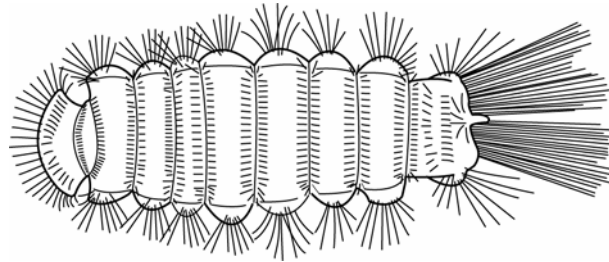


***F. Illustrated Key to Order***

- 1A** Body wall soft; tergites bearing tufts of feathery setae, with a pair of tufts formed by long setae (Fig. 8) at hind end of body; 11-13 rings; very small (less than 4 mm long), never more than 17 leg pairs; worldwide in warmer regions ..... **Polyxenida**



**Polyxenida:** Fig. 8 full body, dorsal aspect

- 1B** Body wall hard and rigid; if setae are present on the tergites they are not arranged in tufts; more than 11 rings; adults with more than 17 leg pairs (except some female **Glomerida**); adults of most species longer than 4 mm ... **2**

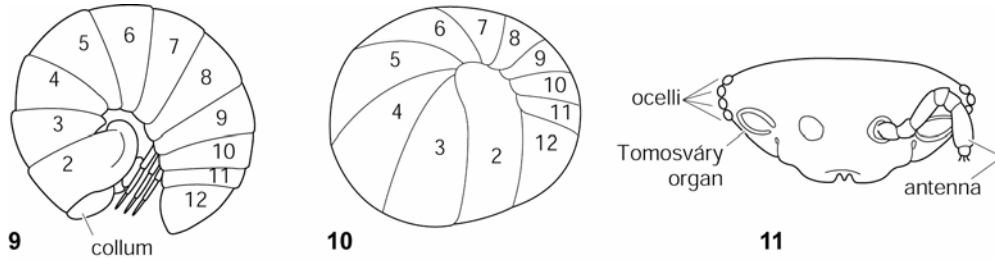
- 2A** [1b] Body with up to 22 body rings ..... **3**

- 2B** Body with more than 22 body rings..... **4**

**3 [2a]: Millipedes with up to 22 rings**

- 3A** Body of adult with 12 rings, counted on the back of the animal, collum narrow, tergite of 2<sup>nd</sup> ring very broad (Fig. 9), body can roll into a ball (Fig. 10), large horseshoe-shaped Tömösváry's organ; ocelli, if present, in a row (Fig. 11), Northern Hemisphere and SE Asia ..... **Glomerida**

Tip/Hint: In Glomerida and Sphaerotheriida, the collum is very small. It may be difficult see when the animal is rolled up. The large 2<sup>nd</sup> tergite, however, is always easy to spot. Find the 2<sup>nd</sup> tergite and count it as 2, continue counting to the body end. The Glomerida have only 12 rings; the 11<sup>th</sup> ring may be very slim and can be overlooked. The last pairs of legs of males are strongly modified.

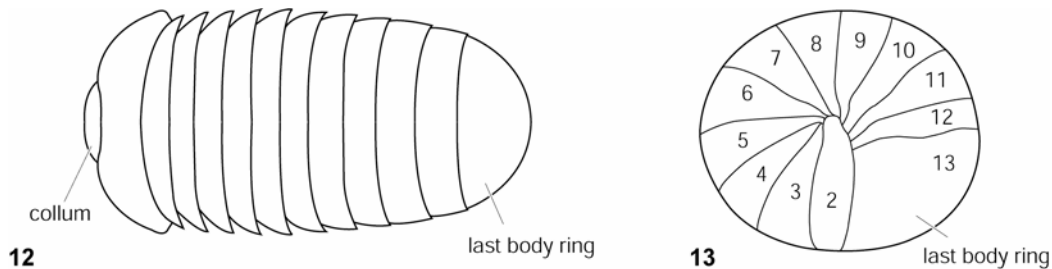


**Glomerida:** Fig. 9 body, lateral aspect; Fig. 10 rolled into a ball; Fig. 11 head with row of ocelli

**3B** Body of adult with 13 rings, counted on the back of the animal, collum small and oval, 2<sup>nd</sup> tergite very broad (Figs 12, 13); 13<sup>th</sup> ring the broadest; no ozopores; restricted to India, Sri Lanka, SE Asia, Australia, New Zealand, East and South Africa, Madagascar and Seychelles .

**Sphaerotheriida**

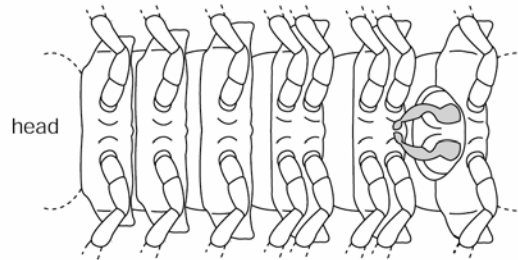
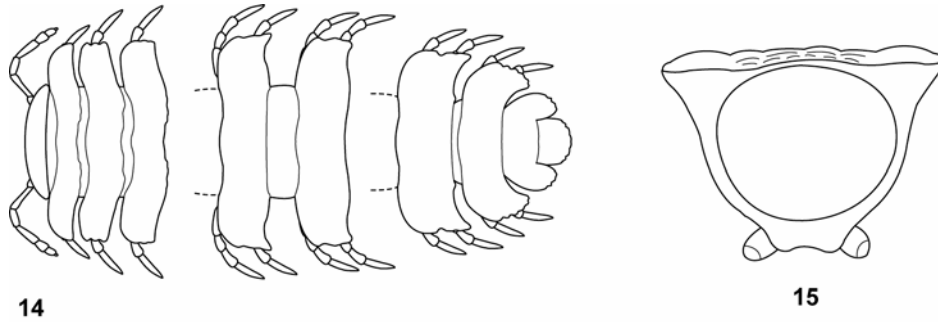
Tip/Hint: In Glomerida and Sphaerotheriida, the collum is very small. It may be difficult see if the animal is rolled up. The large 2<sup>nd</sup> tergite, however, is always easy to spot. Find the 2<sup>nd</sup> tergite and count it as 2, continue counting to the body end. The Sphaerotheriida have 13 rings. In contrast to the Glomerida, the Sphaerotheriida always have large, kidney-shaped eyes with numerous ocelli. The last pairs of legs of males are strongly modified.



**Sphaerotheriida:** Fig. 12 body, dorsal aspect; Fig. 13 rolled into ball

**3C** Body of adult with 19 or 20 rings, no eyes or ocelli; with or without paranota (Figs 14, 15); in adult males anterior leg pair of 7<sup>th</sup> ring modified as gonopods (Fig. 16, compare with Fig. 34), posterior pair of 7<sup>th</sup> ring normal walking leg; worldwide ..

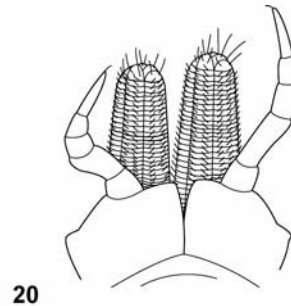
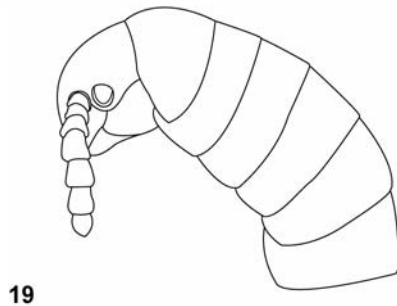
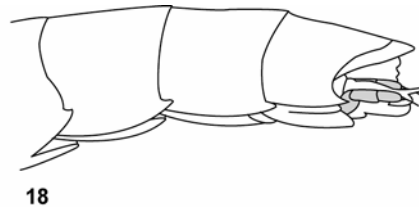
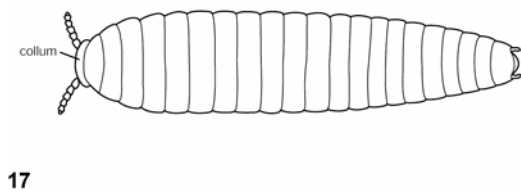
**Polydesmida**



**16**  
**Polydesmida:** Figs. 14, dorsal aspect of body; Fig. 15 cross section through the body of *Polydesmus* (after Blower, 1985); Fig. 16 male, ventral view, showing single pair of gonopods (gray)

**3D** Body of adult with 22 rings (may be difficult to count), body tapering to the end; last leg pair slender, extending beyond the body end and resembling ‘cerci’ (Figs 17, 18); subadult specimens with legs on all rings; large, oval, Tömösváry’s organ behind antenna sockets (Fig. 19), no ocelli; adult females with long tubular ovipositor on each coxa of 2<sup>nd</sup> leg pair (Fig. 20); SE Asia, West Indies, Mexico, northern South America.....

**Glomeridesmida**



**Glomeridesmida:** Fig. 17, entire body, dorsal view; Fig. 18 hind body end, enlarged (after Mauriès, 1980); Fig. 19 lateral aspect of head with Tömösváry’s organ (after Mauriès, 1980); Fig. 20 female ovipositors at second leg pair (after Chamberlin, 1922)

**4 [2b]: Millipedes with more than 22 rings**

- 4A** Tergites dorsally divided by a distinct longitudinal groove, the groove may appear as two longitudinal lines, usually without pigments..... **5**
- 4B** Animals without a longitudinal dorsal groove, a single pigmented midline or a thin, pale suture line may be visible ..... **10**

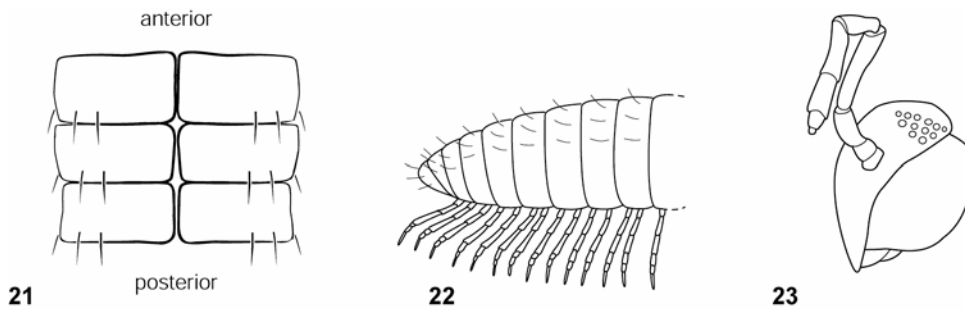
Warning: This couplet may be difficult for the beginner. If you are in doubt about the dorsal midline of your particular animal and you do not reach a satisfying identification, take the alternative step at this point and continue.

**5 [4a]: Animals with a dorsal longitudinal groove**

- 5A** Body of adult with 26 to 32 rings, each tergite with a transverse row of 3+3 setae (Fig. 21); ocelli in a loose cluster (Fig. 23); body tapering at end (Fig. 22); with or without paranota; in adult males gonopods comprised of the anterior and posterior pair of the 7<sup>th</sup> ring; worldwide except for sub-Saharan Africa (present on Madagascar) and tropical South America .....

**Chordeumatida**

Note: The setae are longer and hence easier to see towards the end of the body. In dorsal view, looking onto the thin but distinct dorsal longitudinal groove, only two setae may be clearly visible from above. The third setae of every row often inserts on the lateral side of the animal, with only the tip of the setae visible from above.

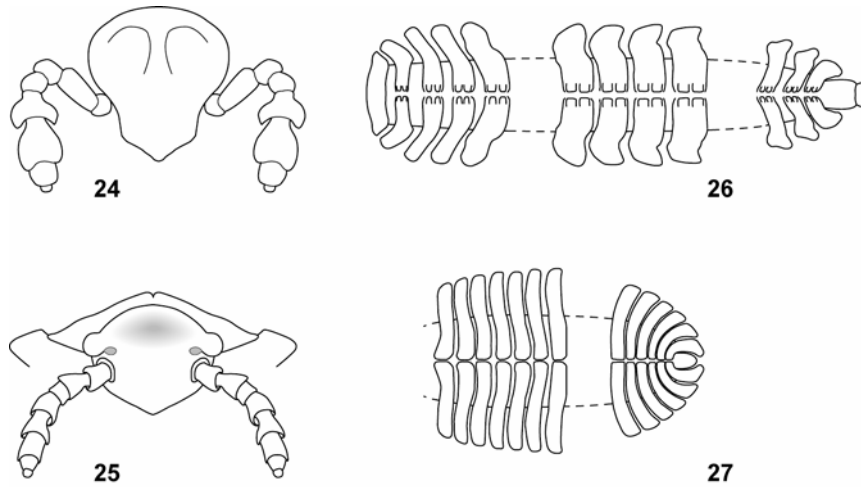


**Chordeumatida:** Fig. 21 dorsal view, showing 3+3 setae; Fig. 22 hind body, side view; Fig. 23 head

- 5B** Body of adult with more than 32 rings ..... **6**

**6A** Ocelli or eyes present..... **7**

**6B** Eyes or ocelli absent, head with bulges above antenna sockets (Figs 24, 25); with distinct lateral paranota (Figs 26, 27), more than 35 rings; adult males with eight pairs of walking legs anterior to the gonopods (Fig. 34); North and Central America, Europe, Japan, SE Asia..... **Platydesmida**

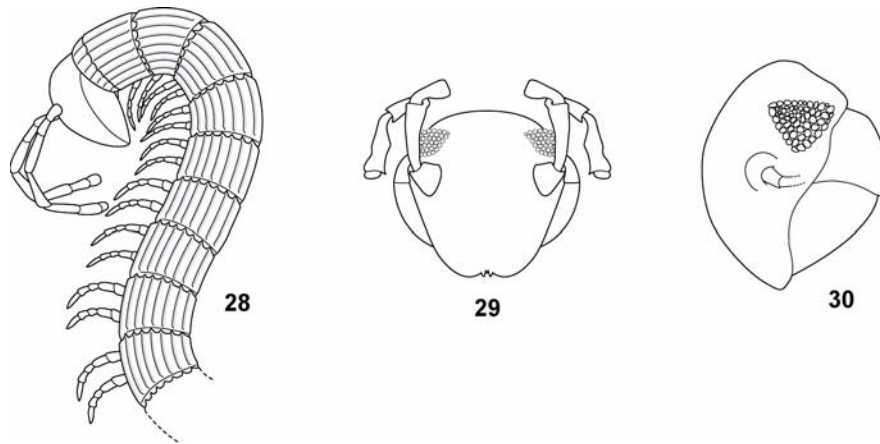


**Platydesmida:** Fig. 24 head, facial view, note bulges above antenna sockets; genus *Gosodesmus*, family Andrognathidae; Fig. 25 head, facial view, lateral bulges above antenna sockets; family Platydesmidae; Fig. 26 partial body, dorsal aspect (*Gosodesmus*, Andrognathidae; Fig. 27 partial body, dorsal aspect (Platydesmidae)

**7A** [6a] Numerous ocelli at both sides of the head..... **8**

**7B** One or two ocelli at both sides of the head..... **9**

**8A** [7a] body frequently with longitudinal crests and ridges (Fig. 28) (absent only in species of the genus *Callipodella* from Italy, 'former Yugoslavia' and Bulgaria); labrum **without** a distinct median suture line (see Fig. 42); 40-60 rings in adults; eyes with many, closely packed ocelli; eyes triangular with distinct borders (Figs 29, 30); in adult males gonopods comprised of anterior leg pair of 7<sup>th</sup> ring, withdrawn in body cavity, with just the distal parts visible; posterior leg of 7<sup>th</sup> ring normal walking leg; North America, Europe and west Asia, southern China and SE Asia..... **Callipodida**



**Callipodida:** Fig. 28 partial body in side view; Fig. 29 head, frontal view; Fig. 30 head, side view

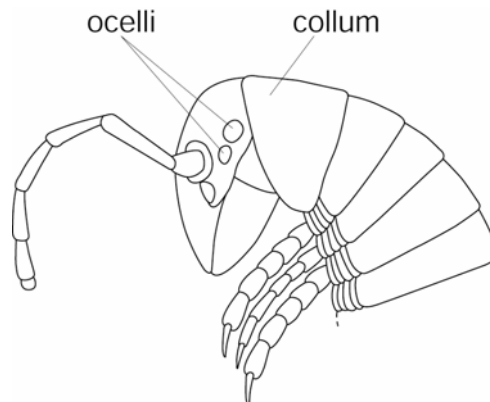
**8B** Body smooth, without longitudinal crests or ridges; labrum with distinct median suture line as in Fig. 41; 40 to 60 rings in adults; eyes with many ocelli; at most a fine pale suture line along the dorsal midline of the body; Western hemisphere, sub-Saharan Africa, SE Asia, Australia .....

**Spirobolida**

Note: Spirobolida do not possess a longitudinal dorsal groove on the tergites. However, some specimens may have a suture line that may be mistaken as a groove. This step here captures this possible misidentification.

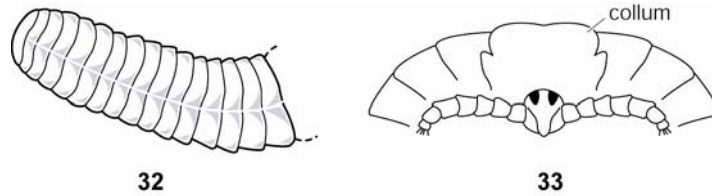
**9A** [7b] Head large with one or two ocelli on each side, if two are present one is distinctly larger (Fig. 31); 39 to 60 rings; in adult males 1<sup>st</sup> pair of legs enlarged, gonopods comprised of anterior legs of 7<sup>th</sup> ring, remnants of posterior legs of 7<sup>th</sup> ring present; Central America, West Indies and tropical South America, central Africa, southern India and Sri Lanka, New Guinea.....

**Stemmiulida**



**Stemmiulida:** Fig. 31 head, lateral aspect

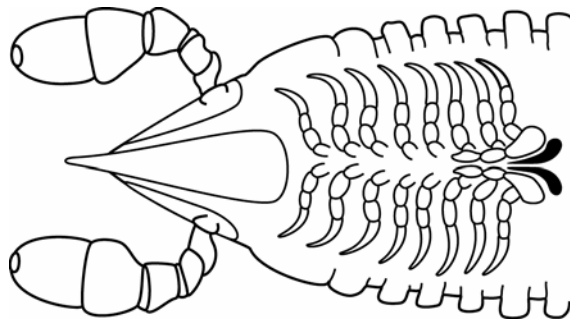
- 9B** Head small, triangular, with 2 pairs ocelli in two black pits above each antenna socket (Fig. 33); adult males with eight pairs walking legs anterior to the gonopods (Fig. 34); posterior legs of 7<sup>th</sup> ring and anterior legs of 8<sup>th</sup> ring modified in adult males; Sumatra, Malacca, Canary and Madeira Islands ..... **Siphonocryptida**



**Siphonocryptida:** Fig. 32 *Hirudicryptus*, partial body (after Enghoff & Golovatch, 1995); Fig. 33 head (after Enghoff & Golovatch, 1995)

**10 [4b]: Millipedes without a dorsal, longitudinal groove**

- 10A** Front of head tapered and triangular to beak-shaped (Figs 33, 34, 37, 38, 39); adult males with eight pairs of walking legs anterior to the gonopods (Fig. 34), two pairs of leg-like gonopods directed forward ..... **11**

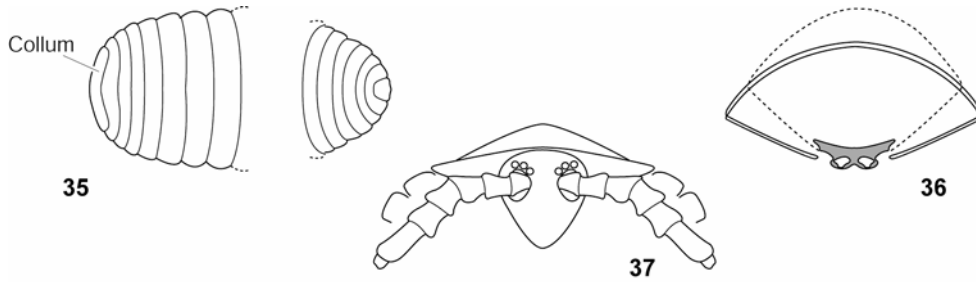


**Colobognatha:** Fig. 34 eight walking legs in front of the male gonopods

- 10B** Front of head not beak-shaped (Figs 29, 41, 42)..... **13**

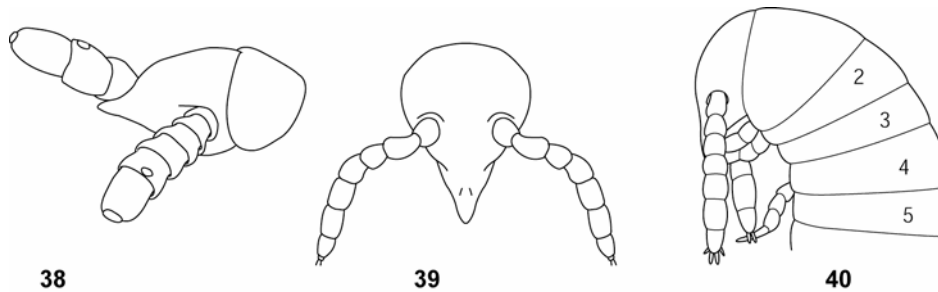
- 11A** [10a] Eyes or ocelli absent; animals slender and worm-like; collum not enlarged; legs short..... **12**

- 11B** 2 dark eye spots present (Fig. 37), animals much wider than thick (Figs 35, 36), dorsal side convex, the ventral side flat or as in Fig. 36; head as in Fig. 37; adult males with paired penes on or behind the coxae of 2<sup>nd</sup> leg pair; Europe, North America, Caribbean, Indian Ocean islands, SE Asia..... **Polyzoniida**



**Polyzooniida:** Fig. 35 partial body; Fig. 36 cross section through body; Fig. 37 head

- 12A** [11a] Cross section of animal forms a half circle, the ventral side of the animal is flat; animal densely covered with fine setae; distal segments of antennae enlarged and thickened (Fig. 38); the Americas, Caribbean, South Africa; SE Asia, Australia and New Zealand..... **Siphonophorida**



**Siphonophorida:** Fig. 38 head, setae omitted; **Siphoniulida:** Fig. 39 head; Fig. 40 front body, side view

- 12B** Cross section of animal forms a perfect circle; body surface very smooth and glabrous; small, up to 10mm in length; distal segments of antennae slender (Fig. 39); legs of 3<sup>rd</sup> ring appear missing (Fig. 40); currently known only from Sumatra and Mexico..... **Siphoniulida**

- 13A** [10b] Adults never with more than 32 body rings; animals very small; 3+3 setae dorsally on the tergites (Fig. 21); with a longitudinal dorsal groove, which may be difficult to see in small specimens ..... **Chordeumatida**

Note: All Chordeumatida possess a longitudinal dorsal groove. In some small specimens, the groove may be difficult to see under the light microscope. This step will hopefully capture a possible misidentification.



**13B** Animals with more than 32 body rings..... **14**

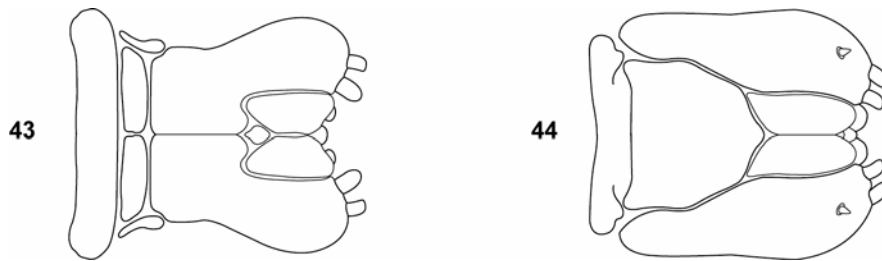
**14A** [13b] Median suture line extending upward from labrum (Fig. 41), 5<sup>th</sup> ring with one pair of legs, in adult males 7<sup>th</sup> ring may be enlarged, gonopods carried inside; Western Hemisphere, sub-Saharan Africa, SE Asia, Australia ..... **Spirobolida**



**Spirobolida:** Fig. 41 head, frontal view (after Keeton, 1960); **Julida** Fig. 42 head, frontal view

**14B** Median suture line on front of head not extending to labrum Fig. 42..... **15**

**15A** [14b] Side pieces of gnathochilarium separated (Fig. 44); in adult males, first pair of legs not hook-like; Western Hemisphere, Australia Africa, Asia south of the Himalayas **Spirostreptida**



**Gnathochilarium:** Fig 43 **Julida:** Fig. 44 **Spirostreptida** (after Attems, 1930)

**15B** Side pieces of gnathochilarium meet at midline (Fig. 43); it may be necessary to detach the head from the trunk, see introduction); first pairs of legs in males short and hook-like (Fig. 6), or enormously enlarged as claspers; fresh specimens with ‘whorl or fringe of setae’ (Fig. 6) at the hind margins of body rings; North America to Panama, Europe, Asia north of the Himalayas, SE Asia..... **Julida**

**F. Flow Chart**

- 1A** Body wall soft; tergites ----- **Polyxenida**
- 1B** Body wall hard and rigid ----- **Chilognatha** ----- **2**
  
- 2A** [1b] Body with up to 22 body rings ----- **3**
  - 3a** -----12 rings -----Gomerida
  - 3b** -----13 rings -----Sphaerotheriida
  - 3c** -----19-20 rings -----Polydesmida
  - 3d** -----22 rings -----Glomeridesmida
- 2B** Body with more than 22 body rings ----- **4**
  
- 4A** Tergites with dorsal midline groove: Chordeumatida, Platydesmida, Callipodida, Spirobolida, Stemmiulida, Siphonocryptida ----- **5**
  - 5a** -----26-32 rings --- Chordeumatida
  - 5b** ----more than 32 body rings ----- **6**
  - 6a** -----ocelli present ----- **7**
  - 6b** -----ocelli absent -----Platydesmida
  - 7a** -----many ocelli ----- **8**
  - 7b** -----One or two ocelli -----Callipodida
  - 8a** ----- with crests -----Spirobolida
  - 8b** ----- without crests ----- **9**
  - 9a** ----head large, 1 or 2 ocelli -----Stemmiulida
  - 9b** -----head small ---Siphonocryptida
- 4B** Tergites without longitudinal dorsal groove ----- **10**
  
- 10 [4b]: Millipedes without a dorsal, longitudinal groove**
- 10A** Head triangular or snout-shaped, males with two pairs of leg-like gonopods Polyzoniida, Siphonophorida, Siphoniulida ----- **11**
  - 11a** -- blind ----- **12**
  - 11b** -- 2 dark eye spots -----Polyzoniida
  - 12a** ---cross section half circle- -----Siphonophorida
  - 12b** ---cross section circle ----- Siphoniulida
- 10B** Front of head not beak-shaped ----- **13**
  
- 13A** [10b] 32 rings or fewer ----- **Chordeumatida**
- 13B** More than 32 body rings: Spirobolida, Spirostreptida, Julida] ----- **14**
- 14A** [13b] Median suture line present----- **Spirobolida**
- 14B** Median suture line on front of head not extending to labrum, Julida Spirostreptida----- **15**
- 15A** Gnathochilarium----- **Spirostreptida**
- 15B** Side pieces of gnathochilarium meet at midline----- **Julida**