

Earthworm Glossary from Blakemore (2002, 2006): *Cosmopolitan Earthworms*

Glossary

Consisting of conventions, abbreviations and descriptions of oligochaetological and general terms used in this text and as used by others (compiled from many sources including: Stephenson, 1930; Gates, 1972; and Sims & Gerard, 1985/1999).

A glossary of zoological terms is here: <http://scientific.thomson.com/support/products/zr/zoological-glossary/>.

Cladistic-jargon terms are modified from SASB and Palaeos websites: www.science.uts.edu.au/sasb/glossary.html and www.palaeos.com/Systematics/Cladistics/index.html. See also classification Glossary appended to Mayr & Bock (2002) (<http://www.blackwell-synergy.com/doi/full/10.1046/j.1439-0469.2002.00211.x>).

Conventions:

Taxonomic nomenclature follows The Code (see <http://www.iczn.org/>) such that Family and Genera names always start with a capital letter and Species names a lower-case letter; the genus name may be abbreviated. Optionally, the name(s) and publication date of the original author(s) follow the species name and go in braces where the genus has been changed (and the species name usually changes to agree in Latin gender of feminine, masculine or neutral). In synonymy lists, the authors of subsequent descriptions are denoted in this work by a colon or semicolon inserted before their citation, e.g. “*Lumbricus terrestris* ; Blakemore, 1997: 1,5, fig. 1.” Types are essential.

Two conventions are followed when describing earthworm regarding their segmental counts and setal designations. Following Michaelsen (1900), segments are counted from the anterior starting from the peristomium (i.e., the segment with the mouth that usually lacks setae and bears the prostomium) using the normal and more familiar Arabic numerals thus avoiding confusion inherent in the use of Roman numerals in some earlier works. Female pores are normally on 14, (male pores in megascolecids are usually on 18, and in lumbricids on 15), unless counts are reduced by suppression of anterior segments. Intersegments and furrows are designated by a slash (eg. 1/2), variations are shown by a comma, and range by a dash (eg. 3,4-5 meaning “segments 3 or 4 to 5”). When referring to the prostomium or to the range of the clitellum, ½, ¼ etc. indicate the extent of encroachment into a segment. Setae, counted from the ventral-most on each side, have lower case letters (eg. a b c d) and in perichaetine species the dorsal-most setae are designated z, the penultimate y, and so on;

setal lines refer to longitudinal setal series, sometimes the width between pairs of setae are written without a space (eg. ab lines, or the dd meridian). For lumbricine specimens setal ratios are often given with the distance between ab standardized to unity for comparison. For perichaetine specimens, setal count ranges are given. However, there is no agreement between workers on which segments to make these counts on and, due to intraspecific variation, these ratios are of debatable taxonomic significance.

When surveying, I only count the anterior/head ends although the total biomass includes all portions and the results are expressed as per square metre (m²), regardless of depth. Cocoons can be counted separately (but included in biomass). Describing assemblages of mature and immature specimens, Gates (1972) gave formulations of the numbers of juvenile - a clitellate - clitellate - regressed eg. 1 - 1 - 1 - 1, in this case one of each; however this scheme did not include cocoons and often omitted the last group.

Abbreviations:

ACT, Australian Capital Territory (Canberra).

Auct., *auctorum*, meaning in the sense “of authors” subsequent to the original.

c. or ca., Latin *circa* - approximately.

cf., Latin *confer* – compare.

CSIRO, Commonwealth Scientific and Industrial Research Organisation (Australia).

DPI, Department of Primary Industries (for Australian states).

GM or gm, genital marking.

GS, genital setae.

lhs, left hand side.

m, mid as in mD = mid-dorsal, etc.

mL, mid-lateral.

mV, mid-ventral.

n.p., nephropore.

NSW, New South Wales.

NT, Northern Territory.

NZ, New Zealand.

Qld, Queensland.

RJB, the author, R. J. Blakemore.

rhs, right hand side

RS, research station.

s. lat., *sensu lato*, description “in the wide sense”.

Sp., species (singular); Spp., species (plural).

s. str., *sensu stricto*, description “in the strict sense”, often meaning restricted.

SA, South Australia.

Sp.p., spermathecal pore.

Syn., synonymous, synonymies.

Tas., Tasmania.

TP, tuberculum pubertatis.

U, circumference, from the German ‘Umfang’.

V, ventral.

Vict., Victoria.

WA, Western Australia.

Definitions:

Note: Patterns of morphological organization are characterized as “Acanthodrilin(e)”, “lumbricine”, “microcoleline”, etc. and the adjective designating pattern was distinguished from that for a subfamily by omission of the final vowel by Gates (1959: 236 footnote) but for consistency and euphony I prefer to retain the final adjectival ‘e’.

Aborted, vestigial and functionless, or lacking and having become so during development of species/specimen.

Acanthodrilin(e) - in the Classical System, having prostatic pores in 17 and 19, separate from male pores in 18 (or their homoeotic equivalents). These pores are often in seminal furrows (= longitudinal grooves) between eq/17 and eq/19.

Acinus (*pl.* acini), acinous, a sac-like termination of a branched gland.

Acitellate, without a clitellum, often adult or nearly so but underdeveloped or regressed.

Adiverticulate, without diverticula, usually referring to spermathecae but also to nephridia.

Adventitious, accidental, occurring in an unusual habitat or host.

Aestivation, a period of inactivity, or dormancy, resulting from unfavourable summer (moisture) conditions when a worm coils up in a cell often at depth in the soil.

Afferent, supplying (blood) to an organ.

Agiceriate, gizzardless, without a gizzard; *cf.* monogiceriate, digiceriate, etc.

Allochthonous, exogenous, non-native to an area, *cf.* autochthonous.

Amphigony, see amphimictic.

Amphimictic, amphimixis, reproduction involving fertilization of the ovum by sperm. In megadriles, with the connotation of biparental, *cf.* parthenogenetic.

Ampulla (*pl.* ampullae), distended ental portion of an adiverticulate spermatheca in which

spermatozoa are stored temporarily or the widened ental portion of the main axis of a diverticulate spermatheca and then without such a storage function. Also, when qualified by dorsal or primary, referring to a distal constricted-off portion of a seminal vesicle.

Anandric, anandry, without testes.

An-arsenosomphic - lacking male pores, as in (R type) parthenogenetic morphs, regenerates or abnormal specimens.

Anastomosis, cross connections of ducts, branches of organs, or, more usually, of blood vessels.

Andry, referring to testis containing segments.

Anecic (French *anéciques* from Greek *anekas* = upward reaching), in Bouché's, 1977, classification, perhaps partially equivalent to Lee's prior (1959: 419; 1985) deep-burrowing worms that feed on dead leaves on the surface, *cf.* topsoil, litter dwellers, endogean, epigean.

Anisochaetine ("with uneven setae" - an adjectival term introduced by Blakemore, at the Vermillennium conference held in Kalamazoo, Michigan, September 16-22, 2000) for a non-lumbricine or perichaetine state where the setal counts vary in different parts of the body, eg., often increasing from 8 anteriorly to >8 posteriorly as found in the genus *Anisochaeta*.

Annular, of clitella, encircling the body, *cf.* saddle-shaped.

Annulus (*pl.* annuli) or annulation(s), ring formed by a superficial secondary furrow around a segment, commonly two or three superficial rings also present (biannulate or triannulate).

Anthropochorous, anthropochore, transported by man, usually unintentionally *cf.* peregrine.

Aortic arch, see hearts.

Apomorphic, apomorphy, a specialized character or structure that is derived (evolutionarily recent) *cf.* plesiomorphic.

Arsenosomphic, with male terminalia (*cf.* an-arsenomrphic).

Asetal, without setae. *cf.* peristomium, periproct.

Astomate, with reference to nephridia, "closed," without a nephrostome.

Atrial, glandular tissue associated with a cleft or coelomic invagination containing the male pore (eg. in Moniligastridae or Lumbricidae).

Atrium (*pl.* atria), a diverticulum of a spermathecae in two moniligastrid genera: *Drawida* and *Moniligaster*. (In earlier works may refer to a prostate).

Atrophy, diminuation in size or function of an organ.

Atyphlosolate, without a typhlosole.

Autapomorphy, an apomorphy (i.e. a novel character) that is restricted to a single species and so cannot provide information about the phylogenetic relations of that species other than the degree of its divergence from its nearest relatives. *Cf.* synapomorphy.

Autochthonous, native, indigenous, *cf.* allochthonous.

Autogamy (= autofecundity), self-fertilization in hermaphrodites.

Autotomy, automize, self-amputation, in megadriles the process of breaking off a portion of the posterior/tail to avoid predation or attack; possibly by autolysis – the destruction of cells of the body by its own serum or enzymes. See also coelomic fluid defence.

Avesiculate, without seminal vesicles when referring to genital systems, without a bladder when referring to nephridia.

Balantin(e), with male and prostatic pores in 19.

Bidiverticulate, with two diverticula (to a spermatheca).

Bigiceriate (= digastrid), with two gizzards.

Biparental, true sexual reproduction involving exchange of sperm and union of gametes between two specimens (cf. amphimictic, parthenogenetic).

Biprostatic, with two prostates.

Biramous, two branched.

Bithecal, with two spermathecae.

Blood glands, follicles clustered in the pharyngeal region, sometimes into racemose aggregates, supposed to function in the production of haemoglobin and blood corpuscles (see Stephenson, [1924](#)).

Brain, see cerebral ganglion.

Brown bodies, spheroidal, ellipsoidal or discoidal bodies, free in the coelomic cavity, filled with corpuscles, setal debris and foreign bodies of various sorts such as cysts of parasites, nematodes and their ova.

Buccal cavity, the first region of the alimentary canal, between mouth and pharynx.

Caecum (*pl.* caeca), a blind diverticulum or pouch from the alimentary canal that probably functions for culture of symbiotic gut flora and fauna. (In earlier works, sometimes referring to the spermathecal diverticulum). Intestinal caeca are single or paired, and may be in series; the two main forms are simple (smooth walled but sometimes with surface lobulations) and manicate (composed of several secondary lobes like fingers of a glove).

Calciferous gland (= 'Glands of Morren'), strictly a whitish gland that secretes calcium carbonate and opens into the gut via an oesophageal pouch, often used for similar organs of unknown function such as the Ocnodrilid diverticula.

Canaliculate, longitudinally grooved.

Capsule, see cocoon.

Casts, or castings, the voided earth and other waste matter that are commonly deposited following passage through the gut. Not all species form their casts above the ground.

Caudal, of the tail region.

Cephalization, loss of metameric uniformity at anterior end of body involving some or all of the following; abortion of septa beginning with 1/2, of nephridia and setal follicles beginning with 2, of segmental hearts or connectives between dorsal and ventral blood vessels. Sometimes involving total or almost total abortion of one or more segments.

Cerebral ganglia (*sing.* ganglion), concentrated, supra-oesophageal, paired nerve cells that function as a simple brain.

Chaeta, (*pl.* chaetae), see seta.

Chitin, resistant aminopolysaccharide composing setae of oligochaetes and integument of insects.

Chloragogen cells, whitish or yellow fatty cells formed around the alimentary canal; their function is uncertain but is attributed to excretion and regeneration in the literature. Often accumulate in the posterior.

Chorology (from Greek *choros* - place), study of causal relationships between geographical phenomena, such as climate or altitude, and study of the spatial distribution of organisms within a region.

Cingulum, see clitellum.

Circumpharyngeal connective, nerve collar, between cerebral ganglion and ventral nerve ganglion.

Classical, of or pertaining to the "classical system" of the Oligochaeta (see next definition).

Classical System, the classification of the Oligochaeta as initially presented in Vol. 10 of *Das Tierreich* by Michaelsen (1900) and expressed in its final form by Stephenson (1930) in "The Oligochaeta." This system held that genital systems are more conservative over evolutionary time than are somatic characters and crystallized around two suppositions (from Gates, 1972): (1) Genera, even subfamilies and families, can be defined and arranged in straight-line phylogenetic sequences by a very few characters such as lumbricine and perichaetine, micronephric and meganephric, presence or absence of gizzard or calciferous glands. (2) Other somatic structures of the digestive and excretory as well as the vascular and nervous system, are phylogenetically less important. Gates revised this system from studies of individual, anomalous, and regenerative variation, as well as of genital and geographic polymorphism, he introduced greater emphasis than previously on somatic characters. However, the Classical System still provides structural stability and a practical framework for all subsequent revisions, and its strengths also lie in its 'convenience' and practicality, as well as its apparent phylogenetic validity. Many subfamilies are now raised to family level status.

Clitellate, having a clitellum, the age or stage during which the worm has a clitellum, *cf.* a clitellate.

Clitellum, [L. *clitellae* – pack saddle], a regional epidermal swelling where gland cells secrete material to form the cocoon (and, in most groups, to provide nourishment for the encapsulated embryos). Often called the "collar". There are two recognised types: annular clitellum or cingulum, which encircles the body; and saddle-shaped where a clitellum encompasses only the dorsal and lateral parts of the body. The segmental extent (and range) of the clitellum is of systematic value although precise characterization is sometimes a function of preservation and observer's choice.

Cocoon, egg-case (oöphore) secreted at the clitellum, shed and containing several eggs, not all of which emerge. Often termed 'capsule'.

Coelom, the fluid-filled body cavity between the body wall and the alimentary canal.

Coelomic fluid, complex of proteins, enzymes and coelomocytes in solution in the body cavity of earthworms, also known to comprise immunoactive cells and molecules involved in immune defence; separate from the blood vascular system.

Coelomic fluid defence, the ejection of coelomic fluid, usually from the dorsal pores or other orifices, in response to stress or attack. The “Blue Squirter Worm”, *Didymogaster sylvaticus* Fletcher, 1886, can exude fluid for several centimeters (Blakemore, 2001).

Coelomocytes are autonomous cells in the coelomic fluid, primarily: (1) autofluorescent eleocytes/chloragocytes filled with numerous large granules (chloragosomes); and (2) amoebocytes; they have been categorized into four classes as lymphocytic coelomocytes, granulocytic coelomocytes, eleocytes (chloragogen cells), and inclusion-containing coelomocytes. Large granules may form to encapsulate shed setae or nematodes. Details here – [ref.](#).

Collar, see clitellum.

Commissurals, usually paired lateral blood vessels connecting dorsal and ventral, or posteriorly the sub-neural, vessels (cf. latero-oesophageal hearts).

Composite, with reference to certain stalked glands, each of which comprises several similar units.

Compressed, flattened laterally, *cf.* depressed.

Concopulant, a mating partner.

Congeneric, of congeners, belonging to the same genera.

Congerries, an assemblage (of species).

Copulatory setae, those in the same segment as or near the spermathecae. Occasionally refers to similar setae in an adjacent but athecal segment (*cf.* genital and penial setae).

Copulatory pouches, invagination of the male pores; also = spermathecae in some older publications, see also copulatory chamber.

Copulatory chamber, an invagination, containing the male pore, that reaches through the body wall into the coelom; may contain a penis, setae, papillae, and have associated internal glands. Also 'bourses copulatrices' in some publications prior to 1900. The

preferred nomenclature is now “copulatory pouch”

Cosmopolitan (Gk, kosmos, world; polites, citizen), ecological meanings are:

1. found in every country
2. widely or globally distributed – this is closest to the present interpretation
3. present in more than one country

Crop, a widened portion of the digestive system that lacks the muscularity of a gizzard. In the Lumbricidae, found at the beginning of the intestine and in front of the gizzard (see proventriculus).

Cuticle, a thin tough, non-cellular transparent outer layer of the body wall (see iridescence).

Cysticercoid, larval stages of the cestode (tapeworm).

Decathecal, with ten spermathecae, usually in five pairs.

Definitive, capable of being used in definition of a taxon.

Depressed, flattened dorso-ventrally, *cf.* compressed.

Diagnostic, uniquely characterizing a taxon (see *precis*).

Diapause, a state in which gut is empty and the worm is often tightly coiled in a closed-off soil cell as in aestivation. Two states have been characterized: *obligatory*, internally controlled for rest or repair, and *facultative* in response to environmental factors. In either case activity, does not re-commence until certain physiological events have been completed, *cf.* quiescence.

Diaphanous, transparent, pellucid.

Digitiform, finger-shaped.

Dimorphic, a species with two genetically determined morphs.

Diploid, having double set of homologous chromosomes (cf. haploid, polyploid).

Distal, away from place of attachment, as in regenerate, or an organ on a septum, the gut, or body wall, *cf.* proximal.

Diverticulum (*pl.* diverticula), diverticulate, having an outgrowth of some sort from the main axis of an organ (eg. on a spermatheca).

Dorsal vessel, a major blood vessel located above the dorsal surface of the alimentary canal conducting blood anteriorly.

Dorsal pore, small sphinctered intersegmental apertures in the mid-dorsal line leading to the coelomic cavity.

Drilosphere, the region of soil around earthworm burrows.

Duodecathecal, having 12 spermathecae, usually in six pairs.

Eco-taxonomy or Ecological-taxonomy, here implying a combination of good ecological survey with competent taxonomic identification; including details of the species' associations, its behaviour, life-cycle, and its external and internal habitat to represent the species in its complexity and its entirety.

Ectal, ectally, outermost or nearest to the body wall, *cf.* ental.

Egg sac, see ovisac.

Endemic, indigenous or restricted to a region, *cf.* allochthonous.

Endogean, endogées, [from Greek *endon*, within; *gaia*, the earth], Bouché's (1977) classification of worms that live and feed in the mineral soil at or below the root mat (equivalent to Lee's prior (1959: 419; 1985) "sub-surface feeders"). See topsoil dwellers.

Ental, entally, away from the body wall, towards the centre of the body, *cf.* ectal.

Enterioic, when referring to the excretory system, opening into gut lumen, *cf.* exoic.

Enterosegmental organs, paired, segmentally repeated structures of unknown function closed to mD on dorsal face of the post-gizzard gut in moniligastrids.

Entonephric, see enteroic.

Epidermis, the outer cellular layer of the body wall, which secretes a protective cuticle.

Epigean, epigaen, epigeic, epigenous, epigées, [from Greek *epi*, upon; *gaia*, earth] Bouché's (1977) classification of worms that live upon the soil surface or "litter dwellers" as per Lee's prior (1959) system. See endogean, hypogean.

Epilobous, epilobic, referring to a prostomium that is continued by a tongue into the peristomium but without reaching 1/2.

Epimorphic, epimorphosis, regeneration that results in addition of new tissue at the level of amputation.

Equator, a central meridian of latitude of a segment often or usually equivalent to a circumferential line passing across apertures of setal follicles.

Equatorial, at, of or pertaining to a central meridian of latitude in a segment.

Equimeric, equimery, with reference to regenerates, having the same number of segments as had been amputated, the state of being such.

Esophageal, American for oesophageal.

Euramerica, the continent formed in the late Mesozoic before the opening of the north Atlantic, comprising part of Laurasia (between Mid-continental Seaway of east North America and the Turgai Straits separating Europe from Asia).

Euryhaline, tolerant of salinity gradients.

Euryoecious, having a wide range of habitat tolerance.

Eurytopic or eurytipicity, displaying wide tolerance for a range of habitats.

Evaginate, evagination, to grow out from, an outgrowth of, as calciferous sacs of the lumbricid oesophagus.

Exogenous, allochthonous, *cf.* endogenous, autochthonous.

Exoic, when referring to the excretory system, opening to the exterior through the epidermis, *cf.* enteroic.

Exonephric, see exoic.

Exotic, imported, foreign, alien, in contrast to native, endemic, and autochthonous.

Extra-mural, of calciferous glands: located externally on oesophagus, commonly stalked.

Exxidine - adjectival term for species having acanthodriline male pores arrangement with non-tubular prostates as in Exxidae genus *Exxus*; or with characteristics of a member of the family Exxidae (*cf.* acanthodriline, megascolecine, etc.).

Facultative, contingent, having the power to live under different conditions. *cf.* obligatory.

Family, a taxon usually comprising a number of genera, with a name ending in *-idae* (*cf.* Sub-family, *-inae*).

Female pores, external apertures of the female ducts; single or paired, often minute and for most families and specimens (unless aberrant) found on segment 14.

Female funnel, enlargement of ental end of an oviduct to facilitate entry of ova on their way to the exterior.

Female ducts, female gonoducts. See oviducts.

Fimbriated funnel, with a filamentous fringe to facilitate the entry of sperm or ova.

Fissure, an epidermal crevice containing, discrete male and prostatic pores, as well as

apertures of penisetal follicles.

Furrow, external groove around the body between segments.

Genital setae, setae associated with genital markings – see seta.

Genital tumescences, in the Lumbricidae, areas of modified epidermis without distinct boundaries and through which follicles of genital setae open.

Genital markings, distinct epidermal areas that are variously circular or pad-like, glandular swellings, pits or grooves. Involved in mate recognition and the alignment, charging and (successive) co-location of reproductive apertures especially spermathecae. Of systematic importance. (See genital tumescences).

Geophagous, feeding on soil *cf.* detritivor, saprophore.

Giceriate, having one or more gizzards.

Girdle, see clitellum.

Gizzard, the muscularized portion of the digestive system, in Lumbricidae, anterior to the intestine and posterior to the crop. Duplicated in some groups and reduced in others.

Gabrous, devoid of setae or ‘smooth’.

Gonad, gonadal, a testis, ovary, or an organ simultaneously or consecutively producing sperm and ova. Of or pertaining to a gonad.

Gondwanaland, the huge Mesozoic southern continent separated by the epicontinental Tethys Sea from the northern continent of Laurasia after the separation of the united Palaeozoic continent of Pangaea. At end of Triassic, West Gondwana (comprised South America and Africa plus Madegascar) separated from East Gondwana (comprised of Antarctica, Australasia and a then detached Peninsular India).

Gonoducts, male, female, ducts or passages that carry gametes from the coelomic funnels to or towards the exterior. (*cf.* Sperm ducts, oviducts.)

Gonophore, see male pores, female pores.

-gyny, the characterization of ovarian location along the main axis, *cf.* holo-, meta- and pro-gyny.

Haemerophilic, not averse to culture nor some human interference with the environment.

Haemerophobic, averse to culture and human interference with the environment.

Haemoglobin, respiratory protein, in solution in the blood serum of earthworms.

Haploid, having a single set of chromosomes (*cf.* diploid, polyploid).

Hatchling, small worm that emerges from a cocoon.

Hearts, enlarged, segmental pulsating connectives in an anterior region of the body between the ventral and one or both other longitudinal trunks, the dorsal and supra-oesophageal. According to the some terminology those opening into the dorsal trunk are lateral, into the supra-oesophageal are oesophageal, into both are latero-oesophageal.

Hemerobiont, dependent on human culture (*cf.* hererodiaphores, hemerophiles, hemerophobes – terms derived from studies of Swedish worms by Julin (1949)].

Hemerodiaphore, a species indifferent to the influence of human culture.

Hemerophile, a species favoured by human culture.

Hemerophobe, a species aversely affected by the influence of human culture.

Hermaphrodite, having both male and female reproductive organs.

Hepato-pancreatic glands reported by Bahl & Lal (1933) in *Eutyphoeus* produce enzymes but may also function to culture microbes (as with intestinal caeca).

Heterodynamous, development indirect because interrupted by a period of rest called diapause.

Heteromorphic, with reference to regenerates, a head regenerated instead of a tail or a tail instead of an amputated head.

Hibernation, the state of rest or inactivity during unfavourable winter conditions.

Hibernestivation, the state of rest or inactivity during unfavourable conditions in the monsoon tropics that extend through both cool and hot seasons.

Holandric, holandry, classical terms that mean testes restricted to 10 and 11, or a homoeotic equivalent, *cf.* proandry, metandry.

Holarctic region, a zoogeographical region comprising the Palaearctic and Nearctic regions.

Hologynous, hlogyny, classical terms that mean ovaries restricted to 12 and 13 or a homoeotic equivalent.

Holoic, referring to an excretory system, having a single pair of large, stomate, exoic nephridia in each segment of the body except the first few and last one; referring to a nephridium, having a preseptal nephrostome or funnel opening into the coelomic cavity, a post-setal looped tubule opening to the exterior through a single epidermal nephropore and derived without fragmentation from a single embryonic rudiment. *Cf.* meroic. Note that the terms ‘macroic’ and ‘microic’ are substituted for holoic and meroic in some recent treatments. See also ‘nephridium’, ‘tufted nephridia’. [Nephridial terminology follows Gates (1972: 320) who avoided unnecessarily long terms such as ‘holonephridial’ and ‘meronephric’ that have the same meaning as holoic and meroic, thus avoiding tautologies or ridiculously convoluted phrases such as “megameronephridial nephridia” or “Nephridia: micromeronephridia median to mega-meronephridia”; these simpler terms are also used in wider invertebrate morphology dictionaries, eg. <http://digitalcommons.unl.edu/onlinedictinvertzoology/2/>].

Holonephric, holonephridial, obsolete and tautological terms (eg. “nephridia holonephridial”). *Cf.* holoic, meroic and see ‘nephridium’.

Holotype, the single lodged specimen that distinguishes and represents a species.

Homodynamous, development direct, ie., not interrupted by a diapause.

Homoeosis, presence of an organ, or pairs of organs, or a series of organs, in a segment or series of segments, other than that or those, in which usually or normally found, similarly for secretory pores (eg. female pores in 13 or 15 rather than 14). Reference primarily is to intraspecific variation, secondarily to phylogenetic variation, for a species or genus may be homoeotic with reference to related species or genera. In case of individual homoeosis, the dislocation may involve one or both organs of a segmental pair. The former is asymmetrical, the latter symmetrical homoeosis.

Homoeotic, the condition of having glands or organs in a segment(s) where they do not normally occur. Refers principally to intraspecific variation (see homoeosis).

Homology, homologous, similarity due to common evolutionary origin. Cf. homoplasy.

Homomorphic, of regenerates, of the same cephalic or caudal nature as the part that was amputated.

Homonym, each of two more available specific or subspecific names having the same spelling but applied to different taxa, (usually the earliest name takes priority).

Homoplasy, homoplastic, homoplasious, similarity due to independent evolutionary change in mostly unrelated groups (eg. wings of birds, bats, or insects are all homoplastic). Cf. homology.

Hoplochaetellin(e), of male terminalia in which one pair of sperm ducts open together with the prostatic ducts of 17 (or close to the prostatic pores), usually with another pair of sperm ducts similarly associated with the prostates of 19 (or in both 17/18 and 18/19).

Hyperandric, hyperandry, having testes additional to those of 10-11.

Hypergynous, hypergyny, having ovaries additional to those of 12-13.

Hypermeric, hypermery, of regenerates, having more segments than had been removed prior to the regeneration.

Hyperplasia, hyperplasic, in oligochaetes, having more than the usual number of organs in a set or battery.

Hypogean, hypogaen [from Greek *hypo*, under; *gaia*, the earth], living in the soil; endogean (perhaps usually applied to entomological species that inhabit soil).

Hypomeric, hypomery, of regenerates, with fewer segments than had been removed.

Immature, a young worm, with undeveloped clitellum and sexual organs (often termed adolescent).

Indigenous, native, belonging to a locality, not imported, *cf.* endemic, exotic.

Intersegmental groove, a circumferential depression of strongly contracted specimens that contains the intersegmental furrow. A common failure, in classical writings, to distinguish between groove and furrow resulted in lack of precision with reference to systematically useful characterizations.

Intersegmental furrow, the boundary between two consecutive segments, almost in a geometrical sense, but actually the level at which the epidermis is thinnest and where colour is lacking in pigmented species.

Intestinal glands or supra-intestinal glands are found in some families/genera, their function is obscure but they are sometimes described as being analogous or complementary to oesophageal calciferous glands and of having a relationship with the (termination of) the typhlosole (e.g. Bahl & Lal, 1933). It is further possible that some intestinal glands have similar function to the intestinal caeca. Smaller paired sacs often seen intraseptally on the dorsal blood vessel may relate to immunity or purification of the blood, but this is presently unresearched – see “Lymph glands”.

Intra-mural calciferous glands, occurring within the oesophageal wall (in Lumbricidae and some other families, eg. Eutyphoeus of the Octochaetidae).

Invaginations, an ingrowth, as of the epidermis into the parietes, or of the whole body wall into the coelom.

Iridescence, in the context of earthworm biology refers to 1) the shining white diffraction of light from the aligned tails of sperms aggregated on the male funnels (*q.v.*) and/or spermathecae (in the ampulla or diverticulum), or 2) the appearance of multiple shimmering colours as a result of light refracted from the cuticle.

Juvenile, referring to young from time of hatching till appearance of seminal furrows or grooves, genital tumescences, markings and/or pores, see immature.

Lamella, (*pl.* lamellae) any thin plate-like or scale-like structure.

Lateral, on, of, or pertaining to the sides of a body or of an organ but in connection with the vascular system, a heart joining the ventral trunk below the gut and the dorsal blood vessel above the gut. Also any segmental commissure with the same relationship to the two major trunks.

Latero-oesophageal, with reference to the vascular system, a heart or other vessel joining the ventral trunk below the gut but bifurcating above the gut, with one branch to the supra-oesophageal trunk, the other to the dorsal trunk.

Laurasia, the huge Mesozoic northern continent (see Gondwanaland); marine incursions during Jurassic isolated eastern North America and Europe from western North America and Asia although northern land connections linked each side of North America to the other landmasses to form Euramerica and Asiamerica.

Limicolous, dwelling in mud.

Limiphagous, mud-eating.

Limnicolous, living in lakes.

Littoral, living on seashore.

Lumbricid, a member of the Holarctic family Lumbricidae common in northern temperate

regions.

Lumbricin(e), having 8 setae per segment usually in 4 pairs, *cf.* anisochaetine, perichaetine.

Lumen, the cavity of a duct, sac, gland or of the gut.

Lymph glands, small organs on the anterior faces of septa and associated with the dorsal blood vessel, in the intestinal regions of pheretimoids and other megascolecids such as *Lennogaster*, supposedly functioning in production of phagocytes/amoebocytes.

Macroic, large, with reference to excretory organs, a substitute for the classical meganephridium (*cf.* tufted nephridia).

Macrolecithal, of eggs with large yolks, *cf.* microlecithal.

Male pores, primarily openings to the exterior of the male ducts (usually on segment 18 for megascolecids and 15 for lumbricids). The pores may be superficial, be invaginated into (eversible/penial) chambers confined to the parietes or reaching more or less extensively into the coelomic cavities, or the apertures of such chambers may be withdrawn into a depression that can be closed off by apposition of its margins. Union of male and prostatic ducts also introduces other complications, *ie.*, the ducts may unite just beneath the epidermis, deeper within the body wall, or within a chamber invaginated into the coelom which may or may not have a penis or some sort of porophore in which case male and prostatic pores may still be discrete. Although of great importance to taxonomy, these pores are often minute and only traceable during dissection. In certain species, particularly of the Lumbricidae and Eudrilidae and in some megascolecids, the pores are large and more readily discernible. Some other species have parthenogenic morphs without male pores.

Male ducts, male gonoducts. See sperm ducts.

Male funnel, a funnel or rosette-shaped enlargement of ental end of a sperm duct, with central aperture through which sperm pass into lumen of the duct on their way to the exterior. Sperm, prior to entering the ducts in many species, temporarily aggregate on the funnels in such a way as to reveal their presence by iridescence.

Manicate, hand-shaped, usually referring to intestinal caecum of certain pheretimoids in which the organ comprises several anteriorly directed secondary caeca.

Meganephridium (*pl.* meganephridia), meganephridial, one of a pair of large excretory organs, in the classical system often referring to organs now called holonephridia.

Megascolecid, of or pertaining to worms or taxa of the family Megascolecidae.

Megascolecine(e), in the classical system, indicating that the single pair of prostates, tubular or racemose, opened to the exterior in 18 together with the sperm ducts. Supposedly arising by deletion of prostates of 17 and dislocation into 18 of prostates from 19.

Megascolicoid, Megascolecid, of or pertaining to worms or taxa of the classical family Megascolecidae.

Meroic, divided, with reference to the excretory system, often minute nephridial tubules formed by longitudinal or transverse fragmentation of the original single pair of embryonic rudiments of each segment. When parietal, often numerous and then said to be "in forests" almost covering the body wall, *cf.* holoic (see also tufted nephridia). Meroic herein means any increase or derivation from the holoic state. See also: holoic; 'nephridium' and <http://digitalcommons.unl.edu/onlinedictinvertezoology/2/>.

Meronephric, meronephridial, obsolete and tautological terms (eg. "nephridia meronephridial"); *cf.* meroic, holoic and see 'nephridium'.

Meronephridium (*pl.* -a) one of many small nephridia.

Mesial, in the middle of the vertical or longitudinal plane.

Metagynous, metagyny, classical terms now meaning only, ovaries restricted to 13 or a homoeotic equivalent, the state of being such.

Metamere, a segment.

Metameric, pertaining to segmentation.

Metandric, metandry, (meroandry) classical terms now meaning only, a single pair of testes restricted to 11, the state of being such, *cf.* holandry, proandry.

Microic, smaller than macroic, substituting for the classical micronephridial, a term often applied to nephridia smaller than meganephridia.

Microlecithal, eggs with small amount of yolk requiring embryo to obtain nourishment from material in cocoon.

Micromeronephridium (*pl.* -a) minute meronephridium.

Micronephridium (*pl.* -a) in classical systematics often with meaning of meronephridium *ie.* small nephridium.

Microscolecine, in classical terminology, provided with a pair of the tubular prostates opening to the exterior in 17 along side or together with the sperm ducts.

Moniliform, arranged like a string of beads.

Monophyletic, (or Monophylic) with a single common ancestry.

Monophyletic taxon, also called a clade, is the building block of [cladistics](#) referring to a group of organisms including their most recent common ancestor and all the descendants of that common ancestor. Eg. Insecta, vertebrates, Mammalia, angiosperms, etc.

Monotheical, having only one spermatheca.

Monotypy, the situation arising when a genus-group taxon is established with only one originally included species; or when a family-group taxon is established with only one originally included genus.

Morph, a group of individuals that share a common anatomy resulting from degradation, deletions, or other changes from structure of the ancestral amphimictic population cause by reproductive isolation. Such isolation usually comes about as a result of parthenogenesis.

Morphallatic, morphallaxis, a regenerative process in which the new parts are reorganised from the old *in situ* instead of being formed anterior or posterior to the level of amputation.

Morren's gland, see calciferous gland.

Mouth cavity, see buccal cavity.

Mouth, the anterior opening to the alimentary canal located in the peristomium.

Muscular tube, see nephridial bladder.

Nearctic, a zoogeographic region comprising Greenland, North America and northern Mexico.

Neotropical, a zoogeographic region encompassing South and Central America south of Mexican plateau and the Caribbean.

Neotype, a single specimen designated as the type specimen of a nominal species-group taxon of which the holotype (or lectotype), and all paratypes or all syntypes are lost or destroyed. Neotypification is the act of selecting a neotype. (For nominal taxon, see taxon).

Nephridial reservoir, see nephridial bladder.

Nephridial bladder, the extended portion of the nephridial tube connected to the nephropore (see vesiculate).

Nephridial pore, see nephropore.

Nephridiopore, see nephropore.

Nephridium (*pl.* nephridia or “small kidneys”), the organ for nitrogenous excretion (holonephridium or meronephridium). Apart from tufted nephridia, there are just two forms of nephridia (after Michaelsen, 1907 and Blakemore, 2000): holoic as found in the ‘primitive’ families and genera, and non-holoic for any derivation at all from holoic.

Nephropore, the external opening of the nephridium.

Nephrostome, the ciliate funnel at the ental end of the (holo)nephridium.

Obligatory, limited to the one mode of life or action, *cf.* facultative.

Octoprostatic, having 8 prostates.

Octothecal, having 8 spermathecae.

Oesophagus, the portion of the gut between the pharynx (anterior) and crop or intestine (posterior), ending in the oesophageal valve. When referring to the circulatory system, a heart that opens dorsally into the supra-esophageal trunk and beneath the gut into the ventral trunk.

Omnivorous, omnivore, non-selective feeder.

Ontogenetic, ontogeny, having to do with individual development.

Oöcyte, a diploid cell that produces haploid eggs (ova) by meiosis.

Oöphore, egg case or cocoon.

Organic Agriculture or Natural Farming, a good introductory summary is [here](#).

Oviducts, ducts or funnels carrying female gametes, usually from the coelomic funnel to or towards the exterior on 14.

Ovum (*pl.* ova), an unfertilized egg.

Palaeartic, zoogeographic region comprising Europe and Mediterranean north of Sahara through to Asia north of Himalayas (i.e., north Atlantic to north Pacific Oceans).

Pangea (Pangaea), supercontinent that began to rift in the Triassic into Laurasia and Gondwana.

Paraphyletic (or Paraphylic) taxon, a group which includes the most recent common ancestor of all those organisms and some, but not all, of that ancestor's descendents. Paraphyletic taxa are recognized in [Linnean](#) and [evolutionary](#) systematics but not in [cladistics](#). For instance, the Class Reptilia gave rise to mammals and birds, but neither mammals nor birds are included under Reptilia. Other examples are found in the Invertebrates, Amphibia, Dinosauria (if birds are excluded), Gymnosperma, etc.

Parieties, body wall of a segment.

Parthenogenesis, uniparental reproduction in which the ovum develops without fertilization by spermatozoa.

Parthenogenetic of or pertaining to that manner of reproduction.

Penial setae, setae associated with proatatic or male pores - see seta.

Peptonephridia, classical term for organs, supposedly modified nephridia, opening into the buccal cavity or pharynx (see pharyngeal mass, salivary glands; tufted nephridia).

Peregrine, exotic, widely distributed, foreign. In the past, often with the implication of widely wandering but now usually more accurately characterized as anthropochorous.

Perichaetin(e), location of the setae, when more than eight per (setigerous) segment, often in a more or less complete circle around the equator, *cf.* lumbricine; anisochaetine.

Periproct, preferred to pygomere (*q.v.*) by some because of similarity to peristomium. Anal segment.

Peristomium, anteriormost portion of the body, around the mouth and, like the pygomere, lacking major characteristics of a segment, such as setae, though counted as segment one.

"Pharyngeal gland-cells" are not gland-cells in the usual sense, and do not communicate with the pharynx; the term "chromophil cells" was proposed for them by Stephenson (1917) because of their intense coloration by hæmatoxylin and similar stains. The so-called "septal glands" are aggregations of similar cells at a more posterior level.

Pharyngeal mass, of peptonephridia and pharyngeal gland cells in the pharyngeal region.

Pharynx, the anterior of the alimentary canal between mouth and the oesophagus (includes buccal cavity) = “pharyngeal region”.

Pheretimoid, a member of the genus *Pheretima auct./s. lat.*, typically with gizzard in 8, male pores on 18, single female pore on 14, clitellum restricted to 14-16, spermathecae in or anterior to 9/10, meroic, perichaetine setae with slight mid-ventral setal gap and often with intestinal caeca.

Phylogenetic, phylogeny, having to do with past evolutionary development, as distinct from ontogenetic.

Plesiomorphic, plesiomorphy, a character or structure that is evolutionarily primitive or ancestral. Cf. apomorphic.

Polyandric, having testes in more segments than 10-11.

Polydiverticulate, with reference to spermathecae, having more than two diverticula per segment.

Polygiceriate, with several gizzards; e.g. digiceriate, trigiceriate.

Polygonadal, having more than four gonads.

Polymorphic, of or pertaining to polymorphism. The latter, with reference to megadriles, is of several kinds, of which the most important for systematics are geographical and parthenogenetic.

Polyoculate, referring to a spermathecal diverticulum, having several seminal chambers.

Polyphyletic, of mixed evolutionary origin, not derived from a common ancestor.

Polyphyletic (or Polyphylic) taxon, a group with some similarities that does not include the probable most recent common ancestor of all members (usually because that ancestor lacks

some or all of the characteristics of the group). Polyphyletic taxa often share derived characters which originated separately by convergence, and are considered invalid or unnatural groupings, unacceptable in either the [Linnean/Evolutionary](#) or the [Cladistics](#) taxonomies.

Polyplloid, having more than two sets of homologous chromosomes, *cf.* diploid, haploid.

Polyprostatic, having more than six prostates in three segments or more than eight in two segments.

Polystomate, having many mouths, referring to nephridia, with several nephrostomes.

Polytesticulate, having more than two pairs of testes.

Polythecal, having more than one or two pairs of spermathecae per segment.

Porophore, any area, protuberance or special structure bearing a pore, usually that of a spermatheca, ovi-duct or sperm-duct.

Posterobiprostatic, with prostates in 19 after loss of a pair in 17 of an acanthodriline set.

Precis or *Précis*, key features in specific or generic definition, a term similar to diagnosis.

Proandric, proandry, classical term meaning testes restricted to 10 or a homoeotic equivalent, the state of being such.

Progenitor (or primogenitor), an ancestor of direct lineage.

Progynous, progyny, a classical term meaning ovaries restricted to 12 or a homoeotic equivalent, the state of being such.

Prolobic, prolobous, characterizing a prostomium demarcated from and without a tongue in prostomium.

Prostate, paired glands found in several families of earthworms, either associated with the vas deferens or opening with separate ducts near male pores. Their exact functions are

largely unknown - probably they produce a fluid for the transport (and nourishment?) of sperm during (and after) copulation; interestingly, they appear to correspond in size with the combined volume of spermathecal pouches (pers. obs.). Tubular prostates have a central lumen and open beside, or within a segment or two of the male pores in acanthodrilids, ocnodrilids and octochaetids. Tubular to racemose glands in megascolecids are usually combined with the male pore. Racemose glands have no central lumen, rather a system of branching ductlets. Intermediate glands, appearing lobular but with varying degrees of branching from the internal lumina are termed tubuloracemose. Prostate also applies to the moniligastrid capsular glands and the eudrilid "euprostates". Lumbricid "prostates", without stalks are characterised as "atrial glands". There are now just two categories of megascolecid prostates (after Michaelsen, 1907; Blakemore, 2000): **tubular**, as found in the more 'primitive' families and genera, and **"non-tubular"** which is any other kind of development from the tubular.

Prostatic duct, a duct from the prostatic gland (see Prostate above) to the male pore. These ducts are often muscular and thus may force or ejaculate the prostatic fluid (collecting semen from the vas deferentia) into partner's receptacles (spermathecae).

Prostomium, a protuberance anteriorly and above the mouth from the first segment. A sensory and prehensile appendage for probing and enfolding ingesta.

Protandric, protandrous, proterandrous, having sperm maturing before ova. Protandry, the state of being such.

Proventriculus, see crop.

Proximal, near to, towards, place of attachment, as in a regenerate, an organ on a septum, the gut, or body wall.

Pseudogamic, of or pertaining to pseudogamy, a method of reproduction in which entrance of the sperm stimulates development of the egg but without involving biparental heredity.

Pseudovesicles, structures on posterior faces of 12/13 or 13/14 that are serially homologous with seminal vesicles. Usually retained from an embryonic or early juvenile state. Function unknown.

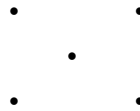
Pygomere, the terminal portion of the body, sometimes called the anal segment but lacking some of the characters of a metamere.

Quadriprostatic, with four prostates.

Quadrithecal, with four spermathecae.

Quiescence (quiescent), a temporary state of inactivity caused by adverse conditions, *cf.* diapause.

Quincunx, a pattern involving location of setae of three consecutive segments in a group of five, with one centrally as here:



Racemose, from the latin *racemus*, meaning bunch, as perhaps of grapes, long used to characterize the lobular kind of prostate present in *Pheretima s. lat.* and related genera. Lobulation may or may not be obvious superficially but within those glands a prostatic duct branches repeatedly, the subdivisions usually unrecognizable macroscopically, *cf.* tubular, tubuloracemose. See 'prostate'.

Regressed, a post-adult, acitellate stage (physiological response to environmental stress?).

Regularization, anatomical adjustments involved in reducing the asymmetry resulting in unilateral splitting of mesoblastic somites.

Rodinia, supercontinent that began to rift apart no later than 750 million years ago before reforming in different configurations as Pannotia and later as Pangaea

Salivary glands, in classical writings a term for organs, opening into the buccal cavity or the pharynx, that sometimes were thought to be modified excretory organs = peptonephridia/tufted nephridia.

Saprovores, deriving energy primarily from ingesting dead plant materials.

Schizolobous, prostomium where two longitudinal furrows continue to diverge some distance beyond the transvers furrow that bisects them (cf. tanylobous in *L. terrestris*).

Scolecophagous, scolecophagy [Greek scoleco-, worm; phagein, to eat], worm-feeding; two meanings: one, you eat the worm; two, the worm eats you.

Segment, a portion of the body, along the anteroposterior axis, between two consecutive intersegmental furrows and the associated septa (also somite, metamere).

Septa (sing. septum), internal partitions between segments.

Seminal, literally of or pertaining to seeds, but characterizing structures in which sperm are involved.

Seminal vesicles, pockets from a septum in which sperm are matured. Seminal vesicles supposedly in 10, as well sometimes as in 11, in some species of *Pheretima s. lat.*, have been testis sacs, of ocnodrilid genera have been hypertrophied testes. The septal outgrowth may be simple, tubular, lobed with connective tissue partitions internally. Often in 9 and 10 on anterior faces of the septa, in 11 and 12 on posterior faces of septa.

Seminal reservoirs, in some older publications, see seminal vesicles.

Seminal furrows or grooves, except in the Lumbricidae, referring to distinct and permanent markings in the epidermis that are associated with male, and sometimes also prostatic pores, and through which sperm and/or prostatic secretions move at time of copulation.

Seminal receptacles, formerly used for spermathecae or occasionally even for seminal vesicles.

Septum (*pl.* septa), two layers of peritoneal cells enclosing muscle fibres, connective tissue and blood vessels separating adjacent segments. Usually delicate but sometimes thickened or muscular between anterior segments.

Seta (*pl.* setae), from Latin meaning bristle, hence more appropriate than chaeta Greek meaning hair or mane. Solid rods, secreted by cells at ental end of a tubular epidermal ingrowth, the setal follicle. Follicles are provided with protractor and retractor muscles so

that the seta can be partially protruded or retracted to aid locomotion. A normal, unspecialized seta has a slight double curvature providing a sigmoid shape, a pointed outer end called the tip, a thickening somewhere near the middle of the shaft called the nodulus, and a blunt inner end called the base. Specialized setae, usually no longer sigmoid, often ornamented in one or more of several ways, if associated more or less closely with male or prostatic pores are called penial setae, that probably function to remove or disrupt sperm stored in the spermathecae from previous concopulants. Copulatory setae are those associated with the spermathecae. Modified setae associated with genital tumescences and/or with special glands but not especially with the male, female, prostatic or spermathecal pores are designated only as genital. These types of setae grip and stimulate concopulants during mating. These setae often are variously modified in shape and may be sculptured (ornamented) ectally in numerous ways. Ornamentation by circles of fine spines or teeth may also characterize enlarged setae at either end of the body. Traditionally, setae have been important to the classification of earthworms, especially the division between lumbricine and perichaetine. However, reliance on precise setal ratios to separate lumbricine taxa is not advisable as there is much intraspecific variability depending on factors such as preservation technique. Similarly, using details of ornamentation of modified setae to differentiate species is often impractical for most workers and there is also intraspecific variation, sometimes even within the setal bundles of a specimen. Setae, as with nephridia and prostates, come in just two varieties or forms (after Michaelsen, 1907; Blakemore, 2000): lumbricine and non-lumbricine.

Setigerous, normally bearing setae.

Sexprostatic, with 6 prostates in 3 consecutive segments (rare or abnormal).

Sexthecal, with 3 pairs of spermathecae.

Somatic, of or pertaining to any portion of the anatomy except the reproductive organs.

Somites, alternative name for segments (see metamere).

Sperm duct, ducts or tubes that carry sperm from the male funnel to or towards the exterior (=vas deferens).

Sperm sacs, in writing of some classical authorities, seminal vesicles, or sometimes

referring to testis sacs or spermathecae.

Spermatheca (*pl.* spermathecae), spermathecal, an often flask-shaped organ in which sperm, received from a copulatory partner, are stored until fertilization of ova in cocoons. The ectal region is often slender and forms the duct (which may support diverticula), while the ental region is dilated to form the ampulla. Number, form and location of the spermathecae is of systematic import.

Spermatophore, a packet of spermatozoa usually transferred to concopulants especially in species lacking spermathecae.

Spermiducal glands, spermiducal pores, of older texts are prostates and prostatic pores.

Stomate, having a mouth, referring to a nephridium, with a funnel. A nephridium with a funnel sometimes is said to be "open".

Sub-adult, large immature without secondary sexual markings or regressed mature.

Sulcate, having seminal furrows or grooves.

Synapomorphy, an apomorphy that is shared by two or more species or groups, so it is plausible that they are related evolutionarily. Cladograms (cf. phylogenetic trees) are built by discovering groups united by synapomorphies, i.e., forming a strictly monophyletic clade (the basis of cladistics); for example feathers are unique to birds and define the class Aves. Equivalent to homology, i.e., similarity due to common evolutionary origin. Cf. autapomorphy, homoplasy, symplesiomorphy.

Synonym, each of two or more names of the same rank used to denote the same taxon.

Synonymy, the relationship between synonyms and a list of taxonomic synonyms.

Symplesiomorphy, possession of a character state that is primitive (plesiomorphic) and shared between two or more taxa thus is not evidence that the taxa are related but diagnostic of a paraphyletic group, cf. synapomorphy.

Tanylobous, characterizing a prostomium with a tongue that reaches all the way through

first segment to 1/2.

Taxon (*pl.* taxa), any unit in a system of classifying of plants or animals.

Testicular vesicle, sometimes mistaken, when enlarged in parthenogenetic morphs for seminal vesicles.

Testicular chamber, testis sac.

Testicular sac, testis sac or some part of it.

Testis sac, usually a closed off coelomic space containing one or both testis and male funnels of a segment.

Tethys Sea, the sea separating Laurasia from Gondwana following the disintegration of Pangaea in the Mesozoic.

Thecal, having spermatheca.

Topsoil dwellers, Lee's (1959) ecological category for worms living in the topsoil.

Trabeculate, characterizing megadrile seminal vesicles that develop as connective tissue proliferations from a septum so as to have numerous irregular spaces that remain inconsiderable until spermatogonia (male germ cells) begin to enter.

Tribe – a taxonomic rank, presumably below Sub-family and above Super-genus, that often was an indication of indecision or insufficient understanding; ending is –ini.

Troglophile, cave loving.

Trogloxene, cave guest.

Tubercula pubertatis (*sing.* tuberculum pubertatis), paired papillose or ridge-like tumescences forming genital pads in the clitellar region of reproductive adults (mainly lumbricids), used to grip partner.

Tubular, prostate form where tube-like glandular portion has central lumen on bisection. See 'prostates'.

Tubuloracemose, prostatic glands with a central lumen, from which short branches pass out, intermediate between the simpler tubular kind (without such branches) and the racemose, polylobular glands (without a central or macroscopically recognisable lumen). These types of prostates were called "strap-like" in some earlier works. See 'prostates'.

Tufted nephridia, found in both holoic and meroic species, are complex holonephridia that often discharge into the buccal cavity (see peptonephridia; salivary glands).

Typhlosolate, having a typhlosole, usually with reference to a segment or segments of the intestine or the intestinal region of the body.

Typhlosole, any longitudinal fold of gut wall, especially if projecting into the gut lumen from the roof at mD or the floor at mV. Lateral typhlosoles (in the intestine) usually are rudimentary. Increases the surface area of intestine for digestion.

Unidiverticulate, having one diverticulum, as of spermathecae.

Uniloculate, having only one seminal chamber, as of spermathecal diverticulum.

Vas deferens (*pl.* vasa deferentia), sperm duct(s).

Ventral blood vessel, large trunk below gut, carrying blood posteriorly.

Vermiculture, breeding and culturing of worms.

Vesicle, referring to the excretory system, the bladder; referring to the reproductive system, anteriorly or posteriorly directed pockets of a septum in which male germ cells mature.

Vesiculate, with reference to a nephridium - provided with a bladder; with reference to a reproductive system - having seminal vesicles; with reference to tissue or organ structure - having small spaces.

Vestibulate, having one or two vestibula.

Vestibulum (*pl.* vestibula), an invagination in some species (eg. *Eutyphoeus*) that contains a penis or male porophore, regardless of whether it is confined to the body wall or reaches more or less conspicuously into the coelom. Not homologous with, but containing the male pore fissure.

Zygalobous, a prostomium not demarcated from the peristomium.

References

- Blakemore, R.J.**, (1994a). "Earthworms of south-east Queensland and their agronomic potential in brigalow soils." Unpub. PhD. Thesis, University of Queensland. Pp 605 with the description of 75 species, including 80 figures.
- Blakemore, R.J.**, (2002, 2006). *Cosmopolitan Earthworms – an Eco-Taxonomic Guide to the Peregrine Species of the World*. VermEcology, PO BOX 414 Kippax, ACT 2615, Australia. Pp. 506 + including 80 figs. [**Recommended text for Soil Quality species determination by ISO/FDIS23611-1:2005**. See <http://www.iso.org/iso/en/CatalogueDetailPage.CatalogueDetail?CSNUMBER=36914&scopelist=ALL>]. (Volume 2 in prep., 2006).
- Blakemore, R.J.** (2005). *A Series of Searchable Texts on Earthworm Biodiversity, Ecology and Systematics from Various Regions of the World*. Eds.: N. Kaneko & M.T. Ito. COE Soil Ecology Research Group, Yokohama National University, Japan. CD-ROM. [<http://bio-eco.eis.ynu.ac.jp/eng/database/earthworm/>].
- Gates, G.E.** (1972). Burmese Earthworms, an introduction to the systematics and biology of Megadrile oligochaetes with special reference to South-East Asia. *Transactions of the American Philosophical Society*. **62(7)**: 1-326. [Online via subscription here <http://links.jstor.org/journals/00659746.html>].
- Sims, R.W. and Gerard, B.M.** (1985). Earthworms. Keys and notes to the identification and study of the Species. *Synopsis of the British Fauna (New series)*. E.J. Brill, Leiden. No. **31**. Pp. 171.
- Sims, R. W. & Gerard, B.M.** (1999): *Earthworms: Notes for the identification of British species*. 4th Edition. Published by Field Studies Council, Montford Bridge, Shrewsbury, UK. Pp. 169.
- Stephenson, J.** (1930). *The Oligochaeta*. Oxford University, Clarendon Press. Pp. 978.