key
Definition. The PUBLICATION containing the PUBLISHED ILLUSTRATION.
Domain. PUBLICATION Primary keys.
Business rule. 1. Required. 2. Semimanual.

Other attributes

Name. FIGURE OR PLATE NUMBER
Definition. Published figure or plate number of PUBLISHED ILLUSTRATION, prefixed by fig. or pl.
Domain. All alphanumeric character strings including fig., pl., unnumbered.

Name. COPYRIGHT AND PERMISSIONS STATUS
Definition. Whether permission is needed for republishing PUBLISHED ILLUSTRATION.
Domain. Not copyrighted, no permission needed; copyrighted, blanket permission granted; copyrighted, need permission.
Business rules. 1. Automatic. 2. Not copyrighted, no permission needed is the domain value if the correlated PUBLICATION.YEAR is 1906 or earlier, or if the correlated PUBLICATION has a GOVERNMENT DOCUMENT NUMBER. Copyrighted, blanket permission granted is the domain value if the correlated PUBLICATION’s Foreign key JOURNAL OR SERIES is flagged as being one that has granted to the PI blanket permission for republishing illustrations. Copyrighted, need permission is the domain value for all other PUBLISHED ILLUSTRATIONs.

Entity name. SPECIMEN
Definition. An individual, a portion of an individual, the evidence of an individual, a group of conspecific individuals in the same piece of rock, a lot, or a colony or part of a colony that is referred to uniquely by SPECIES, REPOSITORY, and REPOSITORY NUMBER.

Primary key

Name. SPECIES Primary key (See Foreign key, below.)
Name. REPOSITORY Primary key (See Foreign key, below.)
Name. REPOSITORY NUMBER
Definition. Number or other identifier assigned to SPECIMEN by museum, other repository, or CONTRIBUTOR.
Domain. All alphanumeric character strings.
Business rules. 1. Required. 2. Manual. 3. May include museum acronym or other repository identifier congruent with REPOSITORY Foreign key, below. 4. A SPECIMEN held personally by the CONTRIBUTOR receives a REPOSITORY NUMBER with prefix CC followed by CONTRIBUTOR’s name derived from log-on. Records for such SPECIMENs are not transmitted to the Paleontological Institute.

Foreign keys

Name. SPECIES Primary key
Definition. The SPECIES to which the SPECIMEN belongs.
**Domain.** SPECIES Primary keys.
**Business rule.** 1. Required. 2. Semimanual.

**Name.** REPOSITORY Primary key
**Definition.** The place in which the SPECIMEN is stored.
**Domain.** REPOSITORY Primary keys.
**Business rule.** 1. Required. 2. Semimanual.

**Other relationships**
Correlation tables resolve SPECIMEN’s many-to-many relationships with entities PUBLICATION, ILLUSTRATION, and many-to-many documentation relationships with associative entities MORPHOLOGY-SPECIES, MORPHOLOGY-GENUS, STRATIGRAPHY-GEOGRAPHY-SPECIES, STRATIGRAPHY-GEOGRAPHY-GENUS, ECOLOGY-SPECIES, ECOLOGY-GENUS, PLATE TECTONICS-SPECIES, and PLATE TECTONICS-GENUS.

**Other attributes**

**Name.** KIND OF SPECIMEN
**Definition.** Indicator of kind of SPECIMEN.
**Domain.** Programmed blank; holotype, lectotype, paratype, cotype, neotype, syntype, toptotype, mentioned, saw somewhere, other, unknown.
**Business rules.** 1. Required. 2. Semiautomatic.

**Name.** SEX
**Definition.** Whether SPECIMEN is male, female, hermaphrodite, immature, or unknown.
**Domain.** Programmed blank; male, female, hermaphrodite, immature, unknown, not applicable.
**Business rules.** 1. Required. 2. Semiautomatic.

**Name.** LATITUDE
**Definition.** Angle of the location where the SPECIMEN was found measured through 90 degrees north or south of the earth’s equator.
**Domain.** Blank; all angles from 0 to 90 degrees and appropriate symbols for their units followed by N or S.
**Business rules.** 1. Optional; default to blank. 2. Manual. 3. Longitude entered in any format will be converted to degrees with 3 decimal places in the following format: DD.DDD° (≤ 90), followed by N or S.

**Name.** LONGITUDE
**Definition.** Angle of the location where the SPECIMEN was found measured through 180 degrees east or west of the prime meridian.
**Domain.** Blank; all angles from 0 to 180 degrees and appropriate symbols for their units followed by E or W.
**Business rules.** 1. Optional; default to blank. 2. Manual. 3. Longitude entered in any format will be converted to degrees with 3 decimal places in the following format: DDD.DDD° (≤ 180), followed by E or W.
Name. LITHOSTRATIGRAPHIC GROUP
Definition. A rock unit that comprises two or more lithostratigraphic formations and is formally defined on the basis of lithologic characteristics and stratigraphic position.
Domain. Blank; the names of all formally proposed and accepted lithostratigraphic groups.

Name. LITHOSTRATIGRAPHIC FORMATION
Definition. A rock unit that is formally defined as a lithostratigraphic formation on the basis of lithologic characteristics and stratigraphic position. Lithostratigraphic formations are of intermediate rank in the hierarchy of lithostratigraphic units and are the primary formal unit of lithostratigraphic classification.
Domain. Blank; the names of all formally proposed and accepted lithostratigraphic formations, including the formal appellation Formation or formal lithologic designation, e.g. Fountain Formation, Foraker Limestone.
Business rules. 1. Required if LITHOSTRATIGRAPHIC MEMBER domain value is other than blank. Optional if LITHOSTRATIGRAPHIC MEMBER domain value is blank; default to blank. 2. Manual.

Name. LITHOSTRATIGRAPHIC MEMBER
Definition. A rock unit that is formally defined as a lithostratigraphic member on the basis of lithologic characteristics and stratigraphic position. A lithostratigraphic member is part of a lithostratigraphic formation.
Domain. Blank; the names of all formally proposed and accepted lithostratigraphic members.

Name. LITHOSTRATIGRAPHIC BED
Definition. A rock unit that is formally or, for the purposes of PaleoBank, informally defined on the basis of lithologic characteristics and stratigraphic position. A lithostratigraphic bed is the smallest formal unit in the hierarchy of lithostratigraphic units.
Domain. Blank; the names of all formally proposed and accepted lithostratigraphic beds.

Entity name. REPOSITORY
Definition. An authority list of locations that store SPECIMENs, including research collections of CONTRIBUTORs.

Primary key
Name. NAME
Definition. Unabbreviated name of museum or other institution that stores SPECIMENs, or CONTRIBUTOR’s name derived from log-on.
Domain. All museum or institution or other names, written in roman characters; CONTRIBUTOR’s name.

Business rules. 1. Required. 2. Semimanual. 3. Authority list includes PI-preferred, unabbreviated forms of names, as well as synonyms of these names, of museums or other institutions that store specimens. If CONTRIBUTOR selects or enters a synonym, PaleoBank will replace it with the preferred name.

Foreign key

Name. COUNTRY Primary key
Definition. The geopolitical nation in which REPOSITORY resides.
Domain. COUNTRY Primary keys.

Name. CITY Primary key
Definition. The city in which REPOSITORY resides.
Domain. CITY Primary keys.
Business rules. 1. Optional. 2. Semimanual. 3. CITY must have same COUNTRY Foreign key as above.

Other relationship
REPOSITORY appears as a Foreign key in entity SPECIMEN.

Other attribute

Name. ACRONYM
Definition. A unique abbreviation that stands for each REPOSITORY.NAME.
Domain. Blank; PI pick list including other, unknown.
Business rules. 1. Optional; default to blank. 2. Semiautomatic; automatic if CONTRIBUTOR selects REPOSITORY.NAME from authority list.

Entity name. MORPHOLOGY

Definition. Pick list of names of hard- and soft-part morphological characters and character states appropriate to the subject group.

Primary key

Name. CHARACTER AND CHARACTER STATE
Definition. The names of hard-part and soft-part morphological characters and character states that are used to describe the taxonomic group that is the subject of PaleoBank.
Domain. Missing data; all terms that are in the PaleoBank MORPHOLOGY pick list.
Business rules. 1. Required. 2. Semiautomatic. 3. MORPHOLOGY pick list terms are defined by coordinating authors.
Other relationships

MORPHOLOGY appears as a Foreign key in associative entities MORPHOLOGY-SPECIES and MORPHOLOGY-GENUS.

Entity name. STRATIGRAPHY

Definition. Pick list of names of stratigraphic units (systems, series, stages, substages) from DNAG, IUGS, Harland, and SEPM time scales.

Primary key

Name. NAME
Definition. Name of a stratigraphic unit (system, series, stage, substage) from one of the time scales.
Domain. All terms that are in the PaleoBank STRATIGRAPHY pick list.

Other relationships

STRATIGRAPHY appears as a Foreign key in associative entities STRATIGRAPHY-GEOGRAPHY-SPECIES and STRATIGRAPHY-GEOGRAPHY-GENUS.

Other attributes

Name. COMMENT BY CONTRIBUTOR
Definition. Unstructured text about STRATIGRAPHY.
Domain. Blank; all alphanumeric character strings that form numbers or English words.
Comment about attribute. CONTRIBUTOR is encouraged to enter information about biostratigraphic zones.

Name. BOTTOM AGE
Definition. Age of bottom of stratigraphic unit in millions of years (Ma xxxx.xx).
Business rule. 1. Automatic.

Name. TOP AGE
Definition. Age of top of stratigraphic unit in millions of years (Ma xxxx.xx).
Business rule. 1. Automatic.

Name. EDWARDS BOTTOM NUMBER
Definition. The Edwards number that corresponds to age of bottom of stratigraphic unit.
Business rule. 1. Automatic.
Name. EDWARDS TOP NUMBER
   Definition. The Edwards number that corresponds to age of top of stratigraphic unit.
   Business rule. 1. Automatic.

Entity name. GEOGRAPHY
   Definition. Pick list of geographical or geopolitical names based on GIS.

Primary key
   Name. GEOGRAPHICAL TERM
       Definition. Geographical or geopolitical name.
       Domain. All names that are in the PaleoBank GEOGRAPHY pick list.

Other relationships
   GEOGRAPHY appears as a Foreign key in associative entities STRATIGRAPHY-GEOGRAPHY-SPECIES and STRATIGRAPHY-GEOGRAPHY-GENUS.

Entity name. ECOLOGY
   Definition. Pick list of terms about the ecology, paleoecology, and environments of organisms.

Primary key
   Name. ECOLOGY TERM
       Definition. A term that describes the ecology, paleoecology, or environment of GENUS or SPECIES.
       Domain. All terms that are in the PaleoBank ECOLOGY pick list.

Other relationships
   ECOLOGY appears as a Foreign key in associative entities ECOLOGY-SPECIES and ECOLOGY-GENUS.

Entity name. PLATE TECTONICS
   Definition. Pick list of the names of the tectonic plates from appropriate computer software systems.

Primary key
   Name. NAME
       Definition. Name of a tectonic plate.
       Domain. All names that are in the PaleoBank PLATE TECTONICS pick list.
Other relationships

PLATE TECTONICS appears as a **Foreign key** in associative entities PLATE TECTONICS-SPECIES and PLATE TECTONICS-GENUS.

**Entity name.** MORPHOLOGY-SPECIES (Associative)

**Definition.** An associative entity that correlates MORPHOLOGY with SPECIES and appropriate documentation—SPECIES (subspecies only), PUBLICATION, or SPECIMEN.

**Primary keys (Foreign keys)**

**Name.** MORPHOLOGY **Primary key**

**Definition.** MORPHOLOGY correlated with SPECIES and documentation in MORPHOLOGY-SPECIES instance.

**Domain.** MORPHOLOGY **Primary keys**.

**Business rule.** 1. Required. 2. Semiautomatic.

**Name.** SPECIES **Primary key**

**Definition.** SPECIES correlated with MORPHOLOGY and documentation in MORPHOLOGY-SPECIES instance.

**Domain.** SPECIES **Primary keys**.

**Business rule.** 1. Automatic.

**Other relationships**

Correlation tables resolve MORPHOLOGY-SPECIES’s many-to-many documentation relationships with entities SPECIES, PUBLICATION, or SPECIMEN.

**Entity name.** MORPHOLOGY-GENUS (Associative)

**Definition.** An associative entity that correlates MORPHOLOGY with GENUS and appropriate documentation—SPECIES, PUBLICATION, or SPECIMEN.

**Primary keys (Foreign keys)**

**Name.** MORPHOLOGY **Primary key**

**Definition.** MORPHOLOGY correlated with GENUS and documentation in MORPHOLOGY-GENUS instance.

**Domain.** MORPHOLOGY **Primary keys**.

**Business rule.** 1. Required. 2. Semiautomatic.

**Name.** GENUS **Primary key**

**Definition.** GENUS correlated with MORPHOLOGY and documentation in MORPHOLOGY-GENUS instance.

**Domain.** GENUS **Primary keys**.

**Business rule.** 1. Automatic.

**Other relationships**

Correlation tables resolve MORPHOLOGY-GENUS’s many-to-many documentation relationships with entities SPECIES, PUBLICATION, or SPECIMEN.
Entity name. STRATIGRAPHY-GEOGRAPHY-SPECIES (Associative)

Definition. An associative entity that correlates STRATIGRAPHY and GEOGRAPHY with SPECIES and appropriate documentation—SPECIES (subspecies only), PUBLICATION, or SPECIMEN.

Primary keys (Foreign keys)

Name. STRATIGRAPHY Primary key
Definition. STRATIGRAPHY correlated with SPECIES, GEOGRAPHY, and documentation in STRATIGRAPHY-GEOGRAPHY-SPECIES instance.
Domain. STRATIGRAPHY Primary keys.
Business rule. 1. Required. 2. Semiautomatic.

Name. GEOGRAPHY Primary key
Definition. GEOGRAPHY correlated with SPECIES, STRATIGRAPHY, and documentation in STRATIGRAPHY-GEOGRAPHY-SPECIES instance.
Domain. GEOGRAPHY Primary keys.
Business rule. 1. Required. 2. Semiautomatic.

Name. SPECIES Primary key
Definition. SPECIES correlated with STRATIGRAPHY, GEOGRAPHY, and documentation in STRATIGRAPHY-GEOGRAPHY-SPECIES instance.
Domain. SPECIES Primary keys.
Business rule. 1. Automatic.

Other relationships
Correlation tables resolve STRATIGRAPHY-GEOGRAPHY-SPECIES’s many-to-many documentation relationships with entities SPECIES, PUBLICATION, or SPECIMEN.

Entity name. STRATIGRAPHY-GEOGRAPHY-GENUS (Associative)

Definition. An associative entity that correlates STRATIGRAPHY and GEOGRAPHY with GENUS and appropriate documentation—SPECIES, PUBLICATION, or SPECIMEN.

Primary keys (Foreign keys)

Name. STRATIGRAPHY Primary key
Definition. STRATIGRAPHY correlated with GENUS, GEOGRAPHY, and documentation in STRATIGRAPHY-GEOGRAPHY-GENUS instance.
Domain. STRATIGRAPHY Primary keys.
Business rule. 1. Required. 2. Semiautomatic.

Name. GEOGRAPHY Primary key
Definition. GEOGRAPHY correlated with GENUS, STRATIGRAPHY, and documentation in STRATIGRAPHY-GEOGRAPHY-GENUS instance.
Domain. GEOGRAPHY Primary keys.
Business rule. 1. Required. 2. Semiautomatic.
Name. GENUS Primary key  
Definition. GENUS correlated with STRATIGRAPHY, GEOGRAPHY, and documentation in STRATIGRAPHY-GEOGRAPHY-GENUS instance.  
Domain. GENUS Primary keys.  
Business rule. 1. Automatic.

Other relationships

Correlation tables resolve STRATIGRAPHY-GEOGRAPHY-GENUS’s many-to-many documentation relationships with entities SPECIES, PUBLICATION, or SPECIMEN.

Entity name. ECOLOGY-SPECIES (Associative)

Definition. An associative entity that correlates ECOLOGY with SPECIES and appropriate documentation—SPECIES (subspecies only), PUBLICATION, or SPECIMEN.

Primary keys (Foreign keys)

Name. ECOLOGY Primary key  
Definition. ECOLOGY correlated with SPECIES and documentation in ECOLOGY-SPECIES instance.  
Domain. ECOLOGY Primary keys.  
Business rule. 1. Required. 2. Semiautomatic.

Name. SPECIES Primary key  
Definition. SPECIES correlated with ECOLOGY and documentation in ECOLOGY-SPECIES instance.  
Domain. SPECIES Primary keys  
Business rule. 1. Automatic.

Other relationships

Correlation tables resolve ECOLOGY-SPECIES’s many-to-many documentation relationships with entities SPECIES, PUBLICATION, or SPECIMEN.

Entity name. ECOLOGY-GENUS (Associative)

Definition. An associative entity that correlates ECOLOGY with GENUS and appropriate documentation—SPECIES, PUBLICATION, or SPECIMEN.

Primary keys (Foreign keys)

Name. ECOLOGY Primary key  
Definition. ECOLOGY correlated with GENUS and documentation in ECOLOGY-GENUS instance.  
Domain. ECOLOGY Primary keys.  
Business rule. 1. Required. 2. Semiautomatic.

Name. GENUS Primary key  
Definition. GENUS correlated with ECOLOGY and documentation in ECOLOGY-GENUS instance.
Domain. GENUS Primary keys
Business rule. 1. Automatic.

Other relationships
Correlation tables resolve ECOLOGY-GENUS’s many-to-many documentation relationships with entities SPECIES, PUBLICATION, or SPECIMEN.

Entity name. PLATE TECTONICS-SPECIES (Associative)
Definition. An associative entity that correlates PLATE TECTONICS and SPECIES with appropriate documentation—SPECIES (subspecies only), PUBLICATION, or SPECIMEN.

Primary keys (Foreign keys)
Name. PLATE TECTONICS Primary key
Definition. PLATE TECTONICS correlated with SPECIES and documentation in PLATE TECTONICS-SPECIES instance.
Domain. PLATE TECTONICS Primary keys.
Business rule. 1. Required. 2. Semiautomatic.

Name. SPECIES Primary key
Definition. SPECIES correlated with PLATE TECTONICS and documentation in PLATE TECTONICS-SPECIES instance.
Domain. SPECIES Primary keys.
Business rule. 1. Automatic.

Other relationships
Correlation tables resolve PLATE TECTONICS-SPECIES’s many-to-many documentation relationships with entities SPECIES, PUBLICATION, or SPECIMEN.

Entity name. PLATE TECTONICS-GENUS (Associative)
Definition. An associative entity that correlates PLATE TECTONICS and GENUS with appropriate documentation—SPECIES, PUBLICATION, or SPECIMEN.

Primary keys (Foreign keys)
Name. PLATE TECTONICS Primary key
Definition. PLATE TECTONICS correlated with GENUS and documentation in PLATE TECTONICS-GENUS instance.
Domain. PLATE TECTONICS Primary keys.
Business rule. 1. Required. 2. Semiautomatic.

Name. GENUS Primary key
Definition. GENUS correlated with PLATE TECTONICS and documentation in PLATE TECTONICS-GENUS instance.
Domain. GENUS Primary keys.
Business rule. 1. Automatic.
Other relationships

Correlation tables resolve PLATE TECTONICS-GENUS’s many-to-many documentation relationships with entities SPECIES, PUBLICATION, or SPECIMEN.