Affinities, systematic Position and significance of Onychophora

The group Onichophora is characterized by -
i) Body is elongated and roughly cylindrical
ii) Body covered with flexible chitinous cuticle
iii) Body is segmented but this segmentation is indistinct externally
iv) External segmentation is marked by paired and un-jointed appendages - lobopods
v) Lobopods bear two claws at tip.
vi) Body is coated with numerous large and small papillae
vii) Head bears three pairs of appendages – a pair of annulated antennae, a pair of sclerotized and clawlike mandible and a pair of oral papillae.
viii) A pair of very large slime gland present inside the body
ix) Body wall is made up of three smooth muscle layers – outer circular, middle diagonal and inner longitudinal layers
x) Body cavity is maximally haemocoel and minimally true coelom
xi) Circulatory system is open type and heart is a median tube
xii) Respiratory organs are network of trachea. Tracheal tubes are delicate and distally branched.
xiii) Segmental excretory organs are paired nephridia
xiv) Nervous system is ladder like consisting of a dorsal brain, circumenteric connectives and a pair of ventral nerve cords connected by commissures
xv) Eyes are simple and one pair on dorsal surface at the base of each antenna.
xvi) Some are oviparous but most are viviparous.

The group possesses many common features of annelids, arthropopds and mollusks.

A. Affinities with the Phylum Annelida
i) Segmentation is homonimus
ii) Body wall is made up of smooth muscle in three continuous layers – outer circular, middle oblique and inner longitudinal
iii) Cuticle is thin and flexible
iv) Segmental nephridia are paired
v) Ladder-like nervous system with dorsal brain and ventral ganglionated double ventral nerve cord.
vi) Eyes are simple and structure of eyes is similar
vii) Appendages are hollow
viii) Slime glands and coxal glands are equivalent to epidermal glands of chaetopoda

Remarks : Features show the closeness with the phylum annelid. The similarities are due to convergence.

B. Affinities with the Phylum Arthropoda
1) Paired appendages (Antennae) are segmented
2) Walking appendages are provided with claws
3) Mandible are specialized for feeding
4) Chitinous cuticle which is equivalent to exoskeleton
5) Coelom is reduced to gonadal and nephridial spaces
6) Hemal system is open type with an ostiate heart.
7) Hemocoel is divided by horizontal septum into pericardial and perivisceral sinuses.
8) Respiration via tracheae.

9) Nephridia modified into salivary glands
10) Cleavage is superficial
Remarks : These are primitive features of terrestrial arthopods. So, Onychophora may be primitive group of terrestrial artropoda.

C. Affinities with the Phylum Mollusca
i) Slug-like appearance
ii) Ladder-like nervous system

Remarks : These affinities are superficial.

Systematic Position

i) The group Onychophora shows affinities with the Phylum Annelida, Phylum Arthropoda and Phylum Mollusca.
ii) Based on molecular and other lines of evidence, the similarities between Onychophora and Annelida are due to convergence.
iii) Characters in common with arthropods reveal the stronger closeness with the phylum Arthropoda. But the structure of spiracles manifests its primitiveness in terrestrial life.
iv) Modification of nephridia into salivary gland on the third head segment may be a panarthropod plesiomorphy. The group probably originated from Cambrian panarthropod ancestors.
v) Affinities with the Phylum mollusca are superficial that has no importance in phylogenetic relationship.
vi) Therefore, the group Onychophora is a distinct group of Panarthropoda. So, it can be recognized as **Phylum Onychophora** (Ruppert et al, 2004).

Significance

i) The group Onychophora is an intermediate group between phylum Annelida and Phylum Arthropoda.
ii) The similarities with the Phylum Annelida due to convbergence.
iii) Onychophora probably arose as an exclusively terrestrial line descended from Cambrian panarthropod ancestors. Some Cambrian fossils such as *Aysheaia* , *Hallucigenia* and *Onichodictyon*, may represent marine ancestors from which the terrestrial Onychophora originated.