

Bio-etymology PART – 8: NEMATODA

LEARNING BIO- ETYMOLOGY

‘Making Biology students interested in Etymologies’ !!!

❖ FUN TO LEARN BIOLOGICAL TERMINOLOGY

❖ THE LANGUAGE OF BIOLOGISTS

❖ SOWING SEEDS OF SYSTEMATICS / TAXONOMY AT THE GRASSROOT LEVEL



➤ The Episode:

The episode of ‘**Bio-etymology**’ is devoted to analyzing the hidden meanings derived from the Names of various **Animal Phyla** and **Classes**, along with the terms specifically used to describe their respective diagnostics, important examples (Genus or species) etc.

➤ Recollecting the Introduction of PART – 1:

At any level, may it be animals in general or Man in particular, there is some structured or indicative or behavioural system of communication. It is simply referred to as a kind of ‘**Language**’. In a broader sense, ‘**Language**’ is the method of communication that involves the use of various languages (in various countries) spoken by man. **Articulation of words** in a definite sequence is the basic of formulating a Language and **knowledge of words** forming it and their ‘**sense**’ is of utmost importance. Accumulation of a treasure of words constitutes what is called ‘**Vocabulary**’ defined variously as follows:

1. *The words of a language.*
2. *The body of words used in a particular language.*
3. *All the words that exist in a particular language or subject.*
4. *A list or collection of the words or phrases of a language, technical field etc.*
5. *A listing either selective or exhaustive, containing the words and phrases of a language, with meaning or translations into another language.*

Over a period of time in past centuries, Science is general and Biology in particular has accumulated a vast array of words to **communicate fact(s)** or **phenomena** through deriving their meanings.

➤ Recollecting Bio-etymology PART – 5:

Prior to switching over to ‘**Nematodes**’, let us recollect the contents of **Bio-Etymology – PART: 5**, where besides many other diagnostics, the **Bilaterians** are also known to possess a ‘**True Body Cavity**’ i.e., ‘**Coelom**’ [Gk. *koiloma* / *koilia* = hollow, cavity].

In Bilaterians, based on the mode of differentiation, **Primary** and **Secondary** are the two types of Coeloms:

- **Primary Coelom** or **Pseudocoelom** [Gk. *pseudo* = false, feigned, erroneous + *coelom*]:

This kind of ‘**Coelom**’ is called ‘**false coelom**’ because it is a cavity between ectoderm on the outside and endoderm (digestive tract) inside [i.e., not lined by mesoderm on both the sides]. In fact, this kind of body cavity is derived from the ‘**blastocoel**’ of the embryo, rather representing the **persistent blastocoel**.

Examples: 7 Minor Phyla and 1 major Phylum – Nematoda (Round Worms). ... Bio-etymology PART – 8

- **Secondary Coelom:**

In all the higher bilateria, from Annelids onwards, the blastocoel gets obliterated by the development of endodermal ‘**archenteron**’ [embryonic gut] and another space (true coelom or **eucoelom**) is created between two layers of mesodermal cells (**peritoneum**) present between the gut (endoderm) and the body wall (ectoderm).

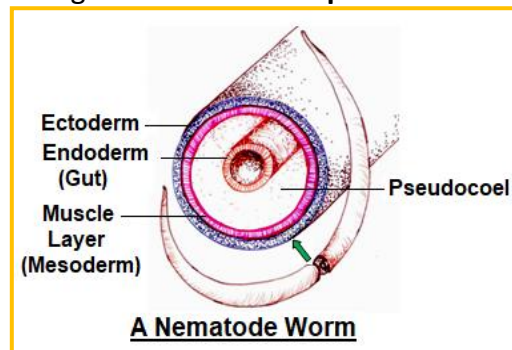
Examples: Annelida to Chordata. Bio-etymology PART – 9 onwards.

BIO-ETYMOLOGY PART – 8

THE PSEUDOCOELOMATES

- Irrespective of the current trends in taxonomy, the **Pseudocoelomates** have been placed in a single **Superphylum – Aschelminthes**:

Gk. **askos** = tube / sac / bag + **helmins / helminthos** = worm i.e., the animals having a fluid-filled tubular body or internal sac, referring to the fluid-filled ‘**pseudocoel**’.



- The ‘History’ reveals that a separate **Phylum Aschelminthes** was proposed by **Karl Grobben** (1910) and Nematodes were included under **Class – Nematoda** along with various other Classes viz., **Rotifera**, **Gastrotricha**, **Kinorhyncha**, **Priapulida** and **Nematomorpha**.

Besides, two more important Pseudocoelomates viz., **Acanthocephala** and **Loricifera**, were included by later workers.

Italian author Sir Francesco Redi (1684) was first to describe **Acanthocephala** but the name was given by Joseph Koelreuter (1771).

Loricifera was discovered only in 1983 by Reinhardt Kristensen in France.

In 1951 **Libbie Henrietta Hyman** renamed Phylum - **Aschelminthes** as **Pseudocoelomata**.

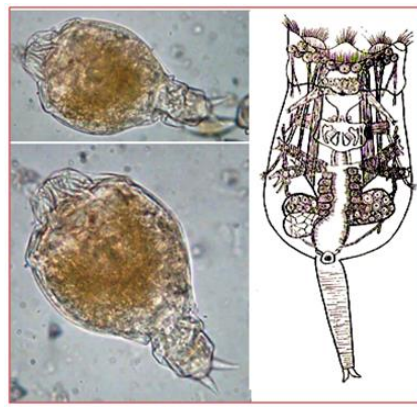
Aschelminthes (without going into the recent Taxonomic disputes), thus, includes 7 Minor Phyla and 1 major Phylum – **Nematoda**; as follows:

MINOR PHYLA

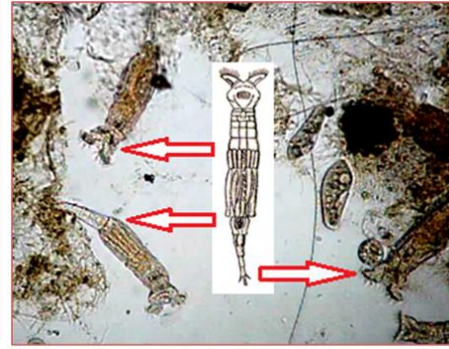
1. **Rotifera**: L. **rota** = wheel + **ferre** = to bear / to carry:

i.e., the microscopic (0.1 – 0.5 mm; may be from 50µm to over 2.0 mm) freshwater (rarely marine) animals with a ciliated ‘**corona**’ (crown-like structure on top of the head) around the mouth which resembles a ‘wheel’ on account of the concerted sequential motion of the corona, hence the common name, ‘**wheel animalcules**’; as exemplified by:

- **Brachionus**: Gk. **brachion** = arm i.e., “An animalcule which has an apparatus of **arms** for taking its prey. The apparatus, which nature has furnished these creatures with, has been greatly misunderstood by the microscopical writers; they supposed it a kind of wheels, and have thence named creatures that are possessed of it, **wheel animals**”. (An History of Animals, John Hill, 1752; books.google.co.in/boo).
- **Philodina** : Latin **phil** = love + Gk. **dinos** = rotation, whirling i.e, ‘**loving rotator movement**’, the world’s most common Metazoan with anterior two rotating wheel organs, called **coronas**. They can contract, extend their coronas and swim freely.



Brachionus
(Microphotograph by SKG)

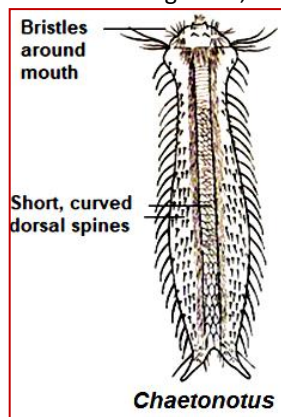


Philodina
(Microphotograph by SKG)

2. **Gastrotricha:** Gk. *gaster* = belly, stomach + *thrix, trikh* = hair:

i.e., microscopic (0.06 – 3.0 mm), worm-like, benthic, aquatic (freshwater or marine) animals having spiny or scaly cuticle and ‘**cilia on the ventral surface**’ (= hair on the belly), hence the common name ‘**hairybellies**’; as exemplified by:

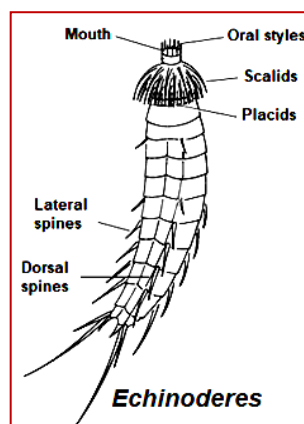
- **Chaetonotus** : Gk. *chaet-* = hair, spine, bristle + *noton* = back *i.e.*, ‘back or dorsal surface with bristles/ spines’; the microscopic marine or freshwater animals with cuticle bearing short, curved dorsal spines.



3. **Kinorhyncha:** Gk. *kinein* = set in motion + *rhunkos* = snout:

i.e., the microscopic (1.0 mm or less), marine animals, called ‘**mud dragons**’; body divided into **introvert**, **neck** and **trunk**; with spines along the superficially segmented body and up to 7 circlets of cilia around head. These spines are used in locomotion, withdrawing and pushing forward the head, then gripping the substrate with the spines to draw the body forward (hence, the meaning ‘**the snout set in motion**’ or ‘**movable snout**’); as exemplified by:

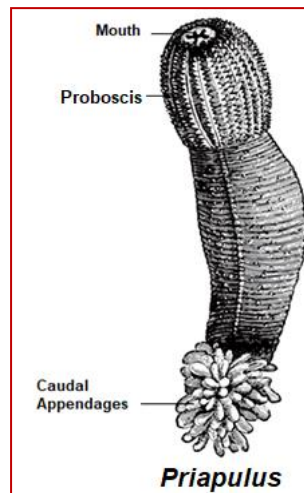
- **Echinoderes**: Gk. *ekhin* = hedgehog + *dere/deire* = neck *i.e.*, **neck** region with about **16 cuticular trapezoidal plates** called ‘**placids**’, arranged radially and articulated directly with the first segment of the trunk. Some of the placids bear additional plates, ‘**the trichoscalids**’ [Gk. *thrix, trikh* = hair + *skalidon* = hoe; a tool with thin flat blade used for tilling mixing or raking]. The cuticle between adjacent placids is soft and appears folded, sometimes named as interstitial placids.



4. **Priapulida**: Gk. *priapus* = the God of procreation, guardian of gardens and vineyards; and personification of the erect human '*phallus*' [Gk. *phallus* = penis + *eidos* = form, shape]:

i.e., unsegmented marine worms, bearing an **eversible spiny proboscis** 'appearing like human penis', hence the common name '**priapulid worms**' or '**penis worms**'; as exemplified by:

- *Priapulus*: [meaning as above].

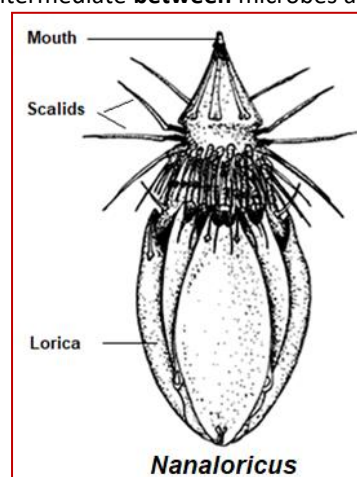


5. **Loricifera**: *L. lorica* = armour / corselet / girdle + *ferre* = to bear:

i.e., microscopic (100µm – 1.0 mm), deep-sea, sediment-dwelling animals with armour-like '**lorica**' / **girdle** / **corselet**, consisting of protective external shell or case of encircling plicae. The head and a trunk region surrounded by 6 plates, forms the '**lorica**'. A neck region falls between the head and trunk. The head can be withdrawn into the **neck** and the neck and head both can be withdrawn into the trunk, where all are protected within the '**lorica**' and by a crown of hollow '**scalids**' [*skalidon* = hoe; a tool with thin flat blade used for tilling mixing or raking]. There are **9 whorls of these scalids** on the head which remain spread all around when the head is extended but get folded after the head is withdrawn, hence the common name '**The Brush Heads**'; as exemplified by:

- *Nanaloricus*: Gk. *nanos* / *nana* = a dwarf / dwarfish + *L. lorica* = armour / corselet / girdle *i.e.*, benthic (constituting ***meiofauna**), **minute** interstitial animals (115 – 425 µm long) living in soil and aquatic sediments with armour-like '**lorica**' / **girdle** / **corselet**, consisting of protective external shell or case of encircling plicae.

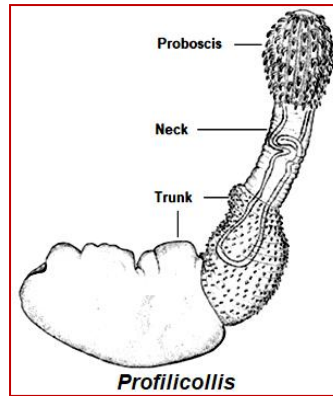
***Meiofauna** [Old Portuguese *meio, meo*; from Latin *medius* = between; Gk. *meion* = less + *fauna* = animal life] includes a diverse assemblage of minute invertebrates, associated with benthos or bottom and can pass through a 500 µm sieve but retained on a 40 µm sieve; intermediate **between** microbes and microscopic organisms.



6. **Acanthocephala**: Gk. *akanthos* = thorn + *kephale* = head:

i.e., '**The thorny-headed**' or '**Spiny-headed worms**', so-called as characterized by the presence of an eversible proboscis, armed with spines; parasitic on two hosts involving invertebrates, fish, amphibians, birds and mammals; the proboscis being used for piercing and hold fastening the gut wall of the hosts; as exemplified by:

- **Profilicollis**: Latin *pro* = before + *filo* = a line, stroke, thread + *collis* = hill *i.e.*, the Acanthocephalans with long, slender neck and fully ovoid proboscis with about 14 – 16 longitudinal rows of 7 – 8 hooks (the possible explanation being that a hill-like proboscis on the tip of long, slender thread-like neck).



7. **Nematomorpha**: Gk. *nema* / *nematos* = thread + *morphe* = form:

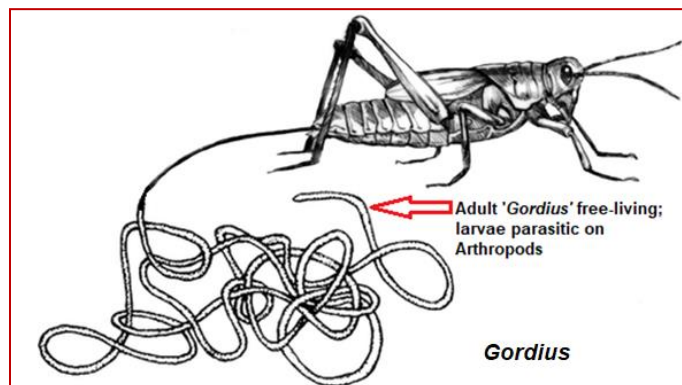
i.e., any of the worms, **superficially resembling the Nematodes in morphology** (hence, the name of the Phylum). Adults free-living but **larvae parasitic** on Arthropods like Beetles, Cockroaches, Locusts, Mantids, Crustaceans etc. Typically tan to black-coloured, these worms have not only been found in **horse watering troughs** (also in swimming pools, streams, puddles and cisterns) but also appear like **‘hairs’** of horse tail (5.0 – 10.0 cm; often reaching up to 2.0 m long; 1.0 – 3.0 mm *dia.*), hence commonly called **‘Horsehair worms’**.

They are also known as **‘Gordian worms’**, the **‘Gordian’** coming from the legendary **‘Gordian knot’**, relating to the fact that Nematomorphs (also called Gordiaceae) often lie coiled and form tangled ‘knots’; as exemplified by:

- **Gordius**: Gk. *Gordios* = legendary king of the ancient ***Phrygia**, who was responsible for the ****‘Gordian knot’**.

***Phrygia** = Kingdom of Muska in the West Central part of Anatolia (now Asian Turkey).

****Gordian Knot** = a legend of **Phrygian Gordium** associated with **Alexander the Great**; used as a **‘metaphor’** (a comparison between two things that are not alike but do have something in common) for an extremely difficult problem to control or deal with (= untying an impossible tangled knot) and solved easily by finding an approach to solve it (= cutting the Gordian Knot).



MAJOR PHYLUM

8. **NEMATODA**

[= Nematelminthes]

The most diverse of all animals (most speciose Phylum after the Arthropods), commonly known as **‘round worms’**, **‘thread worms’**, **‘pin worms’**, **‘hook worms’**, **‘lung worms’**, **‘whip worms’** or **‘eel worms’** are among over 28,000 described species (the number may be exceeding 1000,000) belonging to about 2,271 Genera, included under **Phylum- Nematoda (= Nematelminthes)**, with a well-defined **‘bilateral symmetry’**, **pseudocoelom** and **‘tissue organ grade of body organization’**.

Etymology of the Phylum

➤ **Nematoda:**

Gk. *nema* / *nematos* = thread + *eidos* = form, shape *i.e.*, any of the animals, having **thread-like** form of the body.

➤ **Nemathelminthes:**

Gk. *nematos* = thread + *helmins* / *helminthos* = worm *i.e.*, thread-like worms.

The Common Names

- **Round worms:** Any of the various types of worms with rounded, cylindrical body (cylindrical in transverse section) *e.g.*, *Ascaris* (Order – Ascaroidea).
- **Thread worms, pin worms:** Any of the various ‘**pin-shaped**’ small nematodes, especially females with a long pointed tail region *e.g.*, *Enterobius* (Order – Oxyuroidea).
- **Hook worms:** Any of the nematodes having the head region bent in a hook-like form and also strong buccal hooks or plates *e.g.*, *Ancylostoma* (Order – Strongyloidea).
- **Lung worms:** Any of the nematodes inhabiting the lungs of Amphibians & Reptiles *e.g.*, *Rhabdias*; and also Mammals *e.g.*, *Metastrongylus* (Order – Rhabdiasoidea).
- **Whip worms:** Any of the nematode worms having long, slender, whip-like anterior end *e.g.*, *Trichuris* (Order – Trichuroidea).
- **Eel worms:** Any of several miniature, microscopic, eel-like, free-living or plant parasitic worms (0.1 – 1.5 mm) *e.g.*, *Heterodera* (Order – Rhabditoidea).

History

The oldest record for any Nematode is about the intestinal roundworm *Ascaris lumbricoides* Linnaeus, 1758, from China, about 4690 years ago. The ‘*Papyrus Ebers*’ (Egyptian medical writings of herbal knowledge on a paper, made of the stems of ‘*Papyrus*’ plant), discovered by **Georg Ebers** in 1872 and dating back to 1553 – 1550 BC, also mentions about two parasitic Nematode species *viz.*, *Ascaris lumbricoides* and the Guinea worm (*Dracunculus medinensis*).

The ‘father of modern Taxonomy’ and Swedish Botanist/Zoologist/Physician **Carl Linnaeus** or **Carl von Linne** or **Carolus Linnaeus** [Latinized name after becoming famous for formulating ‘binomial nomenclature’; also becoming famous as **Carolus a Linne** after 1761] described some nematode Genera like *Ascaris* and included them in Group - ‘*Vermes*’ (1758).

All such worms were included under ‘*Nematoidea*’ by German Naturalist and ‘father of Helminthology’ **Karl Asmund Rudolphi** (1808). ‘*Enterozoorum Sive Vermium Intestinalium Historia Naturalis*’ was his first publication to include descriptions of ‘Nematodes’. This Group was treated as ‘**Family – Nematodes**’ by another German Zoologist, **Karl Hermann Burmeister** (1837). They were classified along with **Acanthocephala** in the obsolete Phylum – Nemathelminthes, again by a German Zoologist **Karl Gegenbaur** (1859). The Group was treated as ‘**Order – Nematoda**’ by the Austrian naturalist & Zoologist **Karl Moriz Diesing** (1861). The credit for promoting ‘Nematodes’ to **Phylum** ‘**Rank**’ goes to British Zoologist and evolutionary Biologist **Sir Edwin Ray Lankester** (1877), followed by the American ‘Nematologist’ **Nathan Augustus Cobb** in 1919 [famous as ‘father of Nematology’], laying firm foundation of ‘Nematode Taxonomy’ by describing more than 1000 Nematode species.

- **NEMATOLOGY:** [Gk. *nema* / *nematos* = thread + *logos* = study, discourse of study of] *i.e.*, the discipline of study of Nematodes.

(for detailed History of Nematology pl. refer to:

en.wikipedia.org/wiki/Nematology & coursesonline.iasri.res.in/mod/page/view)

Definition / Diagnostics

Free living (marine, freshwater or terrestrial) *or parasitic* (on Plants and Animals), *Carnivorous*, **Triploblastic**, **Vermiform**, **Bilaterally symmetrical**. *Body elongated, cylindrical and unsegmented. Pseudocoelomate. Digestive system complete with muscular pharynx. Blood vascular system and Respiratory system absent. Nervous system with circumenteric ring and anterior and posterior nerves. Sensory organs in the form of papillae, called 'Amphids' and 'Phasmids'. Dioecious (sexes separate) *with well-defined sexual dimorphism. Gonads simple and colied. Fertilization internal. Development usually direct.**

- **Triploblastic** [Gk. *triploos* / *triples*; Latin *tripplus* = threefold / three + *blast (os)* = denoting embryonic cell / germ layer of an embryo / germ / sprout + *-ic* < Latin *-icus* / Gk. *-ikos* = the suffix used to form adjectives], *i.e.*, the animal body developing from three primary germ layers *viz.*, **Ectoderm**, **Endoderm** and **Mesoderm**.
- **Vermiform** [Latin *vermis* = worm + *forma* = form] *i.e.*, worm-shaped or worm-like form.
- **Bilaterally symmetrical** [Gk. *bi* = two + *lateros* = sides], *i.e.*, body divisible into two identical halves (right and left) only in one plane passing through the median longitudinal axis.
- **Pseudocoelomate**: The animals with a **Primary Coelom** or **Pseudocoelom** [Gk. *pseudo* = false, feigned, erroneous + *koiloma* / *koilia* = hollow, cavity + *ata* = a group or a group of organisms characterized by a structure]. This kind of 'Coelom' is called '**false coelom**' because it is a cavity between ectoderm on the outside and endoderm (digestive tract) inside [*i.e.*, not lined by mesoderm on both the sides]. In fact, this kind of body cavity is derived from the '**blastocoel**' of the embryo, rather representing the **persistent blastocoel**.
- **Circumenteric ring**: [Lain *circum* = round, around + Gk. *enteron* = gut / alimentary canal] *i.e.*, the part of central nervous system made of highly ganglionated 'nerve ring' encircling the pharynx.
- **Amphids**: [Gk. *amphidea* = anything that binds or is bound around or *amphi* = around, double] *i.e.*, principal chemosensory organs found in paired, circular depressions on both sides (laterally) of the anterior end (head) at the base of lips.
- **Phasmids**: '**caudal sensory organs**'.
- **Dioecious** [Gk. *di* = two + *oiki (on)* or *oikos* = house]; male and female reproductive organs (Gonads) at two separate places *i.e.*, male and female individuals.

Classification & Related Terminology

- **Benjamin Goodwin Chitwood** laid down the basis of the modern system of Nematode Taxonomy; first published in 1933 and then revised in 1937 and 1950. He divided the **Phylum Nematoda** into two **Classes** – **Aphasmidia** and **Phasmidia** (**Phasmids present**), named after, respectively, the absence or presence of '**caudal sensory organs**', the '**Phasmids**'.

Since an Order of 'Insecta' named Phasmatoidea (syn. Phasmida) [Gk. *phasma* = apparition, phantom], of large cylindrical or flattened insects used to confuse with the name of the Class – Phasmidia of Nematodes, Chitwood (1958) changed the name of Classes proposed by **von Linstow** (1905) to **Adenophorea** (= Aphasmidia) and **Secernentea** (= Phasmidia); the '**Etymology**' explained as under (**Only important Orders mentioned**):

1. Class: Aphasmidia (Adenophorea / Adenophorasida):

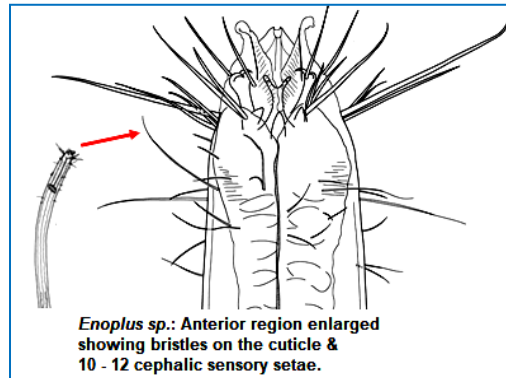
[Gk *a* = no, absent + *phasmid*] *i.e.*, **Phasmids** (the paired, caudal, pore-like chemoreceptors) **absent**.
[Gk. *aden* = gland + *ferre* / *phorea* = bearers / bearing] *i.e.*, gland-bearers or the species with caudal glands. and cephalic, post-labial, circular (pore-like, pocket-like or spiral) chemoreceptors, the **Amphids present**.

Order: Enoploidea: [Gk. *enoplos* = armed + *eidōs* = form, structure] *i.e.*, the free-living, marine nematodes **armed with bristles on the cuticle**; 6 labial papillae (seae) and 10 – 12 sensory bristles (cephalic setae) at the anterior end. The presence of ‘**mandibles**’ in the buccal cavity, may also be the reason to define them as ‘**armed**’.

Amphids cup-shaped or *cyanthiform* [Gk. *kuathion* / *kuathos* = cup + *formē* = form, shape].

Example:

- *Enoplus*: [meaning as of the Order].

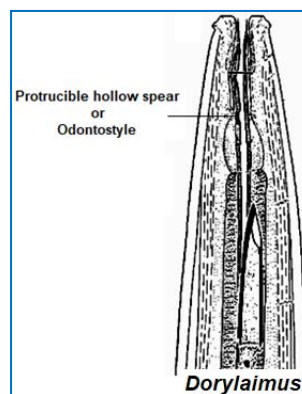


Order: Dorylaminoidea: [Gk. *dory* = spear + *laimos* = throat + *eidōs* = form] *i.e.*, soil and freshwater-dwelling Nematodes with a ‘**spear in throat**’. The said ‘**spear**’ is a movable ‘**hollow tooth**’ or ‘**protrucible hollow spear**’, called ‘**Odontostyle**’ [Gk. *odous* = tooth + *stulos* = pillar, column], originating in a cell of oesophagus, having migrated from ‘**Cheilostome**’ [Gk. *kheilos* = lip, an edge + *stoma* = mouth].

Amphids cup-shaped or *cyanthiform* [Gk. *kuathion* / *kuathos* = cup + *formē* = form, shape].

Example:

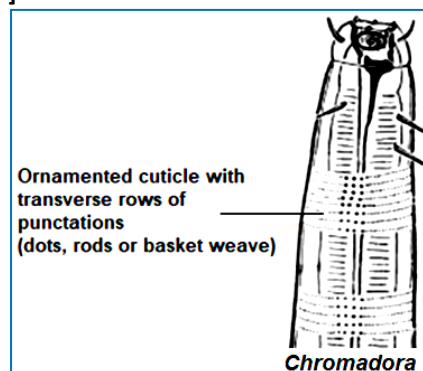
- *Dorylaimus*: [meaning as of the Order].



Order: Chromadoroidea: [Gk. *chroma* = colour + *dora* / *derein* = skin + *eidōs* = form] *i.e.*, the free-living marine Nematodes characterized by the ‘**colour of the skin**’, interpreted as the ‘**ornamented Cuticle**’ with transverse rows of punctuations as dots, rods or ‘**basket weave**’ and often lateral differentiations. **Amphids** spiral, comma-like, transverse loop or slit-like or multispiral.

Example:

- *Chromadora*: [meaning as of the Order].



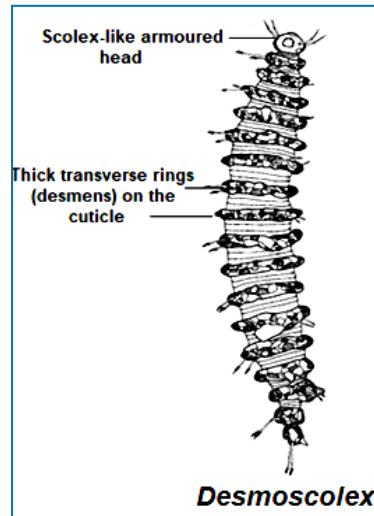
Order: Desmoscolecoida: [Gk. *desmos* = bond, link, knot + *skolex* = worm + *eidōs* = form] *i.e.*, a group of unique marine pseudo-segmented Nematodes, characterized by scales, warts, spines or ‘**desmens**’, the thick transverse rings (usually 17) on the cuticle (= heavily ornamented and annulated cuticle) and consisting of sedimentary particles and ‘**cementing**’ (=binding) material.

They are called ‘*scolecoid* = *Scolex-like*’ because of the fact of having an **armoured head** (like a Scolex of Tapeworm) with **cephalic tubercles** and **4 movable setae**.

A pair of red-brownish pigment spots (Ocelli) often present along the anterior antestine. The **Amphids** are hemispherical.

Example:

- *Desmoscolex*: [meaning as of the Order].



2. Class: Phasmodia (Secernentea)

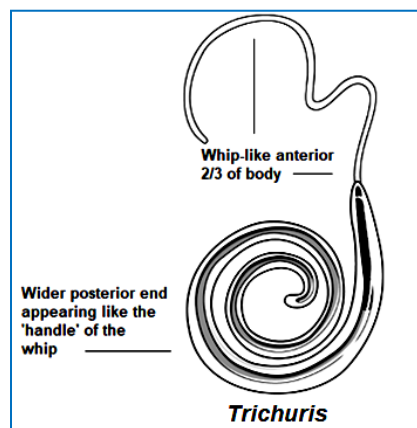
Secernentea: Latin *secernenteus* = to put apart, to separate (some matters from blood), secreting / which promotes secretion or having power of secretion *i.e.*, a sensory system which **contains ‘Phasmids’**, a pair of bilateral, cuticular, glandular organs located at the caudal region (posterior to anus) and opening to the surface by a slit or pore.

Order: Trichuroidea: [Gk. *thrix* = hair + *oura* = tail + *eidos* = form] *i.e.*, parasitic Nematodes of domestic animals with anterior 2/3 of the body narrow or ‘**thread-like**’ or ‘**whip-like**’ (hence, the common name ‘**whip worms**’), the posterior end being wider and appearing like the ‘handle’ of the ‘whip’.

[though the analysis of the meaning communicates about the ‘hair-like’ ‘tail’; which is not the case here because the anterior region is ‘hair-like’; the possible justification being that usually it is the tail region which is mostly tapering / thin & here the anterior region is confusing with the tail].

Example:

- *Trichuris*: [meaning as of the Order].

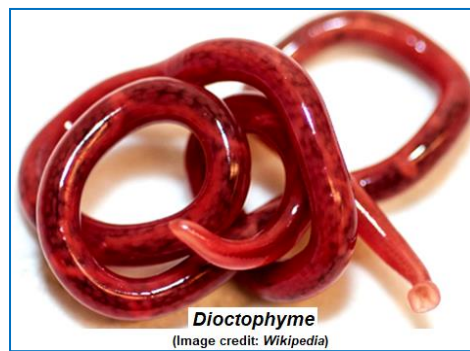


Order: Dioctophymoides: [Gk. *dionkoo* = to distend + *phyma* = tumor, swelling, growth] *i.e.*, these giant, blood-red Nematodes found in the ‘pelvis’ of the ‘kidney’ and the peritoneal cavity of wild carnivores (like minks) and even dogs, cause pathological ‘**tumor-like**’ growths, when infesting their final place of habitation (Kidneys, peritoneal cavity).

Rarely found in human beings, their life cycle completes *via* Leeches, ectoparasitic on crayfishes. The latter are then eaten by various fishes and finally by humans or other fish-eating mammals. If infesting humans, it is the largest known parasitic Nematodes (females may reach up to 1.0 m).

Example:

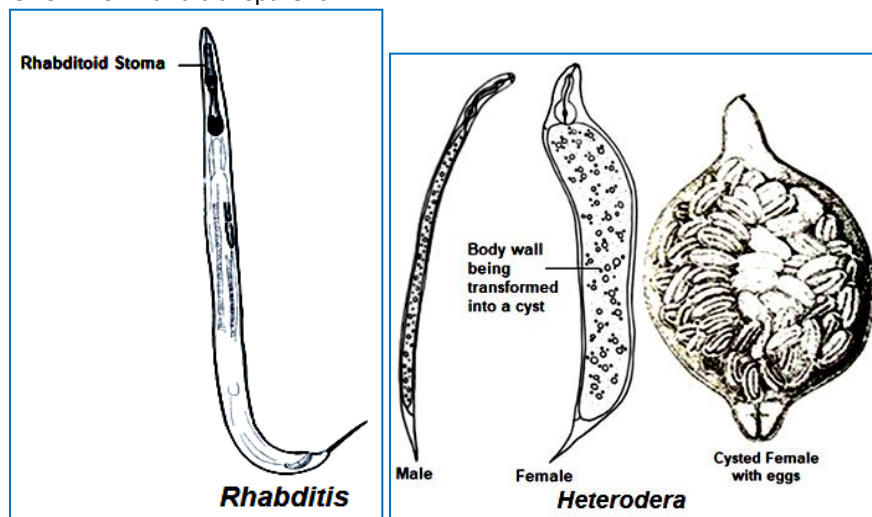
- *Dioctophyma/Dioctophyme*: [The giant kidney worm; meaning as of the Order]



Order: Rhabditoidea: [Gk. *rhabdos* = rod + *eidos* = form] *i.e.*, any of the free-living, small (0.5 – 2.9 mm) nematodes with both ends tapering and possessing ‘**Rhabditoid Stoma**’ [= elongated, open, cylindrical mouth].

Example(s):

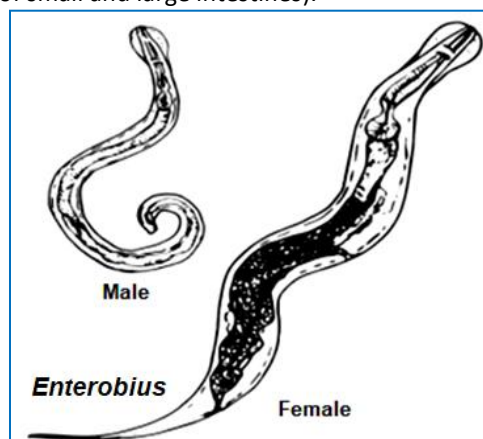
- **Rhabditis:** [meaning as of the Order].
- **Heterodera:** Gk. *heteros* = different, other + *deros* = skin *i.e.* any of the plant nematodes which have the capability to exhibit ‘different skins’ as the body wall of lemon-shaped & white female gets transformed into a permanent, tough, brown cyst, protecting the eggs formed within the body. Finally, the cysts with reniform eggs are dead females with hard, brownish coat; laid in the soil; invasive larvae develop inside eggs and emerge to find the roots of the plant hosts. Males are vermiform and transparent.



Oxyuroidea: [Gk. *oxys* = sharp, acute, pointed + *oura* = tail + *eidos* = form] *i.e.*, the most common parasitic nematode of man (incidence higher in the caecum of females and children) with females (8.0 – 13.0 mm; 0.3 – 0.5 mm dia.) having **sharply-pointed, ‘tail’** (hence the common name ‘**Pin worm**’) and migrating at night through the colon towards rectum; emerging from the ‘anus’ (hence the another common name ‘**Seat Worm**’) and while on the skin near ‘anus’, the eggs are laid (causing itching in the anal region). Males are considerably smaller (2.0 – 5.0 mm; 0.1 – 0.2 mm dia.) with posterior end (tail) curved and blunt.

Example:

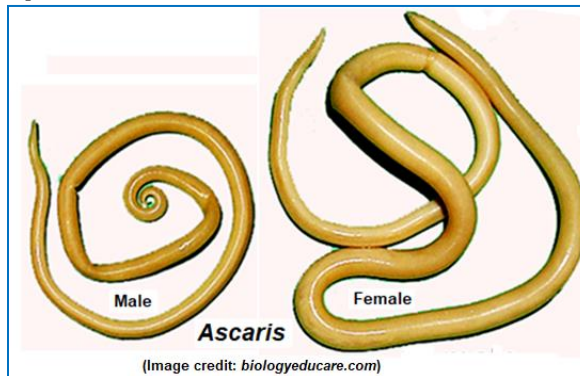
- **Enterobius:** Gk. *enteron* = gut, bowels + *bios* = life, mode of life *i.e.*, the worms living in the alimentary canal (caecum, appendix & at the junction of small and large intestines).



Order: Ascaroidea: [Gk. *askos* = tube / sac / bag + *eidos* = form] *i.e.*, any of the intestinal parasites with large, tubular (rounded in cross section; hence the common name ‘**Round Worms**’) body having spacious ‘pseudocoel’ filled with pseudocoelomic fluid, serving for transportation of metabolites and keeping the body distended.

Example:

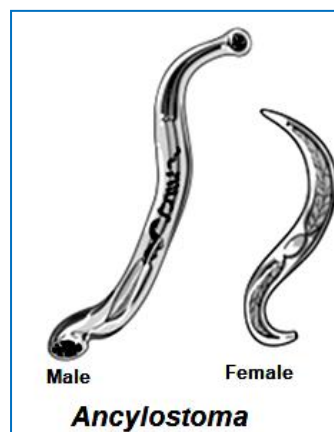
- ***Ascaris***: [meaning as of the Order].



Order: Strongyloidea: [Gk. *strongylos* / *strongulos* = round + *eidos* = form / shape] *i.e.*, any of the ‘Round Worms’ (also called ‘Thread Worms’), parasitizing small intestine of mammals, especially ruminants.

Example:

- ***Ancylostoma***: Gk. *ankulos* + curved, crooked + *stoma* = mouth *i.e.*, any of the Nematode parasites of human intestine with anterior end narrower and ‘curved’ dorsally like a ‘hook’, hence the common name ‘**Hook Worm**’ or ‘**Old World Hook Worm**’, being most common in Old world countries of Asia & Africa; though also found in Europe, Pacific Islands, Americas etc.

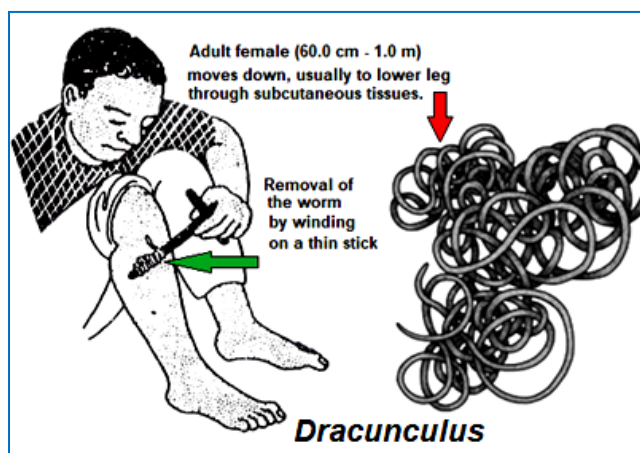


Order: Dracunculoidea: [Latin *dracunculus* / *dracon* = small serpent + Gk. *eidos* = form, shape] *i.e.*, any of the Orders of greatly elongated Nematode worms looking as if a ‘**thread twisted like a serpent**’.

Example:

- ***Dracunculus***: [meaning as of the Order]

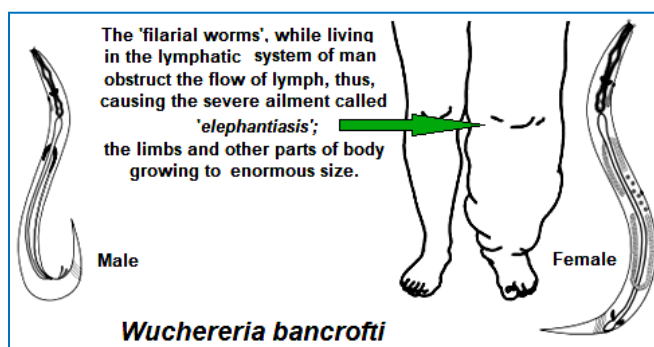
Greatly elongated (females 60.0 cm – 1.0 m, males 1.2 – 2.9 mm) worms, reported in the past having high incidence of infection in the Gulf of Guinea, West Africa (hence the common name ‘**Guinea Worm**’). After a person gets infected by consuming larvae carrying ‘water flea’- contaminated water, the worm moves down, usually to lower leg, through subcutaneous tissues; and while doing so it leads to intense pain and **burning sensation** leading to the another common name ‘**the fiery serpent**’. The disease ‘**Dracunculiasis**’ is Latin for ‘**affliction with little Dragons**’, describing the burning pain associated with the infection.



Order: Filarioidea: [Latin *filum* = thread + Gk. *eidos* = form, shape] *i.e.*, any of the parasitic ‘thread-like’ Nematodes.

Example

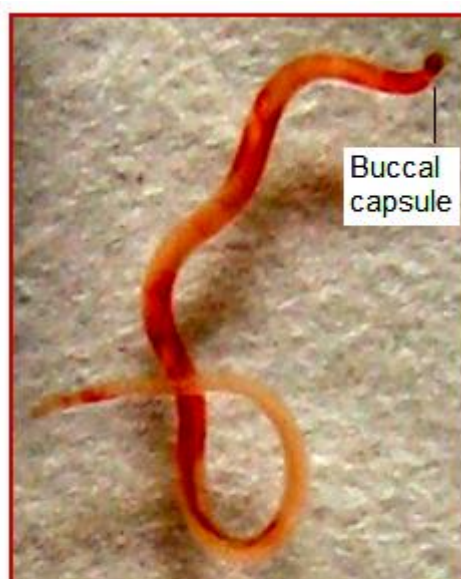
- Wuchereria bancrofti*:** The name of the Southeast Asian Genus is after a Brazilian physician and naturalist, **Otto Edward Henry Wucherer** (1820 – 1873). The species name ‘**bancrofti**’ is after an Australian (Brisbane) physician **Joseph Bancrofti** who discovered the adult worm (1876), later to be named as ***W. bancrofti*** in 1921. Commonly known as ‘**filarial worms**’, spread by *Culex* mosquito, it lives in the lymphatic system of man, where they obstruct the flow of lymph, causing severe ailment called ‘**elephantiasis**’; the limbs or other parts of body (like testicles) growing to enormous size.



Order: Camallanida:

Example

- Camallanus*:** They are ‘intestinal parasites of fishes’ often named as ‘**red worms**’ owing to their diagnostic red colour due to feeding on the blood of fish by drilling with the help of a rasping organ, the buccal capsule at the anterior end. The presence of a buccal capsule (supported by the structures like basal ring, longitudinal or spiral ridges, tridents), divided into two lateral halves, gives a slit-like appearance to mouth. Females larger than males and tail of males is long and rolled ventrally.



Camallanus

[Photograph by SKG after recovering the parasite from the gut of *Barilius* sp.]

Video

(To Play, please refer below section)

Two live specimens of *Camallanus* sp. immediately after being recovered from the gut of *Barilius* sp. from Suswa River in Eastern Doon (Dehradun, Uttarakhand) [Video by SKG].

Learning process is an on-going process:

**Keep on venturing more into the fantastic world of Etymology
and feel**

NEMATODE – friendly!!!