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Arthropods associated with wildlife carcasses in Lowland Rainforest, Rivers State, Nigeria

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ABSTRACT

Investigations were conducted in the rainy season August-October, 2011, to identify the arthropods associated with carcasses of the Greater Cane Rat, Thryonomys swinderianus; two-spotted Palm Civet, Nandina binotata, Mona monkey, Cercopithecus mona and Maxwell's duiker, Philantomba maxwelli in lowland rainforest, Nigeria. Collections were made from carcasses in sheltered environment and open vegetation. Carcasses were purchased in pairs at the Omagwa bushmeat market as soon as they were brought in by hunters. They were transported to the Animal House, University of Port Harcourt. Carcasses of each species were placed in cages in sheltered location and open vegetation. Flying insects were collected with hand nets, while crawling insects were trapped in water. Necrophages, predators and transients were collected. The dominant insect orders were: Diptera, Coleoptera and Hymenoptera. The most common species were the dipteran necrophages: Musca domestica (Muscidae), Lucilia serricata (Calliphoidae), Sacophaga haemorrhoidalis (Sarcophagidae) and the coleopteran, Octopus sp. (Staphylinidae) and Dermestes maculates (Dermestidae). The dominant hymenopteran was the fire ant, Wasmannia auropunctata (Formicidae). These insect species were associated with each of the mammalian species. The transients were lepidopterans (butterflies, moths), odonatans (dragon flies) and orthopterans (grasshoppers). Differences in arthropod species richness were minimal among decomposing rodents, artiodactyls, primates and carnivores. Seasonal difference in species richness occurred in carcasses. In addition to the necrophages, scavengers, predators and parasites that have defined roles, other arthropods that have been variously described as cryptozoics, transients and artefacts also infested the decomposing carrion.

Key Words: Forensics, Necrophages, Predators, Transients, Cryptozoics

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INTRODUCTION

Worldwide, medico-legal Forensic Entomology, which has to do with arthropod involvement in events surrounding felonies or serious crimes, is receiving enormous emphasis [1] Recently published studies are focussed on medic-legal forensic entomology [2, 3]. Since our observations [4] that the basic concept had not been applied to wildlife conservation, targeting poachers in wildlife parks, forest reserves and hunters involved in the indiscriminate slaughter of species for commerce, there has been no change. Recent surveys of the Niger Delta, especially the central part have shown that small logging efforts have had a devastating cumulative effect on animal populations, though both loss of habitat and increase in localized hunting. This situation is growing worse as outsiders move into the delta and hunting pressures grow [5].

To complement the preliminary studies undertaken in the dry season in lowland rainforest, Rivers State, Nigeria on arthropods associated with wildlife carcasses [4], investigations were conducted in the rainy season, August-October, 2011, to identify arthropods associated with four abundant and widely distributed wildlife. The greater

cane rat, *Thyronomys swinderianus*; the two-spotted palm civet, *Nandina binotata*; the Mona monkey, *Cercopithecus mona*; the Maxwell's duiker, *Philantomba maxwelli*. None of these is listed in Nigeria's Endangered Species Decree 11 (1985) [6].

MATERIALS AND METHODS

Four species (*Thyronomys swinderianus*, *Nandina binotata*, *Cercopithecus mona*, *Philantomba maxwelli*) were obtained in pairs from the Omagwa bushmeat market, shortly after delivery by hunters. Preliminary identifications were by vendors and animal house staff at the University of Port Harcourt. These preliminary observations were confirmed with standard keys [7, 8]. Weights of carcasses were: duikers (6.25, 6.85kg); civet cat (0.80, 1.05kg); mona monkey (3.10, 2.39kg); greater cane rat (2.23, 2.35kg).

After body measurements, a carcass of each species was placed in a cage, 2.00m^2, in a sheltered location in the animal house and the other in a cage in open vegetation. Insect nets were swept over each carrion daily, 12.00-16.00hrs for collections. Water traps were arranged adjacent to the carrion to collect crawling insects. Collected arthropods were preserved in 70%alcohol, while Barber's fluid was used as a relaxer before mounting. Arthropods were identified by several keys [9, 10, 11].

RESULTS

The Greater cane Rat yielded 13 species in 11 families of 6 orders (Diptera, Coleoptera, Hymenoptera, Araneida, Lepidoptera, Orthoptera). The dominant order was Diptera containing 5 species in 5 families. The commonest species were *Musca domestica*, *Lucilia serricata*, and *Sarcophaga haemorrhoidalis.* The crickets and butterflies were transients (Table 1).

Table 1: Arthropods Associated with the Carcass of the Greater Cane Rat, *T. Swinderianus*

ORDERS	FAMILIES	SPECIES
DIPTERA	Muscidae	*Musca domestica*
	Calliphoridae	*Lucilia sericata* (Green bottlefly)
		Phormia regina
	Stratiomyidae	*Hermitia illucens*
	Sarcophagidae	*Sarcophaga haemorrhoidalis*
	Piophilidae	*Piophila casei*
COLEOPTERA	Staphylinidae	*Octopus* species
	Dermestidae	*Dermestes maculatus*
HYMENOPTERA	Formicidae	*Wasmannia auropuunctata* (Fire ants)
		Iridomyrmex purpureus (Meat eater ants)
ARANEIDA		Spider
LEPIDOPTERA		*Danaus plexippus*
ORTHOPTERA	Gryllidae	Cricket

In the Mona monkey, 11 species from 11 families in 6 orders were collected. The dominant order was the Diptera, yielding 5 species in 5 families. The order Coleoptera, produced 2 species in 2 families and the other orders (Lepidoptera, Odonata, Hymenoptera, Araneida), one species each (Table 2).

Fifteen species from 11 families in 6 orders were collected from the Two-Spotted Palm Civet. Five of the species were in the Diptera, while 4 were in the Hymenoptera and 3 in the Coleoptera. The most common species were the Dipterans, *Musca domestica*, *Lucilia serricata* and *Sarcophaga haemorrhoidalis*. The species composition of ants was highest in the Two-Spotted Palm Civet. The remaining orders (Lepidoptera, Acarina, Araneida) yielded one species each (Table 3).

Table 2: Arthropods Associated with the Carcass of the Mona monkey, *C. Mona*

ORDERS	FAMILIES	SPECIES
DIPTERA	Muscidae	*Musca domestica*
	Calliphoridae	*Lucilia sericata*
	Sarcophagidae	*Sarcophaga haemorrhoidalis*
	Piophilidae	*Piophila casei* (Cheese fly)
	Stratiomyidae	*Hermitia illucens* (Black soldier fly)
COLEOPTERA	Staphylinidae	*Octopus* species (Rove beetle)
	Dermestidae	*Dermestes maculatus*
LEPIDOPTERA		*Monopsis argillacea*
ODONATA		Dragon fly
HYMENOPTERA	Formicidae	*Wasmannia auropuunctata*
ARANEIDA		*Spider*

Table 3: Arthropods Associated with the Carcass of the Two-Spotted Palm Civet, *N. Binotata*

ORDERS	FAMILIES	SPECIES
DIPTERA	Muscidae	*Musca domestica*
	Calliphoridae	*Lucilia sericata* (Green bottlefly)
		Chrysomya rufifacies
	Sarcophagidae	*Sarcophaga haemorrhoidalis*
	Piophilidae	*Piophila casei* (Cheese fly)
COLEOPTERA	Staphylinidae	*Octopus* species
	Histeridae	*Hister unicolor*
	Dermestidae	*Dermestes maculatus*
HYMENOPTERA	Formicidae	*Wasmannia auropuunctata* (Fire ants)
		Myrmecia species (Bull ants)
		Oecophylla smaragdina (Weaver ants)
		Iridomyrmex purpureus (Meat eater ants)
LEPIDOPTERA		*Monopsis argillacea*
ARANEIDA		Spider
ACARINA	Macrochelidae	*Macrocheles muscae domestica*

Associated with the Maxwell's Duiker were 11 species in 10 families of 5 orders. The Diptera produced 4 species, the Coleoptera 3 species and the Hymenoptera 2 species. The dominant species were the Dipterans; *Musca domestica, Lucilia serricata* and *Sarcophaga haemorrhoidalis* (Table 4).

Table 4: Arthropods Associated with the Carcass of the Maxwell's Duiker, *P. Maxwelli*

ORDERS	FAMILIES	SPECIES
DIPTERA	Muscidae	*Musca domestica*
	Calliphoridae	*Lucilia sericata*
	Sarcophagidae	*Sarcophaga haemorrhoidalis*
	Piophilidae	*Piophila casei*
COLEOPTERA	Staphylinidae	*Octopus* species
	Histeridae	*Hister unicolor*
	Dermestidae	*Dermestes maculatus*
HYMENOPTERA	Formicidae	*Wasmannia auropuunctata* (Fire ants)
		Myrmecia species (Bull ants)
ARANEIDA		Spider
ORTHOPTERA	Gryllidae	Crickets

DISCUSSION

Carrion - associated with arthropods have been classified according to their roles [2, 12, 13]. The necrophages appear successionally in correspondence to changes in carcasses and corpses; they feed on the decaying tissues. They are usually the dominant species. The predators and parasitoids are a mixed group, whose potential for forensic information is minimally understood; the cryptozoics shelter in, on or under carcasses and carrion [12]. The dominance of the Dipterans (houseflies, blowflies and flesh flies) is not surprising because they are the primary necrophages. They play an important role in ecosystems by removing dead decaying animals. The other Dipteran species in the Piophilinidae and Stratomyidae are scavengers [14] but were secondary necrophages, since their presence was fleeting and numbers low. The coleopteran, *Dermestes maculates* appeared during the dry and skeletal stages in the decomposition process. The other Coleopterans (Staphilidae, and Histeridae) are usually found in a variety of habitats, including dung and carrion; they have a dual role as necrophages and predators. Histerids are parasites of houseflies [15, 16]. The formicoids and spiders are predators [17, 18]. The Orthopterans, Lepidopterans and Odonatans were probably transients, with no discernible impact on the decomposition process. The mite which feeds on moulds is considered an artifact [12]. The species richness was in the range, 11-15; although low, the numbers were higher than those collected from the Greater Cane Rat, Forest Genet and Mona monkey in the dry season at the same location [4]. Several factors might have contributed to this difference: larger mammals in the current study, extended decomposition periods and the effects of physical factors. Rainfall lowers temperature; low temperature slows the activity of blowflies and their colonization of carrion and corpses [19]. The numbers of species from these studies were significantly lower than the 202 Coleopterans species on pig carcasses [20].

Post Mortem Interval (PMI) can be estimated during the earlier progress of decomposition, when the estimate is based on the time period needed for each represented species to develop to the growth form collected at the death scene, primarily the blowflies and flesh flies. Those showing the longest period of development, are assumed to manifest the PMI, provided they were exposed and conditions were suitable for insect activity at the beginning of the period [21]. The key assumption is that insects, usually the blowflies and the flesh flies discover the carcasses soon after death [1].

CONCLUSION

In addition to the necrophages, scavengers, predators and parasites that have defined roles, other arthropods that have been variously described as cryptozoics, transients or artefacts may also be encountered on decomposing carrion. Differences in arthropod species richness were minimal among decomposing rodents, artiodactyls, primates and carnivores in the same environment.

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