External Morhology & Terminology
Aphids are small to large homopteran insects. The body is usually divisible into the head, thorax and abdomen, but such divisions are sometimes not possible to make out. However, each portion is dealt with below somewhat, in detail. The names of the different parts of the body of an aphid can perhaps be better understood by referring to the figures A.

**Head:**

The head is usually dorsoventrally flattened, with the clypeus flexed on the ventral side. The frons may be flat or undulated and with or without a median prominence or sinuate at the middle; the lateral frontal tubercles may or may not be present, if present they may be ill or well developed, diverging or parallel or converging on the inner margin; the frons sometimes with anteriorly directed horns at its middle, which may or may not bear hairs, a process on the inner margin of the lateral frontal tubercle or a median rectangular process may also be present. The dorsum of the head may be smooth, scabrous or spinulose. The dorsal cephalic hairs may be very small to very long with acute to acuminate, furcated, blunt to incrassate, capitate, fan-shaped or flask-shaped apices, the margins of these hairs may be smooth or fringed. Small or distinct tubercles are sometimes present on the dorsum of the head. Wax-pores present, sometimes in the form of wax-plates.

1. **Antennae:** are placed in antennal sockets; the number of antennal segment varies between one and six, when more than two segments present, the first and second are known as scape and pedicel respectively and the rest as flagellum; the last antennal segment has a stout basal portion, the base and a short to very long slender terminal portion, the processus terminalis; the first two segments may be smooth, rugose, spinulose and may sometimes be with inwardly directed processes or a small
protuberance; the flagellum may also be smooth or slightly to distinctly imbricated from base to apex, such imbrications may or may not bear spinules, sometimes reticulations are also present on the flagellum, hairs on flagellum may be sparse or dense with sizes and apices similar to those on dorsum of head, sometimes longer hairs are directed on one side of the flagellum; processus terminalis always with at least 3 terminal hairs; primary rhinaria is placed at the junction of the base arid processus terminalis, a few small accessory ones are usually found adjacent to the primary rhinaria, the penultimate segment usually bears one primary rhinaria near its apex, such rhinaria may be round, oval or star-shaped, slightly to distinctly elongate, may seldom bear processes and may or may not be ciliated and may or may not be protuberant; secondary rhinaria always variably present in alate morphs on different flagellar segments and such rhinaria may also be present in apterous morphs, these rhinaria may be round, elongate oval, transversely oval, subanular. They may or may not be protuberant, ciliated, or non-ciliated or may look like reticulations and may be regularly or irregularly distributed.

2. **Eyes**: are present on lateral margins of the head, may be of many or of only three facets; when they are many-faceted there may be an ocular tubercle composed of three facets only and such a tubercle may be indistinct or absent; in alatae three (one median and two lateral) ocelli are present on the head in addition to the compound eyes. Venter of the head may bear small tubercles or a nose-like process on clypeus.

3. **Rostrum**: arises from the ventral surface of the head and consists of five segments; segments 4 and 5 may be fused together or indistinctly to distinctly separate, ultimate rostral segment (4 + 5) shows variable length and shape (blunt, acute, stiletto-shaped, rostrate, etc, and bears three pairs of primary hairs besides a variable number of
secondary hairs and spinules may be present in transverse rows, secondary hairs sometimes absent.

**Thorax:**

The thorax consists of three segments, *viz*, pro, meso and metathorax. The prothorax or the entire thorax may be fused with the head and sometimes head, thorax and abdominal segments 1-7 may get fused; sometimes the meso- and metathorax may get fused. The thorax may be sculptured like the head or may be smooth. The prothorax always bears a pair of lateral tubercles and sometimes spinal ones also, which may or may not be present on the meso and metathorax. The meso and metathoracic segments are with a pair of round or oval spiracles. The mesothorax in apterae is with mid thoracic furca, the arms of which may be entirely separate or connected by a broad base, which may be sessile or stalked. Alatae usually with well developed mesothoracic lobes.

1. **Legs:** Each thoracic segment is with a pair of legs; each leg usually consists of five parts, *viz*, coxa, trochanter, femur, tibia and tarsus; sometimes coxa and trochanter are fused; femora and tibiae may be smooth or with faint to distinct imbrications and their surface may be spinulose, smooth or scabrous; sometimes tibiae are with a row of peg-like hairs beside normal hairs or with stridulatory ridges or with a few small tubercles or with numerous pseudorhinaria-like structure; hind tibiae in oviparae are usually with round pseudosensoria; tibiae are sometimes with wax-pores or wax-plates; the tarsus is usually comprised of two segments or of only one segment; the second tarsal segment is usually provided with a pair of claws; tarsi may be entirely absent, or the second tarsal segment may be atrophied to a short process; the claws are normally paired but may be entirely absent or even a single claw may be present;
both the tarsal segments may be spinulose or only the second tarsal segment may bear spinules or both segments may lack them; the hairs on the femora and tibiae are of variable sizes, apices and thickness, and they may be sparsely or densely distributed, the apices of tibiae are sometimes with hairs which are much thicker and stouter than the normal hairs; the first tarsal segment bears a variable number of hairs, sometimes mid- and hind tarsi may lack such hairs or all such hairs may be absent when tarsi as a whole are atrophied, these hairs usually arise from the ventral side, sometimes a few are also present dorsally, the second tarsal segment usually possesses dorso and latero-apical hairs which may sometimes be quite long and the apices of these hairs may be fine, acuminate or swollen; empodium present between the claws may be hair-like or strap-like or flattened or with expanded apices.

2. **Wings**: The alatae bear a pair of wings, these are of similar consistency but the forewing is always longer and broader than the hind- wing; pterostigma in the forewing may or may not extend up to the apex of the wing; the radial sector may not touch the pterostigma and may be straight or curved or evanescent; the media in the forewing may be simple, once- or twice-branched, sometimes the radial sector touches the media or may get fused with it, cubitus. arid anal veins are simple; the hind wing is sometimes very much reduced and is usually with two oblique veins, but sometimes one or both may be absent, cubitus and anal veins sometimes appear to originate from a common base or they may have separate points of origin which may be far apart; the surface of the wings may be clear or variegated brown; wing-veins may be distinct or faint, and may be bordered brown either along the entire length or only near the tips or may not possess any bordering.
Abdomen:

The abdomen consists of nine segments and the last segment is termed cauda. The first of these segments may be fused with the thorax or may remain distinct, other segments except the segment 8 may be clearly or indistinctly demarcated from each other or may get fused, the segment 8 may be normal or shortened; the margin is usually entire but it may be crenulated. The tergum may be membranous or partly to completely sclerotic, may be smooth or variously sculptured; sometimes the tergite of the postsiphuncular segments extends over the tergite 8 or even over the cauda; the supracaudal process is sometimes present. The dorsal hairs are very short to very long, with or without tuberculate bases or on dark sclerotic bases, with variable apices like those on the head and antennae.

1. Spiracle: Each of the abdominal segments 1-7 is with a pair of spiracles laterally, sometimes that of the abdominal segment 7 absent; and they may be round, reniform, flat or protuberant, they may be either entirely or partially open or of closed type; the spiracles on the segments 1-and 2 as also those on 6 and 7 may sometimes be placed very close, those on the segments 1 and 2 may be so close that their pigmented areas may touch each other, the spiracular apertures are usually of equal size but sometimes those on the segments 6 and 7 may be larger.

2. Lateral abdominal tubercles: The lateral abdominal tubercles on the segments 1 and 7 are usually present but those on the segments 2-6 may be variably present, these tubercles may or may not bear hairs; sometimes the tubercles on the abdominal dorsum are variably present.

3. Wax-plates: Wax-plates or pores may be present on the dorsum of the thorax and abdomen, the position and size being variable in wax-plates, similar wax plate-like
structure may also be found on the circumanal area. ‘Muskelplatten’ or muscle-plates are also sometimes present.

The venter may be either completely spinulose or locally, especially anteriorly, laterally and posteriorly. The ventral hairs may be short to long and they are usually with acute apices.

4. Siphunculi or Cornicles: Dorsolaterally on the abdominal segments 5 or 6 usually occur a pair of siphunculi or cornicles, these may be altogether absent, but when present they may be of variable shape and size, viz, ring-like, mammiform, cone-shaped, cylindrical, truncate, tapering, slightly to distinctly clavate or cigar-shaped, may be with a flange near its apex or flangeless, siphuncular opening may be placed right at the apex or may be shifted laterally; the surface may be smooth, warty, and may sometimes bear some spinules on either the whole surface or only near the apices; may bear wax-pores or wax-plates; the margins may be smooth, faintly to distinctly imbricated or denticulate or warty; sometimes near the apices a few connecting striae are present and these may look like transversely drawn out cells; reticulation in the form of transversely drawn out cells may also extend over the entire length or may be restricted either at the very base or near the apex, sometimes the cells are isodiametrical and then such cells are present at-most on the distal 0.60 portion; hairs on siphunculi, if present, may be found all over densely or sparsely, these may sometimes be arranged in whorls only at the base or may be appended to the base without forming whorls, hairs on the siphunculi may be with fine, acuminate, blunt, or furcated apices.

5. Cauda: various shapes of Cauda are present, viz, semi oval and with or without a median stylus, very short, oval to pentagonal, elongate or knobbed and the knobbed
portion may be rounded, oval or elongated, of variable size and color with a few to many hairs. Sometimes processi are variably present on the dorsum of abdomen.

6. **Subanal plate**: The subanal plate is situated ventral to the cauda and it may be entire or slightly to distinctly indented or bilobed and is usually with many stiff hairs.

7. **Subgenital plate**: Anterior to the subanal plate is the subgenital plate which is usually hairy. Rudimentary gonapophysis 1-4; sometimes the body terminates in a tube-like structure and then separate entities of cauda, subanal and subgenital plates are not distinguishable.

In males and oviparous females the genitalia are noticed.
The following measurement taken by ocular micrometer and expressed in mm:

**Body-length:** Distance from middle of frons to tip of cauda.

**Body-width:** Maximum width of body.

**Antenna:** Length of antenna from base of segment 1 to the tip of flagellum.

**Base of ultimate segment of antenna:** Length of ultimate segment from its basal articulation to distal end of primary rhinaria.

**Processus terminalis:** Length of ultimate segment between apical end of primary rhinarium and tip of the segment.

**Basal diameter of Antennal segment III:** Diameter of the segment just following basal articulation of the segment.

**Ultimate rostral segment:** Length of the portion of rostrum between basal articulations of segment 4 to tip of the rostrum.

**Second segment of hind tarsus:** Length of second segment of hind tarsus from basal articulation to tip.

**Length of siphunculus:** Length from its base to apex.

**Length of cauda:** Length from middle of its very base to apex.

**Length of hair:** Length of hair from socket to tip.
Abbreviations used for body parts of Aphids

A - Anal vein in fore wing

Alate - Alate viviparous female.

Aptera - Apterous viviparous female.

b.d. III - Basal diameter of antennal segment III.

Cu - Cubitus vein in forewing.

F.T.C. - First tarsal chaetotaxy.

h.t.2 - Second segment of hind tibia.

l.a.t. - Lateral abdominal tubercle.

M - Median vein in forewing.

p.t. - Processus terminalis.

Sc - Subcoastal vein in forewing.

u.r.s. - Ultimate rostral segment.

I, II, III…VI - Antennal segment I, II, III …VI.

I, 2, 3 …8 - Abdominal segments 1, 2, 3……8.
**Lateral Frontal Tubercle**  
**Median Frontal Prominence**  
**Eye**  
**Triomatidium**  
**Rostrum**  
**Ultimate Rostral Segment (u.r.s.)**  
**Siphunculus**  
**Cauda**  
**Spiracle**  
**Subanal Plate**  
**Subgenital Plate**  
**Processus Terminalis (p.t.)**  
**Base**  
**First Tarsal Segment**  
**Second Tarsal Segment**  
**Empodial Hair**  
**Claw**  

**Fig. A. External morphology of Typical Apterous Aphid**