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Collection of Drosophilidae (Diptera) along a transect in Kenya

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At ten localities, collections of Drosophilidae have been made using bananas or mangoes as baits. In total, 33 species have been recorded, 11 of them for the first time in Kenya. An updated list containing 61 species of *Drosophila*, *Scaptodrosophila*, and *Zaprionus* from Kenya is given.

Keywords: Kenya, Drosophilidae, *Drosophila*, *Scaptodrosophila*, *Zaprionus*, new records

INTRODUCTION

The genus *Drosophila* is thought to have originated from *Scaptodrosophila* in Africa (THROCKMORTON, 1975). In particular, the subgenus *Sophophora*, containing the intensively studied *melanogaster* and *obscura* species groups, may originate from eastern Africa (LAKOVAARA & SAURA, 1982; CARIOU *et al.*, 1988). Above all, Kenya with its various ecological habitats – tropical humid forests in the lowlands as well as tropical highland forests above 2000 m – is supposed to harbor many species of Drosophilidae. However, the drosophilid fauna has been known for many years from rather accidentally collected specimens without using baits. Some interesting species of *Apenethia*, *Leucophenga*, *Luzonimyia*, *Scaptomyza*, *Stegana*, etc. were recorded by this method (BURLA, 1957; TSACAS, 1990; and unpubl.).

In the last 20 years, a number of collections have been made, using fruit baits, to get strains of certain species for studies of population parameters and taxonomic aspects etc. (e.g. TOMIMURA & TOBARI, 1983; RAFAEL, 1984; OHNISHI & WATANABE, 1984, 1985; LEE & WATANABE, 1987; MONNEROT *et al.*, 1990; LACHAISE & JOLY, 1991; TOMIMURA *et al.*, 1993). Such collections usually did not much extend the knowledge of the fauna, on the one hand, because most collections have been made mainly at domestic/cultivated sites, where the species in question have been expected, and on the other hand because all the specimens not used for the studies have been discarded or the respective faunistical results are unpublished.

The recent detection of new species of the *obscura* group in the higher mountains of Kenya above 2000 m (TSACAS *et al.*, 1985; CARIOU *et al.*, 1988) is a typical result of a more intensive and purposeful collection activity and raises expectations of many additional species (CARIOU *et al.*, 1988).

Results of a first wide-range drosophilid collection by baiting were published by TAKADA *et al.* (1990). The present report is a further step in improving our knowledge on Kenyan drosophilids.

MATERIAL AND METHODS

The material for this report was collected by Stefan Andersson Escher and Kerstin Eriksson during October and November 1995. Help and advice were pro-

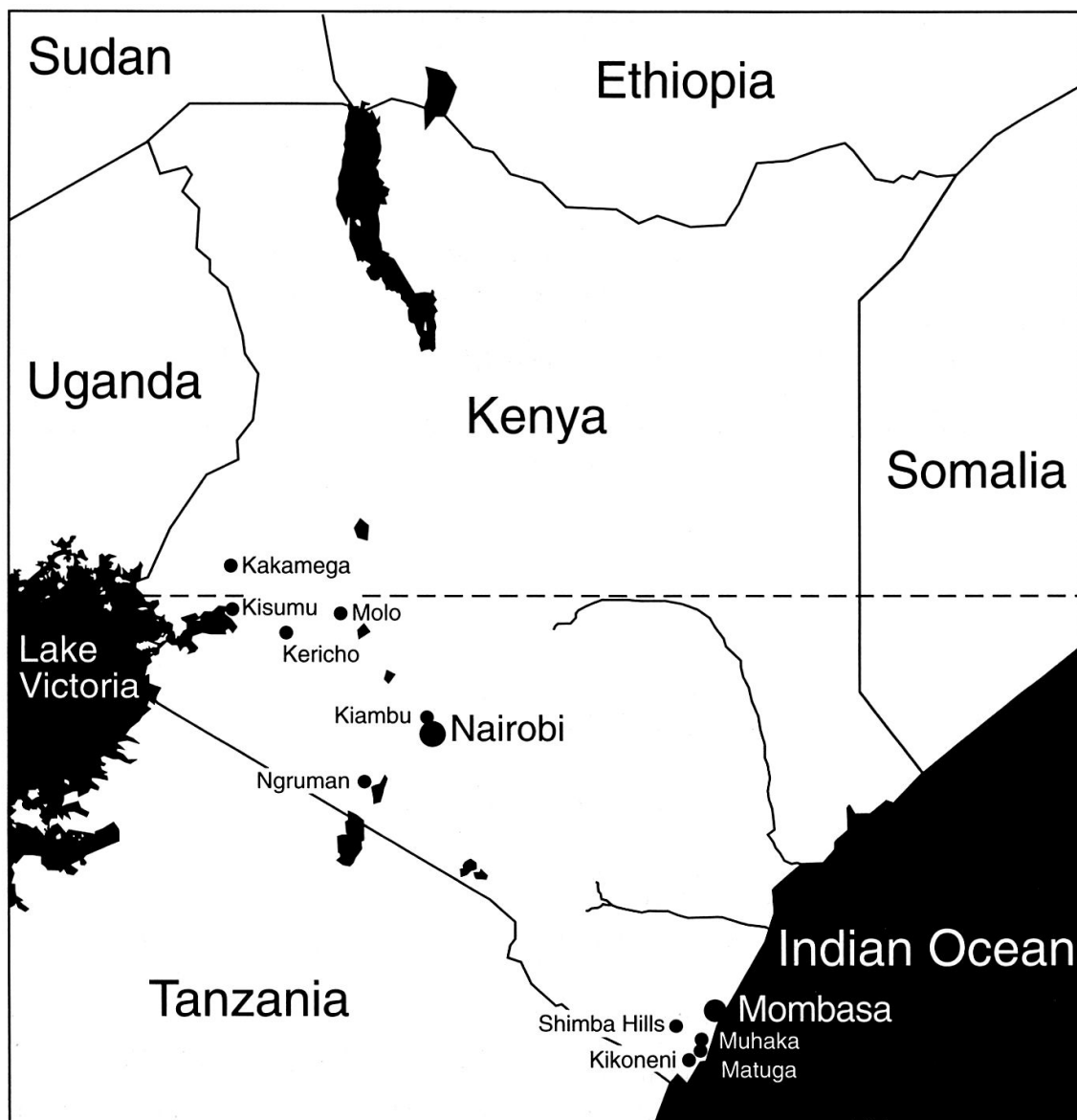


Fig. 1. Map of Kenya, showing the collection sites.

vided by Dr. Lucie M. ROGO and her co-workers at ICIPE (International Centre for Insect Physiology and Ecology) Nairobi, Kenya.

Sampling was performed along a transect across southern Kenya (Fig. 1). The localities range from sea level at the coast to considerably more elevated areas. Sites visited include: Ngruman (at about 1000 m above sea level), Molo (at more than 2000 m), Kericho (at about 2000 m), Kisumu (1100 m), Kakamega rainforest (at 1500 m), Kiambu near Nairobi (at 1900 m), Kikoneni (at about 100 m; south coast), Shimba Hills forest (at 300 m), Matuga (at about 100 m), and Muhaka (at about 100 m).

Traps with bananas were used (at mango gardens rotten mangoes picked from the ground were also put in the traps). Depending on weather conditions and other factors, the traps were checked after at least one hour, and in the majority of cases also repeatedly during the day, but preferentially in the early morning or late afternoon. The flies were collected by suction, etherised and studied at location in the field.

At least 20 single female flies were collected at each site and put in vials with instant *Drosophila* medium blue (Carolina Biological Supply Company). In the cases when successful iso-female strains were established, these were brought to Sweden and further examined. Some of these iso-female lines are available at The European *Drosophila* Stock Centre at Umeå University, Umeå, Sweden.

Collection sites were “shambas”; cultivated land around a house, where the farmers cultivate a great mixture of plants, including bananas, pineapples, papayas, corn, cassava etc., depending on the locality and traditions in the area. Two mango gardens were also used as collection sites (one of the sites in Ngruman and the Matuga site).

Additional collection sites were around the Green Garden Lodge in Molo and the guest house in Kakamega forest, at Kiambu market, and in the Shimba Hills forest. The forest collection sites in Kakamega and Shimba Hills are distinct from the other collection sites in that they are not parts of or especially close to any cultivated areas.

RESULTS

Of the genera *Drosophila*, *Scaptodrosophila* and *Zaprionus*, we have recorded 33 species (Tab. 1). In total, the following 61 species are known to be represented in Kenya:

Genus *Drosophila* FALLÉN

Subgenus *Dorsilopha* STURTEVANT

1. *D. busckii* COQUILLET, 1901

Recorded in Kenya by TAKADA *et al.* (1990). A widespread, domestic species.

Subgenus *Drosophila* FALLÉN

The status of the Afrotropical species has been discussed by TSACAS & CHAS-SAGNARD (1994); only few species are affiliated to the known species groups.

funnebris species group

2. *D. funnebris* (FABRICIUS, 1787)

Recorded in Kenya by TAKADA *et al.* (1990). A widespread, domestic species

immigrans species group

3. *D. immigrans* STURTEVANT, 1921

Recorded in Kenya by TAKADA *et al.* (1990). We have many specimens from Molo, Kericho, and Kiambu. A widespread, domestic species.

4. *D. nasuta* LAMB, 1914

Already recorded in Kenya by various authors concerned with phylogenetics and population genetics of the *nasuta* species complex. We have many specimens

Tab. 1. Species of the genera *Drosophila*, *Scaptodrosophila*, and *Zaprionus* recorded at ten collection sites, arranged by genera, species groups, and species subgroups, where appropriate.

Species	Localities									
	Ngruman	Molo	Kericho	Kisumu	Kakamega Forest	Nairobi/Kiambu	Kikonei	Shimba Hills	Muhaka	Matuga
<i>D. adamsi</i>		X								
<i>D. immigrans</i>		X	X			X				
<i>D. nasuta</i>	X						X			X
<i>D. nutrita</i>		X								
<i>D. repleta</i>						X				
<i>D. anisoctena</i>		X	X							
<i>D. bakondjo</i>		X								
<i>D. dentissima</i>		X								
<i>D. abure</i>				X						
<i>D. akai</i>				X						
<i>D. fima</i>				X						
<i>D. kulango</i>				X						
<i>D. sycophila</i>				X						
<i>D. ananassae</i>	X					X			X	
<i>D. malerkotliana</i>	X						X		X	X
<i>D. melanogaster</i>	X		X			X				X
<i>D. simulans</i>	X	X	X	X	X	X				
<i>D. teissieri</i>								X		
<i>D. yakuba</i>	X			X	X		X			X
<i>D. bocqueti</i>				X	X					
<i>D. burlai</i>				X	X					
<i>D. greeni</i>				X						
<i>D. ifestia</i>		X								
<i>D. nikananu</i>					X					
<i>D. phyale</i>				X	X					
<i>D. seguyi</i>	X	X	X	X	X	X	X	X		X
<i>S. latifasciaeformis</i>	X		X	X	X	X	X			X
<i>S. triangulifer</i>		X	X	X						
<i>Z. tuberculatus</i>	X			X		X		X		X
<i>Z. indianus</i>	X	X	X	X	X	X				X
<i>Z. proximus</i>		X								
<i>Z. taronus</i>		X			X					
<i>Z. inermis</i>					X					

from Ngruman, Kikoneni, and Matuga. Also known from the Seychelles and South Asia.

repleta species group

5. *D. fulvimacula* PATTERSON & MAINLAND, 1944

This New World species has been recorded in Kenya by TAKADA *et al.* (1990). There are some doubts regarding the correct identification, because this species is not known yet to have spread out of its area of origin.

6. *D. hydei* STURTEVANT, 1921

Recorded in Kenya by TAKADA *et al.* (1990). A widespread, domestic species.

7. *D. mercatorum* PATTERSON & WHEELER, 1942

Recorded in Kenya by IKEDA *et al.* (1982) and Takada *et al.* (1990). A widespread, subtropical species.

8. *D. repleta* WOLLASTON, 1858

Already recorded in Kenya by SÉGUY (1938) and TAKADA *et al.* (1990). We have specimens from Kiambu. A widespread, domestic species.

virilis species group

9. *D. virilis* STURTEVANT, 1916

Recorded in Kenya by TAKADA *et al.* (1990). A widespread, semidomestic species.

unplaced to species group

10. *D. adamsi* WHEELER, 1959

Already recorded in Kenya by TSACAS (1972), TSACAS *et al.* (1981), and TAKADA *et al.* (1990). We have three males from Molo; the genitalia well agree with the drawings of the holotype given by TSACAS (1972). Probably a widespread Afro-tropical species.

11. *D. lucida* SÉGUY, 1938

Recorded in Kenya by SÉGUY (1938) and TSACAS *et al.* (1981). An endemic species.

12. *D. nutrita* DUDA, 1935

Recorded in Kenya by TAKADA *et al.* (1990) and TSACAS & CHASSAGNARD (1994). We have one male from Molo. A Central and West African species.

13. *D. paucilineata* BURLA, 1957

This East African species is a member of the *D. adamsi* species complex; it has, since its description, never been recorded again.

14. *D. pruinosa* DUDA, 1940

Recorded in Kenya by TSACAS *et al.* (1981) and TAKADA *et al.* (1990). A widespread Afrotropical species.

Subgenus *Sophophora* STURTEVANT

dentissima species group

TSACAS (1980b) has shown that all members of this species group, except for *D. dentissima*, are restricted to the Afrotropical mountain areas.

15. *D. altissima* TSACAS, 1980

Recorded in Kenya by TSACAS (1980b), TSACAS *et al.* (1981) and LACHAISE & TSACAS (1983), living at an altitude of nearly 4000 m.

16. *D. anisoctena* TSACAS, 1980

Already recorded in Kenya by TAKADA *et al.* (1990). We have six males from Molo and three from Kericho, both sites at or above an altitude of 2000 m.

17. *D. bahunde* TSACAS, 1980

Recorded in Kenya by TAKADA *et al.* (1990).

18. *D. bakondjo* TSACAS, 1980

We have one male from Molo collected at an altitude of more than 2000 m. New record for Kenya.

19. *D. dentissima* BOCK & WHEELER, 1972

According to TSACAS (1980b), this species has been recorded only in South Africa. We have one male from Molo. New record for Kenya.

20. *D. oribatis* TSACAS, 1980

Recorded in Kenya by TSACAS *et al.* (1981).

fima species group

This Afrotropical species group has been revised by TSACAS & LACHAISE (1981), who also discussed the strange ecological living conditions.

21. *D. abure* BURLA, 1954

We have one male from Kisumu. New record for Kenya. A West African species.

22. *D. akai* BURLA, 1954

We have six males from Kisumu. New record for Kenya. A widespread Afrotropical species.

23. *D. dimitra* TSACAS, *in* TSACAS & LACHAISE, 1981

Recorded in Kenya by TAKADA *et al.* (1990). An Afrotropical species.

24. *D. fima* BURLA, 1954

Already recorded in Kenya by TAKADA *et al.* (1990). We have seven males from Kisumu. A widespread Afrotropical species.

25. *D. kulango* BURLA, 1954

We have two males from Kisumu. New record for Kenya. An Afrotropical species.

26. *D. sycophila* TSACAS, in TSACAS & LACHAISE, 1981

According to TSACAS & LACHAISE (1981), this species is recorded from Central and West Africa. We have one male from Kisumu. New record for Kenya.

melanogaster species group / *ananassae* subgroup

27. *D. ananassae* DOLESCHALL, 1858

Already recorded in Kenya by TOMIMURA & TOBARI (1983), TAKADA *et al.* (1990), TOBARI (1993), and TOMIMURA *et al.* (1993). We have many specimens from Ngruman, Kiambu, and Muhaka. A widespread, circumtropical species, originally described from Indonesia.

28. *D. malerkotliana* PARSHAD & PAIKA, 1964

Recorded in Kenya by TAKADA *et al.* (1990). Since its description from India, the range of this species has obviously been extended to tropical and subtropical Africa and America. It has most probably become a domestic species. We have many specimens from Ngruman, Kikoneni, Muhaka, and Matuga.

melanogaster species group / *melanogaster* subgroup

29. *D. melanogaster* MEIGEN, 1830

Already recorded in Kenya by various authors. We have specimens from Ngruman, Kericho, Kiambu and Matuga. A widespread, domestic species.

30. *D. simulans* STURTEVANT, 1919

Already recorded in Kenya by various authors. We have many specimens from Ngruman, Molo, Kericho, Kisumu, Kakamega, and Kiambu. A widespread, domestic species.

31. *D. teissieri* TSACAS, 1971

Already recorded in Kenya by LACHAISE & JOLY (1991). We have more than 20 males from Shimba Hills. A widespread Afrotropical species.

32. *D. yakuba* BURLA, 1954

Already recorded in Kenya by LEE & WATANABE (1987), MONNEROT *et al.* (1990), and TAKADA *et al.* (1990). We have many males from Ngruman, Kisumu, Kakamega, Kikoneni, and Matuga. A widespread Afrotropical species.

melanogaster species group / *montium* subgroup

33. *D. bocqueti* TSACAS & LACHAISE, 1974

We have many specimens from Kisumu and Kakamega. New record for Kenya. A widespread Afrotropical species.

34. *D. burlai* TSACAS & LACHAISE, 1974

Already recorded in Kenya by OHNISHI & WATANABE (1984, 1985) and TAKADA *et al.* (1990). We have males from Kisumu and Kakamega. A widespread Afrotropical species

35. *D. greeni* BOCK & WHEELER, 1972

We have specimens from Kisumu. New record for Kenya. A widespread Afrotropical species.

36. *D. ifestia* TSACAS, 1984

We have nine males from Molo. New record for Kenya. An Afrotropical species.

37. *D. nikananu* BURLA, 1954

Already recorded in Kenya by TAKADA *et al.* (1990). We have specimens from Kakamega. A widespread Afrotropical species.

38. *D. phyale* TSACAS, 1981

We have five males from Kisumu and Kakamega. New record for Kenya. An Afrotropical species.

39. *D. seguyi* SMART, 1945

This Afrotropical species was described from Kenya by SÉGUY (1938) as *D. subobscura*. As the name was preoccupied, SMART (1945) changed it to *D. seguyi*. Other records from Kenya were made by TSACAS *et al.* (1981), OHNISHI & WATANABE (1984), RAFAEL (1984) and TAKADA *et al.* (1990). We have many specimens from all localities except for Muhaka. A complex of species near to *D. seguyi* is known from Malawi (pers. comm. L. TSACAS).

40. *D. vulcana* GRABER, 1957

Recorded in Kenya by TAKADA *et al.* (1990). As shown by TSACAS & CHASSAGNARD (1991), the identity of this species is obscure.

obscura species group

41. *D. cariouae* TSACAS, in TSACAS *et al.*, 1985

Recorded in Kenya by TSACAS *et al.* (1985) and CARIOU *et al.* (1988). An endemic species.

42. *D. kitumensis* TSACAS, in TSACAS *et al.*, 1985

Recorded in Kenya by TSACAS *et al.* (1985) and CARIOU *et al.* (1988). An endemic species.

43. *D. kimbasi* TSACAS, in TSACAS *et al.*, 1985

Recorded in Kenya by TSACAS *et al.* (1985) and CARIOU *et al.* (1988). An endemic species.

44. *D. microlabis* SÉGUY, 1938

Recorded in Kenya by SÉGUY (1938), TSACAS (1975), TSACAS *et al.* (1981, 1985), and CARIOU *et al.* (1988). An endemic species.

Genus *Scaptodrosophila* DUDA

aterrima species group

This Afrotropical species group has been established by TSACAS *et al.* (1988). All species are anthophilous.

45. *S. mirei* (TSACAS, CHASSAGNARD & DAVID, 1988)

Recorded in Kenya by TSACAS *et al.* (1988). A widespread Afrotropical species.

46. *S. smicra* (TSACAS, 1980)

Recorded in Kenya by SÉGUY (1938, as *D. minuta* SÉGUY) and TSACAS *et al.* (1988). A widespread Afrotropical species.

brunnea species group

47. *S. medleri* (TSACAS & CHASSAGNARD, 1976)

Recorded in Kenya by TSACAS *et al.* (1981). A widespread Afrotropical species.

latifasciaeformis species group

48. *S. dibi* (BURLA, 1954)

Recorded in Kenya by TSACAS *et al.* (1981) and TAKADA *et al.* (1990). A widespread Afrotropical species.

49. *S. latifasciaeformis* (DUDA, 1940)

Already recorded in Kenya by TAKADA *et al.* (1990). It is a widespread, semi-domestic species, found by us in large numbers at all localities except for Molo, Shimba Hills, and Muhaka.

50. *S. triangulifer* (LAMB, 1914)

We have one male from Molo, three males and two females from Kericho, and one female from Kisumu. New record for Kenya. An Afrotropical species.

Genus *Zaprionus* COQUILLET

The phylogeny, biogeography, and taxonomy of the Afrotropical species of this genus have been studied by CHASSAGNARD (1988) and TSACAS & CHASSAGNARD (1990).

armatus species group / *armatus* subgroup

51. *Z. fumipennis* SÉGUY, 1938

Recorded in Kenya by SÉGUY (1938), TSACAS *et al.* (1981), and TSACAS & CHASSAGNARD (1990). An endemic species.

52. *Z. montanus* COLLART, 1937

Recorded in Kenya by CHASSAGNARD (1988). A widespread Afrotropical species.

armatus species group / *tuberculatus* subgroup

53. *Z. tuberculatus* MALLOCH, 1932

Already recorded in Kenya by COLLART (1937), SÉGUY (1938), and TAKADA *et al.* (1990). CHASSAGNARD & KRAAIJEVELD (1991) have shown the distribution in the Mediterranean area. We have specimens from Ngruman, Kisumu, Kiambu, Shimba Hills, and Matuga. Two additional males have been found in the collection of B. MERZ, Zürich: Nairobi-Kabete, 4.III.1993, leg. B. MERZ; Uplands, 28.III.1993, coll. B. MERZ. A widespread Afrotropical species.

armatus species group / *vittiger* subgroup

54. *Z. indianus* GUPTA, 1970

Already recorded in Kenya by TAKADA *et al.* (1990). It is characterized by TSACAS (1980b) as being present everywhere in Africa; in addition, records are known in Israel (unpublished). We have many specimens from all localities except for Kikoneni, Shimba Hills, and Muhaka.

55. *Z. multivittiger* CHASSAGNARD, 1996

Recently described from Kenya and Rwanda.

56. *Z. proximus* COLLART, 1937

Already recorded in Kenya by COLLART (1937), TSACAS (1980a), TSACAS *et al.* (1981), and LACHAISE & TSACAS (1983). We have one male from Molo. An endemic species.

57. *Z. taronus* CHASSAGNARD & TSACAS, 1993

This probably widespread species was formerly considered to be *Z. ornatus* SÉGUY, a species of uncertain identity (CHASSAGNARD & TSACAS, 1993). We have four males from Molo and one from Kakamega. New record for Kenya.

58. *Z. vittiger* COQUILLET, 1901

Recorded in Kenya by COLLART (1937) and LE PELLEY (1968); however, these identifications are most probably wrong (TSACAS, 1980a) and may refer to *Z. indianus*. A South African species.

inermis species group**59. *Z. ghesquierei* COLLART, 1937**

Recorded in Kenya by TSACAS *et al.* (1981) and TAKADA *et al.* (1990). It is also found in the Mediterranean (CHASSAGNARD & KRAAIJEVELD, 1991). A wide-spread Afrotropical species.

60. *Z. inermis* COLLART, 1937

Already recorded in Kenya by TAKADA *et al.* (1990). We have one male from Kakamega. A widespread Afrotropical species.

61. *Z. sexvittatus* COLLART, 1937

This species, known from Zaïre as well, has been recorded in Kenya by COLLART (1937), TSACAS *et al.* (1981), LACHAISE & TSACAS (1983), and CHASSAGNARD (1996).

DISCUSSION

In 1988, an intensive collection of drosophilids was made to get a series of laboratory strains of various species. Subsequently, all specimens caught were identified (TAKADA *et al.*, 1990). More than 12 species were recorded for the first time in Kenya, proving that the fauna is at least as rich as that of the neighbouring countries, as shown in Tab. 2. We have to admit that not all countries have been checked intensively and that not all determinations might be correct. However, the actual number of species known may serve as a first indication of the composition of the respective faunas.

As mentioned by LACHAISE & TSACAS (1983), many Afrotropical species have evolved in a close association with certain plant species. They may also have various other ecological connections, that require special collection techniques. Hence, the very effective use of fruits for collecting should be complemented by sampling methods adapted to the respective ecological situation, giving access to species which are not attracted by fruits at all.

In our short-time study of the fauna of Kenya, 11 additional species have been found. Obviously, the knowledge of the distribution area of certain species can be further extended by such intensive collecting activities. We are convinced that many new records and even new species are awaiting detection.

As already mentioned, most of the collection sites are cultivated areas, where species known to be "domestic" (and/or widespread), e.g. *D. melanogaster*, *D. simulans*, *S. latifasciaeformis*, *Z. indianus*, are present. In addition, a large number of "wild" species have been recorded which do not show "domestic" preferences. The character of at least a few of these sites might be relatively "wild". On the other hand, at the rather "wild" sites Kakamega and Shimba Hills a few "domestic" species were found. HOENIGSBERG & LIN (1977) showed that *D. melanogaster*, one of the typical "domestic" species, was collected far from human habitations, however, in small proportions only. Obviously, "wild" species can become established in (or at least do occasionally enter) "domestic" habitats, and vice-versa.

While discussing biogeography and evolution of the *dentissima* species group, TSACAS (1980) has shown that more or less all species are typically found above 1200 m above sea level. Our data (three species exclusively found at about 2000 m or above) corroborate the mountainous distribution type.

Tab. 2. Species of the genera *Drosophila*, *Scaptodrosophila*, and *Zaprionus* recorded in Kenya and the neighbouring countries, based on TSACAS *et al.* (1981) and more recent references. For Somalia and Sudan, no species of these genera are recorded yet.

Species	Kenya	Burundi	Ethiopia	Rwanda	Tanzania	Uganda	Zaire
<i>Drosophila</i>							
<i>D. abure</i>	X						
<i>D. adamsi</i>	X		X			X	
<i>D. akai</i>	X					X	
<i>D. altissima</i>	X						X
<i>D. ananassae</i>	X	X			X	X	
<i>D. anisoctena</i>	X						X
<i>D. bahunde</i>	X						X
<i>D. bakondjo</i>	X					X	X
<i>D. bakoue</i>						X	X
<i>D. bocqueti</i>	X				X		
<i>D. burlai</i>	X				X		
<i>D. busckii</i>	X		X			X	
<i>D. buzzatii</i>			X				
<i>D. cariouae</i>	X						
<i>D. dentissima</i>	X						
<i>D. dimitra</i>	X	X					X
<i>D. dyaromankana</i>						X	X
<i>D. dyula</i>							
<i>D. fima</i>	X				X		
<i>D. fraburu</i>						X	
<i>D. fulvimacula</i>	X						
<i>D. funebris</i>	X			X		X	
<i>D. gibbinsi</i>							
<i>D. greeni</i>	X						X
<i>D. hirtipes</i>							
<i>D. hydei</i>	X				X		X
<i>D. ifestia</i>	X						
<i>D. immigrans</i>	X						
<i>D. kitumensis</i>	X						
<i>D. kivuensis</i>						X	X
<i>D. kimbasi</i>	X						
<i>D. kulango</i>	X						
<i>D. lachaisei</i>							X
<i>D. lucida</i>	X						
<i>D. malerkotliana</i>	X					X	X
<i>D. mambilla</i>						X	X
<i>D. matae</i>							X
<i>D. megapyga</i>							X
<i>D. megalis</i>			X				
<i>D. melanogaster</i>	X	X	X		X	X	X
<i>D. mercatorum</i>	X						
<i>D. microlabis</i>	X						
<i>D. nasuta</i>	X				X		X
<i>D. nikananu</i>	X						
<i>D. nitida</i>							X
<i>D. nutrita</i>	X						
<i>D. oreia</i>						X	
<i>D. oribatis</i>	X					X	X
<i>D. paucilineata</i>	X				X		
<i>D. phyale</i>	X						
<i>D. pruinosa</i>	X				X	X	
<i>D. repleta</i>	X	X				X	
<i>D. seguyi</i>	X				X	X	
<i>D. sexlineata</i>			X				
<i>D. simulans</i>	X	X	X		X	X	X
<i>D. suma</i>						X	X
<i>D. sycophila</i>	X						
<i>D. teissieri</i>	X				X		X
<i>D. tsacasi</i>					X		
<i>D. virilis</i>	X						
<i>D. vulcana</i>	X				X	X	X
<i>D. yakuba</i>	X				X	X	X
<i>Scaptodrosophila</i>							
<i>S. aterrima</i>						X	X
<i>S. dibi</i>	X				X		X
<i>S. ebenea</i>							
<i>S. eoundo</i>						X	
<i>S. framire</i>						X	
<i>S. lambi</i>						X	
<i>S. latifasciaeformis</i>	X		X		X	X	
<i>S. medleri</i>	X					X	
<i>S. mirei</i>	X						
<i>S. momortica</i>							X
<i>S. pseudoebenea</i>							X
<i>S. smicra</i>	X						
<i>S. triangulifer</i>	X						
<i>S. tuberculatus</i>	X		X		X	X	X
<i>Zaprionus</i>							
<i>Z. arduus</i>							X
<i>Z. armatus</i>							X
<i>Z. fumipennis</i>	X						
<i>Z. ghesquierei</i>	X				X	X	X
<i>Z. indianus</i>	X				X	X	X
<i>Z. inermis</i>	X					X	X
<i>Z. koroleu</i>						X	
<i>Z. momorticus</i>							X
<i>Z. montanus</i>	X						X
<i>Z. multivittiger</i>	X	X		X			X
<i>Z. neglectus</i>							
<i>Z. proximus</i>	X						X
<i>Z. seguyi</i>							
<i>Z. sepsoides</i>						X	X
<i>Z. serratus</i>						X	X
<i>Z. sexvittatus</i>	X						X
<i>Z. spineus</i>							X
<i>Z. spinosus</i>							X
<i>Z. taronus</i>	X						X
<i>Z. tuberarmatus</i>							X
<i>Z. vittiger</i>	X		X		X	X	X
<i>Z. vrydaghi</i>						X	X

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REFERENCES

- BURLA, H. 1957. Ostafrikanische Drosophiliden (Dipt.). *Jahresh. Ver. vaterl. Naturk. Württ.* 112: 36–49.
- CARIOU, M.L., LACHAISE, D., TSACAS, L., SOURDIS, J., KRIMBAS, C., & ASHBURNER, M. 1988. New African species in the *Drosophila obscura* species group: genetic variation, differentiation and evolution. *Heredity* 61: 73–84.
- CHASSAGNARD, M.T. 1988. Esquisse phylogénétique du genre *Zaprionus* Coq. (Diptera: Drosophilidae) et description de trois nouvelles espèces afrotropicales. *Naturaliste can.* 115: 305–322.
- CHASSAGNARD, M.T. 1996. Les espèces africaines du sous-genre *Zaprionus* s.str. à six bandes thoraciques (Diptera: Drosophilidae). *Annls Soc. ent. Fr. (N. S.)* 32: 59–65.
- CHASSAGNARD, M.T. & KRAAIJEVELD, A.R. 1991. The occurrence of *Zaprionus* sensu stricto in the palearctic region (Diptera: Drosophilidae). *Annls. Soc. ent. Fr. (N. S.)* 27: 495–496.
- CHASSAGNARD, M.T. & TSACAS, L. 1993. Le sous-genre *Zaprionus* s.str. Définition de groupes d'espèces et révision du sous-groupe *vittiger* (Diptera: Drosophilidae). *Annls. Soc. ent. Fr. (N. S.)* 29: 173–194.
- COLLART, A. 1937. Les *Zaprionus* du Congo belge (Diptera: Drosophilidae). *Bull. Mus. r. Hist. nat. Belgique* 13(9): 1–15.
- HOENIGSBERG, H. & LIN, F.J. 1977. Populations genetics in the American Tropics. XIV. *Drosophila melanogaster* MEIGEN in Colombian and Chinese natural habitats. *Mitt. Schweiz. ent. Ges.* 50: 57–58.
- IKEDA, H., KITAGAWA, O., & FUKATAMI, A. 1982. Colonization of *D. mercatorum* in Africa. *Drosophila Information Service* 58: 81.
- LACHAISE, D. & JOLY, D. 1991. Sperm and evolution in *Drosophila*: morphological and molecular aspects. In: HEWITT, G.M. et al. (eds), *Molecular Techniques in Taxonomy*, NATO ASI Ser. vol. H57, pp. 201–216. Springer, Berlin, Heidelberg.
- LACHAISE, D. & TSACAS, L. 1983. Breeding-Sites in Tropical African Drosophilids. In: ASHBURNER, M., CARSON, H.L., & THOMPSON, J.N. Jr. (eds), *The Genetics and Biology of Drosophila*, vol. 3d, pp. 221–332. Academic Press, London.
- LAKOVAARA, S. & SAURA, A. 1982. Evolution and speciation in the *Drosophila obscura* group. In: ASHBURNER, M., CARSON, H.L., & THOMPSON, J.N. Jr. (eds), *The Genetics and Biology of Drosophila*, vol. 3b, pp. 1–59. Academic Press, London.
- LEE, W.H. & WATANABE, T.K. 1987. Evolutionary genetics of the *Drosophila melanogaster* subgroup. I. Phylogenetic relationships based on matings, hybrids and protein. *Jpn. J. Genet.* 62: 225–239.
- LE PELLEY, R.H. 1968. *Pests of Coffee*. Longmans, London, 590 pp.
- MONNEROT, M., SOLIGNAC, M., & WOLSTENHOLME, D.R. 1990. Discrepancy in Divergence of the Mitochondrial and Nuclear Genomes of *Drosophila teissieri* and *Drosophila yakuba*. *J. Mol. Evol.* 30: 500–508.
- OHNISHI, S. & WATANABE, T.K. 1984. Systematics of the *Drosophila montium* Species Subgroup: a Biochemical Approach. *Zool. Sci.* 1: 801–807.
- OHNISHI, S. & WATANABE, T.K. 1985. Genetic analysis of color dimorphism in the *Drosophila montium* subgroup. *Jpn. J. Genet.* 60: 355–358.
- RAFAEL, V. 1984. Relations interspécifiques dans le nouveau complexe africain de *Drosophila bakoue* du groupe *melanogaster*, sous-groupe *montium* (Diptera, Drosophilidae). *Bull. Soc. zool. Fr.* 110: 3–18.
- SÉGUY, E. 1938. Mission scientifique de l'Omo. *Mém. Mus. natn. Hist. nat. Paris, N. Sér.* 8: 319–380.
- SMART, J. 1945. *Drosophila subobscura* COLLIN: Descriptive notes on the species with comments on its nomenclatorial status (Diptera). *Proc. r. ent. Soc. Lond.* 14B: 53–56.
- TAKADA, H., WOODRUFF, R.C., & THOMPSON, J.N. Jr. 1990. Collections of Drosophilidae (Diptera) in Kenya, with description of a new species of Dettopsomyia. *Ent. News* 101: 246–255.
- THROCKMORTON, L.H. 1975. The phylogeny, ecology and geography of *Drosophila*. In: KING, R.C. (ed), *Handbook of genetics: Invertebrates of genetic interest*, vol. 3a, pp. 451–469. Plenum Press, New York and London.
- TOBARI, Y.N. 1993. Geographical Distribution. In: TOBARI, Y.N. (ed.), *Drosophila ananassae, Genetical and Biological Aspects*, pp. 19–22. Karger, Basel.

- TOMIMURA, Y. & TOBARI, Y.N. 1983. Geographic variation of gene arrangements in natural populations of *Drosophila ananassae*. In: KITAGAWA, O. (ed.), *Report on the overseas scientific expedition for the collection of drosophilid flies, 1971–1982*, pp. 50–53. Tokyo.
- TOMIMURA, Y., MATSUDA, M., TOBARI, Y.N., CARIU, M.L., DA LAGE, J.L., STEPHAN, W., & LANGLEY, C.H. 1993. Population Genetics. In: TOBARI, Y.N. (ed.), *Drosophila ananassae, Genetical and Biological Aspects*, pp. 139–198. Karger, Basel.
- TSACAS, L. 1972. Revision of the African Drosophilidae Described by ADAMS, KAHL and CURRAN. *Univ. Texas Publs* 7213: 327–343.
- TSACAS, L. 1975. *Drosophila matilei*, nouvelle espèce de l'ouest Cameroun, du groupe *melanogaster*, et redescription de *D. microlabis* SÉGUY (Dipt. Drosophilidae). *Bull. Soc. ent. Fr.* 79 (1974): 145–151.
- TSACAS, L. 1980a. L'identité de *Zaprionus vittiger* COQUILLETT et révision des espèces afrotropicales affines. *Bull. Soc. ent. Fr.* 85: 141–154.
- TSACAS, L. 1980b. Les espèces montagnardes afrotropicales de Drosophilidae (Diptera). I – Le groupe *Drosophila dentissima*. *Annl. Soc. ent. Fr. (N. S.)* 16: 517–540.
- TSACAS, L. 1990. Drosophilidae de l'Afrique Australe (Diptera). *Ann. Natal Mus.* 31: 103–161.
- TSACAS, L. & CHASSAGNARD, M.T. 1990. Les espèces du genre *Zaprionus* à fémurs antérieurs spinuleux (Diptera: Drosophilidae). *Annl. Soc. ent. Fr. (N. S.)* 26: 461–487.
- TSACAS, L. & CHASSAGNARD, M.T. 1991. L'identité de *Drosophila (Sophophora) vulcana* GRABER (Diptera, Drosophilidae). *Bull. Soc. ent. Fr.* 96: 427–432.
- TSACAS, L. & CHASSAGNARD, M.T. 1994. Le genre *Drosophila* s.str. en Afrique et description de deux nouvelles espèces (Diptera, Drosophilidae). *Revue fr. Ent. (N. S.)* 16: 71–80.
- TSACAS, L. & LACHAISE, D. 1981. Les espèces au second article tarsal modifié du groupe afrotropical *Drosophila fima* (Diptera, Drosophilidae). *Annl. Soc. ent. Fr. (N. S.)* 17: 395–415.
- TSACAS, L., LACHAISE, D., & DAVID, J.R. 1981. Composition and Biogeography of the Afrotropical Drosophilid Fauna. In: ASHBURNER, M., CARSON, H.L., & THOMPSON, J.N. Jr. (eds), *The Genetics and Biology of Drosophila*, vol. 3a, pp. 197–259. Academic Press, London.
- TSACAS, L., CARIU, M.L., & LACHAISE, D. 1985. Le groupe *Drosophila obscura* en Afrique de l'Est. Description de trois nouvelles espèces (Diptera, Drosophilidae). *Annl. Soc. ent. Fr. (N. S.)* 21 (1984): 413–424.
- TSACAS, L., CHASSAGNARD, M.T., & DAVID, J.R. 1988. Un nouveau groupe d'espèces afrotropicales anthophiles dans le sous-genre *Scaptodrosophila* du genre *Drosophila* (Diptera: Drosophilidae). *Annl. Soc. ent. Fr. (N. S.)* 24: 181–202.

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