

palpalis (Nemorhina) and *fusca* (Austenina). These subgenera are differentiated on anatomical features and are also broadly differentiated according to their habitats, thus the *morsitans* group are classed as savannah-inhabiting species, *palpalis* group as riverine or lacustrine species and *fusca* group as forest-inhabiting species.

The tsetse species occurring in any African country are known, as is their approximate distribution, and distribution maps and tables of tsetse species for each country are available either on the internet or in publications (see 1.7). Experienced field workers soon acquire the ability to identify tsetse species by the naked eye. However, it is necessary to confirm species identification based on given characteristics for each species. A standard method of determining species (of tsetse and other animals or plants) is by means of an identification key. Such keys work by having a list of questions, usually in pairs or “couplets”, each of which normally asks you to look at a given feature of the insect and to decide whether it is similar to the first description or not. The answer you give will then lead you to the next question, giving you another choice. At the end of the sequence of questions and answers the key will tell you which species the specimen is. For most AW-IPM operations, a small number of economically important tsetse species will be targeted. However, it may be necessary to identify some unimportant species in the area and therefore a key for identification is given here for all species, with the more important ones highlighted. The key here is adapted from that published in Mulligan (1970) and incorporates material, particularly diagrams, from the FAO training manual for tsetse personnel, Volume 1 (FAO 1982a). The key is updated to include the most recently named species, i.e. *Glossina frezili* (Gouteux 1987). Keys tend to use technical anatomical terms for the features and technical or rather obscure words, not in common use, for describing these structures. These terms are explained by the use of diagrams, accompanying descriptions and a glossary or in some cases are substituted by more understandable terms. Although some characters are quantifiable and can be measured or counted, a drawback of keys used for tsetse identification is that other features are comparative and subjective, and without having two different examples to compare it can be difficult to answer the key question with certainty.

For many of the features in the key a good magnifying glass, or preferably a dissecting microscope is essential.

1.5.1. Key for the Identification of Adults of the Species of *Glossina*

1.5.1.1. By External Characters (Visible with Naked Eye, Magnifying Glass or Dissecting Microscope)

1. Pteropleuron (**Figure 1.8**) bearing a few strong bristles of size equal to those on the sternopleuron, these bristles being clearly distinct from the general vestiture of the shorter setulose hairs on the pleura; hairs fringing the thoracic squamae (**Figure 1.19**) curly and numerous, giving a woolly appearance; large to medium flies (9.5–14 mm) *fusca* group (subgenus Austenina) **2**

Pteropleuron bearing only setulose hairs, of which some may be longer than others, but none equal in size to the clearly differentiated bristles that project from amongst the setulose hairs of the sternopleuron; hairs fringing the thoracic

squamae not curly but giving a neat fringe-like appearance; medium to small flies (6.5–11 mm)

palpalis and *morsitans* groups (subgenera *Nemorhina* and *Glossina* s.s.) **13**

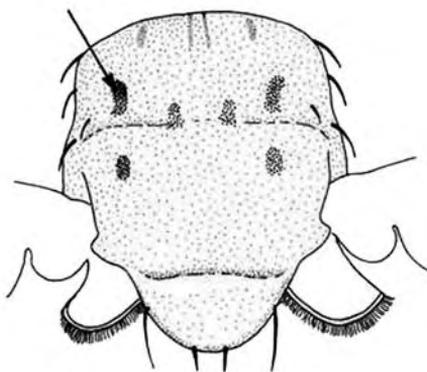
2. Palps shorter than width of the head, or not exceeding it by more than a ninth of their length **3**
 Palps longer than width of the head by a sixth to a third of their length **6**

3. Ground tint of wings dusky; antennal fringe a quarter to a third of greatest width of antenna *tabaniformis* Westwood
 Ground tint of wings pale; antennal fringe a fifth of greatest width of antenna or less **4**

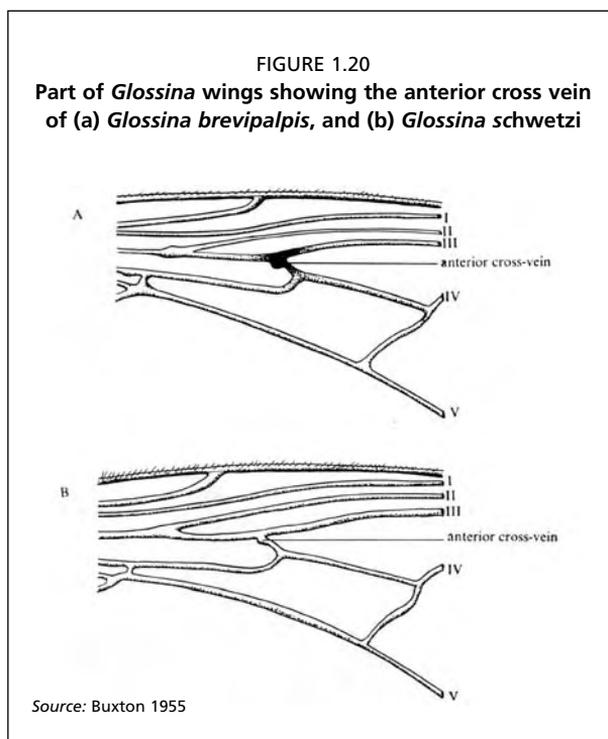
4. Dorsum of thorax with a conspicuous dark brown spot towards each corner (**Figure 1.19**); a pale species (generally light yellowish brown); under side of bulb of proboscis with dark apex *longipennis* Corti
 Dorsum of thorax without any conspicuous dark brown spots; general colour greyish to dark brown; under side of bulb of proboscis uniformly coloured **5**

5. Anterior cross vein of both sexes with thickened portion strongly chitinized and darkened, forming a dark spot on the wing (**Figure 1.20a**) *brevipalpis* Newstead
 Anterior cross vein of female only showing above dark spot
schwetzi Newstead and Evans
 Anterior cross vein of neither sex showing dark spot (as in **Figure 1.20b**)
medicorum Austen

FIGURE 1.19
Dorsal view of the thorax of *Glossina longipennis* showing the pattern of dark spots (arrow) and hairs fringing the thoracic squamae

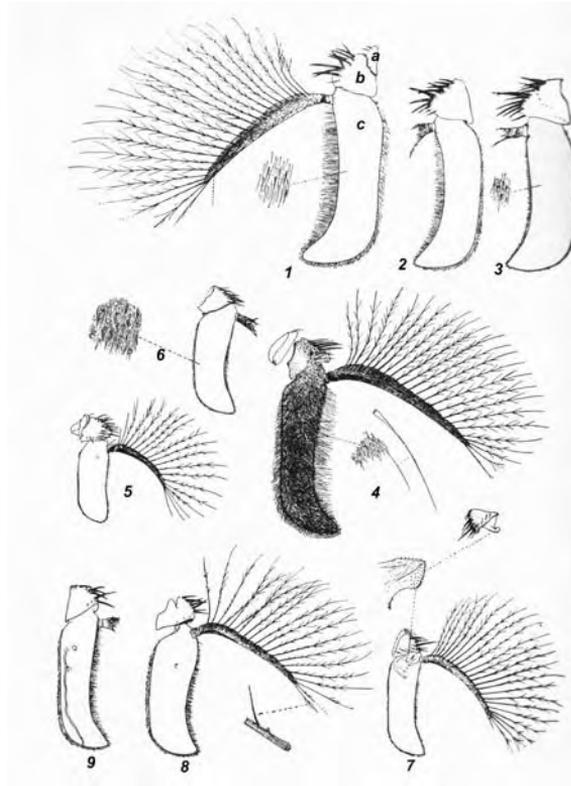


Source: FAO 1982a



6. All segments of hind tarsi uniformly dark dorsally 7
 Only last two segments of hind tarsi dark dorsally, contrasting with paler coloration of remaining segments 8
7. Last two segments of fore and middle tarsi pale, or at most showing some darkening at distal margins; pleura and hind coxae fuscous grey; third segment of antenna strongly and gradually recurved at tip, as in *G. nigrofusca* (**Figure 1.21(1)**) 8
severini Newstead
 Last two segments of fore and middle tarsi dark, penultimate at least with dark band at distal extremity and last segment entirely dark dorsally, forming a marked contrast to the remaining tarsal segments; third segment of antenna with a blunt tip, only slightly and abruptly recurved, as in *G. fusca* (**Figure 1.21(3)**)
nashi Potts
8. Antennal fringe half to three-quarters of greatest width of third antennal segment; hind tibia with broad dark suffusions in middle and much less distinct one at apex 9
nigrofusca nigrofusca Newstead
 Antennal fringe less than a quarter of greatest antennal width; hind tibiae with or without dark suffusions 9

FIGURE 1.21
Antennae of *Glossina* spp. all to the same scale

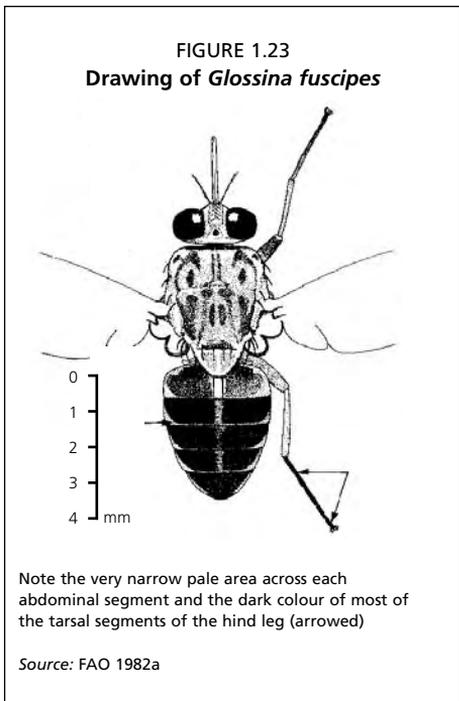
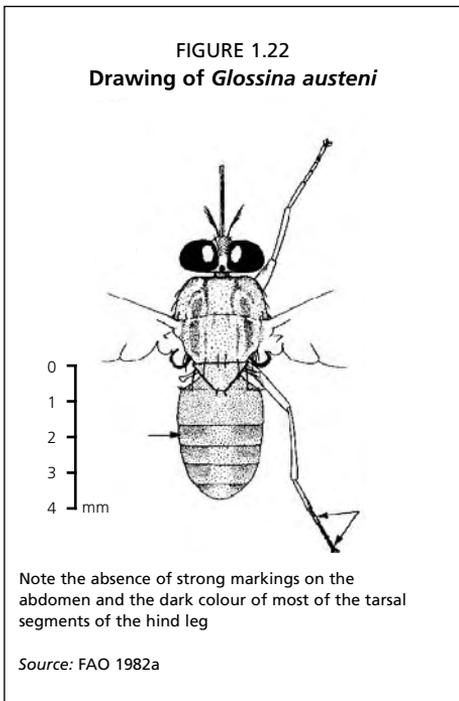


(1) *Glossina nigrofusca* [(a) 1st antennal segment, (b) 2nd antennal segment, (c) 3rd antennal segment],
(2) *Glossina tabaniformis*, (3) *Glossina fusca*, (4) *Glossina pallicera*, (5) *Glossina tachinoides*, (6) *Glossina palpalis*,
(7) *Glossina morsitans*, (8) *Glossina longipalpis*, (9) *Glossina pallidipes*

Source: Buxton 1955

9. Infra-alar bulla (**Figure 1.8**) dark brown to fuscous, without any pale vertical streak in centre
fuscipluris Austen
Infra-alar bulla testaceous, often with pale vertical streak in centre **10**
10. Antennal fringe about a fifth of greatest width of third antennal segment
haningtoni Newstead and Evans
Antennal fringe less than a sixth of greatest width of third antennal segment
(**Figure 1.21 (1)**) **11**
11. Hind tibiae with dark diffusions in middle and a much less distinct one at apex
nigrofusca hopkinsi van Emden

- Hind tibiae without dark diffusions, and if former, with a scarcely less distinct infuscation at the apex than at the base **12**
- 12.** Palps grey black; first three segments of hind tarsi brown *vanhoofi* Henrad
 Palps buff or dusky to grey brown; first three segments of hind tarsi yellowish or ochraceous buff (but may sometimes tend to brownish) *fusca* Walker
- 13.** All segments of hind tarsi dark brown or blackish when viewed from above; dorsum of abdomen usually uniformly brown, generally dark brown, not showing distinct transverse dark bands on a paler background
palpalis group (subgenus *Nemorhina*) and some forms of *austeni* **14**
 Only distal segments of hind tarsi dark brown or blackish, generally contrasting strongly with paler proximal segments; dorsum of abdomen generally with distinct dark bands showing against a paler background
morsitans group (subgenus *Glossina* s.s.) **22**
- 14.** Dorsal surface of abdominal segments with interrupted dark banding on a pale yellowish background *tachinoides* Westwood
 Dorsal surface of abdominal segments without distinct banding on a pale yellowish background **15**
- 15.** Dorsal surface reddish ochraceous; small flies (7.5–8.5 mm)
austeni (*Glossina* s.s.)



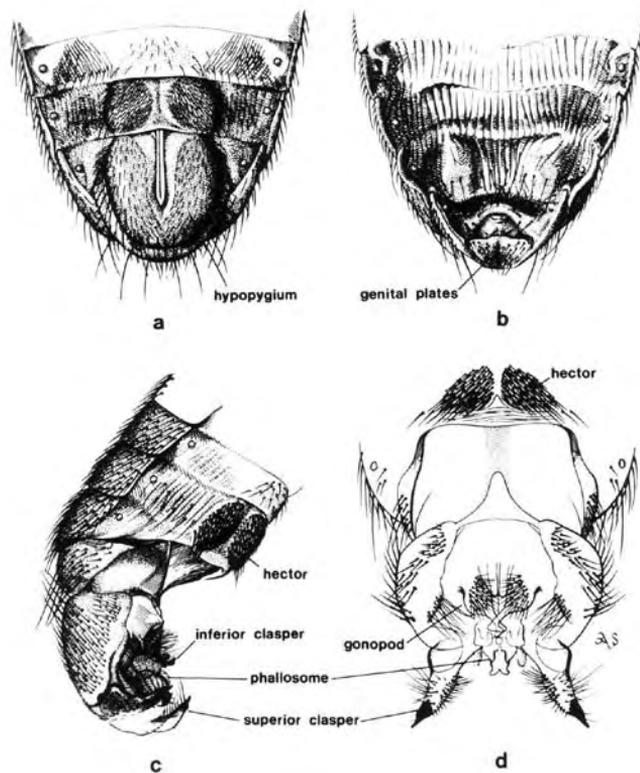
Dorsal surface of abdomen brown to dark brown (sepia or clove); large flies (8.5–11 mm) **16**

16. Fringe of hairs on anterior edge of third antennal segment a quarter of the antennal width or longer (*pallicera* s.l.) **17**

Fringe of hairs on anterior edge of third antennal segment a sixth of antennal width or shorter **18**

17. Third antennal segment usually narrow relative to its length and strongly curved at apex (**Figure 1.21 (4)**); antennal fringe about three-fifths of antennal width
pallicera pallicera Bigot

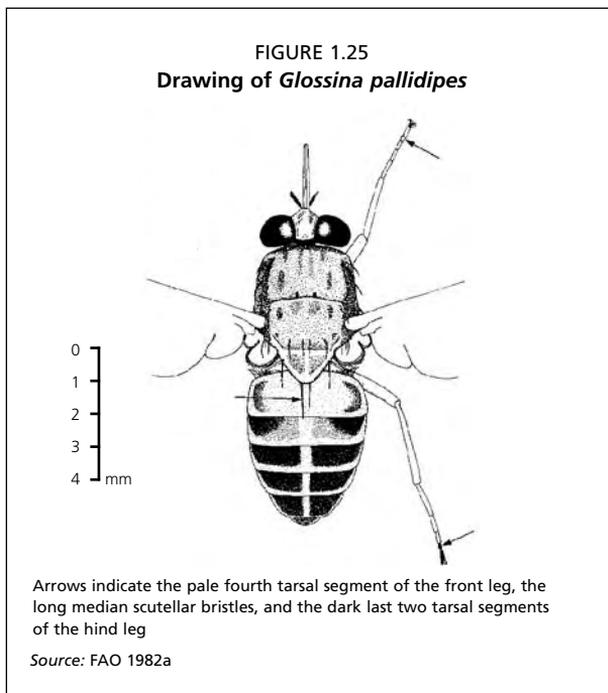
FIGURE 1.24
Drawing of external genitalia of tsetse

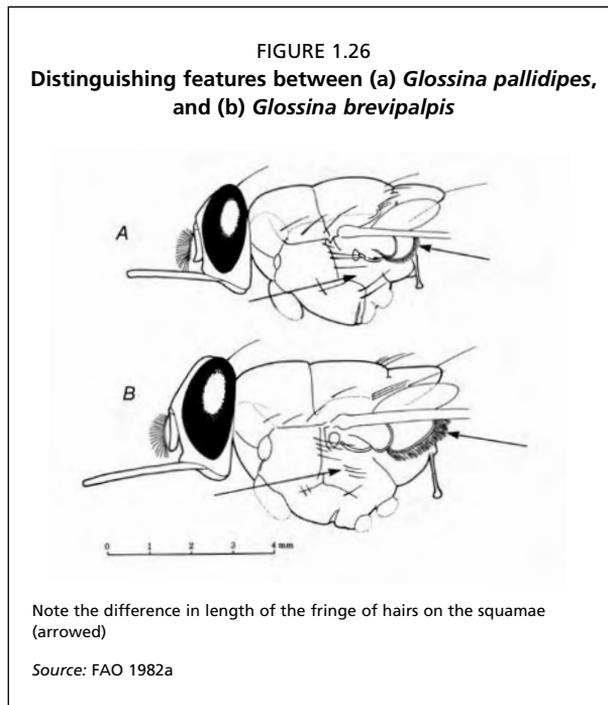


(a) hind end of the abdomen of male *Glossina* viewed from beneath, showing knob-like appearance of hypopygium drawn up into the abdomen, (b) hind end of abdomen of female *Glossina* viewed from beneath, showing absence of any knob-like hypopygium, (c) hind end of abdomen of male *Glossina* with hypopygium extended, viewed from a ventro-lateral position, and (d) hypopygium of *Glossina* after maceration and flattening under a coverslip

Source: Jordan 1993

- Third antennal segment not as preceding, more like a pea pod in shape; antennal fringe a quarter of antennal width *pallidipallica newsteadi* (Austen)
- 18.** Dorsal surface of abdomen dark to sepia brown, hind margins of segments not narrowly paler than rest; a wide, more or less square median pale area on second tergite *caliginea* Austen
Hind margins of dorsal surfaces of abdominal segments narrowly paler, and median pale area on second tergite narrow and elongated **19**
- 19.** Colour of dorsal surface of abdomen variable but general tendency is to be very dark; posterior margin of hectors (see **Figure 1.24c,d**) in form of a shallowly concave curve, or straight *fuscipes* s.l. **20**
Colour of dorsal surface of abdomen variable but general tendency is to be less dark; posterior margin of hectors deeply cleft by a forwardly pointed triangle *palpalis* s.l.
- 20.** Posterior margin of hectors straight, and with uninterrupted covering of hairs *fuscipes quanzensis* Pires
Posterior margin of hectors shallowly concave, and with median interruption of the covering of hairs **21**
- 21.** General coloration pale; glabrous interruption on hind margin of hectors a narrow line *fuscipes martinii* Zumpt





General coloration darker; glabrous interruption on hind margin of hectors triangular, with apex directed forwards *fuscipes fuscipes* Newstead

22. Antennal fringe a fifth to a third of antennal width 23
Antennal fringe not more than a sixth of antennal width 24

23. Front and middle tarsi uniformly yellowish brown; length of third antennal segment about five times its width, tip strongly recurved and tapering; antennal fringe a third of antennal width (**Figure 1.21 (9)**) *pallidipes* Austen

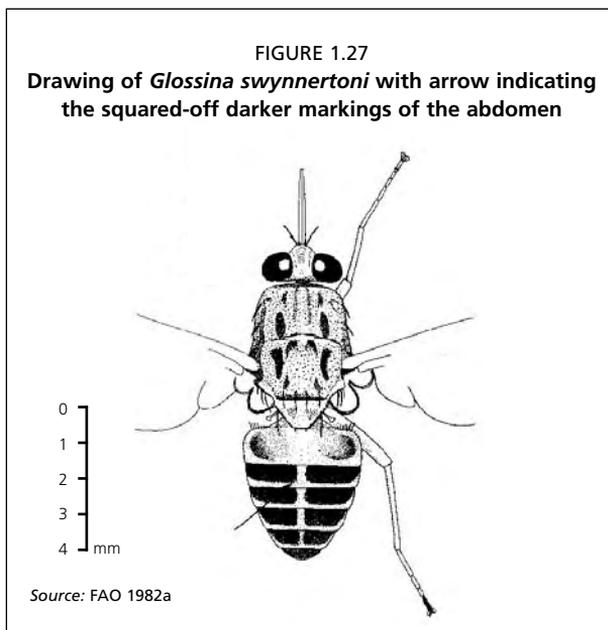
Front and middle tarsi with strongly defined dark tips; length of third antennal segment about 3.5 times its width, tip only slightly and abruptly recurved and not tapering; antennal fringe a fifth to a quarter of antennal width (**Figure 1.21 (8)**)

longipalpis Wiedemann

Where *G. pallidipes* (**Figure 1.25**) and *G. brevipalpis* occur together, an additional feature that can be used to distinguish the two species is the length of the fringe of hairs on the squamae, which are short on *G. pallidipes* and long on *G. brevipalpis* (**Figure 1.26**).

24. Dorsal surface of abdomen reddish ochraceous to yellowish buff, with only rather indistinct darker transverse bands, dark brown to black; last two segments of hind tarsi not very much darker than the brownish proximal segments

austeni Newstead



Dorsal surface of abdomen yellowish or greyish yellow, with distinct medially interrupted dark transverse bands; last two segments of hind tarsi dark, strongly contrasted with the pale yellowish-brown proximal segments **25**

- 25.** Hind margins of abdominal dark bands generally not very clearly defined and inner corners rounded (only occasionally somewhat truncate, e.g. some forms of subspecies *submorsitans*), so that median pale line is not very sharply defined

morsitans (s.l.)

Hind margins of dark bands clearly defined and inner corners squarely truncate, so that narrow median pale line is very distinct (**Figure 1.27**) *swynnertoni* Austen

1.5.1.2. By the Characters of the Male Terminalia

- 1.** Superior claspers narrowing to a distal extremity, which terminates in a tooth or claw; claspers free, not joined by a membrane (**Figure 1.28a**)

fusca group (subgenus Austenina) **15**

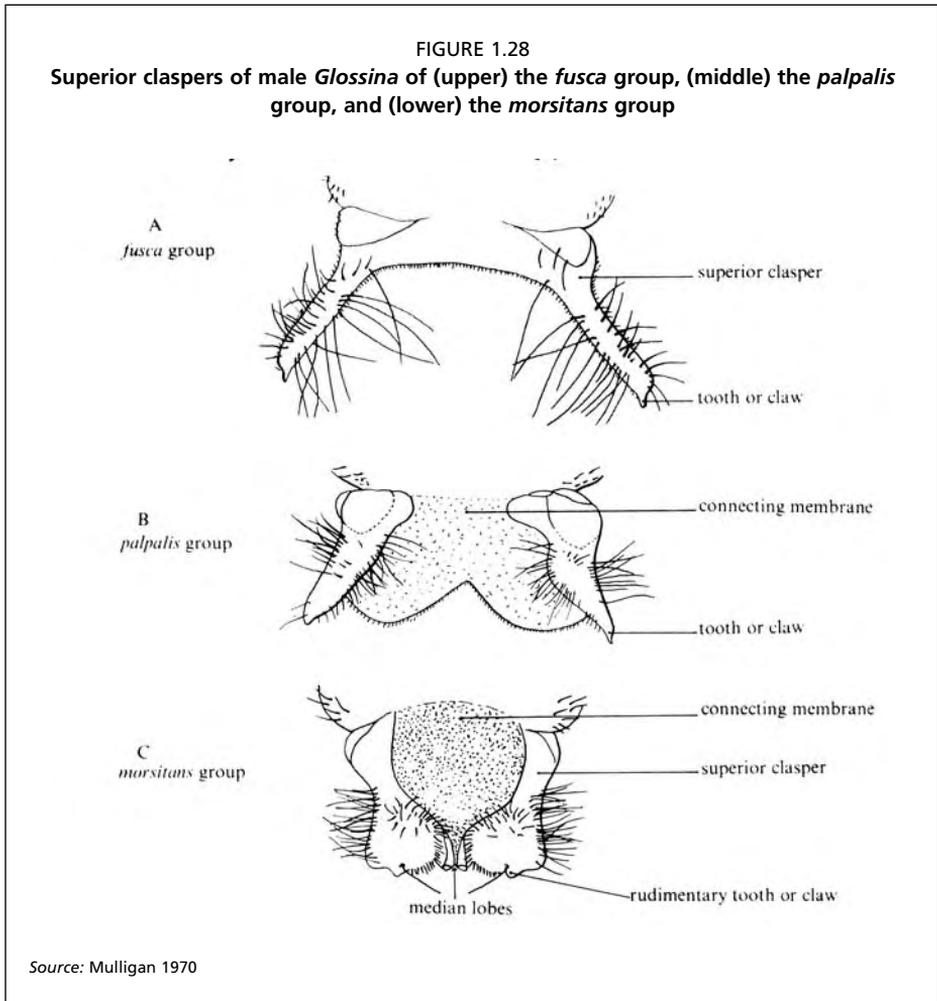
Superior claspers joined by a membrane; may terminate in a tooth or claw as in preceding (**Figure 1.28b**) or distal extremity may be dilated (**Figure 1.28c**) **2**

- 2.** Superior claspers terminating in a tooth or claw

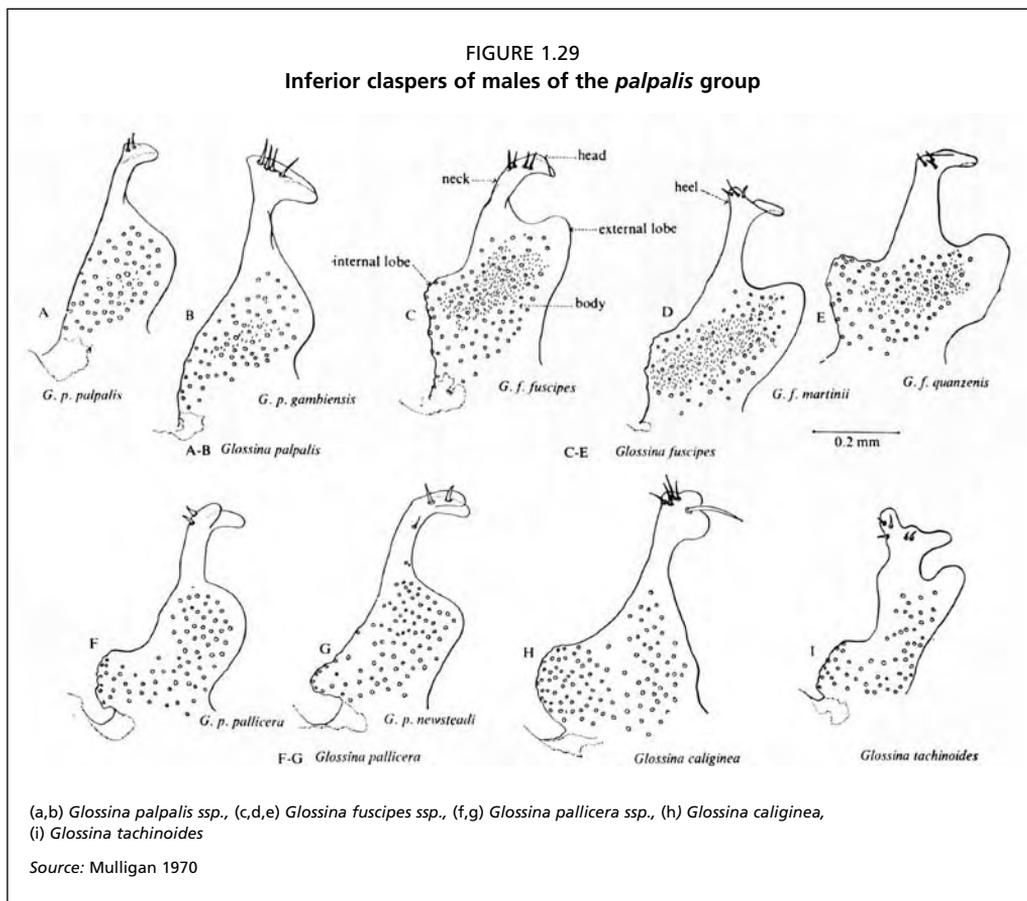
palpalis group (subgenus Nemorhina) **3**

Superior claspers dilated and distal extremity club like

morsitans group (subgenus *Glossina* s.s.) **11**



3. Superior claspers with free tooth or claw very long, almost a third of the length of the clasper; inferior claspers with head swollen, not foot like, and notched, giving bilobed appearance, but not bifurcated (**Figure 1.29h**). West Africa, from Ghana to Cameroon, Gabon and northern Democratic Republic of the Congo
caliginea
4. Superior claspers with free tooth or claw short, very much less than a third of the length of the clasper; inferior clasper with foot like head (**Figure 1.29a,g,i**) 4
5. Inferior clasper with head bifurcated (**Figure 1.29f,g**) 5
6. Inferior clasper with head not bifurcated (**Figure 1.29a-e,i**) 6
5. Internal lobe of inferior clasper with flattened outline (**Figure 1.29f**). West Africa, Sierra Leone to Cameroon
pallicera pallicera



Internal lobe of inferior clasper with pointed outline (**Figure 1.29g**) Gabon, Ubangui-Shari, Democratic Republic of the Congo, north-western Angola
pallicera newsteadi

- 6. Neck of inferior clasper short, about as broad as long (**Figure 1.29i**). Hinterland of West Africa to Sudan and Ethiopia; Saudi Arabia and Yemen *tachinoides*
Neck of inferior clasper long, plainly longer than broad (**Figure 1.29a-e**) **7**

- 7. Inferior claspers with external lobe (see **Figure 1.30, right**) prominent and projecting at least slightly upwards; internal lobe present and generally prominent (**Figure 1.29c-e**) (*fuscipes* s.l.) **8**
Inferior claspers with external lobe not prominent and not projecting, even slightly upward; no internal lobe (**Figure 1.29a,b**) (*palpalis* s.l.) **10**

- 8. Terminal dilation of inferior claspers (“head”) in form of a curved pointed hook, the curve prolonging that of the neck; internal lobe of “body” of inferior clasper not

projecting strongly (**Figure 1.29c**). Central and eastern Africa generally (in region of the great forest and the central African lakes) *fuscipes fuscipes*

Terminal dilation of inferior claspers more or less foot like; internal lobe of inferior claspers may or may not project strongly (**Figure 1.29d,e**) **9**

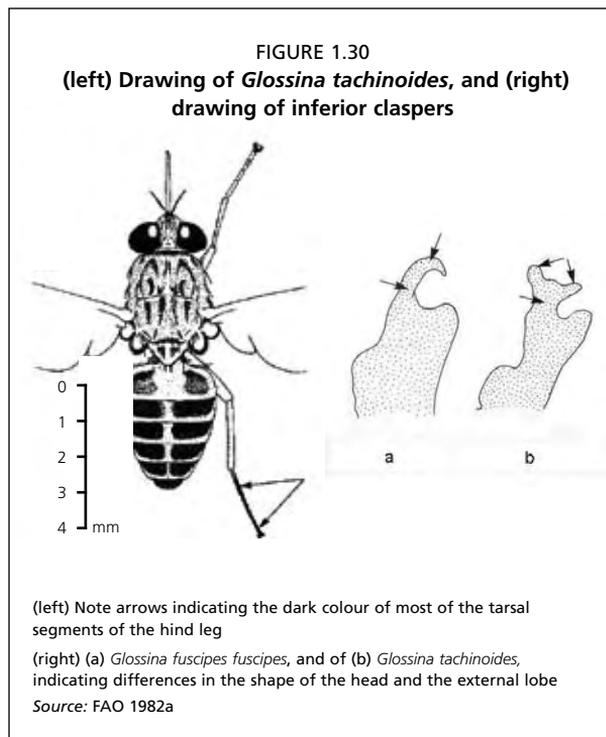
9. Terminal dilation of inferior claspers markedly foot like, with pronounced "head"; "sole" markedly concave; internal lobe of inferior claspers not projecting strongly (**Figure 1.29d**). Democratic Republic of the Congo, Tanzania, Zambia (from Lualaba to Luapula rivers and Lake Tanganyika) *fuscipes martinii*

Terminal dilation of inferior claspers not so markedly foot like, heel not very pronounced; "sole" more or less flat; internal lobe of inferior claspers projecting strongly (**Figure 1.29e**). Central African Republic, Democratic Republic of the Congo, Angola *fuscipes quanzensis*

10. Terminal dilation ("head") of inferior claspers relatively small, its width plainly less than length of "neck" which emerges abruptly from the "body" of the clasper (**Figure 1.29a**). West Africa, from Nigeria to southern Angola

palpalis palpalis

Terminal dilation of inferior claspers relatively large, its width markedly exceeding length of "neck" which merges gradually into the "body" (**Figure 1.29b**). West Africa, from Senegal to Ivory Coast *palpalis gambiensis*



- 11. Outer lateral angle of superior claspers forming a blunt tooth (Figure 1.31a,b) 12
 Outer lateral angle of superior claspers either rounded or strongly produced, not forming a tapering tooth (Figure 1.31c-e) 13
- 12. Tooth of superior claspers subterminal; length of line of junction between the two inner flange-like extensions of the claspers about equal to greatest width of

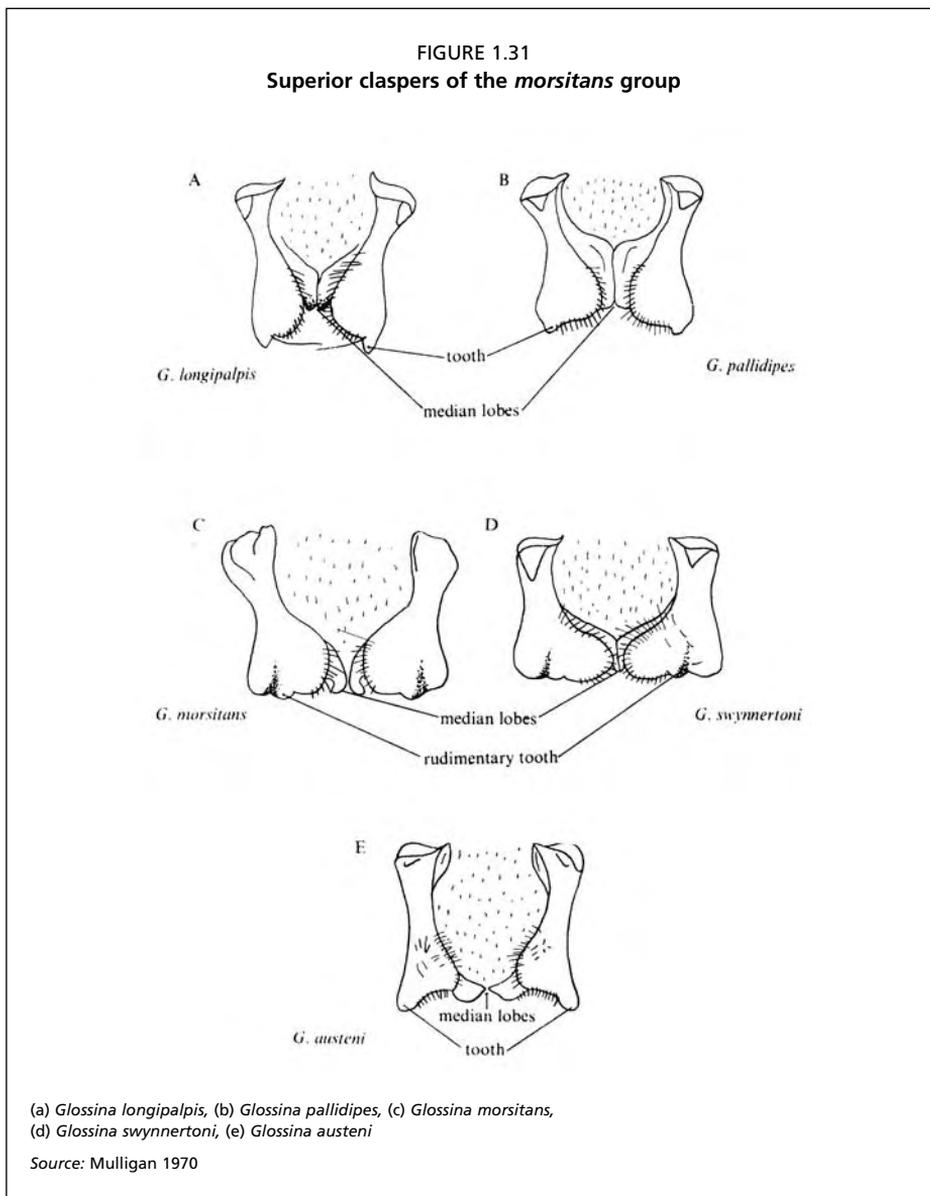
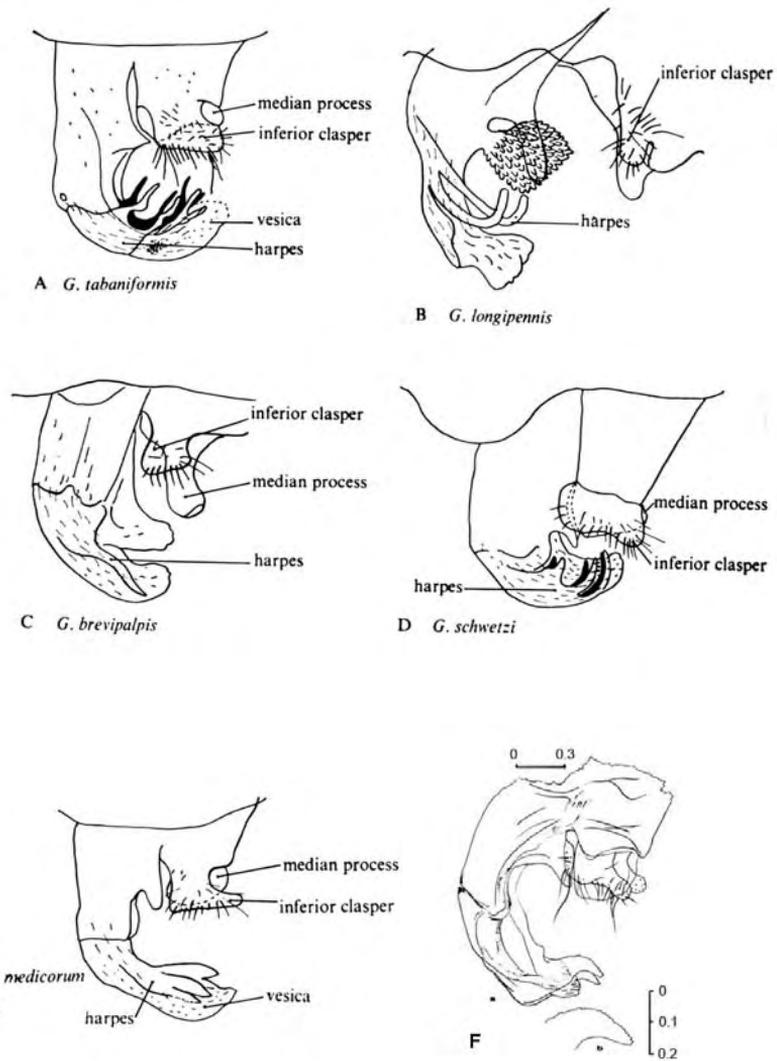


FIGURE 1.32
Lateral views of male terminalia of species of the *fusca* group



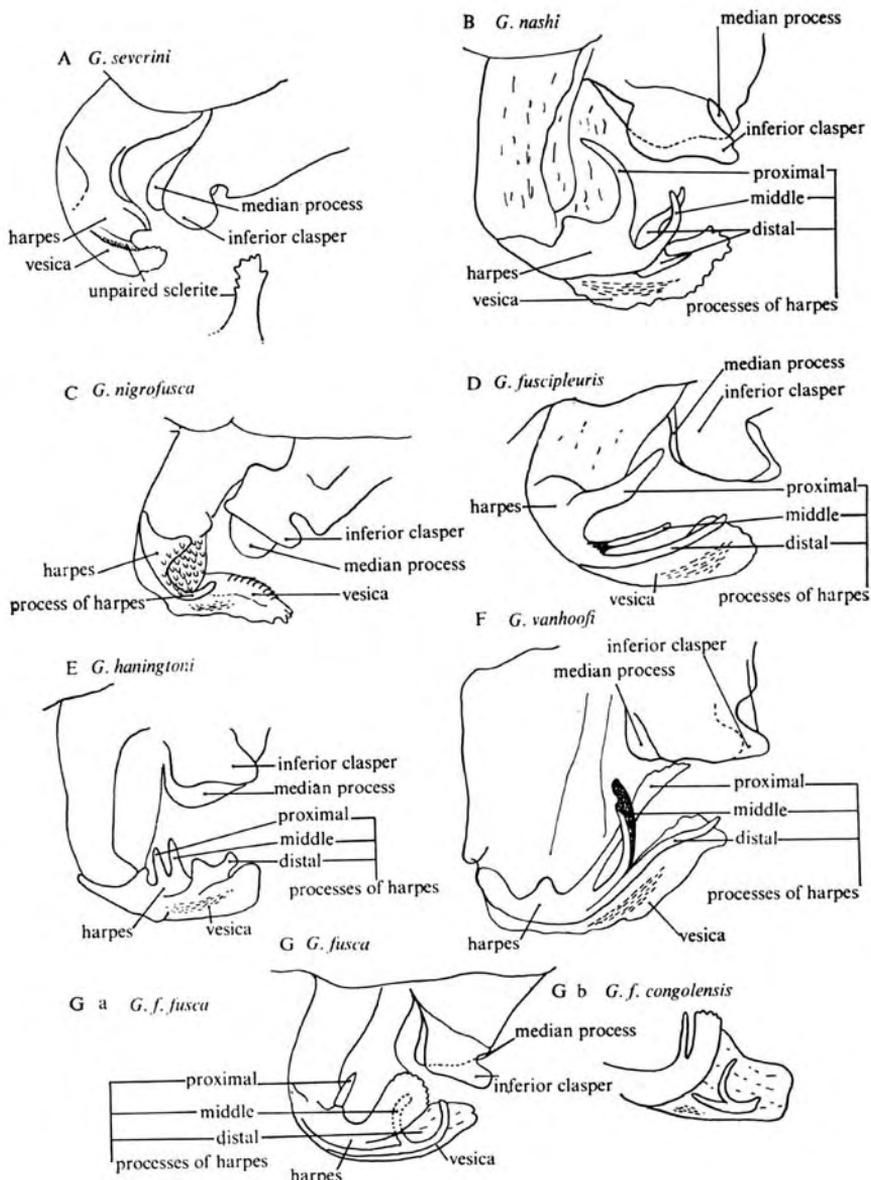
(a) *Glossina tabaniformis*, (b) *Glossina longipennis*, (c) *Glossina brevipalpis*, (d) *Glossina schwetzi*,
(e) *Glossina medicorum*

Source: Potts 1973

(f) *Glossina frezili*

Source: Gouteux 1987

FIGURE 1.33
Lateral views of male terminalia of species of the *fusca* group



(a) *Glossina severini*, (b) *Glossina nashi*, (c) *Glossina nigrofusca*, (d) *Glossina fuscipleuris*, (e) *Glossina haningtoni*, (f) *Glossina vanhoofi*, (g/a) *Glossina fusca fusca*, and (g/b) *Glossina fusca congolensis*

Source: Mulligan 1970

the claspers (**Figure 1.31b**). Central and eastern Africa, Somalia and Ethiopia to Southern Mozambique *pallidipes*

Tooth of superior claspers terminal; length of line of junction between the inner extensions of the claspers plainly less than the greatest width of the claspers (**Figure 1.31a**). West Africa, from Zambia to Cameroon *longipalpis*

- 13.** Outer lateral angles of superior claspers strongly produced and narrowly rounded (**Figure 1.31e**). East African coastal regions, Somalia to KwaZulu Natal (South Africa), extending inwards as far as 33° and 38° in Tanzania and Mozambique, respectively *austeni*
Outer lateral angles of superior claspers rounded and not strongly produced (**Figure 1.31c,d**) **14**

- 14.** Median lobes of superior claspers with broad tips, turned outwards and generally ending level with or projecting slightly beyond the swollen distal portion of the claspers (**Figure 1.31c**). West, Central and East Africa *morsitans* s.l.

BOX 1.1

Differentiation of the *morsitans* subspecies

Machado (1970) recognized four subspecies of *morsitans* differentiated as follows:

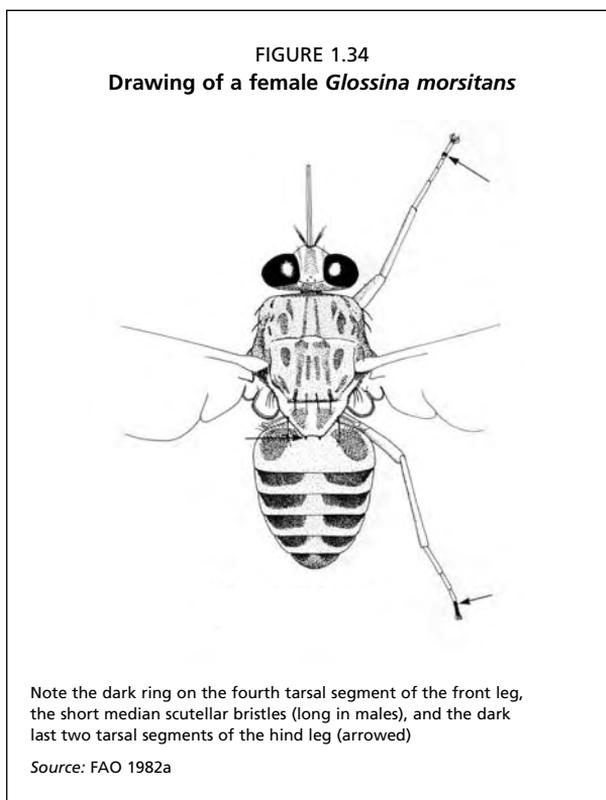
- a. Superior claspers with external distal angle rounded; rudimentary tooth of the claspers distinctly projecting beyond the level of the external angle of the clasper (as in **Figure 1.31e**) **b**
Superior claspers with distal angle bluntly pointed; rudimentary tooth not projecting beyond the level of the external angle of the claspers (*morsitans submorsitans*) **c**
- b. Median lobes relatively feeble and narrow, with tips only slightly divergent *morsitans morsitans*
Median lobes robust and relatively wide, with tips markedly divergent (as in **Figure 1.31c**) *morsitans centralis*
- c. Median lobes relatively feeble and narrow, with tips only slightly divergent *morsitans submorsitans* (type)
Median lobes robust and relatively wide, with tips markedly divergent *morsitans submorsitans ugandensis*

Median lobes of superior claspers with small pointed tips, not generally reaching the level of the distal edge of the claspers (**Figure 1.31d**). Kenya and Tanzania
swynnertoni

- 15. A very prominent median process projecting between the inferior claspers for twice their length or more (**Figure 1.32c**). East and Central Africa, from south-western Ethiopia and southern Somalia through Kenya to Zululand and to south-eastern Democratic Republic of Congo
brevipalpis
Median processes not prominent and generally projecting only slightly if at all between the inferior claspers (**Figure 1.33a,d**) and never projecting for more than their length (**Figure 1.33b,c**) **16**

- 16. Harpes poorly developed and not properly differentiated from the general chitinization of the aedeagus, without projecting processes (**Figure 1.33a**). Eastern part of Democratic Republic of Congo
severini
Harpes well developed, with one or more freely projecting processes (**Figure 1.33a,b**, etc.) **17**

- 17. Harpes with one pair of freely projecting processes **18**
Harpes with three such pairs **20**

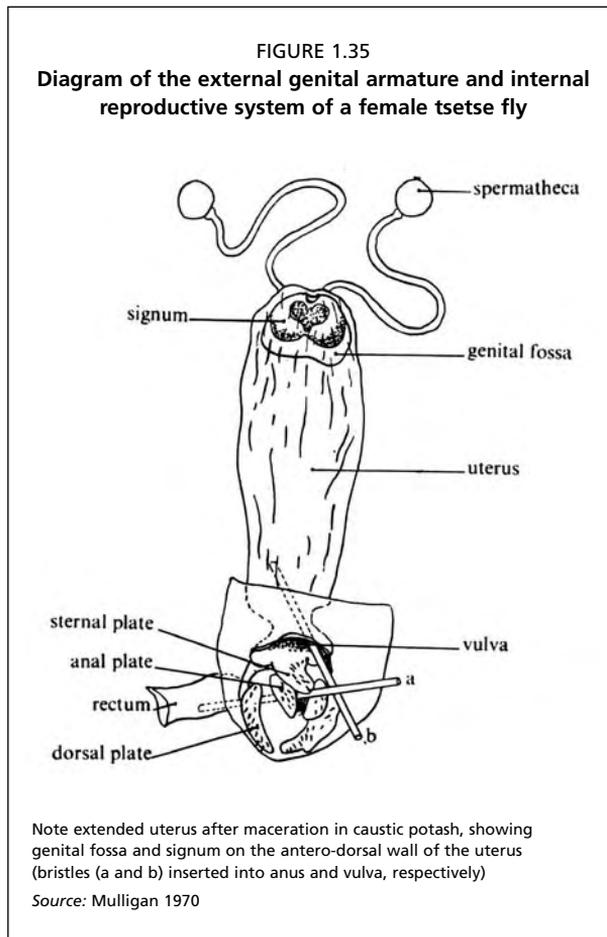


18. Processes of harpes bifid (**Figure 1.32e**). Coast of Gulf of Guinea and Liberia to Nigeria *medicorum*
Processes of harpes simple, not bifid **19**
19. Harpes consist of a pair of long slender processes curving upwards and tapering (**Figure 1.32b**). Northern East Africa including the southern border of the Sudan, Ethiopia, Somalia, Kenya, northern Uganda and northern border of Tanzania *longipennis*
Harpes consist of a basal triangular portion, the bottom corner of which is drawn out into a bluntly ending process, strongly chitinized; covered by a membrane thickly studded with short squamiform (scale-like) spines (**Figure 1.33c**). (The male terminalia do not differ in the two subspecies of *G. nigrofusca* but these are easily differentiated by other characters (see 1.5.1.1, couplets 8-11)). West Africa, Liberia, Ivory Coast, Ghana, Nigeria and along the northern border of the Democratic Republic of the Congo and adjacent portions of territories to north and west of these, as *n. nigrofusca*; extreme east of Democratic Republic of the Congo and extreme west of Uganda *n. hopkinsi nigrofusca*
Harpes large and arched; toothed (**Figure 1.32f**) *frezili*
20. None of the three pairs of processes with bifid members (**Figures 1.33d, 1.34f**) **21**
Distal pair of processes with bifid members (**Figures 1.33a, 1.34b**) **23**
21. Harpes with the processes of the proximal and middle pairs dilated towards their tips, only the distal ones tapering to a point; all three pairs of approximately the same length (**Figure 1.33f**). Eastern edge of equatorial forest in the Democratic Republic of the Congo from its boundary with the Central African Republic to the Kivu area *vanhoofi*
Harpes none of the processes dilated distally; pairs of processes not all of approximately the same length (**Figures 1.33d, 1.34d**) **22**
22. Harpes with proximal pairs of processes the shortest of the three pairs (**Figure 1.32d**) Central Africa, Republic of Congo, western Democratic Republic of the Congo and Angola (on the Congo river system) *schwetzi*
Harpes with the middle one of the three pairs of processes the shortest; the processes of the last pair characteristically with a dark base, the rest of it being clear and somewhat transparent (**Figure 1.33d**). Central Africa (Cameroun), Democratic Republic of the Congo, southern Sudan, Uganda, and western Kenya *fuscipleuris*
23. Harpes with processes of all three pairs tapering to a point **24**
Harpes with processes of one or other of pairs dilated distally or in form of blunt protuberances (**Figure 1.33e**) **25**

- 24.** Harpes with proximal pairs of processes markedly longer than the other two pairs, characteristic form and disposition of the processes as shown in **Figure 1.33b**. Southern Sardauna province of Nigeria, Central African Republic, Republic of Congo, Gabon and Angola (Belize, in Kabinda area) *nashi*
Harpes with proximal pairs of processes not markedly longer than the other two pairs, characteristic form and disposition of the processes as shown in **Figure 1.32a**. West coast of Africa (Ivory Coast and Ghana, and from Nigeria to the Democratic Republic of the Congo, where stretches inland nearly to the eastern boundary of that territory) *tabaniformis*
- 25.** Proximal and middle pairs of processes of harpes peg like; processes of distal (bifid) pair in form of blunt protuberances (**Figure 1.33e**). West and Central Africa (south-western corner of Nigeria to Republic of Congo, Democratic Republic of the Congo and Angola (in the Kabinda area)) *haningtoni*
Middle pair of harpes with processes dilated distally, the proximal and distal (bifid) pairs with pointed processes (**Figure 1.33g**) **26**
- 26.** A macrophallic form; proximal pair of processes stout, short and peg like reaching to about the middle of the second pair, members of which are broadly dilated distally, with shallowly convex serrated distal margin, and relatively broad shafts; distal arm of the bifid sickle-shaped distal process as long as the proximal part (**Figure 1.33g(a)**). West Africa (Republic of Guinea to central southern Ghana) *fusca fusca*
A microphallic form; proximal pair of processes straight, more slender, longer and tapering gradually to a point, about as long as the second pair, members of which are less broadly dilated and truncated distally, with straight serrated distal margin; distal arm of bifid sickle-shaped distal process about half the length of the proximal one or less (**Figure 1.33g (b)**). West and Central Africa (south-western Ghana and Benin to western Uganda and Democratic Republic of the Congo, as far south as the south-eastern corner near the border of Angola) *fusca congolensis*

1.5.1.3. By the Female Genital Armatures and Signa

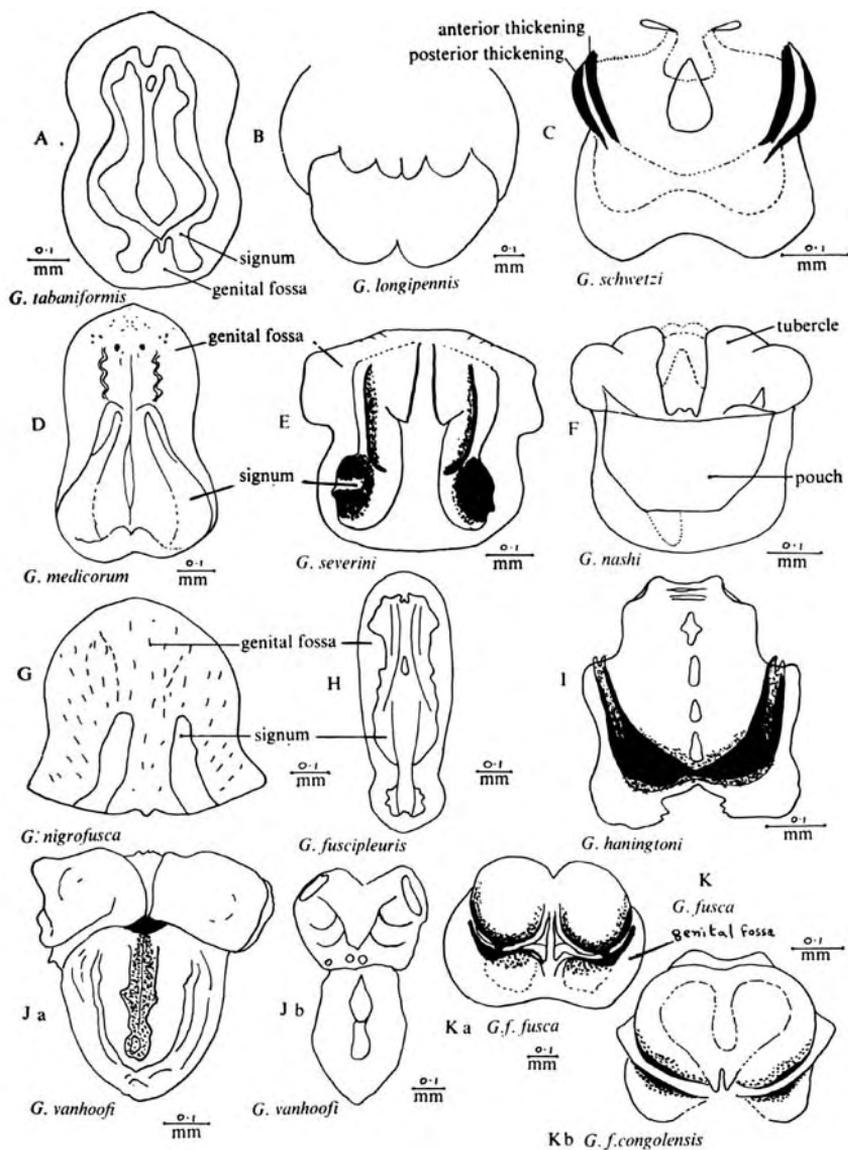
- 1.** External genital armature consists of five or six well-defined chitinous plates (**Figures 1.12, left**); signum (a chitinized plate of the anterior end of the uterus (**Figure 1.35**)) may or may not be present **2**
External genital armature very much reduced, well-defined chitinous plates being generally absent and not exceeding three if present (**Figure 1.12c**); signum never present *morsitans* group (subgenus *Glossina* s.s.)
- 2.** External genital armature consists of five well-defined chitinous plates (**Figure 1.12a**); signum present in all species except one **3**
fusca group (subgenus *Austenina*) **3**
External genital armature consists of six well-defined chitinous plates (**Figure 1.12b**); signum never present *palpalis* group (subgenus *Nemorhina*) **15**



3. No signum; in addition to the well defined chitinous plates there are two "hamate" (hook- or comma-shaped) sclerites at the base of the anal plates (found only in this species) *brevipalpis*
Signum always present, though it may be only very weakly chitinized in freshly emerged specimens, particularly in some species (e.g. *G. longipennis*) **4**
4. Signum consists of separated paired chitinous plates **5**
Signum consists of single unpaired chitinous plates **6**
5. Signum much reduced, the "plates" being only two widely separated submedial strips of pale chitin running upwards from the bottom of the genital fossa to about half way up it (**Figure 1.36g**) *nigrofusca*
Signum not reduced, the plates being well defined, and of characteristic shape, expanded at the tip and approximated to one another, occupying most of the genital fossa (**Figure 1.36e**) *severini*

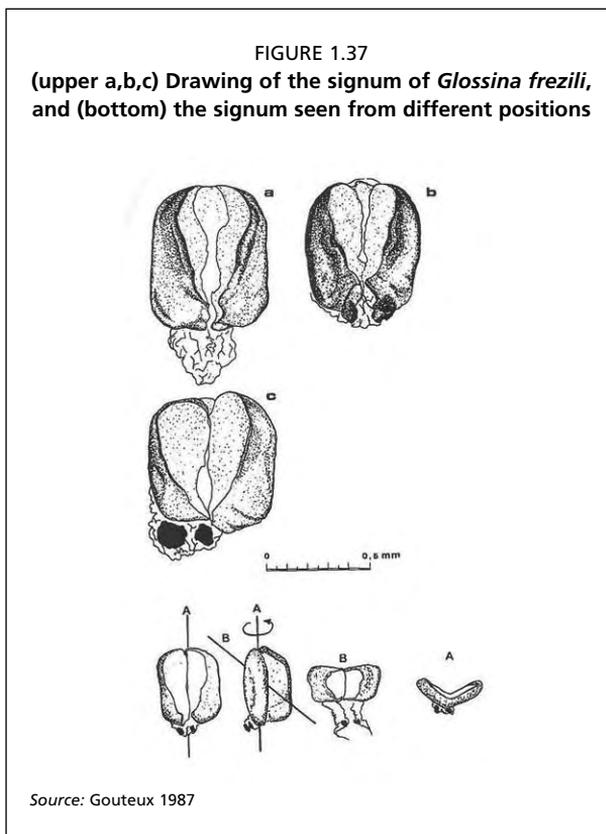
6. Signa elongated vertically, somewhat lyriform in shape (**Figure 1.36a,h**) **7**
 Signa of various shapes but never lyriform **8**
7. Signum strongly flexed or even bent double in the middle of its length, sides roughly parallel, with two transverse constrictions towards bottom and top (**Figure 1.36h**) *fuscipleuris*
 Signum not flexed and sides not roughly parallel, divided into two unequal portions by a transverse constriction, the bottom margin with divergent horns laterally and the top one more or less deeply bifurcate (**Figure 1.36a**) *tabaniformis*
8. Signum cordiform in outline (**Figure 1.36d**) *medicorum*
 Signum distinct and formed of two flat hollowed out shell-like plates placed opposite to each other along their length (**Figure 1.37**) *frezili*
 Signum not cordiform **9**
9. Signa with conspicuous paired dark-curved chitinous thickenings (as in **Figure 1.36c**) **10**
 Signa without such thickenings **13**
10. Signa subrotund **11**
 Signa not subrotund **12**
11. Signum mainly composed of two lobes separated anteriorly by a deep V-shaped depression (**Figure 1.36k(a)**) *fusca fusca*
 Signum mainly composed of two lobes separated anteriorly by only a shallow depression (**Figure 1.36k(b)**) *fusca congolensis*
12. Shape of signum as in **Figure 1.36c**, particularly characteristic being the small processes directed outwards from the anterior corners; the paired chitinous thickenings situated anteriorly and not continuous medially, sometimes a separated second pair behind the first *schwetzi*
 Shape of signum as in **Figure 1.36i**, no outwardly directed anterior processes; the paired chitinous thickenings situated posteriorly, and continuous medially, so forming a crescent *haningtoni*
13. Signum in the form of the bottom part of a circle, the curved portion directed posteriorly and cut into medially by a V-shaped notch, separating the half circle into two lobes; tends to be very weakly chitinized, so much so in a freshly emerged specimen that it was originally missed when the female genital armatures were described; occupying only a small portion of the genital fossa posteriorly (**Figure 1.36b**) *longipennis*
 Signum not so shaped and occupying most of genital fossa **14**

FIGURE 1.36
Signa of female tsetse of the *fusca* group



(a) *Glossina tabaniformis*, (b) *Glossina longipennis*, (c) *Glossina schwetzi*, (d) *Glossina medicorum*, (e) *Glossina severini*, (f) *Glossina nashi*, (g) *Glossina nigrofusca*, (h) *Glossina fuscipleuris*, (i) *Glossina haningtoni*, (j(a-b)) *Glossina vanhoofi*, (k(a)) *Glossina fusca fusca*, and (k(b)) *Glossina fusca congolensis*

Source: Mulligan 1970



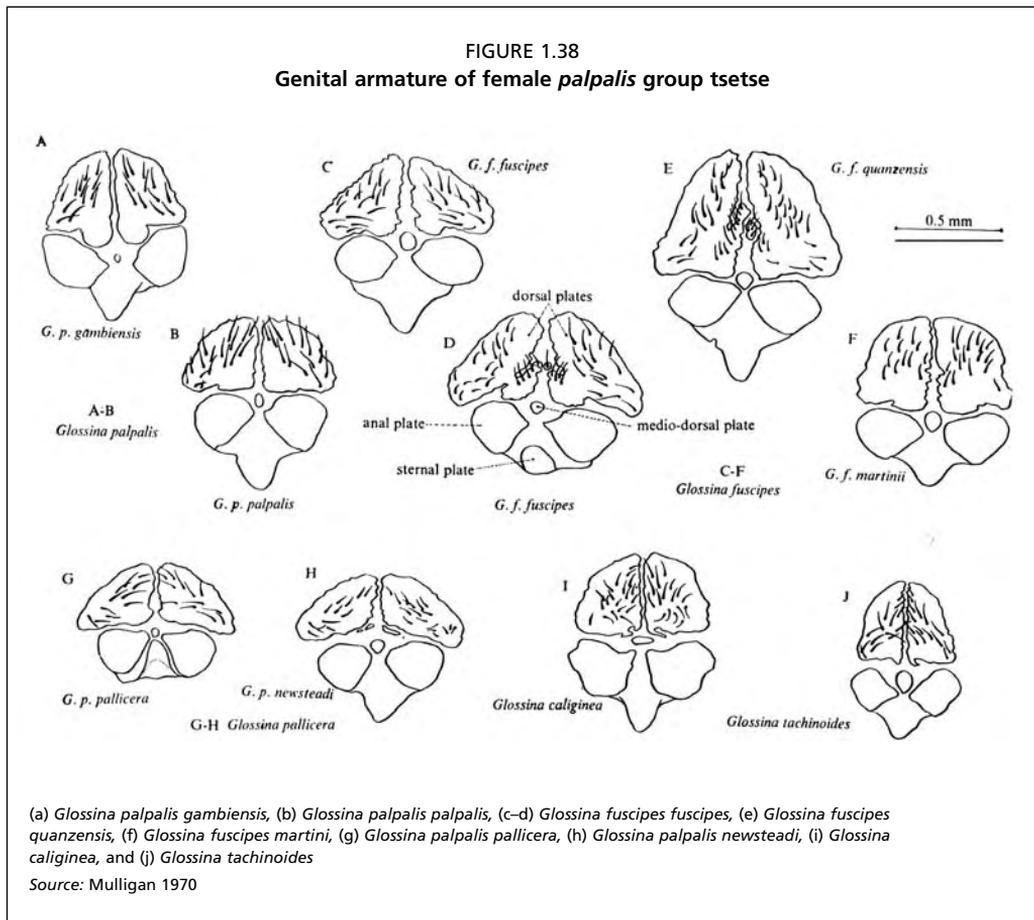
- 14. Signum of uterus with two anterior bilobed tubercles tapering posteriorly into hollow stalks that lead into a sporran-shaped pouch (**Figure 1.36f**) *nashi*
 Signum of uterus consisting of two parts, the upper a hollow lobe capping the lower one, a truncated cone in which there is a median chitinous plate in the form of a spear head with the point directed anteriorly (**Figure 1.36j**) *vanhoofi*

- 15. Median plate of external genitalia broader than tall (**Figure 1.38i**) *caliginea*
 Median plate as tall as broad or taller **16**

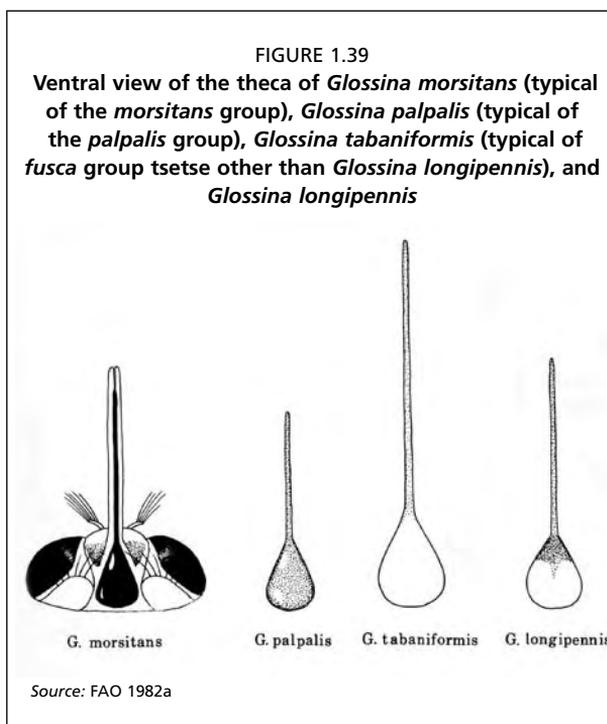
- 16. Dorsal plates taller than broad **17**
 Dorsal plates as tall as broad or nearly so **20**

- 17. Dorsal plates nearly twice as tall as broad (**Figure 1.38j**) *tachinoides*
 Dorsal plates never nearly twice as tall as broad **18**

- 18. Dorsal plates extending laterally well beyond width of anal plates (**Figure 1.38e**) *fuscipes quanzensis*
 Dorsal plates not extending laterally beyond width of anal plates **19**



19. Inner angles of dorsal plates projecting markedly downwards below base of plates; median plate very small (**Figure 1.38a**) *palpalis gambiensis*
Inner angles of dorsal plates not so projecting; median plate large (**Figure 1.38f**) *fuscipes martinii*
20. Dorsal plates markedly broader than tall (**Figure 1.38g,h**) *pallicera* s.l.
Dorsal plates about as broad as tall or only slightly broader **21**
21. Dorsal plates very close together; hairs more robust and absent from median space and internal angles (**Figure 1.38b**) *palpalis palpalis*
Dorsal plates comparatively widely separated; hairs less robust and almost always present on internal angles and often on median space as well (**Figure 1.38c,d**) *fuscipes fuscipes*



1.5.1.4. Additional Features Useful for Identification

There are a few key features that are used for identification of most species, for example, the superior claspers can distinguish all species of male *morsitans* group flies, the inferior claspers distinguish the *palpalis* group males, whilst the shape of the signa is characteristic of all *fusca* group female tsetse. *Palpalis* group and *fusca* group tsetse are best identified by examination of the genitalia rather than using the key in 1.5.1.1. The females of the *morsitans* group must be identified by use of the key in 1.5.1.1. The females of the subspecies of *G. pallicera* and *G. p. newsteadi* cannot be separated by their external genitalia, but are easily distinguished from each other by external characters (1.5.1.1.). Some species or groups of tsetse can be distinguished by the colour of the thecal bulb (**Figure 1.39**). *Fusca* group tsetse, except for *G. longipennis*, have a very pale brown thecal bulb when viewed from underneath; that of *G. longipennis* has a darker apex, in contrast to *G. brevipalpis*, whilst the thecal bulb of *morsitans* and *palpalis* group tsetse is dark brown or nearly black. This is a useful feature as the latter two species occur in the same habitat.

1.6. GLOSSARY OF TERMS

The terms used here, although apparently obscure words often have precise meanings and are commonly used in botanical and zoological keys.

Apical	At the tip, or apex
Bifid	Divided by a deep cleft into two parts
Bifurcated	Divided into two branches (two forked)