Beetles at the Kafa Biosphere Reserve, with notes on other insects

Matthias Schöller, contribution on butterflies by Daniel Wiersborski

Highlights

→ This is the first time a comprehensive assessment of beetles has been conducted and reported at Kafa BR, covering a wide range of habitats and altitudinal gradients.

→ The various sampling and trapping methods applied proved to be effective.

→ 400 beetle species belonging to 79 families/subfamilies were recorded. Almost every major beetle family occurred at the sampled sites.

→ Despite collecting during an unfavourable season, 164 Staphilinidae species were recorded within just 10 sampling days, out of approximately 530 known for Ethiopia (30%).

→ Several species are new to science, e.g., a water beetle *Pachysternum* sp. nov., and the new species *Tachinoplesius schoelleri* Schülke 2016 was described. To date, determinations indicate 40 species are new to science; however, this number could increase as more determinations are completed. This process proved difficult due to a lack of specialists for many beetle groups.

→ In the bamboo forests, phytotelmata were discovered, hidden in freshwater habitats. These are previously unknown for Ethiopia.

→ Wetland habitats like the Shoriri Wetlands are in good condition. More research is needed in these areas.

→ Species diversity in PFM forest sites benefits when the moisture in the ground layer is maintained by, e.g., the presence of large trees or microstructures such as climbing plants, tree holes or shrub and herb diversity.

→ Leaf beetles in the genus *Altica* could be good indicators of wetland conservation status.

1. Introduction

Information on the insect fauna of Ethiopia has never been reviewed. Thus, no checklist is available for the insects of Ethiopia. Occasionally, this information can be quickly extracted from existing catalogues or keys, but only for very few taxa (e.g., dragonflies). There is no national insect collection, so comparison with earlier collections is impossible. In addition, comparatively few specimens are available in European museums. Existing information (Selman 1973; Borowiec 1994; Medvedev 2000; Biondi et al. 2015) suggests that the insect fauna of Ethiopia differs considerably from that of neighbouring countries Sudan, South Sudan, Somalia and Kenya. However, only Kenyan insect fauna have received any significant study.

Consequently, information must be compiled from scattered original publications, typically revisions of insect taxa at the genus or species-group level. This cannot be provided even for the beetles during this assessment; it will have to be a long-term project, ideally coordinated by an Ethiopian institution. Such a checklist will only be able to provide broad information, because many of the descriptions from the 19th and early 20th centuries provide only vague descriptions of collection sites (e.g., "Abyssinia"). An example of such a checklist, compiled by the author, is given in the Appendix.

On the species level, the beetle fauna of Ethiopia is composed of Afrotropical and Palaearctic elements. However, a study of museum specimens of leaf beetles (Chrysomelidae) by the author suggests the presence of relatively few Palaearctic elements. Generally, lowland ecosystems were expected to exhibit greater diversity than montane forests. The assessment took place in December, but most Ethiopian beetles traced in museum collections were collected in April and March; therefore, an influence of seasonality was expected. The impact of settlements and habitat fragmentation on beetle species composition cannot be predicted yet, because the ecological demands of the different species are not yet known.

The beetles were sorted to the family level, in many cases to the genus level and partly to the species level.

2. Materials and Methods

2.1 Study area

Table 1 lists the study sites visited during the 10 days of the assessment. These include coffee forests (montane forests), bamboo forest, secondary forest, river banks, and wetlands.

Table 1: Study sites and characteristics

No.	Code	Area	Woreda	Habitat	Sites
1	BA	BONGA	Adiyo	Bamboo forest/ riverine vegetation	Bamboo forest
2	BK	BONGA	Adiyo	Montane forests	Boka Forests
3	KO	BONGA	Gimbo	Montane forests	Komba Forests
4	AW	BONGA	Decha	Montane forests/ riverine vegetation	Awurada Valley (Gummi River, PFM sites)
5	AG	BONGA	Gimbo	Wetland	Alemgono Wetland
6	SHO	BONGA	Gimbo	Wetland	Shoriri
7	MA	BONGA	Decha	Montane forests	Mankira forests
8	GO-wet	BOGINDA	Gawata	Wetland	Gojeb Wetland
9	GO-riv	BOGINDA	Gawata/Gimbo	River/floodplain forests	Gojeb River
10	BO	BOGINDA	Gawata	Montane forests	Boginda Forests
11	BG	BONGA	Guesthouse	Anthropogenic settlement	KDA Guesthouse and surroundings

2.2 Sampling methods

A variety of sampling methods and trap types were used. These are presented in the following sections.

2.2.1 Collection methods

Beating umbrella

A beating umbrella is used to catch insects found on foliage. The umbrella is held beneath the foliage while the collector strikes the foliage with a stick. Insects then fall into the umbrella. This is especially effective with tough and scrubby or spiny plants. One disadvantage is its openness, as some active insects can escape.

A special umbrella for insects (Fig. 1) can be obtained commercially in Europe, but regular umbrellas can be also used. However, these should be unicolour, so insects can be readily perceived. An aspirator is used to collect the insects from the umbrella.

Sifter

A sifter (Fig. 2) is used to sample accumulations of organic material such as leaf litter, and/or the top layer of soil. All typical arthropods on the top layer of soil are covered by this collection method. Only some very small arthropods may be missed.

In forest habitats, one square metre of leaf litter was sampled, along with the top layer of soil. This was repeated three times, i.e., a total of three square metres were sampled. In every forest, the following sieving sites were chosen: a relatively open site, a site close to the buttress root of a tree and a site close to decaying wood. Whenever possible, additional special microhabitats such as organic material in tree hollows or on aerial roots, bark and fungi were sampled.

Sweeping net

A sweeping net is used to catch insects present on herbs, grasses or flowers. A single piece of cloth or gauze is mounted on a metal frame held by a pole (Figs. 3 and 4).

Aerial insect car net

Many beetles fly between locations. Those beetles can be caught by aerial nets. In Kafa, an aerial insect car net was used, mounted on a four-wheel drive jeep (Fig. 5).

The net was constructed by the author, as such nets are not commercially available. The net was 2 m long, with a 0.5 m² opening and attenuated towards the end. A removable collecting bag was attached to the end of the net. The nylon material had a mesh width of 0.2 mm x 0.25 mm. The time and speed of collecting were standardised: one hour between 5:30 pm and 6:30 pm at a constant speed of 30 km/h, i.e., a distance of 30 km. GPS and altitude data were recorded at the start and end of the drive.

2.2.2 Traps

Barber pitfall trap

The Barber pitfall trap is a tool to quantitatively assess terrestrial arthropods. They primarily catch nocturnal insects. Barber traps were positioned in three forest sites and at the KDA Guesthouse in Bonga for a period of six days. A plastic cup was placed inside another plastic cup with a hole in the bottom to prevent drowning the trap during rain (Fig. 6). The outer cup was a quarter-filled with a mixture of two parts ethanol (75%) and one part glycerine. The cup was buried in the ground, with the upper rim carefully positioned level with the soil surface to avoid obstructing walking arthropods. A second type of Barber trap with a funnel placed above the collection vial was also tested. This design prevents vertebrates from falling into the trap.

Barber traps could only be placed in three sites (KDA Guesthouse, Mankira Forest, Komba Forest), because there was insufficient time to visit more places twice to collect the traps.

Flight intercept trap

Flight intercept traps are used to catch flying insects. They hit the glass window of the trap and fall through the funnel into a cup filled with the liquid killing agent, which is one part glycerine and two parts 75% ethanol (Fig. 7). Flying insects are generally caught at random.

Due to ease of transport, a small type of flight intercept trap was used in Kafa BR. It was modified by the author with a moth-funnel trap used for forest- and stored-product moths. Two forest sites and the area around the KDA Guesthouse were sampled. The traps were used continuously for a period of six days. Flight intercept traps could only be placed in three sites (BG, MA, KO, see Table 1), because there was insufficient time to visit more places twice to collect the traps.

Light trap

Many insects are attracted by light. When conditions are ideal, large numbers of insects can be caught. The ideal conditions are temperatures above 18°C, little or no moonlight and little wind. A variety of light sources can be used, such as white light or black light (ultraviolet light).

In Kafa, a light trap was provided by the Ethiopian insect team (Fig. 8). A generator was used to power white light bulbs, set in front of a white sheet and

a gauze light tower brought from Germany. Insects were removed from the sheet using a collection vial and an aspirator. On one occasion, the energy for the light was provided by a car battery with the help of a power converter. Alligator clips were used to connect the converter to the light.

Yellow dish trap

Yellow dish traps mimic yellow flowers and attract flower-visiting insects (Fig. 9). These insects fall into the liquid killing agent. Sometimes flying insects not attracted by colour fall into the dishes by chance.

2.3 Data analysis

Following the national regulations of the Ethiopian Biodiversity Institute (EBI), samples were properly prepared and exported to Germany, with the main objective of further identifying the species and completing the species list. The rove beetles (Staphylinidae) were identified in collaboration with Michael Schülke, Berlin, and the water scavenging beetles (Hydrophilidae) with Martin Fikáček, Prague. The butterflies (Lepidoptera) collected by Daniel Wiersborski were identified by Dr Axel Hausmann, The Bavarian State Collection of Zoology (ZSM).

Insects were identified to the family level, and, where possible, information on subfamily, tribe, genus and (in a few cases) species are given. The number of species was estimated using morphospecies analysis. Table 4 classifies beetles according to the family group names proposed by Bouchard et al. (2011). Due to the lack of collection reference in European museums, a number of species are still being identified, which will take some time. Only a qualitative analysis was conducted.

3. Results and Discussion

3.1 Collection methods

Beating umbrella

All insect groups typically obtained with a beating umbrella were caught in Kafa: Blattodea, Neuroptera, Dermaptera, Ensifera, Caelifera, Coleoptera, Hemiptera like Heteroptera and Homoptera, Auchenorrhyncha, Psocoptera, Thysanoptera, Hymenoptera. Some spiders were also caught, but are not collected here.

The number of insects varied greatly by habitat type and plant species. However, the beating umbrella was one of the most effective collection tools. Phytophagous Coleoptera such as weevils (Curculionoidea) and leaf beetles (Chrysomelidae) were mainly collected via this method.

Sifter

Typical soil arthropods such as woodlice, Myriapoda, Millipedia and insects such as Collembola were found. However, the number of arthropods sieved was generally low. Few beetles were found, ranging from one to five per square metre. Numbers were too low to compare forest sites. Microhabitats such as organic material on aerial roots were more diverse, and cockroaches, rove beetles and ground beetles were found. No beetles were found on fungi.

The leaf litter and the top layer of soil were relatively dry. This could be due to the climatic conditions during the dry season. Use of the forests for coffee production could also be responsible for the dryness of the soil, e.g., due to the removal of decaying wood, herbs, shrubs and shading trees. The area should be investigated again at other times of the year, at least at the start of the rainy season

Sweeping net

By sweeping grasses and herbs, insects of the following orders were caught: Ensifera, Coleoptera, Heteroptera, Auchenorrhyncha, Hymenoptera and Lepidoptera.

In general comparatively few insects were obtained. The exception was some wetland sites, where several groups were abundant (e.g. leaf beetles in the genus *Altica* on *Rumex* plants). This classic collection method is especially recommended for the wetlands. In forest sites, spiny shrubs limit the application of sweeping nets.

Aquatic net and sieve

These techniques were used by the mollusca team. Water beetles belonging to the Dytiscidae and Hydrophilidae families were obtained. However, the number of individuals obtained was low.

Aerial insect car net

Insects in the following orders were obtained: Coleoptera, Hemiptera like Heteroptera and Homoptera Auchenorrhyncha, Psocoptera, Thysanoptera, Hymenoptera, Diptera Nematocera, Diptera Brachycera and Lepidoptera. Mites were also caught, and are presumably phoretic on the insects.

While handheld aerial nets have long been used to catch beetles, little data is available on aerial insect car nets. Experience from Germany and Costa Rica determined the chosen speed and time of day. At higher speeds, soft insects such as flies are squashed, but at lower speeds the net cannot be stretched to its full capacity. These observations were confirmed in Kafa BR. A large number of insects were obtained. However, compared to (unpublished) data from sampling in Germany, fewer insects were caught, in terms of number of both individuals and species. The factors affecting this method require more detailed study. The aerial insect car net is recommended for exploring insect diversity, as almost none of the species obtained with this method was obtained elsewhere. It also caught beetles that are difficult to collect by other methods, such as small myrmecophilous Staphylinidae.

3.2 Traps

Barber pitfall trap

Arthropods typically caught in Barber traps were also obtained in Kafa BR: beetles in the families Carabidae and Staphylinidae, springtails (Collembola) and some caterpillars. However, few individuals were caught. Barber traps should be used as a standard technique in the future. During the study period, the number of insects caught was too low to compare the forest sites. One problem is the presence of ants, which try to get liquid from the trap. Some traps contained large numbers of ants, which were hard to separate from the other arthropods. When Barber traps are used in future long-term assessments, they should be covered to shelter them from rain water.

Light trap

The following insect groups were obtained in Kafa BR by using light traps: Ensifera, Caelifera, Coleoptera, Heteroptera, Auchenorrhyncha, Lepidoptera, Hymenoptera, Diptera, Ephemeoptera, Isoptera and Plecoptera. Various beetle families such as Carabidae, Scarabaeidae, Hydrophilidae, Dytiscidae and Elmidae were also caught.

The full moon during the sampling period presumably diminished the success of the light trap. However, large numbers of insects were attracted to the trap at sites like the bridge near Enderach, showing the potential of this method. Light traps are the most important technique for collecting nocturnal Lepidoptera and should be used in future studies.

Flight intercept trap

The following insect groups were obtained in Kafa using the flight intercept trap: Coleoptera, Heteroptera, Auchenorrhyncha, Thysanoptera, Hymenoptera and Diptera. Flight intercept traps should be used as a standard technique in the future. Techniques should be developed to place these traps higher in the canopy. When placed in a particular plant, this trap type can trap insects specifically associated with that plant. When used over a longer period, seasonal effects on insect activity can also be monitored.

During the study period, the number of insects caught was too low to compare the forest sites. However, it was possible to show that insects actively fly in the relatively dark low mountain forest layers during the dry season.

Yellow dish trap

The yellow dish traps mainly caught Diptera. A few beetles and Hymenoptera were also trapped.

3.3 Habitats

Bamboo forest

The bamboo thickets are dominated by bamboo (*Arundinaria alpina*), but single rainforest trees are present, such as *Schefflera abyssinica*. An adjacent wetland was also sampled.

Few insects were obtained with the beating umbrella from bamboo and trees in the bamboo thicket. Only the different species of broad-nosed weevils (Entiminae) were remarkable. Sieving the ground layer revealed few beetle specimens, but ants were very abundant, indicating a disturbed habitat.

Even though the bamboo had few external feeders, holes in the stems were common (Figs. 10 and 11). Such holes are known to be produced by longhorn beetles (Cerambycidae) and butterflies (Lepidoptera). The holes in the bamboo in Kafa BR are probably caused by moths from the family Crambidae. The Ethiopian insect team found that Kafa BR is species-rich when it comes to this family (see Table 4).

Rainwater running down the stem enters these holes and partly fills up the internodes, producing phytotelmata, small temporary water habitats (Mogi 2004). Phytotelmata are small and hidden, and thus often overlooked by humans. The water in internodes cannot be seen from the outside. However, these hidden aquatic habitats support a rich aquatic fauna dominated by invertebrates (Fig.12).

The existence of such phytotelmata in Ethiopia was not previously known. In Eastern Africa, they are only known to occur in Kenya (Damir Kovac pers. com.). Six bamboo stems of different age and a diameter of ca. 15 cm with holes in them were cut above the level of

the holes to extract the water they contained. Young stems contained clear water. Nematocera larvae were collected from stems of medium age. Old stems had cracks and no water remained.

In Southeast Asia, bamboo phytotelmata are known to contain species-rich microhabitats. The presence of holes and fly larvae indicate the possibility of the presence of more species associated with the phytotelmata in Kafa. However, this must be investigated when the young bamboo is growing, as in Southeast Asia most species are collected during this period. In Kafa BR, this period is expected to be in June.

The wetlands close to the bamboo thickets are bordered by pastures, i.e., grassland with *Hypericum* shrubs. Insects were abundant in these wetlands. Typical species include rove beetles in the genus Stenus on grasses and water beetles of the family Gyriniae in patches of open water. Grassland ants are very abundant close to the river, indicating a disturbed habitat. But the gallery forest is dominated by *Hagenia abbyssinica* and rich in climbing plants, so diverse phytophagous insects can be found there.

Moist evergreen montane forest containing wild *Coffea arabica*

Insects were sampled in the leaf litter and upper soil layer, as well as on herbs and shrubs (Fig. 13). Insects in fungi and in pieces of deadwood were also sampled. However, these structures exhibited poor species richness and a low number of individuals. The soil and litter was very dry, which could have been a seasonal effect. Observations on seasonality of soil invertebrates were published by Rybalov (1990) for Ethiopia, indicating that many species survive the dry season as diapausing eggs. The only exception was the Saja Forest. This forest and the forest adjacent to the Shoriri Wetlands should be examined for possible higher diversity in the future.

The flight intercept traps and the aerial car net revealed typical forest beetles such as bark beetles (Scolytinae, 17 species) and their specialised predators, adapted Histeridae and Cleridae. More beetles, especially ground and rove beetles, were collected in microhabitats such as accumulations of organic material in and on trees. Moisture content was higher in these structures, as indicated by the presence of cockroaches. Phytophagous beetles were mainly collected from climbing plants and coffee trees. It is extremely difficult to identify beetle species characteristic of certain forest types, requiring a detailed knowledge of the forest ecosystem. Even in Central Europe, it has been difficult to identify indicator species for forests (Eckelt et al. 2014).

Wetlands

Characteristic flea beetles in the genus *Altica* (Fig. 14) were abundant on Rumex and Oentheraceae. Many *Altica* spp. are strongly female-biased, and this also proved true for the Ethiopian species. The presence of large populations could be a good indicator of an intact wetland habitat. As they feed on characteristic dicotyledonous plants in the wetlands, they indicate the structural diversity of this grass-dominated habitat. In addition, their absence could indicate possible herbicide impact, as herbicides can selectively kill dicotyledonous plants and potentially pollute the wetlands.

3.4 Beetle, Coleoptera

A total of 400 beetle species from 79 families/subfamilies were recorded. The number of beetles recorded at each collection site is listed in Table 3. The species numbers given for the different sites do not reflect differences in biodiversity, because it was not possible to expend the same collection effort across all sites. For example, traps could only be placed at three sites. However, the Mankira, Komba, Boka, Ufa and Alemgono sites are comparable, and around 100 species were found at each of these sites. Due to lack of literature, information on endemicity cannot be given at this time. None of the beetle species has IUCN threat status.

3.5 Other insect groups

The car aerial net revealed a rich fauna of parasitoid Hymenoptera, especially Chalcidoidea. This is interesting, because parasitoid Hymenoptera were thought to be comparatively poorly represented in tropical rainforests compared to temperate regions (Veijalainen 2012). This is theorised as the main reason why beetles are the most diverse insect group worldwide, rather than Hymenoptera (like in Central Europe). It would be interesting to investigate whether this species richness in Kafa is characteristic for moist evergreen montane forests, or if these results are due to the sampling method. A diverse array of Thysanoptera was also sampled, along with representatives of different ecological guilds, such as fungus-feeders and predators. Research on Lepidoptera is currently being conducted by the Ethiopian insect team, coordinated by Daniel Wiersborski (see Table 5 with determinations by Dr Axel Hausmann). Dragonflies and flower-visiting Hymenoptera are reported separately by Dr Viola Clausnitzer (see Chapter on dragonflies) and Hans-Joachim Flügel (see Chapter on flower-visiting insects).

4. Conclusions and Recommendations for Conservation and Monitoring

4.1 Recommendations for insect conservation

Most recommendations for insect conservation focus on habitat conservation. Insect communities reflect the status of their habitats, along with their richness in microstructures and plant diversity.

Reliable data on the vulnerability of insect species to extinction and their threats also requires robust biological monitoring of tropical ecosystems, which is typically limited to a few flagship species (Lawton et al. 1998). Therefore, multi-taxa assemblages, including functional guilds, must be considered in case insect responses to disturbance need to be properly assessed.

Within the Kafa BR, many natural ecosystems are altered to agro-ecosystems. This has created a mosaic landscape comprised of simple and complex agro-ecosystems and patchily distributed rainforest fragments of varying quality. The distance between these rainforest fragments should be minimised and connections between the different natural habitats should be established.

At present, the Afromontane moist forests where coffee grows as understorey trees are traditionally managed by thinning the shade tree canopy and slashing competing undergrowth (Hundera et al. 2015). In PFM sites with coffee forests, preservation of microhabitats such as climbing plants, accumulation of organic material in and on trees, decaying wood and shrubs other than coffee should be encouraged. Ideally, at least small exclosures should be created to allow the natural regeneration of the forest trees.

Some forest areas should be protected from all kinds of use, including agroforestry and cattle trespass. Screening for the potential natural composition of tree species should be followed up by screening of phytophagous insects on these trees. Recent studies like those by Biondi et al. (2015) use groups of beetles to characterize both the biogeography and ecology of the Afrotropical region, which could potentially be used to aid conservation biology. However, such groups must be well known, and there are only a few examples with representatives in Ethiopia (e.g., the genus *Chaetocnema*).

To work out more specific recommendations, the following tasks must be completed:
A monitoring scheme should be developed to sample insects in selected habitat types. Several of the techniques evaluated in this report are recommended for this, such as Barber pitfall traps, flight intercept traps, car aerial nets and beating umbrellas. Previous studies on Afrotropical insect diversity found that applying range of sampling methods yields more diverse material than high replication of any individual method (Missa et al. 2009). In addition, morphospecies composition in trap catches is more strongly influenced by habitat type than by sampling methods (Missa et al. 2009).

The insect fauna associated with different tree species should be studied. One promising method is fogging (Adis et al. 1998), which involves distributing a pyrethrum mist into the canopy. Insects are knocked down by the natural insecticide, and fall onto blankets distributed on the ground below the tree. Flight intercept traps can also be used for this task.

In the long run, research into biodiversity in the Kafa BR and other Ethiopian regions require a national infrastructure. A national Ethiopian insect collection should be established. A checklist of Ethiopian insects should be compiled. Wetlands should be preserved through buffer zones separating wetlands from agricultural land, to prevent pollution through pesticides and fertilizers. The presence of large populations of *Altica* (Fig. 14) could be monitored via flight intercept traps and/or standardised netting.

The degree of knowledge of Ethiopian beetle fauna is currently difficult to estimate, due to the lack of checklists and the absence of systematic monitoring. However, the results on the Staphylinidae from this expedition point to poor knowledge of the fauna: within 10 sampling days during an unfavourable season, 164 Staphylinidae species were recorded, out of approxmiately 530 known for Ethiopia (30%).

4.2 Suggestions for future studies

Future studies should last at least one year and should combine systematic trapping and sampling, along with exploration of potential primary forest and other little-disturbed habitats.

Fogging should be introduced to study the canopy fauna of the remaining rainforest trees shading the coffee (Adis et al. 1998). This method allows insects to be associated with particular tree species. Data for comparison with other Afrotropical sites is available.

Barber ground traps and flight intercept traps could be used to obtain data on both species richness and diversity, as well as to estimate sampling effort (i.e. species accumulation curves). It would also provide a

dataset for future comparison with similar areas (e.g., Yayu BR, Bale National Park).

Based on the results of such studies, insect groups should be selected as indicator species for specific habitat structures and above- and belowground biodiversity. For the coffee forest, we suggest:

- Phytophagous beetles (Curculionidae and Chrysomelidae) for the canopy of specific tree species in different forests.
- Springtails (Collembola) for the forest floor soil fauna assemblages, the floor litter and the associated input of organic matter into the soil, which is a key factor linking the components of the tree-soil biodiversity system.

5. References

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6. Appendix

6.1 Tables

Table 2: List of collection sites for beetles by date. For codes, see Table 1

Date	Code	Geographical location	Altitudinal range (m a.s.l.)	Species number	Indicator species: *Altica*	Notes
2.12.2014	BG	07°15.032' N 36°15.306' E		8		Light trap
3.12.2014	BG	07°15.032' N 36°15.306' E		35		Barber traps, flight intercept traps, yellow dish traps
3.12.2014	KO	Start: 07°18.718' N 36°04.822' E End: 07°18.864' N 36°03.156' E	1680-1806	18		Aerial car net
3.12.2014	KO	07°16.839' N 36°11.426' E	1766	9		Light trap
4.12.2014	MA	07°18.936' N 36°03.092' E	1601	15		At stream
4.12.2014	MA	07°11.754' N 36°16.949' E	1640	4		Forest sieving site
4.12.2014	MA	Start: 07°11.986' N 36°16.198' E End: 07°11.157' N 36°18.224' E	1689-1906	103		Aerial car net
4.12.2014	MA	07°12.151' N 36°17.012' E	1606	32		Enderach, light trap on a bridge
4.12.2014	MA	07°11.997' N 36°16.625' E	1627	1		Enderach light trap above forest
5.12.2014	AW	07°05.146' N 36°12.468' E	1759	31		Ufa, PFM-site cof-fee forest
5.12.2014	AW	Start: 07°04.874' N 36°11.736' E End: 07°01.524' N 36°11.053' E	1910-1985	99		Aerial car net
6.12.2014	KO	07°10.176' N 36°13.277' E	1987	22		Barber traps, flight intercept traps
6.12.2014	KO	Start: 07°18.718' N 36°04.822' E End 07°18.864'N 36°03.156' E	1991-2103	51		Aerial car net
7.12.2014	BA	7°30.170' N 36°11.797' E	1864	25		Gichi river
7.12.2014	BA	07°14.610' N 36°27.388' E	2710	18		Bamboo
7.12.2014	BA	07°14.596' N 36°27.340' E	2668	33	Present	River bank
7.12.2014	BA	07°17.711' N 36°22.555' E	2414	41		Pasture, wetland
7.12.2014	BK-BG	Start: 07°17.711' N 36°22.555' E End 07°15.064' N 36°15.298' E	2668-1777	129		Aerial car net
8.12.2014	Go-riv	7°25.066'N 36°22.452' E	1291	9		Secondary forest / plantation
8.12.2014	BG-BK	Start: 07°15.064' N 36°15.298' E End 07°15.983' N 36°19.452' E	1777-2170	98		Aerial car net
9.12.2014	BO	7°30.281' N 36°06.375' E	2103	14		Saja Forest
10.12.2014	AG	7°21.754' N 36°13.275' E	1639	20	Present	Wetlands
10.12.2014	SHO	7°20.486' N 36°12.538' E	1640	5		Wet forest
10.12.2014	SHO	7°20.498' N 36°12.230' E	1607	33	Present	Wetlands
11.12.2014	BK	Start: 07°17.711' N 36°22.555' E End: 07°17.656' N 36°22.560' E	2668-2418	27	Present	Stream, wetland, pasture, bamboo
11.12.2014	BK	07°14.149' N 36°16.596' E	1956	8		Roadside
11.12.2014	AG	Start: 07°18.569' N 36°13.950' E End: 07°23.272' N 36°15.354' E	1758-1741	88		Aerial car net

Table 3: Checklist of Chrysomelidae, Cryptocephalinae, Cryptocephalini in Ethiopia and adjacent regions according to literature studies

Genus Cryptocephalus
Subgenus *Cryptocephalus*
adonis Pic, 1922: 12; **AFR**: Abyssinia, Republic Congo = var. *aruensis* Pic, 1930: 354 = var. *burgeoni* Pic, 1930: 354
aduanus Reineck, 1915: 431; **AFR**: Ethiopia = var. *viridepunctus* Pic, 1939: 35
arussi Gestro, 1895: 440; **AFR**: Abyssinia Gallaland
bouriensis Pic, 1933: 5; **AFR**: Ethiopia
bisbirufonotatus Pic, 1922: 11; **AFR**: Abyssinia
candezei Clavareau, 1913: 137 [Replacement Name]; **AFR**: Abyssinia = *ellipticus* Chapuis, 1876: 348 [Homonym]
decoratus Reiche, 1847: 406; **AFR**: Abyssinia Eritrea, Uganda = var. *chiaromontei* Pic, 1933: 129; **AFR**: Eritrea = var. *andreinii* Pic, 1933: 129; **AFR**: Eritrea = var. *ugriensis* Pic, 1933: 129; **AFR**: Eritrea
menelik Reineck, 1915: 402; **AFR**: Abyssinia
multicoloratus Gridelli, 1939: 575; **AFR**: South Abyssinia
quadrinotaticollis Pic, 1930: 356; **AFR**: Abyssinia
zavattarii Pic, 1939: 373; **AFR**: Ethiopia Abyssinia Ital. Somaliland
Subgenus *Anteriscus*
proteus Weise, 1906: 41; **AFR**: Abyssinia Keren
septemplagiatus Chapuis, 1876: 348; **AFR**: Abyssinia
tricoloraticollis Pic, 1915: 12; **AFR**: Africa Eritrea
trigeminus Chapuis, 1876: 346; **AFR**: Abyssinia Sudan
viator Suffrian, 1857: 140; **AFR**: Eastern Africa = *abyssiniacus* Jacoby, 1895: 174; **AFR**: Abyssinia = *contrarius* Chapuis, 1876: 347; **AFR**: Abyssinia
virideapicalis Pic, 1939: 35; **AFR**: Ethiopia

Table 4: Coleoptera collected in the Kafa BR during the biodiversity assessment

Family	Subfamily	Tribe	Subtribe	Taxon	MA	AW	KO	BK	BG	SHO	AG	Go-riv	BO	BA
Suborder ADEPHAGA														
Gyrinidae				spec. 1										1
Carabidae	Scaritinae			spec. 1					1					1
Carabidae	Scaritinae			spec. 2					1					
Carabidae	Trechinae	Bembidiini	Tachyina	cf. *Sphaerotachys* sp. 3			1							
Carabidae	Harpa¬linae	Harpalini		*Progonochaetus* (= *Dichaetochilus*) *planicollis* Putz					1					
Carabidae				spec.5					1					
Carabidae	Harpa¬linae	Lebiini	Lebiina	cf. *Phloezetheus Lebia* sp. 6		1								
Carabidae				spec. 7										1
Carabidae				spec. 8				1						
Carabidae				spec. 9	1									
Carabidae				spec. 10				1						
Carabidae	Trechinae	Bembidiini	Tachyina	cf. Sphaerotachys sp. 11				1			1			
Carabidae				spec. 12				1						
Carabidae	Trechinae			spec. 13				1						
Carabidae				spec. 14									1	
Carabidae				spec. 15									1	
Carabidae	Trechinae			spec. 16									1	
Dytiscidae				spec. 1	1									
Dytiscidae				spec. 2							1			
Dytiscidae				spec. 3										1
Dytiscidae				spec. 4						1				
Dytiscidae				spec. 5						1				
Dytiscidae				spec. 6	1									
Dytiscidae				spec. 7							1			
Suborder POLYPHAGA														
Hydrophilidae				*Cercyon* spec. 1			1							
Hydrophilidae				spec. 2			1							
Hydrophilidae				*Cercyon* spec. 3			1							
Hydrophilidae				spec. 4			1							
Hydrophilidae				*Helochares* spec. 1	1									
Hydrophilidae				*Hydrochara* spec. 1	1							1		
Hydrophilidae				*Cercyon* (*Paracercyon*) 1							1			
Hydrophilidae				*Coelostoma* spec. 1	1									
Hydrophilidae				*Enochrus* spec. 1	1									
Hydrophilidae				*Cercyon* spec. 4				1						
Hydrophilidae				*Cercyon* spec. 6		1								
Hydrophilidae				spec. 12								1		
Hydrophilidae				spec. 13								1		
Hydrophilidae				spec. 14				1						
Hydrophilidae				*Cercyon* spec. 2			1				1			
Hydrophilidae				*Cercyon* spec. 5		1								
Hydrophilidae				*Cercyon* spec. 7		1		1			1			

Family	Subfamily	Tribe	Subtribe	Taxon	MA	AW	KO	BK	BG	SHO	AG	Go-riv	BO	BA
Hydrophilidae				*Pachysternum* capense							1			
Hydrophilidae				*Pachysternum* sp. nov.							1			
Hydrophilidae				*Paracymus* spec. 1	1									
Hydrophilidae				*Cryptopleurum* spec. 1		1								
Hydrophilidae				*Pseucyon* spec. 1		1		1						
Hydrophilidae				*Pseucyon* spec. 2				1						
Histeridae				spec. 1	1									1
Histeridae				spec. 2							1			
Histeridae				spec. 3	1									
Hydraenidae				spec. 1							1			
Ptiliidae				gen. spec. 1		1					1			
Ptiliidae				gen. spec. 2		1					1			
Ptiliidae				gen. spec. 3		1								
Ptiliidae				gen. spec. 4							1			
Ptiliidae				gen. spec. 5							1			
Ptiliidae				gen. spec. 6			1							
Ptiliidae				gen. spec. 7							1			
Ptiliidae				gen. spec. 8		1								
Ptiliidae				gen. spec. 9							1			
Leiodidae				gen. spec. 1			1							
Leiodidae				gen. spec. 2										
Leiodidae	Cholevinae			gen. spec. 3				1			1			
Staphylinidae	Omaliinae	Omaliini		*Xylostiba* sp.				1			1			
Staphylinidae	Proteininae	Proteinini		*Megarthrus* spec.	1									
Staphylinidae	Pselaphinae	Euplectini		Euplectini gen. spec.				1			1			
Staphylinidae	Pselaphinae			Pselaphinae gen. spec. 1		1								
Staphylinidae	Pselaphinae			Pselaphinae gen. spec. 2				1						
Staphylinidae	Pselaphinae			Pselaphinae gen. spec. 3			1	1			1			
Staphylinidae	Pselaphinae			Pselaphinae gen. spec. 4									1	
Staphylinidae	Tachyporinae	Tachyporini		*Cilea* spec.		1								
Staphylinidae	Tachyporinae	Tachyporini		*Sepedophilus* spec.			1							
Staphylinidae	Tachyporinae	Tachyporini		*Tachinoplesius schoelleri* Schülke 2016		1								
Staphylinidae	Aleocharinae	Placusini		*Placusa* sp.	1		1							
Staphylinidae	Aleocharinae	Gyroph-aeinini		*Gyrophaena* spec. 1	1			1						
Staphylinidae	Aleocharinae	Gyroph-aeinini		*Gyrophaena* spec. 2		1		1			1			
Staphylinidae	Aleocharinae	Deremini		*Deremini* gen. spec. 1	1	1		1			1			
Staphylinidae	Aleocharinae	Deremini		*Deremini* gen. spec. 2				1			1			

Family	Subfamily	Tribe	Subtribe	Taxon	MA	AW	KO	BK	BG	SHO	AG	Go-riv	BO	BA
Staphylinidae	Aleocharinae	Deremini		*Derelina* cf. *ruhembeana* (Bernhauer)			1				1			
Staphylinidae	Aleocharinae			Bolitocharini gen. sp. 1		1		1			1			
Staphylinidae	Aleocharinae			Bolitocharini gen. sp. 2							1			
Staphylinidae	Aleocharinae	Deremini		Falagriini ? sp. (Deremini?)		1					1			
Staphylinidae	Aleocharinae	Falagriini		Falagriini cf. *Cordalia* sp.							1			
Staphylinidae	Aleocharinae	Falagriini		Falagriini gen. spec. 1	1	1		1			1			
Staphylinidae	Aleocharinae	Falagriini		Falagriini gen. spec. 2	1			1			1			
Staphylinidae	Aleocharinae	Falagriini		Falagriini gen. spec. 3	1			1						
Staphylinidae	Aleocharinae	Falagriini		Falagriini gen. spec. 4				1			1			
Staphylinidae	Aleocharinae	Falagriini		Falagriini ?? gen. spec. 5				1						
Staphylinidae	Aleocharinae	Falagriini		Falagriini spec. (*Borboropora* sp.)				1						
Staphylinidae	Aleocharinae	Falagriini		*Autalia* spec.			1	1			1			
Staphylinidae	Aleocharinae	Falagriini		*Falagria* spec. 1	1	1		1						
Staphylinidae	Aleocharinae	Falagriini		*Falagria* spec. 2	1	1	1	1						
Staphylinidae	Aleocharinae	Falagriini		*Falagria* spec. 3		1								
Staphylinidae	Aleocharinae	Falagriini		*Falagria* spec. 4				1						
Staphylinidae	Aleocharinae			*Stenomastax* ? spec.	1			1			1			
Staphylinidae	Aleocharinae	Homalotini		*Homalota* sp. 1		1								
Staphylinidae	Aleocharinae	Homalotini		*Homalota* sp. 2				1						
Staphylinidae	Aleocharinae	Homalotini		*Homalota* sp. 3							1			
Staphylinidae	Aleocharinae			Homalotini ? spec.		1		1			1			
Staphylinidae	Aleocharinae	Tachyusini		*Brachiusa* spec.	1	1	1	1			1			
Staphylinidae	Aleocharinae	Tachyusini		*Gnypeta* spec.	1									
Staphylinidae	Aleocharinae	Tachyusini		Tachyusini gen. spec.	1	1								
Staphylinidae	Aleocharinae	Tachyusini		*Tachyusa* spec.	1									
Staphylinidae	Aleocharinae			Aleocharinae gen. spec. (Tachyusini?)		1								
Staphylinidae	Aleocharinae	Athetini		Athetini spec. 1	1	1		1						
Staphylinidae	Aleocharinae	Athetini		Athetini spec. 2	1	1	1	1			1			
Staphylinidae	Aleocharinae	Athetini		Athetini spec. 3	1			1			1			
Staphylinidae	Aleocharinae	Athetini		Athetini spec. 4		1		1						
Staphylinidae	Aleocharinae	Athetini		Athetini spec. 5	1			1						
Staphylinidae	Aleocharinae	Athetini		Athetini spec. 6	1	1	1	1						
Staphylinidae	Aleocharinae	Athetini		Athetini spec. 7		1		1						
Staphylinidae	Aleocharinae	Athetini		Athetini spec. 8		1								
Staphylinidae	Aleocharinae	Athetini		Athetini spec. 9		1								
Staphylinidae	Aleocharinae	Athetini		Athetini spec. 10		1								
Staphylinidae	Aleocharinae	Athetini		Athetini spec. 11	1									
Staphylinidae	Aleocharinae	Athetini		Athetini spec. 12			1				1			

Family	Subfamily	Tribe	Subtribe	Taxon	MA	AW	KO	BK	BG	SHO	AG	Go-riv	BO	BA
Staphylinidae	Aleocharinae	Athetini		Athetini spec. 13	1	1								
Staphylinidae	Aleocharinae	Athetini		Athetini spec. 14							1			
Staphylinidae	Aleocharinae	Athetini		Athetini spec. 15	1									
Staphylinidae	Aleocharinae	Athetini		Athetini spec. 16							1			
Staphylinidae	Aleocharinae	Athetini		Athetini spec. 17							1			
Staphylinidae	Aleocharinae	Athetini		Athetini spec. 18							1			
Staphylinidae	Aleocharinae	Athetini		*Atheta coriaria* (Kraatz)				1						
Staphylinidae	Aleocharinae	Athetini		*Atheta* spec. 1	1	1	1	1						
Staphylinidae	Aleocharinae	Athetini		*Atheta* spec. 2	1	1	1	1			1			
Staphylinidae	Aleocharinae	Athetini		*Atheta* spec. 3			1							
Staphylinidae	Aleocharinae	Athetini		*Aloconota* spec. 1	1	1								
Staphylinidae	Aleocharinae	Athetini		*Aloconota* (?) spec. 2				1			1			
Staphylinidae	Oxypodini spec.			Athetini spec. 14	1									
Staphylinidae	Aleocharinae	Lomechusini		*Aenictonia anommatophila* Wasmann	1	1	1	1	1					
Staphylinidae	Aleocharinae	Lomechusini		*Myrmechusa* spec. 1				1	1					
Staphylinidae	Aleocharinae	Lomechusini		*Myrmechusa* spec. 2		1	1	1						
Staphylinidae	Aleocharinae	Lomechusini		*Trichodonia* spec. 1	1	1		1	1					
Staphylinidae	Aleocharinae	Lomechusini		*Trichodonia* spec. 2				1						
Staphylinidae	Aleocharinae	Lomechusini		*Trichodonia* ?? spec. 3							1			
Staphylinidae	Aleocharinae	Lomechusini		Lomechusini gen. sp. 1		1		1	1					
Staphylinidae	Aleocharinae	Lomechusini		Lomechusini gen. sp. 2		1		1	1					
Staphylinidae	Aleocharinae	Lomechusini		Lomechusini gen. sp. 3				1						
Staphylinidae	Aleocharinae	Lomechusini		Lomechusini gen. sp. 4			1							
Staphylinidae	Aleocharinae	Lomechusini		Lomechusini gen. sp. 5			1							
Staphylinidae	Aleocharinae	Lomechusini		Lomechusini gen. sp. 6		1		1	1					
Staphylinidae	Aleocharinae	Lomechusini		Lomechusini gen. sp. 7		1		1	1					
Staphylinidae	Aleocharinae	Lomechusini		Ocyplanus spec. (Lomechusini sp. 8)		1			1					
Staphylinidae	Aleocharinae	Lomechusini		Lomechusini gen. sp. 9					1					
Staphylinidae	Aleocharinae	Lomechusini		Lomechusini gen. sp. 10					1					
Staphylinidae	Aleocharinae	Lomechusini		Lomechusini gen. sp. 11					1					
Staphylinidae	Aleocharinae	Lomechusini		Lomechusini gen. sp. 12					1					
Staphylinidae	Aleocharinae	Lomechusini		*Zyras* spec. Lomechusini gen. sp. 13					1		1			

Family	Subfamily	Tribe	Subtribe	Taxon	MA	AW	KO	BK	BG	SHO	AG	Go-riv	BO	BA
Staphylinidae	Aleocharinae	Lomechusini		Lomechusini gen. sp. 14							1			
Staphylinidae	Aleocharinae	Lomechusini		Lomechusini gen. sp. 15							1			
Staphylinidae	Aleocharinae	Lomechusini		Lomechusini gen. sp. 16							1			
Staphylinidae	Aleocharinae	Lomechusini		Lomechusini ? sp. 1	1			1						
Staphylinidae	Aleocharinae	Lomechusini		Lomechusini ? sp. 2		1	1							
Staphylinidae	Aleocharinae	Lomechusini		*Rhoptrodinarda* sp.							1			
Staphylinidae	Aleocharinae	Pygostenini		Pygostenini gen. sp. 1		1								
Staphylinidae	Aleocharinae	Pygostenini		Pygostenini gen. sp. 2		1		1			1			
Staphylinidae	Aleocharinae	Pygostenini		Pygostenini gen. sp. 3			1	1			1			
Staphylinidae	Aleocharinae	Pygostenini		Pygostenini gen. sp. 4				1						
Staphylinidae	Aleocharinae	Pygostenini		Pygostenini gen. sp. 5				1						
Staphylinidae	Aleocharinae	Pygostenini		Pygostenini gen. sp. 6				1						
Staphylinidae	Aleocharinae	Aleocharini		Aleocharini gen. spec.			1							
Staphylinidae	Aleocharinae	Aleocharini		Aleocharini gen. spec.2 (Aleochara?)							1			
Staphylinidae	Aleocharinae	Aleocharini		*Amarochara* spec. 2				1						
Staphylinidae	Aleocharinae	Aleocharini		*Amarochara* spec. 1	1	1		1			1			
Staphylinidae	Scaphidiinae			Scaphidiinae gen. spec. 1				1			1			
Staphylinidae	Scaphidiinae			Scaphidiinae gen. spec. 1							1			
Staphylinidae	Scaphidiinae			Scaphidiinae gen. spec. 1							1			
Staphylinidae	Osoriinae	Eleusini		*Eleusis* spec. 1				1						
Staphylinidae	Osoriinae	Eleusini		*Eleusis* spec. 2				1						
Staphylinidae	Osoriinae	Osoriini		Osoriinae gen. sp. (cf. Holotrochus)	1		1	1			1			
Staphylinidae	Oxytelinae	Oxytelini		*Anotylus* spec. 1	1	1	1	1			1			
Staphylinidae	Oxytelinae	Oxytelini		*Anotylus* spec. 2	1									
Staphylinidae	Oxytelinae	Oxytelini		*Anotylus* spec. 3		1								
Staphylinidae	Oxytelinae	Oxytelini		*Anotylus* spec. 4	1						1			
Staphylinidae	Oxytelinae	Oxytelini		*Anotylus* ?? spec. 5				1			1			
Staphylinidae	Oxytelinae	Oxytelini		*Anotylus* spec. 6							1			
Staphylinidae	Oxytelinae	Oxytelini		*Oxytelus* (?) spec. 1	1									
Staphylinidae	Oxytelinae	Oxytelini		*Oxytelus* spec. 2	1	1		1			1			
Staphylinidae	Oxytelinae	Oxytelini		*Oxytelus* spec. 3	1		1							
Staphylinidae	Oxytelinae	Oxytelini		*Oxytelus* spec. 4		1		1						

Family	Subfamily	Tribe	Subtribe	Taxon	MA	AW	KO	BK	BG	SHO	AG	Go-riv	BO	BA
Staphylinidae	Oxytelinae	Oxytelini		*Oxytelus bonghensis* Fagel	1	1	1	1						
Staphylinidae	Oxytelinae	Oxytelini		*Oxytelus* spec. 6	1			1			1			
Staphylinidae	Oxytelinae	Oxytelini		*Oxytelus* spec. 7	1			1						
Staphylinidae	Oxytelinae	Oxytelini		*Oxytelus* spec. 8				1						
Staphylinidae	Oxytelinae	Oxytelini		*Oxytelus* spec. 9	1			1						
Staphylinidae	Oxytelinae	Oxytelini		*Oxytelus* spec. 10	1			1			1			
Staphylinidae	Oxytelinae	Thinobiini		*Carpelimus* sp. 1	1			1						
Staphylinidae	Oxytelinae	Thinobiini		*Carpelimus* sp. 2	1	1		1						
Staphylinidae	Oxytelinae	Thinobiini		*Carpelimus* sp. 3	1									
Staphylinidae	Oxytelinae	Thinobiini		*Carpelimus* sp. 4	1									
Staphylinidae	Oxytelinae	Thinobiini		*Carpelimus* (*Troginus*) spec. 5				1						
Staphylinidae	Oxytelinae	Thinobiini		*Carpelimus* spec. 6							1			
Staphylinidae	Scydmaeninae			*Euconnus* spec.			1				1			
Staphylinidae	Scydmaeninae			*Scydmaenus* spec. 1	1			1			1			
Staphylinidae	Scydmaeninae			*Scydmaenus* spec. 2	1			1						
Staphylinidae	Scydmaeninae			*Scydmaenus* spec. 3				1						
Staphylinidae	Paederinae	Paederini	Cryptobiina	*Cryptobiina* gen. spec.	1									
Staphylinidae	Paederinae	Paederini	Medonina	Medonina gen. spec. 1	1			1						
Staphylinidae	Paederinae	Paederini	Medonina	Medonina gen. spec. 2 (cf. *Lithocharis*)				1			1			
Staphylinidae	Paederinae	Paederini	Medonina	*Lithocharis* spec. 1				1						
Staphylinidae	Paederinae	Paederini	Medonina	*Lithocharis* spec. 2				1						
Staphylinidae	Paederinae	Paederini	Medonina	*Lithocharis* spec. 3							1			
Staphylinidae	Paederinae	Paederini	Medonina	*Lithocharis* spec. 4							1			
Staphylinidae	Paederinae	Paederini	Medonina	*Thinocharis* spec.				1						
Staphylinidae	Paederinae	Paederini	Paederina	*Paederus* spec.	1			1	1					
Staphylinidae	Paederinae	Paederini	Stilicina	*Rugilus* spec. 1	1		1	1			1			
Staphylinidae	Paederinae	Paederini	Stilicina	*Rugilus* spec. 2				1						
Staphylinidae	Paederinae	Paederini	Stilicina	*Rugilus* spec. 3							1			
Staphylinidae	Paederinae	Paederini	Scopaeina	*Scopaeus* spec. 1				1						
Staphylinidae	Paederinae	Paederini	Scopaeina	*Scopaeus brunnescens* Fagel				1			1			
Staphylinidae	Paederinae	Paederini	Scopaeina	*Scopaeus* spec. 3							1			
Staphylinidae	Staphylininae	Staphylinini	Tanygnathinina	*Atanygnathus* spec.		1		1			1			
Staphylinidae	Staphylininae	Staphylinini	Philonthina	*Erichsonius* spec. 1				1						
Staphylinidae	Staphylininae	Staphylinini	Philonthina	*Erichsonius* spec. 2				1						
Staphylinidae	Staphylininae	Staphylinini	Philonthina	*Gabrius* spec. 1				1						
Staphylinidae	Staphylininae	Staphylinini	Philonthina	*Gabrius* spec. 2				1						

Family	Subfamily	Tribe	Subtribe	Taxon	MA	AW	KO	BK	BG	SHO	AG	Go-riv	BO	BA
Staphylinidae	Staphylininae	Staphylinini	Philonthina	*Gabronthus* spec. 1	1	1		1			1			
Staphylinidae	Staphylininae	Staphylinini	Philonthina	*Gabronthus* spec. 2							1			
Staphylinidae	Staphylininae	Staphylinini	Philonthina	*Neobisnius* spec.	1			1						
Staphylinidae	Staphylininae	Staphylinini	Philonthina	*Philonthus* spec. 1	1									
Staphylinidae	Staphylininae	Staphylinini	Philonthina	*Philonthus* spec. 2 (cf. turbidus)	1									
Staphylinidae	Staphylininae	Staphylinini	Philonthina	*Philonthus* spec. 3				1						
Staphylinidae	Staphylininae	Staphylinini	Philonthina	*Philonthus* spec. 4							1			
Staphylinidae	Staphylininae	Staphylinini	Philonthina	*Philonthus* spec. 5							1			
Staphylinidae	Staphylininae	Xantholinini		*Xantholinini* gen. spec. 1 (cf. Leptacinus)	1		1				1			
Staphylinidae	Staphylininae	Xantholinini		*Xantholinini* gen. spec. 2	1	1		1			1			
Staphylinidae	Staphylininae	Xantholinini		*Xantholinini* gen. spec. 3							1			
Staphylinidae	Staphylininae	Xantholinini		*Xantholinini* gen. spec. 4							1			
Geotrupidae														
Scarabaeidae	Aphodiinae			spec. 1			1							
Scarabaeidae	Aphodiinae			spec. 2		1								
Scarabaeidae	Aphodiinae			spec. 3		1	1							
Scarabaeidae	Aphodiinae			spec. 4							1			
Scarabaeidae	Scarabaeinae	Coprini		*Onthophagus* sp.							1			
Scarabaeidae	Scarabaeinae	Coprini		spec. 2		1								
Scarabaeidae	Cetoniinae			spec. 1					1					
Scarabaeidae	Cetoniinae			spec. 2			1							
Scarabaeidae	Cetoniinae			spec. 3					1					
Scirtidae				spec. 1		1								
Scirtidae				spec. 2				1						
Scirtidae				spec. 3				1						
Dascillidae														
Rhipiceridae														
Elmidae	Elminae			spec. 1	1									
Elmidae	Elminae			spec. 2	1									
Elmidae	Elminae			spec. 3	1									
Elmidae	Elminae			spec. 4	1									
Eucnemidae														
Throscidae				spec. 1							1			
Elateridae				spec. 1		1								
Elateridae				spec. 2							1			
Elateridae				spec. 3	1									
Elateridae				spec. 4		1								
Lycidae				spec. 1		1								
Lycidae				spec. 2										1

Family	Subfamily	Tribe	Subtribe	Taxon	MA	AW	KO	BK	BG	SHO	AG	Go-riv	BO	BA
Lycidae				*Lycus* spec. 3	1									
Lycidae				spec. 4				1						
Lampyridae				spec. 1				1						
Cantharidae	Malthininae			spec. 1				1						
Bostrichidae	Bostrichinae			spec. 1				1						
Bostrichidae	Lyctinae			spec. 1		1								
Ptinidae	Ptininae			spec. 1		1								
Ptinidae	Anobiinae			spec. 1		1								
Ptinidae	Anobiinae			spec. 2		1								
Lymexylidae				spec. 1					1					
Cleridae				spec. 1	1									
Cleridae				spec. 2	1									
Melyridae	Dasytinae			spec. 1									1	
Monotomidae	Rhizophaginae			spec. 1		1								
Monotomidae	Rhizophaginae			spec. 2				1						
Monotomidae	Rhizophaginae			spec. 3				1						
Cryptophagidae	Cryptophaginae			spec. 1									1	
Silvanidae				spec. 1		1					1			
Silvanidae				spec. 2		1								
Silvanidae				spec. 3				1			1			
Cucujidae				spec. 1				1						
Cucujidae				spec. 2		1								
Cucujidae				spec. 3		1								
Laemophloeidae				spec. 1							1			
Laemophloeidae				spec. 2		1	1				1			
Laemophloeidae				spec. 3							1			
Laemophloeidae				spec. 4					1					
Nitidulidae	Carpophilinae			gen. spec. 1		1		1						
Nitidulidae	Carpophilinae			gen. spec. 2		1								
Nitidulidae				gen. spec. 3			1							
Nitidulidae				gen. spec. 4		1								
Nitidulidae				gen. spec. 5			1							
Nitidulidae				gen. spec. 6							1			
Nitidulidae				gen. spec. 7			1							
Nitidulidae				gen. spec. 8			1							
Nitidulidae				gen. spec. 9	1									
Coccinelidae	Coccinelinae			gen. spec. 1					1					
Coccinelidae	Coccinelinae			gen. spec. 2	1						1			
Coccinelidae	Coccinelinae			gen. spec. 3					1					
Coccinelidae	Coccinelinae			gen. spec. 4	1									
Coccinelidae	Coccinelinae			gen. spec. 5										1
Coccinelidae	Coccinelinae			gen. spec. 6	1									
Coccinelidae	Coccinelinae			gen. spec. 7	1									
Coccinelidae	Coccinelinae			gen. spec. 8										1
Coccinelidae	Coccinelinae			gen. spec. 9									1	1
Coccinelidae	Coccinelinae			gen. spec. 10	1									
Coccinelidae	Coccinelinae			gen. spec. 11									1	
Corylophidae	Corylophinae	Sericoderini		cf. *Sericoderus* spec. 1							1			

Family	Subfamily	Tribe	Subtribe	Taxon	MA	AW	KO	BK	BG	SHO	AG	Go-riv	BO	BA
Corylophidae	Corylophinae	Sericoderini		cf. *Sericoderus* spec. 2				1						
Latridiidae				gen. spec. 1	1				1					
Latridiidae				gen. spec. 2			1	1			1			
Latridiidae				gen. spec. 3				1			1			
Latridiidae				gen. spec. 4				1						
Mycetophagidae				spec. 1			1				1			
Mordellidae				spec. 1				1						
Zopheridae	Colydiinae			spec. 1				1						
Zopheridae	Colydiinae			spec. 2									1	
Tenebrionidae	Lagriinae			spec. 1					1					
Tenebrionidae	Lagriinae			spec. 5								1		
Tenebrionidae	Lagriinae			spec. 6										
Tenebrionidae	Tenebrioninae			spec. 2			1							
Tenebrionidae	Tenebrioninae			spec. 3		1								
Tenebrionidae	Diaperinae			spec. 4		1								
Tenebrionidae				spec. 5				1						
Anthicidae				spec. 1		1								
Anthicidae				spec. 2				1						
Anthicidae				spec. 3				1						
Scraptiidae	Anaspidinae			spec. 1			1							
Cerambycidae	Lamiinae			spec. 1										1
Cerambycidae	Lamiinae			spec. 2										1
Cerambycidae	Lamiinae			spec. 3		1								
Chrysomelidae	Bruchinae			spec. 1	1									
Chrysomelidae	Cassidinae			*Cassida* spec. 1			1							
Chrysomelidae	Cassidinae			spec. 2				1						
Chrysomelidae	Cassidinae			spec. 3						1				
Chrysomelidae	Cassidinae			*Conchyloctenia hybrida* (Bohemann 1854) sp. 4								1		
Chrysomelidae	Cassidinae			spec. 5				1						
Chrysomelidae	Chrysomelinae	Chrysomelini		spec. 1										1
Chrysomelidae	Chrysomelinae	Chrysomelini		spec. 2		1								
Chrysomelidae	Galerucinae	Alticini		gen. spec. 1					1					
Chrysomelidae	Galerucinae	Alticini		gen. spec. 2										1
Chrysomelidae	Galerucinae	Alticini		gen. spec. 3										1
Chrysomelidae	Galerucinae	Alticini		gen. spec. 4				1						
Chrysomelidae	Galerucinae	Alticini		gen. spec. 5									1	
Chrysomelidae	Galerucinae	Alticini		gen. spec. 6									1	
Chrysomelidae	Galerucinae	Alticini		*Psylliodes* sp. 1										
Chrysomelidae	Galerucinae	Alticini		*Orthocrepis* sp. 1										1
Chrysomelidae	Galerucinae	Alticini		*Nisotra* spec. 1	1				1					
Chrysomelidae	Galerucinae	Alticini		*Podagrica* spec. 1	1									
Chrysomelidae	Galerucinae	Alticini		*Altica* spec. 1		1			1	1	1			
Chrysomelidae	Galerucinae	Alticini		*Altica* spec. 2										1
Chrysomelidae	Galerucinae	Galerucini	Luperina	gen. spec. 1	1									
Chrysomelidae	Galerucinae	Galerucini		gen. spec. 1					1		1			
Chrysomelidae	Galerucinae	Galerucini		gen. spec. 2						1	1			
Chrysomelidae	Galerucinae	Galerucini	Monoleptina	*Medythia* sp. 1	1				1					

Family	Subfamily	Tribe	Subtribe	Taxon	MA	AW	KO	BK	BG	SHO	AG	Go-riv	BO	BA
Chrysomelidae	Galerucinae	Galerucini	Mono-leptina	*Afrocandezea* spec. 1					1					
Chrysomelidae	Galerucinae	Galerucini	Mono-leptina	cf. *Afronaumannia* spec. 1										1
Chrysomelidae	Cryptocephalinae			gen. spec. 1			1							
Chrysomelidae	Eumolpinae						1					1		
Anthribidae	Anthribinae			gen. spec. 1	1									
Anthribidae	Anthribinae			gen. spec. 2									1	
Anthribidae	Anthribinae			gen. spec. 3					1					
Attelabidae	Apoderinae			gen. spec. 1								1	1	
Brentidae	Apioninae			gen. spec. 1				1				1		
Brentidae	Apioninae			gen. spec. 2										
Dryophthoridae				gen. spec. 1							1			
Dryophthoridae				gen. spec. 2								1		
Dryophthoridae				gen. spec. 3				1						
Curculionidae	Curculioninae	Rhamphini		gen. spec. 1		1								
Curculionidae				gen. spec. 1		1								
Curculionidae				gen. spec. 2		1								
Curculionidae				gen. spec. 3		1								
Curculionidae				gen. spec. 4		1								
Curculionidae				gen. spec. 5	1			1			1			
Curculionidae				gen. spec. 6		1								
Curculionidae				gen. spec. 7		1								
Curculionidae				gen. spec. 8					1					
Curculionidae				gen. spec. 9		1								
Curculionidae				gen. spec. 10	1									
Curculionidae				gen. spec. 11	1									
Curculionidae	Entiminae			gen. spec. 1					1					
Curculionidae	Entiminae			gen. spec. 2		1								
Curculionidae	Entiminae			gen. spec. 3		1								
Curculionidae	Entiminae			gen. spec. 4		1								
Curculionidae	Entiminae			gen. spec. 5	1									
Curculionidae	Entiminae			gen. spec. 6	1									
Curculionidae	Entiminae			gen. spec. 7	1									
Curculionidae	Entiminae			gen. spec. 8	1									
Curculionidae	Entiminae			gen. spec. 9	1									
Curculionidae	Entiminae			gen. spec. 10										1
Curculionidae	Entiminae			gen. spec. 11	1									
Curculionidae	Entiminae			gen. spec. 12	1									
Curculionidae	Entiminae			gen. spec. 13	1									
Curculionidae	Entiminae			gen. spec. 14									1	
Curculionidae	Scolytinae			gen. spec. 1		1								
Curculionidae	Scolytinae			gen. spec. 2							1			
Curculionidae	Scolytinae			gen. spec. 3							1			
Curculionidae	Scolytinae			gen. spec. 4							1			
Curculionidae	Scolytinae			gen. spec. 5		1	1	1						
Curculionidae	Scolytinae			gen. spec. 6		1	1	1						
Curculionidae	Scolytinae			gen. spec. 7		1								
Curculionidae	Scolytinae	Hylesinini		cf. *Hylesinopsis* spec. 8		1								

Family	Subfamily	Tribe	Subtribe	Taxon	MA	AW	KO	BK	BG	SHO	AG	Go-riv	BO	BA
Curculionidae	Scolytinae			gen. spec. 9							1			
Curculionidae	Scolytinae			gen. spec. 10							1			
Curculionidae	Scolytinae			gen. spec. 11							1			
Curculionidae	Scolytinae			gen. spec. 12							1			
Curculionidae	Scolytinae			gen. spec. 13	1									
Curculionidae	Scolytinae			gen. spec. 14	1									
Curculionidae	Scolytinae			gen. spec. 15	1									
Curculionidae	Scolytinae			gen. spec. 16				1						
Curculionidae	Scolytinae			gen. spec. 17	1									
Curculionidae	Scolytinae	Hylesinini		gen. spec. 18				1						
Curculionidae	Platypodinae			gen. spec. 1		1								
Curculionidae	Platypodinae			gen. spec. 2		1								
Total: 409 species					104	103	52	132	35	5	112	9	14	18

Table 5: Lepidoptera collected in the Kafa BR (determined by Dr Axel Hausmann)

Taxon	Number of species
Rhopalocera	6
Sphingidae	0
Saturniidae	0
Notodontidae	0
Lymantriidae	2
Limacodidae	1
Bombyces / Rest	0
Erebidae / Arctiinae	8
Erebidae / Hypeninae	5
Erebidae / Rest	4
Nolidae / Nolinae	6
Nolidae / Chloephorinae	0
Noctuidae / Noctuinae	19
Noctuidae / Plusiinae	5
Geometridae / Desmobathrinae	1
Geometridae / Sterrhinae	1
Geometridae / Larentiinae	8
Geometridae / Ennominae	4
Cossidae	0
Hepialidae	0
Pyraloidea (Pyralidae / Crambidae)	31
Tortricidae	3
Microlepidoptera / Rest	19
Total	**123**

6.1 Photos

Figure 1: Beating umbrella (photo: Matthias Schöller)

Figure 2: Sifter (photo: Matthias Schöller)

Figure 3: Sweeping net for butterflies and Hymenoptera (photo: Matthias Schöller)

Figure 4: Sweeping net for insects on grass and herbs (photo: Matthias Schöller)

Figure 5: Aerial insect car net (photo: Matthias Schöller)

Figure 6: Barber pitfall trap (photo: Matthias Schöller)

Figure 7: Flight intercept trap (photo: Matthias Schöller)

Figure 8: Light trap (photo: Matthias Schöller)

Figure 9: Yellow dish trap (photo: Matthias Schöller)

Figure 10: Holes in bamboo caused by insects (photo: Matthias Schöller)

Figure 11: Opened internode of bamboo larvae (photo: Matthias Schöller)

Figure 12: Water content concealed in internode with fly larvae (photo: Matthias Schöller)

Figure 13: Diverse microhabitats: climbing plants and dead plant material on trees (photo: Matthias Schöller)

Figure 14: *Altica* sp. on *Polygonum* sp. in the Shoriri Wetlands (photo: Matthias Schöller)

Figure 15: Tortoise beetle (*Conchyloctenia hybrida*) (photo: Matthias Schöller)