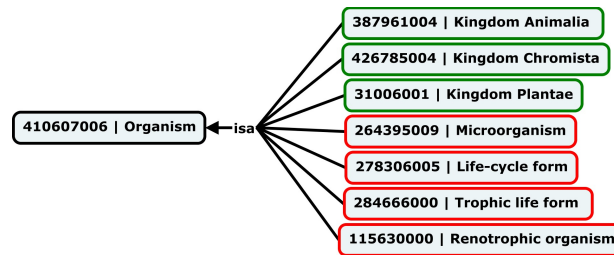


# Clarify, simplify, and correct the top levels of the SCT Organism hierarchy.

## First generation descendants of 410607006 | Organism

Figure 1 shows the first generation of descendants of 410607006 | Organism. The three Kingdoms (green border) are essentially placed correctly. Most current taxonomic references list three organism "Domains" namely Domain Archaea, Domain Bacteria and Domain Eukaryota. We need to decide whether these Domains should be included. If so, they are the logical first descendants of organism.

**Figure 1. First generation descendants of 410607006 | Organism (SNOMED CT January 2017 Edition)**



Concept classes in green are (likely) appropriately placed. Concept classes in red are involved in logical errors, content inconsistencies or perhaps not appropriate for placement in the organism hierarchy.

The three kingdoms in figure 1 are properly placed in Domain Eukaryota. Absent the addition of Domain Eukaryota, [Jeff Wilcke](#) considers them to be correctly placed at this time.

The remaining 4 concepts classes in Figure 1 (red border) require the attention of this project group.

### 264395009 | Microorganism

- creates logical inconsistencies and factual errors in the organism hierarchy
  - Fungi are subtypes of microorganism, mushrooms are subtypes of fungi, mushrooms are not microscopic
  - Eukaryota are subtypes of microorganism, many (most) eukaryote classes are not microscopic
- correcting the errors could be accomplished but would require extensive revision of the subtype hierarchies as the distinction between microscopic and non-microscopic occurs at different levels for different organisms. True integration of this concept with organisms would get VERY complicated.
- What would be the effect of "removal"?
  - involved in defining 60 concepts many of which are of questionable value, ambiguous or just wrong
  - Procedures (59)
    - destination value for the 246093002 | Component relationship
    - These concepts do not represent procedures that are actually performed (ordered)
      - 104172004 | Organism specific culture
        - appears to be a heading (navigational) for a very large collection of culture procedures where the organism really is specified.
      - 61594008 | Microbial culture (and it's 27 or so children)
      - 117011000 | Quantitative urine culture
        - not aware of other than bacterial culture that is quantitative in the urine
  - Disorders (1)
    - destination value for the 246075003 | Causative agent relationship
    - 4141000119104 | Necrotizing fasciitis caused by microorganism.
      - Taken literally, the phrase necrotizing fasciitis is a disorder associated with inflammation of the fasciae of muscles and other organs results in rapid destruction of overlying tissues.
      - Medically, the phrase is only associated with bacteria as causative agent

### 278306005 | Life-cycle forms

- Life-cycle forms are the subject of a separate project (IHTSDO-455). They are to be moved from the organism hierarchy and placed in a "qualifier values subhierarchy."

### 284666000 | Trophic Life forms

- All life forms are "trophic" or they are not alive. This concept is either completely without meaning or it is a navigational concept
  - Literal meaning in this context would be: "Organism classified by means of acquiring energy"
  - The trophic "level" of an organism is the position it occupies in a food chain
- An attempt to actually classify ALL organisms by their "trophism(s)" is beyond scope and beyond anything we are ever likely to do.
- Within the context of SCT, trophic life forms (like life-cycle forms) are more properly considered characteristics of organisms than organisms in their own right
  - errors in the subhierarchy
  - not related to any other content in SCT

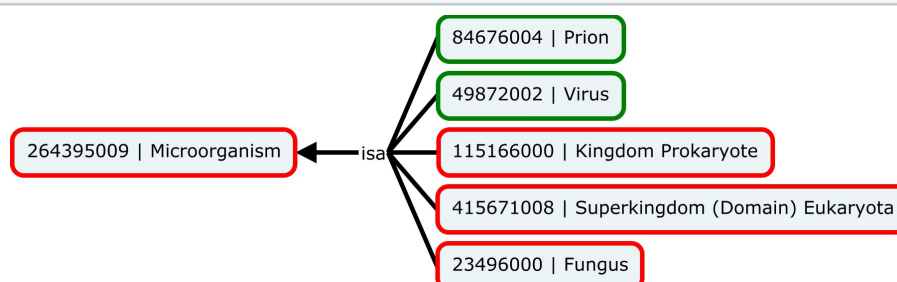
### 115630000 | Renotrophic organism

- Renotrophic is technically defined as any agent that influences the growth of the kidney (positive or negative)
- In this case is likely is intended to mean "any organism with a predilection to cause kidney infection(s)"
  - If this meaning is intended, it would only serve a navigational purpose (identifying said organisms) which creates an editorial / authoring challenge we cannot meet.
- this concept and subtypes are not used in any definitions in SCT
  - only two subtypes
- [Jeff Wilcke](#) believes this should be retired as ambiguous

## First generation descendants of 264395009 | Microorganism

Figure 2 shows the first generation of descendants of 264395009 | Microorganism. Prion and Virus s (green border) are certainly microscopic. Although it is often argued that they are not free living organisms, they are etiologic agents and referenced as such in the definitions of SCT disorders and procedures. There would have to be a very strong case made to remove them from the organism hierarchy. The disposition of the concept class "microorganism" will determine their final location. The remaining concepts (red border) present different challenges in this work.

Figure 2. First generation descendants of 264395009 | Microorganism (SNOMED CT January 2017 Edition)



Concept classes in green will likely move to first generation under 410607006 | Organism. Concept classes in red are involved in logical errors, content inconsistencies or perhaps not appropriate for placement in the organism hierarchy.

### 26495009 | Microorganism

- See previous section.

### 115166000 | Kingdom Prokaryote

- Detailed examination of the archaea has convinced most experts that the Archaea share characteristics of eukaryotes as well as prokaryotes. For this reason, Kingdom Prokaryote is omitted from the most recent classification systems in favor of placing the archaea and bacteria in separate domains.
- [Jeff Wilcke](#) believes that the SCT organism hierarchy should follow this convention.

### 415671008 | Superkindgom (Domain) Eukaryota

- If we choose to represent the first generation of the organism hierarchy as three domains, "Domain Eukaryota" (already a synonym in SCT) should be made the FSN and PT for this concept class.
- Descendants of this concept class should be reviewed but are believe to be reasonable at this time (with the exception of the fungi and protozoa which will be the subject of their own review)

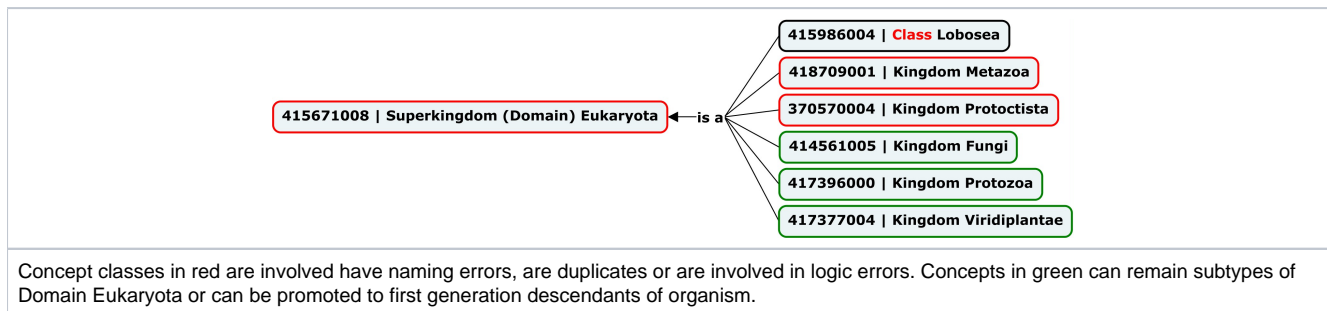
### 23496000 | Fungus

- This concept class would appear to be a duplicate of 414561005 | Kingdom Fungi. There is overlap but it is not a duplicate.
- Reconciling this concept with Superkingdom Fungi is a necessary project and is of such a scale that it may be considered separately

## First generation descendants of 415671008 | Superkingdom (Domain) Eukaryota

Figure 3 shows the first generation of descendants of 415671008 | Superkingdom (Domain) Eukaryota.

Figure 3. First generation descendants of 415671008 | Superkingdom (Domain) Eukaryota. (SNOMED CT January 2017 Edition)



#### 415986004 | Class Lobosea

- Class Lobosea (current subtype of Superkingdom Eukaryota) may be Subphylum Lobosa. If so it is part of a larger problem in that the classification of the “amoeba” (e.g. *Entamoeba histolytica*) is in flux. Various classifications currently place them as either Protista or Protozoa. Experts place them in an unranked phylum “between” Protista and Protozoa.

#### 418709001 | Kingdom Metazoa

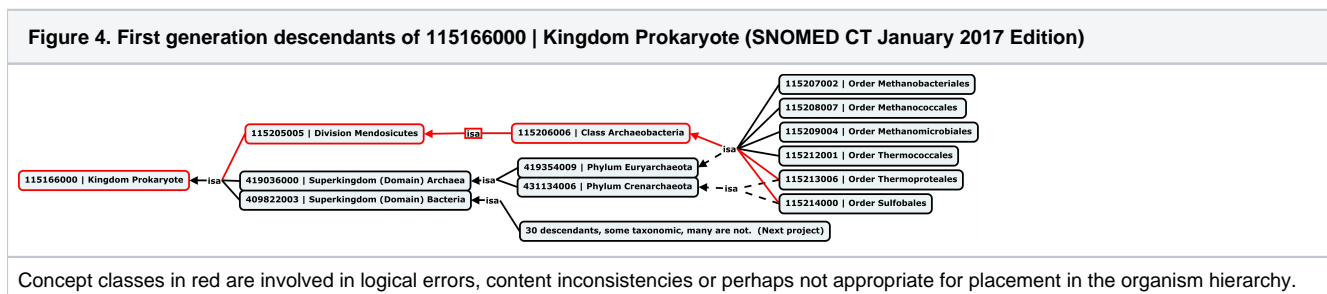
- Concept: 387961004 | Kingdom Animalia = 418709001 | Kingdom Metazoa
  - Kingdom Metazoa is not preferred
  - Kingdom Metazoa has no descendants in SCT (they’re all already Kingdom Animalia)
  - Simple retirement of Metazoa concept with referral to Animalia should be sufficient.

#### 370570004 | Kingdom Protoctista

- Kingdom Protoctista is now Kingdom Protista (just a name change)

## First generation descendants of 115166000 | Kingdom Prokaryote

Figure 4 shows the first generation of descendants of 115166000 | Kingdom Prokaryote. This figure really represents a kingdom that is no longer considered to be valid. The upper levels of the bacteria hierarchy will be the subject of a project in their own right.



#### Archaea

- An area of rapid growth and change in the organisms hierarchy
  - Many new organisms (and subsequently new phyla) have been discovered recently. The scientific attention given to these organisms has generated changes in the taxonomy
  - Archaea Kingdoms
    - Kingdom (Euryarchaeota) appears to be relatively stable
    - Other kingdoms vary with reference source
      - Some authors include unranked groups (of phyla)
      - Other authors assign two additional kingdoms
        - Crenarchaeota (present in SCT)
        - Kroarchaeota (not present in SCT) are assigned kingdom rank by some authors and phylum rank by others
- Specific errors
  - 419036000 | Superkingdom Archaea has a synonym “Domain Archaea”
    - Domain Archaea is correct and should be preferred.
  - Current Phyla in SCT are probably not correct and are incomplete
    - Euryarchaeota seems to be universally recognized as a kingdom (not a phylum)
    - the rank or Crenarchaeota is debated and it may be a phylum
    - All existing Archaea in SNOMED can be (are) grouped under one of these two phyla
    - New “phyla” are being identified all the time
  - 115205005 | Division Mendosicutes is a sibling of 419036000 | Superkingdom Archaea
    - is an organizing “chapter” in Bergey’s manual. Mendosicutes is not used generally and Division is not a taxonomic rank.
      - Class Archaeobacteria (only subtype of Division Mendosicutes) is deprecated and considered to BE the Archaea

- a few classes of archaea are assigned as both Archaea and Bacteria
    - incorrect subtype assignment to phenotype classifications 49682003 | Gram positive coccobacillus (organism) and 59343002 | Anaerobic bacteria (organism)
- Classification chaos among the Archaea is a justification for including three domains at the top of the organism hierarchy.
  - Other groupings and many other taxons exist. NONE (that I am aware of at this point) are involved in any definitions in SNOMED.
  - this primitive hierarchy can be isolated (should not intersect bacteria and eukaryote) and curated separately



