Tsetse flies

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**ANATOMY/MORPHOLOGY**

The head bears a long piercing proboscis, which has a distinct basal bulb and points forward when at rest. The mouthparts consist of 3 parts (the upper lip or labium, the hypopharynx and the lower lip or labrum) surrounded by a pair of maxillary palps.

![Glossina morsitans](image1)

**Glossina morsitans**

![Lateral aspect of a female Glossina morsitans. Note forward-pointing proboscis](image2)

Lateral aspect of a female *Glossina morsitans*. Note forward-pointing proboscis

![Glossina proboscis](image3)

**Glossina proboscis**

![Lateral aspect of the head of a tsetse fly with the haustellum lowered to the feeding position](image4)

Lateral aspect of the head of a tsetse fly with the haustellum lowered to the feeding position
Both sexes are hematophagous. The third segment of the antenna bears an arista with hairs (on the upper surface only) which are themselves branched (feathered). Tsetse flies can detect odours by means of sensilla situated on the antennae. Kairomones produced in the host’s breath (e.g. carbon dioxide, acetone or 1-octen-3-ol) and in the urine of African buffaloes and cattle (phenols) attract tsetse (Vale et al., 1985 & 1988). The odours of humans and some animal species (e.g. waterbuck) repel some species of tsetse flies (Gikonyo, 2002).

The compound eyes are widely separated by the frons and are important in short-range host location. The eyes can also distinguish between light and dark, a useful attribute for seeking out shaded microclimates when ambient temperatures are at lethal levels.
Arthropod vectors → Tsetse flies

The wings at rest are folded scissor-like, so that they are fully overlapping one another. The wing venation is typical with the discal cell (comprised between 4th and 5th longitudinal vein and the posterior cross-vein) being "hatchet" shaped (shaped like a butcher's cleaver).

Lateral aspect of a female *Glossina morsitans.* Note forward-pointing proboscis

Dorsal aspect of a female *Glossina morsitans* showing the position of the wings when the fly is at rest. Note the forward-pointing proboscis

Glossina wing

Wing of a tsetse fly, with the 'hatchet' cell indicated by stippling
Arthropod vectors → Tsetse flies

Abdomen: The male presents at the ventral side of the posterior abdomen a tumefaction: the hypopygium that is in fact the folded male terminalia.

_Glossina_ male and female

Ventral aspect of the terminal portion of the abdomen of both sexes of _Glossina morsitans_
Arthropod vectors → Tsetse flies

During copulation the hypopygium is deployed and reveals the superior claspers and penis.

*Hypopygium folded out*

The claspers are used for withholding the female during copulation and their form is characteristic for each subgenus.
The internal anatomy of tsetse flies is characterized by 2 extremely long salivary glands which end in the anterior part of the abdomen, an alimentary tract subdivided in an oesophagus, a crop, which receives the major part of the blood meal before the meal is diverted to the midgut, the proventriculus which controls the passage of blood between the crop and the midgut and secretes the peritrophic membrane (a semi-permeable membrane protecting the midgut cells), a midgut responsible for water absorption, digestion of the meal and absorption of the nutrients and behind the insertion of the Malphigian tubules (with a function comparable to kidneys) the hindgut.
The female reproductive system consists of paired ovaries each consisting of 2 ovarioles, the uterus and two spermathecae.

As the 4 ovarioles are producing a single follicle in turn in a predictable order, this sequence can be used to determine the age of an adult female tsetse (Saunders, 1960; Challier, 1965).