

Tabanidae (Diptera) from Taï National Park, Côte-d'Ivoire with descriptions of three new species

Philip D. TAYLOR & John E. CHAINEY

Taylor, P. D. & Chainey, J. E. 1994. Tabanidae (Diptera) from Taï National Park, Côte-d'Ivoire with descriptions of three new species. *J. Afr. Zool.* 108: 467-479.

Eight genera and 29 species of Tabanidae were collected from Taï National Park in southwest Côte-d'Ivoire (Ivory Coast) in 1989 and 1990. *Rbigioglossa (Dasycompsa) montonenae* sp. n., *Tabanus menoensis* sp. n., *Tabanus taiensis* sp. n. and the female of *Spbecodemyia infuscata* are described. Our material suggests that *Tabanus secedens* Walker s. lat. should be split into the nominal forms: *Tabanus gabonensis* Macquart, *Tabanus kingsleyi* Ricardo, *Tabanus regnaulii* Surcouf and *Tabanus secedens* Walker. The type of *Tabanus conformis* Walker is declared to be of oriental origin, and the former type *Tabanus socialis* Walker is reinstated as the type of the African specimens formerly identified as *T. conformis*. *Chrysops langi* Bequaert, *Tbriambeutes singularis* Grünberg, *Rbigioglossa apiformis* Neave, *T. gabonensis* and *Haematopota boudeni* Oldroyd are recorded for the first time from Côte-d'Ivoire. The varied tabanid fauna of Taï National Park further supports the importance of the Upper Guinea Forest block as a centre of faunal diversity in Africa.

Tabanidae (diptera) du Parc national Taï, Côte-d'Ivoire, et description de trois nouvelles espèces. - Huit genres et 29 espèces de Tabanidae ont été récoltés dans le Parc national Taï dans le sud-ouest de la Côte-d'Ivoire en 1989 et 1990. *Rbigioglossa (Dasycompsa) montonenae* sp. n., *Tabanus menoensis* sp. n., *Tabanus taiensis* sp. n. et la femelle de *Spbecodemyia infuscata* sont décrits. Notre matériel suggère que l'espèce *Tabanus secedens* Walker s. lat. devrait être scindée sous les formes nominales suivantes : *Tabanus gabonensis* Macquart, *Tabanus kingsleyi* Ricardo, *Tabanus regnaulii* Surcouf et *Tabanus secedens* Walker. Le type de *Tabanus conformis* Walker est d'origine orientale et l'ancien type *Tabanus socialis* Walker est redésigné comme le type des spécimens africains identifiés précédemment sous le nom de *T. conformis*. *Chrysops langi* Bequaert, *Tbriambeutes singularis* Grünberg, *Rbigioglossa apiformis* Neave, *T. gabonensis* et *Haematopota boudeni* Oldroyd sont cités pour la première fois de Côte-d'Ivoire. La faune variée des tabanides du Parc national Taï confirme l'importance du bloc forestier de Haute Guinée en tant que centre de diversité faunistique en Afrique.

Key words: Tabanidae, Côte-d'Ivoire, Upper Guinea, taxonomy, new species, phenology

P. D. Taylor (*), Dept of Biology, Carleton University, Ottawa, ON, Canada. - J. E. Chainey, The Natural History Museum, Cromwell Road, London SW7 5BD, U.K.

INTRODUCTION

Here we present a summary of Tabanidae collected in Taï National Park (TNP), Côte-d'Ivoire. TNP is part of the largest intact forest block in West Africa and is centred in the core of one of the

postulated centers of endemism in the forests of West Africa (known as the Upper Guinea forests) (Hamilton & Taylor 1991; Martin 1991). At over 330,000 ha in size, it is one of largest protected areas in West Africa. Since its establishment as a National Park 1972 (50 years after its designation as a forest and wildlife refuge) it has been accepted as a UNESCO biosphere reserve (1978) and a World Heritage Site (1982). Surveys of a number of groups of insects

(*) Correspondence to: Dept Biology, Acadia University, Wolfville, NS, Canada B0P 1X0.

(mainly Coleoptera, Diptera, Hemiptera, Heteroptera, Homoptera) have established that the park protects a diverse fauna that typifies the Upper Guinea forests and contains numerous undescribed species (Couturier & Guillaumet, 1986; Couturier & Gillon, 1988). These insect surveys combined with surveys of vegetation, birds and mammals have clearly established that Taï National Park is of vital importance for the protection of West African forest biodiversity (Allport, 1991; Gartshore *et al.* 1994; Couturier & Gillon, 1988).

Doucet *et al.* (1958) summarized collections of Tabanidae from Côte-d'Ivoire. Since then, Morel and Ovazza (1963) made collections from the Liberian side of Mount Nimba and Morris (1963) summarized collections from Liberia, at the northern edge of the Upper Guinea forest. We are aware of no additional systematic work in the Upper Guinea forest on this important group of biting flies. Compared to most of the rest of the African fauna, the Tabanidae of the Upper Guinea forest is poorly known—a serious deficiency because of the area's known importance as a centre of endemism.

During a four month period (December 1989 to April 1990) PDT made daily collections of Tabanidae using a variety of traps. These collections are the first extensive collections of Tabanidae from the region since Morris's (1963) collections from nearby Liberia. In the present paper, we augment his picture of the temporal distribution and habitat preferences of some West African forest Tabanidae (through the dry season; December-April), record 5 additional species for Côte-d'Ivoire and describe 3 new species. These observations add to our knowledge of the biodiversity of the region and further establish the importance of Taï National Park for protecting this biodiversity.

COLLECTIONS

Taï National Park is situated in southwestern Côte-d'Ivoire between the Cavally River (the border with Liberia) and the Sassandra River. It is the most extensive protected area within the Upper Guinea forest and encompasses a variety of seasonal wet forest, inselberg (large granitic outcrops with deciduous vegetation) and riverine environments (Legrand & Couturier, 1985). Mean annual rainfall varies from 1700 mm in the north to 2200 mm in the south with peaks in June and September. Daily mean temperatures range from 25–35°C (Stoorvogel, 1993).

Between 19 December 1989 to 28 March 1990 one of us (PDT) made daily collections of Tabanidae using a single Malaise trap (Gressitt & Gressitt, 1962), a Manitoba trap (Thorsteinson *et al.* 1965), hand nets and vehicles. My whereabouts were dictated by other work so I made no effort to standardize sampling by season or habitat. While at any given location in the park, I sampled as many distinct habitats as possible. These included: secondary forest (larger trees had been removed in the previous 25 years), primary forest treefall gaps, edges of primary/secondary forest, inselbergs and riverine forest. Virtually all collections were made at two locations: the vicinity of the Institute Ecologie Tropical research station (IET station) mid-way along the western border of the park (5°50'N, 7°20'W) and along the Meno river in the interior of the park *ca.* 20km east of the IET station (5°48'N, 7°13'W) in secondary, primary and riverine forest habitats. Some additional collections were made at the north-west corner of the park (6°7'N, 7°25'W), towards the southern border of the park (5°27'N, 7°15'W), and in areas along the border of the park. For each specimen collected, I noted the trap type, location, date, and the dominant habitat.

Specimens were identified using Oldroyd (1952, 1954, 1957) and reference material from the Natural History Museum (London) (BMNH). Most specimens were compared directly with material from the BMNH and (for *Tabanus menoensis* sp. n.) with specimens of *Tabanus sowi* Seguy, *Tabanus rickenbachi* R. & T. and *Tabanus procedens* R. & T. from the collection of the Florida Department of Agriculture, USA. Types and vouchers for all species have been deposited in the Natural History Museum (London).

To determine if species had affinities to particular habitats, we selected those species collected from within secondary, primary and riverine forest habitats and for which there were more than 10 specimens. We divided the collecting period into 3 seasons—the end of the wet season: 19 December 1989 to 31 December 1989; dry season: 1 January 1990 to 21 February; and the beginning of the wet season: 22 February to 28 March—and constructed three-way contingency tables of SPECIES X HABITAT X SEASON. Since we knew collecting effort was not distributed equally through habitats and season, we fit a log-linear model (Sokal & Rohlf, 1981) containing the interaction term HABITAT X SEASON (and lower-order terms) to the contingency table, and then examined tables of studentized residuals. The studentized residuals correct for differences in collecting effort between habitat and season, and so reveal associations between species and habitat, and between species and season. High positive residuals indicate that a species was collected more frequently than expected in a given season and habitat. We make no statistical inferences because the contingency tables contained large numbers of zeros, but consider studentized residuals in excess of 3 to be of interest.

DESCRIPTIONS AND TAXONOMY

Tabanus menoensis sp. n.

Description of female

Head. - Eyes unbanded with short white hairs. Frons (Figure 1a, index 4.2) greyish brown with black hairs, indistinctly shining at vertex; calli dark brown. Subcallus yellowish-brown pollinose. Clypeus and parafacials pale yellowish with concolorous hairs. Antennae (Figure 1b): scape and pedicel brown through thick grey tomentum; flagellum dark red-brown becoming blackish apically. Palps (Figure 1c) yellow-brown with pale hairs basally, otherwise with black hairs. Proboscis black.

Thorax. - Mesoscutum and scutellum black through grey tomentum with indistinct traces of grey median and sublateral stripes; hairs mixed light and dark but tufts of long white hairs posterior to wing bases. Pleura yellowish-grey with concolorous hairs (mesopleuron with some black hairs). Legs: coxae concolorous with pleura; femora dark grey with mixed light and dark hairs; tibiae light yellowish, becoming blackish apically, with mostly white hairs including fringe on hind tibia; tarsi black. Wing hyaline, vein R4 without appendix. Halteres dark brown with whitish knob. Squamae light brown.

Abdomen. - Tergites blackish-brown with indistinct pale median triangles (largest and most distinct on tergite 2), light greyish hind-margins and diffuse grey oblique sublateral spots; hairs largely concolorous with background. Sternites dark grey with pale hind-margins and black haired except on hind-margins which are white haired.

Lengths. - Body 12.5 mm, wing 10.5 mm.

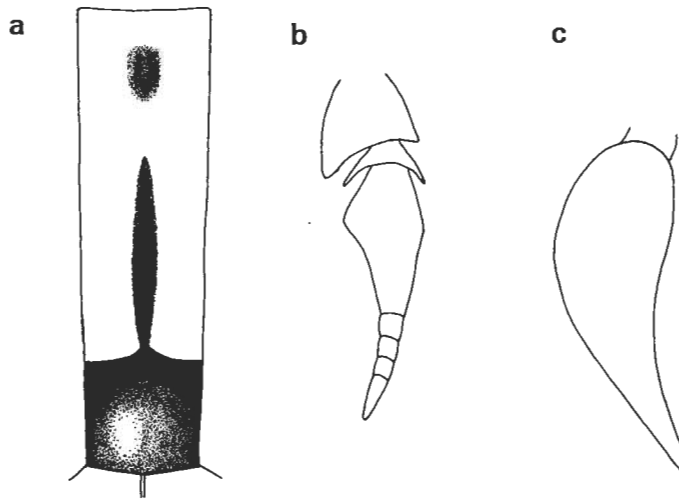


Fig. 1. - Frons (a), antennae (b) and palps (c) of *Tabanus menoensis*.

Comments. - This species is structurally similar to others in the *Tabanus chevalieri* group but is considerably darker in overall appearance. *T. menoensis* is closest in general appearance to *Tabanus sowi* Goodwin, but has much less distinct sublateral spots and densely pilose eyes. It can be distinguished from other members of the group by the following combination of characters: eyes densely pilose; frons with basal callus higher than wide; palps predominantly black haired; yellowish brown subcallus; clypeus and parafacials dull yellowish with concolorous hairs; wings clear; venter of abdomen with entirely black hairs except on hind-margins.

***Tabanus taiensis* sp. n.**

Description of female

Head. - Eyes bare; when revived bronze with a rather indistinct single green band that is approximately as wide as the length of the scape. Post-occipital fringe black. Frons (Figure 2a) strongly convergent basally (index 8.5), dark brown or silvery depending on light direction and with blackish calli; the lower callus not separated from eye-

margins. Subcallus shining dark brown. Clypeus and parafacials grey with white hairs. Antennae (Figure 2b): scape and pedicel light orange through grey tomentum; flagellum dark red-brown. Proboscis black.

Thorax. - mesoscutum and scutellum black-brown, greyer anteriorly with a pair of light grey sublateral stripes on anterior half and a light grey band across posterior rim of mesoscutum and basal two-thirds of scutellum; hairs light yellowish on anterior half, otherwise concolorous with background. Notopleuron light brown with long black hairs. Pleura grey (brown on upper half of mesopleuron) with mostly whitish hairs except for a stripe of more greyish hairs from below notopleuron downwards. Legs: coxae concolorous with pleura; femora black with mixed light and dark hairs; tibiae light yellowish with black apices and hairs mostly concolorous with background; tarsi black. Wing hyaline, vein R4 without appendix. Halteres and squamae blackish.

Abdomen. - Tergites dark brown with pale pattern as follows (hairs mostly concolorous with background): tergite 1

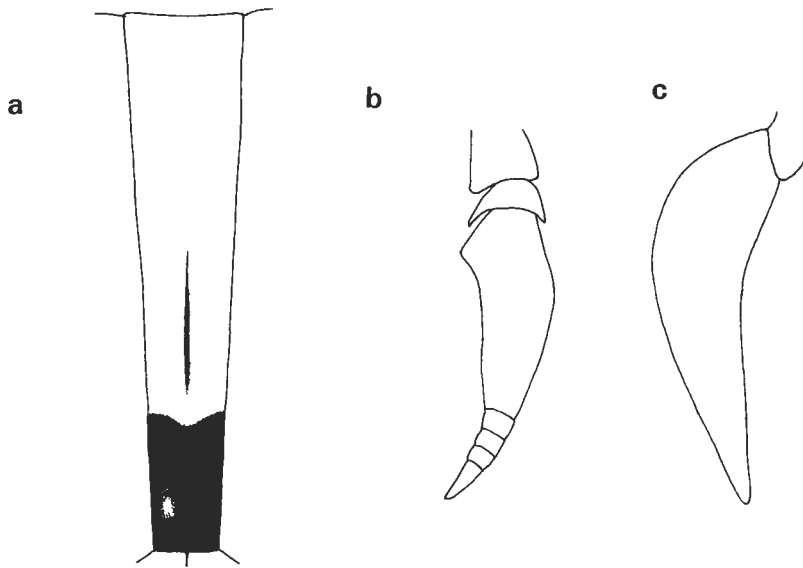


Fig. 2. - Frons (a), antennae (b) and palps (c) of *Tabanus taiensis*.

grey laterally and with small median spot of white hairs; tergite 2 with median white triangle which is broader than high and reaches about half way up segment and large white spots laterally along hind-margin; tergites 3 and 4 similar but with lateral spots joined to median triangle along hind-margin; tergites 4 and 5 with narrow whitish hind-margins. Sternites dark brown with broad diffuse grey hind margins; sternite 2 and hind-margins with white hairs, otherwise hairs black.

Lengths. - Body 13 mm, wing 11 mm.

Comments. - This species is structurally similar to *T. triquetromatus* with which it occurs. *T. taiensis* differs in having distinct sublateral stripes on mesoscutum, abdominal tergites with lower, broader median triangles and larger lateral spots and sternites with hind-margins much less distinct. The eyes of *T. triquetromatus* when revived are bright purple with a bright green band that is wider than the length of the scape.

***Rhigioglossa (Dasycmpsia) montonenae* sp. n.**

Description of female

Head. - Eyes unbanded, covered with dark hairs. Postocular rim with mixed light and dark hairs. Frons (Figure 3a; index 1.3): yellowish-grey on basal third, otherwise dark brown; hairs mostly black but with some pale hairs basally. Subcallus, clypeus and parafacials yellowish-grey with pale yellowish hairs. Antennae (Figure 3b): scape and pedicel showing orange through greyish tomentum and with light and dark hairs; flagellum with only 3 terminal flagellomeres, black except extreme base which is concolorous with pedicel. Palps (Figure 3c) brownish grey with mixed light and dark hairs. Proboscis black, shorter than height of head.

Thorax. - Mesoscutum and scutellum shining black through brownish grey tomentum; with white hairs except for a broad band of black hairs before suture (including notopleuron) and another black band posterior to wing bases.

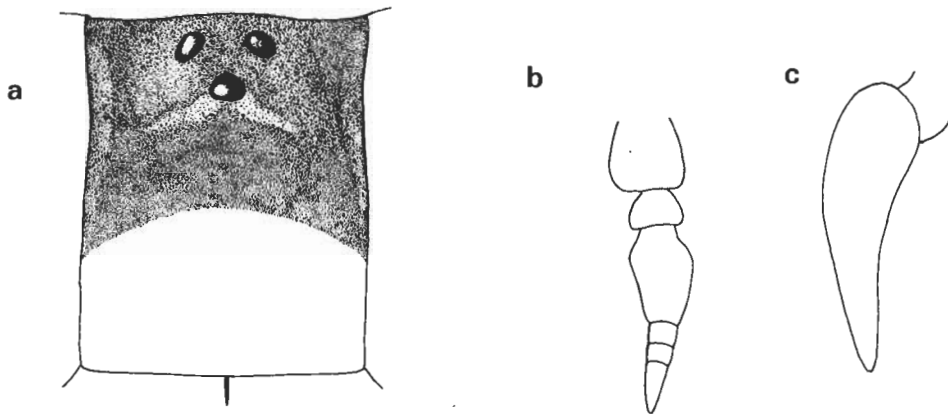


Fig. 3. - Frons (a), antennae (b) and palps (c) of *Rbigioglossa montonenae*.

Pleura grey with whitish hairs except on mesopleuron where mixed with black hairs. Legs: coxae concolorous with pleura; femora black-brown and black haired, but with white hairs dorsobasally on mid femur; tibiae mostly pale cream coloured but with apical half of fore tibia and apices of mid and hind tibiae black, hairs largely concolorous with background but hind tibia with a fringe of long black hairs; tarsi black. Wings with extreme base black and costal cell yellowish-brown, otherwise hyaline but faintly yellowed basally. Halteres and squamae blackish.

Abdomen. - Tergite 1 orange with whitish hairs. Tergite 2 basally concolorous with tergite 1, the orange area distinctly narrowing medially. Rest of tergite 2 and other tergites blackish with distinct pale hind-margins, the hairs concolorous with background. Sternites similar but with broader pale hind-margins.

Lengths. - Body 13 mm, wing 12 mm.

Comments. - Closely related and structurally similar to *Rbigioglossa cincta* Enderlein but that species has entirely pale haired palps, mesoscutum with pale bands yellow haired, entirely pale haired pleura, dense long yellow hairs on

notopleuron and adjacent part of mesopleuron, darker wings with dark brown costal cell and tergite 2 mostly orange with only a narrow posterior black band that is not expanded medially. Since these two forms occur together without indications of intergrades these differences are considered sufficient to justify separation at the species level. The presence of these two structurally similar taxa at one locality suggests that earlier placement of *R. cincta* as being conspecific with *R. apiformis* Neave may have been premature and for this reason we list *R. cincta* as a full species.

Spbecodemyia infuscata Oldroyd, 1957 (female)

Head. - (except eyes) mostly shining orange. Frons (index 2) with basal half mostly filled with swollen orange callus; vertex swollen with 3 ocelli that enclose a black spot. Parafacials and genae yellow tomentose along eye margins and genae with mostly dark hairs. Antennae, palps and proboscis concolorous with head; scape longer than pedicel but not swollen; palps swollen and with orange hairs; labellae darker apically.

Thorax. - largely orange but with the following black areas: mesoscutum with a median oblong patch adjacent to the

black scutellum; peropimeron; hind margin of anepisternum; anepimeron; katatergite; katepimeron. Hairs mostly concolorous with background but mesoscutum with entire median third black haired and katepisternum black haired. Legs orange with orange hairs. Wings dark brown, but with costal cell more yellowish and anal cells almost hyaline except at base. Squamae black. Halteres orange.

Abdomen. - Tergite 1 black along margin with scutellum, otherwise orange with orange hairs. Tergite 2 narrowly orange on anterior margin, otherwise black with black hairs. Tergites 3-6 black with black hairs. Terminalia orange. Venter of abdomen similar to dorsum.

N.B. - There is a female of this species in the Canadian National Collection (Biosystematics Research Institute, Ottawa) collected in Zaria, Samaru, N. Nigeria. 20 September 1968, in house.

Taxonomy of *Tabanus secedens* Walker, 1854

Oldroyd (1954) lumped under the name *Tabanus secedens* "all specimens with two prominent yellow, or yellow-grey, thoracic stripes..." which included descriptions of 11 species.

We collected a long series of nominal *T. secedens*, which can be separated into four forms based on the colour and width of the thoracic stripes, the size and shape of the sublateral spots and size. The four forms correspond precisely to four of the species that Oldroyd lumped viz. *Tabanus secedens* Walker, 1854, *Tabanus gabonensis* Macquart, 1855, *Tabanus kingsleyi* Ricardo, 1908 and *Tabanus regnaulti* Surcouf, 1912. There is variation within forms, but all but one of 247 specimens can be unambiguously placed into one of the groups and males of two forms (*T. kingsleyi* and *T. gabonensis*) are readily associated with the females. In addition to the clear

morphological separation of the forms, there are both seasonal and habitat differences in the occurrence of each form (Figure 4; results).

Oldroyd (1954) felt that *T. secedens* was likely a group of three closely related species viz. *T. secedens*, *T. kingsleyi*, and *T. regnaulti*, and designated the later two as identifiable subspecies. He stated that he did not distinguish between them because intermediates existed which he felt could not be placed. We are confident that four species occur in TNP which we associate with: *T. secedens* Walker (with *Tabanus camaronensis* Bigot and *Tabanus ignotus* Surcouf as questionable synonyms); *T. gabonensis* Macquart (with *T. blanchardi* and *T. brunnescens* Ricardo as synonyms); *T. kingsleyi* Ricardo and *T. regnaulti* Surcouf. We cannot readily assign *T. claripes* Ricardo or *T. mesquitelai* (a recently described Travassos Dias species that obviously belongs with *T. secedens* s. lat.) to any of these forms. Although many specimens from other localities can be placed with one of these taxa, *T. secedens* s. lat. shows great variation and some specimens appear to be intermediate between the apparently distinct species found in TNP. Other specimens probably represent undescribed species.

A revised key to species of *Tabanus "secedens"* s. lat. in TNP is presented in Table 1.

Taxonomy of *Tabanus conformis* Walker, 1848

The type of *Tabanus conformis* in the BMNH has a frons and proboscis (labella partly shining) that unquestionably affiliates it with Oriental species near to *Tabanus effilatus* Schuurmans Stekhoven. The locality on the specimen label is unclear and difficult to read. It is apparent to us that the species within Oldroyd's (1954) *T. conformis* group are more correctly associated with *Tabanus*

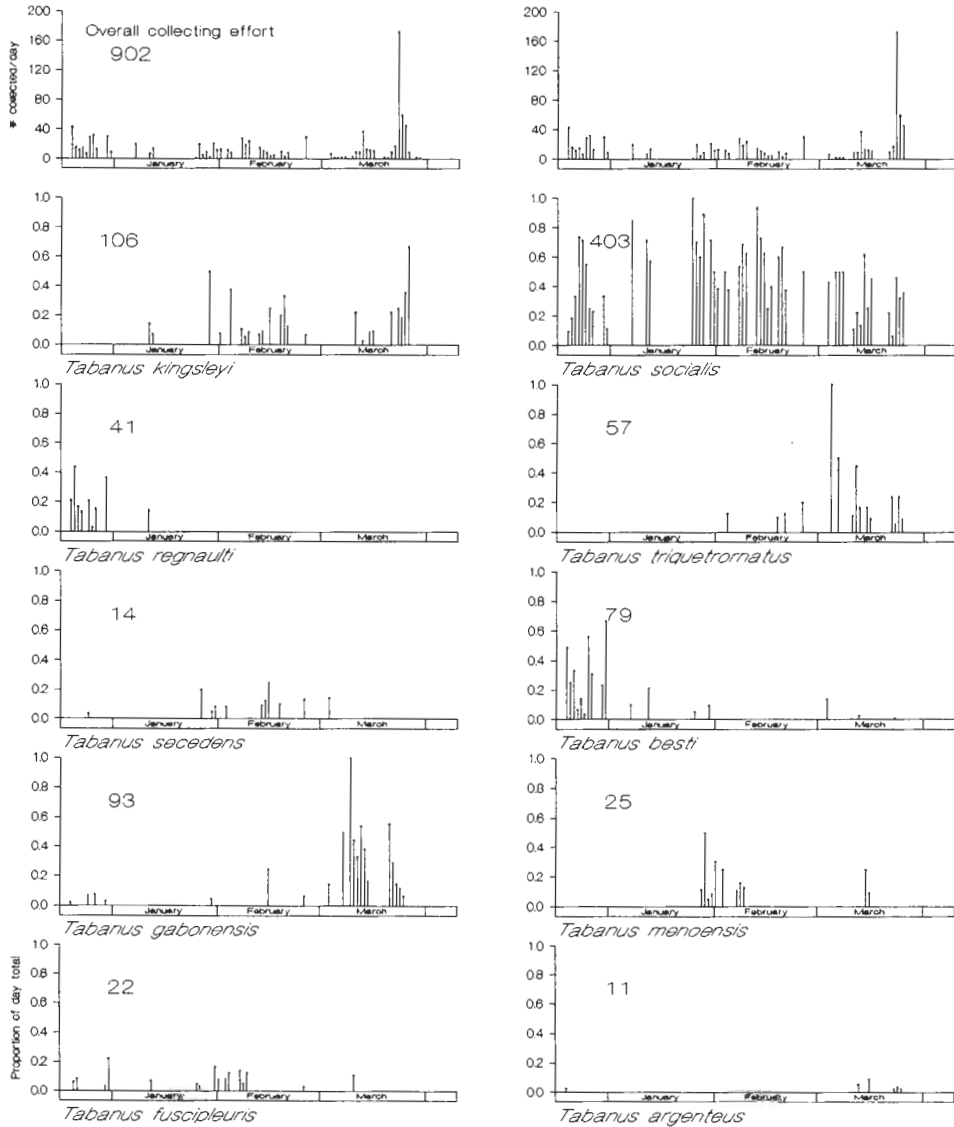


Fig. 4. - Proportion of daily catches of the most common Tabanidae collected in all habitats in Tai National Park, Côte-d'Ivoire, December 1989-April 1990. On the left are grouped members of the *Tabanus secedens* complex. The top of each column shows the number of tabanids collected on that day. No collecting was done on days with no bars. The number in each sub-graph is the total number of individuals collected of that species.

Table 1. - Key to species of *Tabanus "secedens"* s. lat. in Taï National Park, Côte-d'Ivoire

1. Females	2
Males	5
2. Sublateral stripes on thorax broader than antennal scape is high. Abdomen predominantly brown, contrasting with ground colour of mesoscutum	3
Sublateral stipes narrower than scape is high. Abdomen black or if a little brownish then not strongly contrasting with ground colour of mesoscutum	4
3. Abdomen with sublateral spots absent. Median spots united into distinct but diffuse yellow-haired stripe. Hind margins of tergites distinctly blackish. Tergite 1 with no grey tomentose patch adjacent to scutellum	<i>gabonensis</i> Macquart, 1855
Sublateral spots distinct and overlain with whitish hairs. Median spot united into distinct even stripes with pale yellow hairs. Tergite 1 with greyish tomentose patch around border with scutellum, the colour similar to the thoracic stripes. Hind margins of tergites not black. .	<i>kingsleyi</i> Ricardo, 1908
4. Large species with abdomen a little brownish basally. Abdomen with indistinct sublateral spots covered with black hairs. Median triangles united into irregular stripe but partly obscured by black hairs except at apices of each tergite. Mesopleuron with mixed black and pale hairs	<i>secedens</i> Walker, 1854
Smaller black species with distinct pale haired sublateral spots on abdomen. Median triangles white haired and conspicuous, united into an irregular stripe. Mesopleuron mostly black haired	<i>regnaulti</i> Surcouf, 1907
5. Mesonotum mostly yellow haired with broad (wider than length of scape and pedicel combined) diffuse yellow sublateral stripes. Abdomen with yellow median stripe that is wider than the sublateral mesonotal stripes. Tergite 1 yellow at base	<i>gabonensis</i> Macquart, 1855
Mesonotum with hairs mostly concolorous with background colour and with narrower (about as wide as scape and pedicel combined), more clearly defined yellowish sublateral stripes. Abdomen with yellowish median stripe that is narrower than the sublateral mesonotal stipes. Tergite 1 greyish around border with scutellum	<i>kingsleyi</i> Ricardo, 1908

[No male specimens of *regnaulti* or *secedens* were captured in Taï National Park]

socialis. We therefore place *T. conformis* as an unknown within the Oriental group, and re-instate the name *Tabanus socialis* Walker, 1850 as the type of the African material previously named *T. conformis*. We point out that this still lumps together a wide variety of forms from most of Africa, and so likely represents a group of sibling species. Considerable work needs to be done on the group.

RESULTS AND DISCUSSION

A list of species collected by us in TNP and the ranges of dates is presented in

Table 2. A small number of additional specimens collected outside the main collection period are presented in Table 3. For each of the more common species (>10 specimens) collected we present graphs of relative seasonal abundance (Figure 4). The number of records for each species is presented as a proportion of the total number of specimens collected on that day. The resulting index gives a picture of the relative seasonal and daily abundance primarily as measured by the host-seeking traps.

The contingency-table analysis highlighted 8 species that were collected

more frequently than expected in a given season or habitat (based on the null model of no association between species and habitat, and species and season). These affinities are visible on Figure 4: *T. besti*, *T. regnaulti* - end of wet season; *T. socialis* - dry season; *T. fuscipleuris*, *T. menoensis* - riverine forest, dry season; *T. kingsleyi* - secondary forest, end of dry season; *T. gabonensis* - primary forest, end of dry season; *T. triquetromatus* - primary forest, end of dry season.

Several additional species (excluded from the contingency-table analysis because they were collected in low numbers) were collected exclusively in single habitat types and are noted in Table 2 and Table 3.

Habitat

Rhigioglossa cincta Enderlein and *R. montonenae* sp. n. were collected only in the riverbed of the Meno River. Oldroyd (1957) noted a riverine affinity in the subgenus *Mesomyia* (*Dasycompsa*), but attributed the affinity to the species being a canopy dweller, and the river offering a break in the canopy. I (PDT) collected several *R. cincta* which had alighted on black binoculars placed on a rock at the edge of a small river. They probed the surface of the binoculars long enough for me to capture them by hand—a behaviour indicative of host-seeking. In addition, the species was collected in host-seeking (Manitoba) traps placed at the edge of the river. It seems likely that the species uses the river bed for at least the host-seeking component of its behaviour. *T. men-*

Table 2. - Dates of occurrence and habitat affinities of Tabanidae collected in Taï National Park between 19.12.89 and 28.3.90.

Species	Range of Dates	Habitat Affinity	♀	♂
<i>Haematopota bowdeni</i>	15.02.90	Primary Gap	1	-
<i>H. grabami</i>	19.12.89 - 27.03.90	none	11	-
<i>H. torquens</i>	20.12.89 - 23.03.90	none	16	-
<i>Tabanus argenteus</i>	20.12.89 - 24.03.90	none	11	-
<i>T. besti</i>	1.12.89 - 22.03.90	none	79	-
<i>T. boueti</i>	3.03.90	Primary Gap	1	-
<i>T. fuscipleuris</i>	21.12.89 - 10.03.90	Riverine	22	-
<i>T. gabonensis</i>	20.12.89 - 24.03.90	Primary	89	4
<i>T. kingsleyi</i>	11.01.90 - 25.03.90	Secondary	101	5
<i>T. marmorosus</i>	26.12.89 - 27.12.89	none	5	-
<i>T. menoensis</i>	27.01.90 - 15.03.90	All Riverine	25	-
<i>T. pluto</i>	19.03.90 - 23.03.90	none	5	-
<i>T. regnaulti</i>	20.12.89 - 12.03.90	none	41	-
<i>T. secedens</i>	25.12.89 - 11.01.90	Riverine	14	-
<i>T. socialis</i>	20.12.89 - 24.03.90	none	402	-
<i>T. taeniola</i>	1.12.89 - 24.03.90	Secondary	16	-
<i>T. taiensis</i>	20.12.89 - 12.03.90	none	7	-
<i>T. tenuipalpis</i>	11.12.89 - 25.03.90	Secondary	3	-
<i>T. triquetromatus</i>	3.02.90 - 24.03.90	Primary	57	-
<i>Ancala fasciata</i>	26.12.89, 15.02.90	none	2	-
<i>Cbrysops langi</i>	12.02.90	Primary Gap	1	-
<i>C. longicornis</i>	21.12.89 - 18.03.90	none	10	-
<i>Rhigioglossa cincta</i>	26.01.90 - 14.03.90	All Riverine	9	-
<i>R. montonenae</i>	25.01.90 - 7.02.90	All Riverine	4	-
<i>Sphecodemyia infuscata</i>	5.03.90	Primary Gap	1	-
<i>Tabanocella stimulans</i>	24.03.90 - 28.03.90	none	5	-
<i>Thriambeutes singularis</i>	5.01.90	Primary Gap	1	-

oensis sp. n., a member of Oldroyd's (1954) *Tabanus chevalieri* group, was also collected exclusively along the Meno River and a single, teneral female was collected from a small sand bar in the Meno river. Other members of the group are considered riverine (Oldroyd, 1954; Goodwin, 1982).

Morris (1963) collected single specimens of *R. cincta* (as *Mesomyia cincta*) and *T. chevalieri* in traps along rivers. We have examined his specimen of *R. cincta* and concur with his assessment. However, we are unable to find his specimen(s) of *T. chevalieri*.

Five species that were collected only once were all from primary forest gaps. We cannot base any conclusions on single specimens, but the group of species conform to a group Oldroyd termed 'forest canopy species': *Chrysops langi* Bequaert, *Haematopota bowdeni*, *Sphecodemyia infuscata* Oldroyd, *Thriambeutes singularis* and *Tabanus boueti* Surcouf. After the main collecting period, the latter species was found in both primary and secondary forest in larger numbers (Table 3).

Tabanus marmorosus Surcouf was only collected early in the year at a site 50 km south of the main collection locale (Table 3). Morris (1963) indicates that this is a wet-season species, so our lack of records from the main study area may indicate a slightly longer wet-season at

the more southern collecting site.

Season

A pattern of wet season, dry season and non-seasonal species is evident in Figure 4. These concur broadly with the seasonal affinities noted by Morris's (1963) (in his Table 1). The onset of the wet season in northern Liberia was in April, about the same time as in TNP. The end of the wet season may be more prolonged in the more southern part of the Guinea forest; rain persisted into December during our stay in TNP. Consequently, the seasonal occurrence of wet-season species is more prolonged in TNP. For example, we collected *T. besti* well into January whereas Morris (1963) only collected them until November.

New species to Côte-d'Ivoire

In addition to the three newly described species, the following species are additions to the list of species from Côte-d'Ivoire compiled by Doucet *et al.* (1958).

Chrysops langi Bequaert, 1930. The species has been rarely collected and not previously west of Cameroon. It is a known forest-canopy species and vector of *Loa loa* (Oldroyd, 1957).

Thriambeutes singularis Grünberg, 1906. A widespread forest species, but known from only a handful of specimens (Oldroyd, 1957).

Sphecodemyia infuscata Oldroyd, 1957. A forest species, known only from a handful of specimens. There is a note in the collection of the British Museum by Oldroyd dated 1965—"A female of this species from northern Ivory Coast is in Tervuren. Agrees very closely with male".

Rbigioglossa (Dasycompsa) cincta Enderlain, 1925. In West Africa, there is

Table 3. - Dates of occurrence of Tabanidae collected in Taï National Park outside of our major collection period.

Species	Range of Dates
<i>Haematopota grabami</i>	17.10.90
<i>H. guineaensis</i>	7.11.90
<i>Tabanus besti</i>	3.10.90 - 18.10.90
<i>T. boueti</i>	17.10.90, 7.11.90
<i>T. ruficrus</i>	16.10.90, 17.10.90
<i>T. socialis</i>	17.10.90
<i>T. tenuipalpis</i>	18.10.90
<i>Tabanocella stimulans</i>	13.10.90

a single record from Ghana (Oldroyd, 1957) and one from Liberia (Morris, 1963).

Tabanus gabonensis Macquart, 1855. Since we re-instate this form as a full species in the present paper other specimens may exist that are included under the name *T. secedens*.

Haematopota bowdeni Oldroyd, 1952. A West African forest species, known from Ghana and Liberia (Oldroyd, 1952).

West African forest Tabanidae

The species collected in TNP are broadly the same as those forest species collected by Morris (1963) in Liberia. We did not collect 3 out of 19 of Morris's 'very abundant' 'abundant' and 'regular' species that would have been present during our collection period—*viz.*, *Tabanus par*, *Tabanus congoensis* Ricardo, and *Tabanus flavicoxa* Oldroyd. Another 4 of these species that we did not collect were all collected by him during the wet season.

Tabanids found in TNP and not collected by Morris (1963) included the three new species, the species for which only single specimens were collected, *Tabanus triquetronatus* Carter, *T. socialis* and *Tabanus fuscipleuris* Oldroyd. We have re-examined Morris's material held in the BMNH collection to check for consistency of identification. Amongst several specimens of *Tabanus argenteus* (Surcouf) there is a single, very poor specimen of *T. triquetronatus* that he presumably overlooked. Most of the specimens (but not all) he assigned to *T. postacutus* are actually *T. socialis* explaining the absence of this extremely abundant species from his collections. Similarly, we believe that his *T. congoensis* are actually *T. fuscipleuris* since several of the latter, but none of the former are found amongst his material in the BMNH collection. Thus, few

discrepancies exist between the dry season lists from the two localities except for the new species, our rarely collected forest-canopy species noted above, and some of his rarely collected species.

There is also a concordance with the list of specimens of Tabanidae from Mount Nimba by Morel & Ovazza (1963). Mount Nimba is at the northern edge of the Guinea forest and so has savannah species that are unlikely to be found within TNP. Conversely, because it is well within the forest zone, many species we collected in TNP were not collected by Morel and Ovazza. Their collecting effort was obviously low compared to ours and Morris's, so direct comparisons between the lists are of limited usefulness. Of species for which they list more than a single record, only one, *T. flavicoxa* was not recorded by us.

The richness of TNP and of the fauna of the Upper Guinea forests is demonstrated by this limited survey of Tabanidae. The discovery of 3 new species, and the presence of 4 very rarely collected forest species gives further support to the significance of the site as a centre of endemism, and as an important refuge for West African forest fauna.

ACKNOWLEDGEMENTS

The work was conducted while surveying birds for the International Council for Bird Preservation and the World Wide Fund for Nature. We gratefully acknowledge the logistical support provided by that project. The Ivorian Minister of Water and Forests gave permission to work in the park. M. E. Gartshore, Yagnon Valentin & S. H. Montonen assisted daily in collecting and pinning material and in constant battles with ants and mould. S.H. Montonen also assisted in the identification of material. G. B. Fairchild provided additional material for

confirmation of identifications. R. Bouchier and two reviewers commented on a draft of the manuscript.

REFERENCES

- Allport, G. A. 1991. The status and conservation of threatened birds in the Upper Guinea forest. *Bird Conservation International*, 1: 53-74.
- Couturier, G. & Guillaumet, J.-L. 1986. Les recherches entomologiques en forêt de Taï (Côte-d'Ivoire). *Revue fr. Ent. (N.S.)*, 7:195-202.
- Couturier, G. & Gillon, Y. 1988. Les insectes et la forêt tropicale humide: Cas de la forêt de Taï en Côte-d'Ivoire. *Revue fr. Ent. (N.S.)*, 10:47-55.
- Doucet, J., Ovazza, M. & Adam, J. P., 1958. Tabanides de Côte-d'Ivoire. *Annls parasit. hum. comp.*, 33:284-294.
- Gartshore, M. E., Taylor, P. D. & Francis, I. S. 1994. *Forest Birds in Côte-d'Ivoire: A survey of Taï National Park and other forests and forestry plantations, 1989-1991*. Birdlife International, Study Report #58 (tentative), Birdlife International, Cambridge. (in review).
- Goodwin, J. T. 1982. The Tabanidae (Diptera) of Mali. *Misc. Pub. Entomol. Soc. Am.* 13: 1-141.
- Gressitt, J. L. & Gressitt, M. K. 1962. An improved Malaise trap. *Pacif. Insects*, 4: 87-90.
- Hamilton, A. C. & Taylor, D. 1991. History of climate and forests in tropical Africa during the last 8 million years. *Climatic Change*, 19: 65-78.
- Legrand, J. & Couturier, G. 1985. Les Odonates de la forêt de Taï (Côte-d'Ivoire). Premières approches: faunistique, répartition écologique et association d'espèces. *Revue Hydrobiol. trop.* 18: 133-158.
- Martin, C. 1991. *The Rainforests of West Africa: ecology - threats - conservation*. Birkhauser Verlag, Basel, Boston, Berlin. 235 pp.
- Oldroyd, H. A. 1952. *The horse flies (Diptera: Tabanidae) of the Ethiopian Region. Volume I. Haematopota and Hippocentrum*. British Museum (Natural History), London, pp. 1-226.
- . 1954. *The horse flies (Diptera: Tabanidae) of the Ethiopian Region. Volume II. Tabanus and related genera*. British Museum (Natural History), London, pp. 1-341.
- . 1957. *The horse flies (Diptera: Tabanidae) of the Ethiopian Region. Volume III. Subfamilies Chrysopinae, Sepsidinae and Pangoninae and a revised classification*. British Museum (Natural History), London, pp. 1-489.
- Morel, R. C. & Ovazza, M. 1963. Diptera (Tabanidae et Glossinidae). In: La Réserve naturelle intégrale du Mont Nimba. *Mém. Inst. fond. Afr. noire*, Dakar. 66: 443-446.
- Morris, K. R. S. 1963. A study of African tabanids made by trapping. *Acta Tropica*, 20: 16-34.
- Stoorvogel, J. J. 1993. *Gross inputs and outputs of nutrients in undisturbed forest, Taï area, Côte-d'Ivoire*. Tropenbos Series 5. The Tropenbos Foundation, Wageningen, the Netherlands.
- Thorsteinson, A. J., Bracken, G. K. & Haneč, W. 1965. The orientation behaviour of horse flies and deer flies (Tabanidae, Diptera). III. The use of traps in the study of orientation of tabanids in the field. *Entomol. Exp. Appl.* 8: 189-192.

(Manuscript received 10 September 1993, revised 19 July 1994, accepted 5 August 1994)