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Preliminary data on the feeding habits of the endemic species *Synodontis koensis* Pellegrin, 1933 (Siluriformes, Mochokidae) in a West African River (Sassandra River Basin, Côte d'Ivoire)

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ABSTRACT

Key-words:
Synodontis
koensis*,
endemic
species,
feeding habit,
Sassandra River,
Côte d'Ivoire*

In the implementation of programs for protection and management of ichthyofauna, endemic species should have high priority in the conservation measures. Their fishery should be based on intimate knowledge of their ecology and biology.

Feeding habits of the endemic Mochokid *Synodontis koensis* were assessed in the Sassandra River (Côte d'Ivoire) in relation to the study zone, the specimen sex and size, and the season.

Of the 303 stomachs examined, 49 were empty (16%). The fluctuation of the vacuity index indicated that *S. koensis* feeds more at night. The diet consisted mainly of plant detritus and chironomid larvae. The statistical analysis of the feeding according to the study zones, the sex of fish and the seasons does not show any significant difference between regimes, whereas significant ontogenic shifts in diet were observed.

RÉSUMÉ

Premières données sur les habitudes alimentaires de *Synodontis koensis* Pellegrin, 1933 (Siluriformes, Mochokidae), espèce endémique d'un bassin ouest-africain (fleuve Sassandra, Côte d'Ivoire)

Mots-clés :
Synodontis
koensis*,
espèce
endémique,
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Côte d'Ivoire*

Dans la mise en œuvre de programmes pour la protection et la gestion de l'ichtyofaune, les espèces endémiques doivent faire l'objet d'une attention particulière. Leur exploitation doit se faire sur la base d'une bonne connaissance de leurs écologie et biologie.

Les habitudes alimentaires de *Synodontis koensis*, espèce endémique du fleuve Sassandra (Côte d'Ivoire), ont été étudiées pour la première fois en fonction de la zone d'étude, du sexe et de la taille des spécimens et de la saison.

Sur 303 estomacs examinés, 49 étaient vides (16 %). La variation de l'indice de vacuité indique que *S. koensis* se nourrit surtout la nuit. Elle consomme principalement des débris végétaux et des larves de Chironomidae. Le régime alimentaire ne présente de variation statistiquement significative ni en fonction de la zone d'étude, du sexe et ni des saisons. À l'inverse, il est fonction de la taille des individus.

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INTRODUCTION

In Africa, river and lake basins are undoubtedly of vital importance in providing food security, employment, tradable products, income, and cultural and aesthetic values for millions of people (Béné, 2005; Emerton, 2005). Unfortunately, the last decades have witnessed increasing pressures on freshwater systems through introduced species, overexploitation, water pollution, hydropower and hydroelectric development, catchment deforestation, water diversions, and overall land use change (Chapman and Chapman, 2003). Like in the other rivers of Côte d'Ivoire (West Africa), the Sassandra river faces threats from agricultural and industrial pollution, and the current lack of adequate policing of the ecosystems in the north of the country because of civil war (Thieme *et al*., 2005; Kouamé *et al*., 2008). In addition, a second hydroelectric dam has been proposed for construction downstream on Sassandra River.

The extent of threats requires us to establish priorities and to set goals and targets for the protection of aquatic systems and their biodiversity. On this point, much attention must be paid to the conservation of endemic species and the management of their habitats. The Mochokidae (Teleostei, Siluriformes) is one of the African fish families which contain a high number of endemic species (Paugy and Roberts, 2003). Of these endemic mochokids, the species *Synodontis koensis* is only known from the Sassandra basin. This fish is commercially exploited in all regions where it occurs. The other representatives of the genus (*S. bastiani*, *S. punctifer* and *S. schall*) are more widely distributed in Côte d'Ivoire. Although at present *S. koenis* is not classified as overexploited, nor endangered species, management measures should be taken before conservation status becomes critical. Investigations on life-history characteristics such as growth, diet, reproduction, etc., are needed for the species management and conservation programs (Dadzie, 2007; Leunda *et al.*, 2007). Several studies have dealt with some species of the genus *Synodontis*. Nevertheless, the references about *S. koensis* concern only its systematic, distribution (Paugy and Roberts, 2003) and breeding period (Traoré, 1996). Thus, no information is available on its feeding habits.

The main objectives of the present work were to examine the feeding habits of the endemic species *Synodontis koensis*. Emphasis was placed on the assessment of space, sex, size, and season-related feeding habits.

MATERIAL AND METHODS

> *STUDY AREA*

The Sassandra River Basin flows through western Côte d'Ivoire to the Atlantic Ocean. It runs for approximately 840 km and drains 75 000 km^2 (Lemoalle, 1999). The lake Buyo, formed from the lower Sassandra impoundment in 1981, covers 920 km^2 and provides electric power (Traoré, 1989). The present study was restricted to the lower course of the basin (Figure 1) because an armed conflict has prevented field work in northern Côte d'Ivoire since September 2002. The vegetation of the region is primarily tropical rainforest. Two dry and two wet seasons are recognized in the study area (Eldin, 1971). The long dry season (LD) extends from December to March and the second one (SD) from July to September. The long wet season (LW) occurs from April to June and the short one (SW) from October to November. The study area is divided into three zones: the main channel and two major tributaries, Lobo and Davo. The wide main river channel receives less shade from streamside forests than smaller tributaries which are shaded by overhanging canopy of riparian vegetation. The fluctuations in stream level and flow rate are determined by both intensity of precipitation and discharge from the Buyo dam. *Synodontis koensis* were collected at 11 stations of which 4 (stations Sa1–Sa4) are located on the main channel, 3 (Sa5–Sa7) on the Lobo tributary and 4 (Sa8–Sa11) on the Davo tributary (Figure 1). The stations were selected based on an easy accessibility by the road and a possibility for conducting a sampling program.
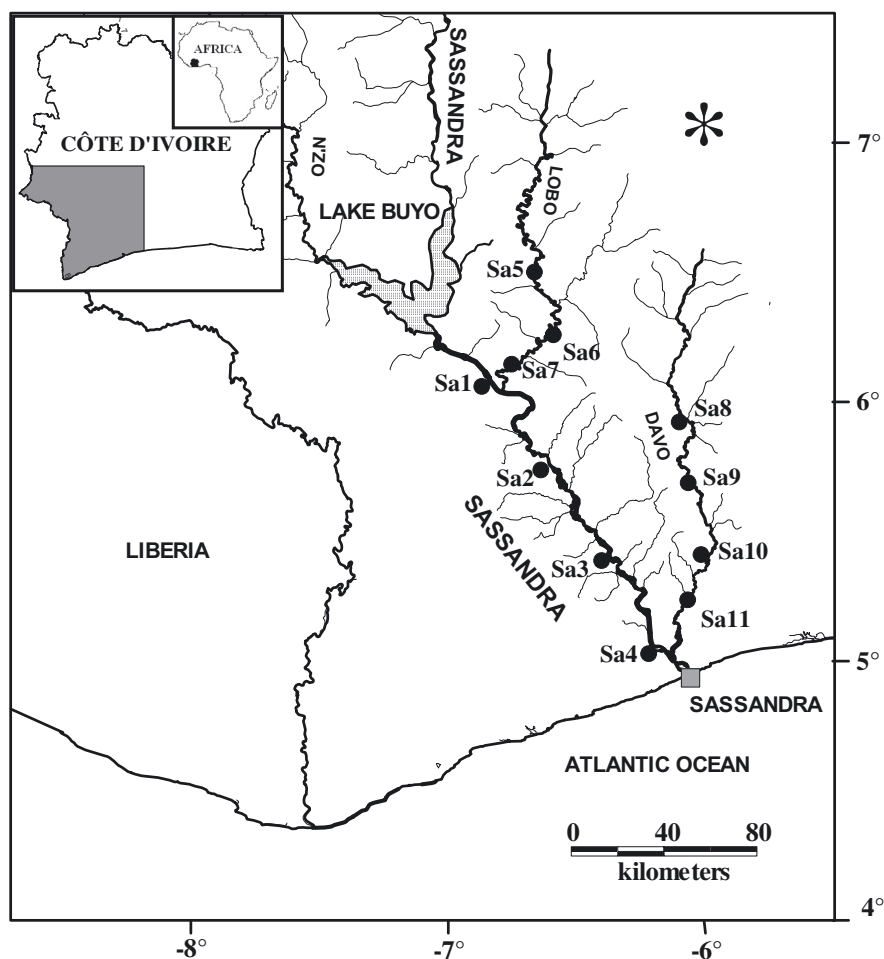
Figure 1
Positions of the sampling sites (Sa1–Sa11) on the Sassandra River Basin (Côte d'Ivoire).

Figure 1
Situation des sites d'échantillonnage (Sa1–Sa11) sur le bassin de la rivière Sassandra (Côte d'Ivoire).

> SAMPLING AND STOMACH CONTENTS ANALYSIS

Each station was sampled four times: twice in the wet season (October–November 2004 and May–June 2005) and twice during the dry season (January–February 2005 and August–September 2005). Thirteen weighted gill-nets, 30 m in length, 2.5 m in height, and of 8, 10, 12, 15, 20, 25, 30, 35, 40, 45, 50, 55 and 60 mm stretched mesh size were employed to capture fish. Nets were set at 5 p.m. and fish were removed at 7 a.m and again at 12 a.m. In the field the fish caught were identified following Paugy and Roberts (2003), and standard length (mm) and body weight (g) were recorded for each specimen. Specimens were then dissected, their stomachs removed and preserved in 5% formalin solution. Sex was determined by visual inspection of urinogenital papilla and gonads. In the laboratory, each stomach was slit open and its contents were placed in a Petri dish and the aggregates were dispersed with distilled water. Item number and wet weight to the nearest 0.01 g were recorded after removal of surface water by blotting on tissue paper. The preys were then identified to the lowest taxonomic level possible according to Durand and Lévêque (1980, 1981), Dejoux *et al*. (1981) and using a binocular microscope.

Three indexes were calculated for qualitatively and quantitatively expressing the importance of the different preys in the diet. These were:

(1) Corrected occurrence percentage (F_C) (Rosecchi and Nouaze, 1987):

$$F_C = \frac{F_i}{\sum F_i} \times 100 \quad \text{with} \quad F_i = \frac{n_i}{N_T}$$

where F_i represents the frequency of prey i, n_i the number of stomachs including prey i and N_T the total number of non-empty stomachs examined.

(2) Weight percentage (W) (Hyslop, 1980):

$$W = \frac{W_i}{W_T} \times 100$$

where W_i represents the total weight of prey i and W_T the total weight of all preys.

(3) The index of preponderance (Ip) (Natarajan and Jhingran, 1961), combining the occurrence (F_C) and weight (W) percentages, was used to assess the relative importance of each type of prey:

$$Ip = \frac{F_C \times W}{\sum (F_C \times W)} \times 100.$$

The index of preponderance (Ip) varies from 0 to 100%. Different prey taxa were arranged according to the classification scale of Simenstad (1979): first, the items are arranged by decreasing index value; cumulative Ip was then calculated. The items for which cumulative Ip was equal or superior to 50% were considered as preferential ones. The items for which the index value added to that of the preferential, reaches at least 75%, were regarded as secondary prey. All the other items represent incidental preys.

To assess for possible changes in diet with respect to fish size, different size classes were defined following Sturge's rule (Scherrer, 1984):

– Number of classes = $1 + (3.3 \log_{10} N)$, where N = total number of specimens examined;
– Interval of classes = $\frac{SL_{max} - SL_{min}}{\text{total of classes}}$, where SL = standard length.

The vacuity index (VI) was calculated in order to evaluate feeding intensity (Hureau, 1970):

$$VI = \frac{\text{number of empty stomachs}}{\text{total of stomachs}} \times 100.$$

Effects of space, length class, season and sex on diet were tested by Spearman rank-order analysis (Snedecor and Cochran, 1989). The variation in vacuity index was tested by a chi-square test over a contingency table of number of empty stomachs (Sokal and Rohlf, 1981). These analyses were performed with the software Statistica version 7.1 and R, respectively.

RESULTS

> FEEDING INTENSITY

Of the 303 stomachs of *S. koensis* examined (148 stomachs for the main channel, 86 for the Lobo tributary and 69 for the Davo tributary), 49 were empty, indicating a vacuity index of 16%. This index (14% in the main channel, 15% in the Lobo tributary and 22% in the Davo tributary) didn't differ significantly among the study areas ($x^2 = 2.077$, $p > 0.05$) (Table I). Similar results were found among the sexes (15% in males, 17% in females; $x^2 = 0.116$, $p > 0.05$), the seasons (19% in SW, 16% in LD, 21% in LW, 13% in SD; $x^2 = 3.730$, $p > 0.05$) and the size classes (18% in size class 50–60 mm, 15% in size class 60–140 mm; $x^2 = 0.047$, $p > 0.05$). Conversely, in each study area (Figure 2), the fluctuation of the vacuity index showed significant daily differences in feeding intensity characterized by a higher proportion of empty stomachs recorded during the day than during the night ($x^2 = 42.599$, $p < 0.05$). The maximum vacuity index observed during the night was of 13% (in Davo tributary) and the minimum during the day was of 32% (in Lobo tributary).
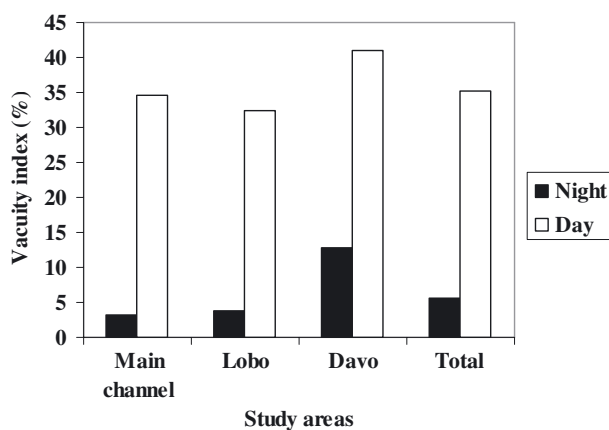
Table I
Number of specimens of Synodontis koensis *caught in Sassandra River basin (Côte d'Ivoire) and variations of the vacuity index according to study areas.*

Tableau I
Nombre d'individus de *Synodontis koensis* capturés dans le bassin de la rivière Sassandra (Côte d'Ivoire) et variations de l'indice de vacuité selon les sites d'étude.

Study area	Specimens examined	Full stomachs	Empty stomachs	Vacuity index (%)
Main channel	148	127	21	14.19
Lobo tributary	86	73	13	15.12
Davo tributary	69	54	15	21.74
Total	303	254	49	16.17

Figure 2
Diel variation in vacuity index for Synodontis koensis *from Sassandra River Basin (Côte d'Ivoire).*

Figure 2
Variations journalières de l'alimentation de *Synodontis koensis* de la rivière Sassandra (Côte d'Ivoire).

> GENERAL DIET COMPOSITION

The trophic spectrum of *S. koensis* (n = 254) shows that 14 items, excluding sand grains and mud, constituted its diet (Table II). They were assigned to five categories: (1) insects (n = 8; chironomid larvae, *Ceratopogon* sp., *Chaoborus* sp., Baetidae, *Povilla* sp., *Ecnomus* sp., Hydropsychidae and Formicidae), (2) crustacea (n = 3; ostracoda, cladocera and copepoda), (3) molluscs (n = 1; bivalves), (4) macrophytes (n = 1; plant detritus) and (5) other prey (n = 1; fish scales). Plant detritus (fragments of bark and leaves of macrophytes, peel, pulp and seeds of fruits) occurred most frequently (F_C = 42.1%), followed by chironomids (F_C = 25.3%). Lowest frequencies were showed by the crustaceans cladocera and copepoda with respectively F_C = 1.1%. In terms of weight, plant detritus constituted the principal food items, with W = 70.3%, followed by chironomids (W = 18.2%). In relation to the feeding index (Ip), the most important food sources were plant detritus (Ip = 74.4%). The diet was supplemented with chironomids (Ip = 21.9%). The other prey items were quite negligible and together represented less than 4% Ip of the diet. According to the classification of Simenstad (1979), plant detritus were classified in the principal prey category, while chironomids as secondary prey. All the other taxa represent accessory items.

> SPATIAL VARIATIONS OF DIET

Figure 3 synthesizes Ip% for major prey categories in *S. koensis* from the three study zones. Plant detritus were the most important ingested prey in the main channel, and the Lobo

Table II
Diet composition of Synodontis koensis *(n* = 254*; 50–140 mm standard length) from the Sassandra River basin (Côte d'Ivoire).*
W = weight percentage; F$_C$ *= corrected occurrence percentage; I*p *= index of preponderance.*

Tableau II
Composition du régime alimentaire de *Synodontis koensis* (*n* = 254 ; 50–140 mm longueur standard) du bassin de la rivière Sassandra (Côte d'Ivoire).
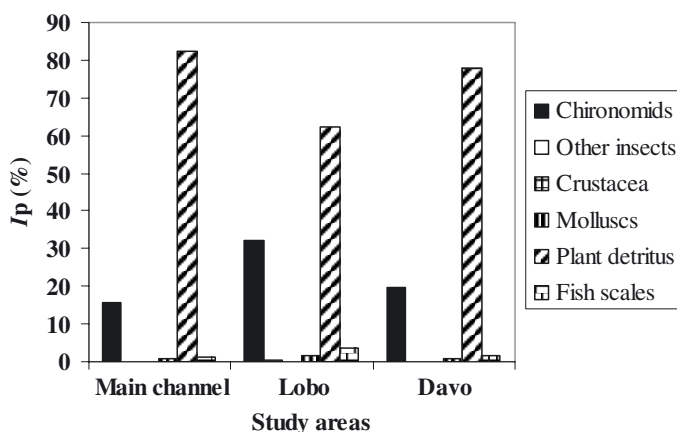*W* = pourcentage pondéral ; *F*$_C$ = pourcentage d'occurrence corrigé ; *I*p = indice de prépondérance.

Prey taxa	W (%)	F$_C$ (%)	Ip (%)
INSECTS			
Diptera			
Chironomid larvae	18.24	25.26	21.93
Ceratopogon **sp.**	0.16	1.35	0.01
Chaoborus **sp.**	1.03	1.17	0.06
Ephemeroptera			
Baetidae	0.17	0.26	0.002
Povilla **sp.**	0.25	0.26	0.003
Trichoptera			
Ecnomus **sp.**	0.71	1.26	0.04
Hydropsychidae	1.56	1.34	0.10
Hymenoptera			
Formicidae	0.37	1.17	0.02
CRUSTACEA			
Ostracoda	0.25	3.26	0.04
Cladocera	0.05	1.09	0.002
Copepoda	0.05	1.09	0.002
MOLLUSCS			
Bivalves	2.20	9.78	1.02
MACROPHYTES			
Plant detritus	70.25	42.11	74.39
OTHER PREY			
Fish scales	4.71	10.61	2.38
TOTAL			
INSECTS	22.49	32.07	22.17
CRUSTACEA	0.35	5.43	0.04
MOLLUSCS	2.20	9.78	1.02
MACROPHYTES	70.25	42.11	74.39
OTHER PREY	4.71	10.61	2.38

and Davo tributaries, constituting 82.30%, 62.26% and 77.77% of the total Ip, respectively. These food items were followed by chironomids (Ip = 15.56%, 32.14% and 19.75%, respectively), while other prey groups were comparatively lower and of less importance. The Spearman tests confirmed that diets in the three areas were similar (Table III).

> *DIET VARIATIONS ACCORDING TO SEX*

Of the 254 specimens examined, 103 were males (52 to 137 mm SL) and 151 females (50 to 140 mm SL). Plant detritus (Ip = 67.4% in males and 74.3% in females) and chironomids (Ip = 24.2% in males and 21.0% in females) were the dominant food for both sexes (Figure 4). The Spearman test proved that diets of males and females were significantly correlated (p = 0.0036; R = 0.70).

Figure 3
Spatial variations in diet of Synodontis koensis *in Sassandra River Basin (Côte d'Ivoire).*

Figure 3
Variations spatiales de l'alimentation de *Synodontis koensis* de la rivière Sassandra (Côte d'Ivoire).

Table III
Results of Spearman rank order correlation analysis for testing differences in food composition between study areas, size classes (SC) and seasonal samples of Synodontis koensis *from the Sassandra River basin (Côte d'Ivoire).*
*SC1 = group 1 = 50 ≤ SL ≤ 60 mm; SC2 = 60 < SL ≤ 70 mm; SC3 = 70 < SL ≤ 80 mm; SC4 = 80 < SL ≤ 90 mm; SC5 = 90 < SL ≤ 140 mm; group 2 = SC2 + SC3 + SC4 + SC5; D = dry season; W = wet season; * = correlation is significant at p < 0.05.*

Tableau III
Résultats de l'analyse de corrélation de rangs de Spearman testant les différences de composition alimentaire entre les sites d'étude, classes de taille (SC) et saison d'échantillonnage de *Synodontis koensis* du bassin de la rivière Sassandra (Côte d'Ivoire).
SC1 = groupe 1 = 50 ≤ SL ≤ 60 mm ; SC2 = 60 < SL ≤ 70 mm ; SC3 = 70 < SL ≤ 80 mm ; SC4 = 80 < SL ≤ 90 mm ; SC5 = 90 < SL ≤ 140 mm ; group 2 = SC2 + SC3 + SC4 + SC5 ; D = saison sèche ; W = saison humide ; * = corrélation significative à *p* < 0.05.

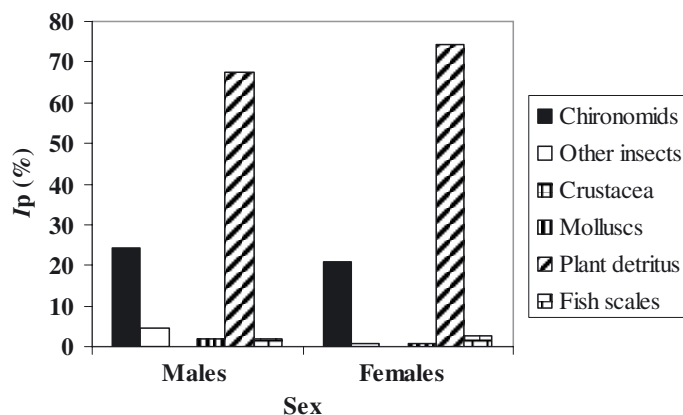| Source of variation	Spearman coefficient of correlation R	t (N − 2)	p-level
Study area			
Main channel - Lobo	0.73	3.71	0.003*
Main channel - Davo	0.83	5.08	0.0003*
Lobo - Davo	0.88	6.42	0.00003*
Size			
SC1 - SC2	0.07	0.26	0.80
SC1 - SC3	0.14	0.51	0.62
SC1 - SC4	0.02	0.08	0.94
SC1 - SC5	−0.02	−0.06	0.95
SC2 - SC3	0.84	5.60	0.00009*
SC2 - SC4	0.58	2.58	0.02*
SC2 - SC5	0.66	3.13	0.008*
SC3 - SC4	0.78	4.43	0.0007*
SC3 - SC5	0.61	2.80	0.01*
SC4 - SC5	0.72	3.77	0.002*
Season			
Group 1 (D) - Group 1 (W)	0.82	3.15	0.03*
Group 2 (D) - Group 2 (W)	0.62	2.50	0.03*

Figure 4

Diet of males (n = 103) and females (n = 151) of Synodontis koensis *within the Sassandra River basin (Côte d'Ivoire).*

Figure 4
Alimentation des mâles (*n* = 103) et des femelles (*n* = 151) de *Synodontis koensis* de la rivière Sassandra (Côte d'Ivoire).
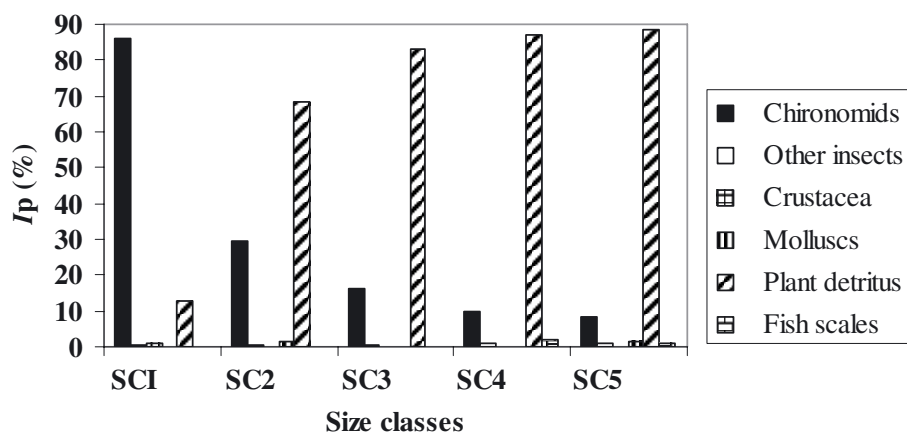

Figure 5

Composition of Synodontis koensis *diet among size classes (SC) based on the % Ip values of main prey categories. SC1 (n = 81) = 50 mm ≤ SL ≤ 60 mm; SC2 (n = 63) = 60 mm < SL ≤ 70 mm; SC3 (n = 45) = 70 mm < SL ≤ 80 mm; SC4 (n = 34) = 80 mm < SL ≤ 90 mm; SC5 (n = 31) = 90 mm < SL.*

Figure 5
Composition du régime alimentaire de *Synodontis koensis* selon les classes de taille (SC) basée sur les valeurs %*I*p des principales catégories de proie.
SC1 (*n* = 81) = 50 mm ≤ SL ≤ 60 mm ; SC2 (*n* = 63) = 60 mm < SL ≤ 70 mm ; SC3 (*n* = 45) = 70 mm < SL ≤ 80 mm ; SC4 (*n* = 34) = 80 mm < SL ≤ 90 mm ; SC5 (*n* = 31) = 90 mm < SL.

> *DIET VARIATIONS ACCORDING TO SIZE*

Size of specimens of *Synodontis koensis* ranged from 50 to 140 mm SL, and nine class intervals were obtained according to Sturge's rule (Scherrer, 1984). Due to limited amount of samples from some of them ($n < 30$), the data were finally grouped into five size classes (Figure 5). Those size classes differed in terms of diet, with chironomids ($Ip = 85.8\%$) relatively more important for the specimens from size class SC1, while plant detritus were more dominant ($Ip > 60\%$) in the diet of larger fish. Taken all round, the *I*p of plant detritus increased
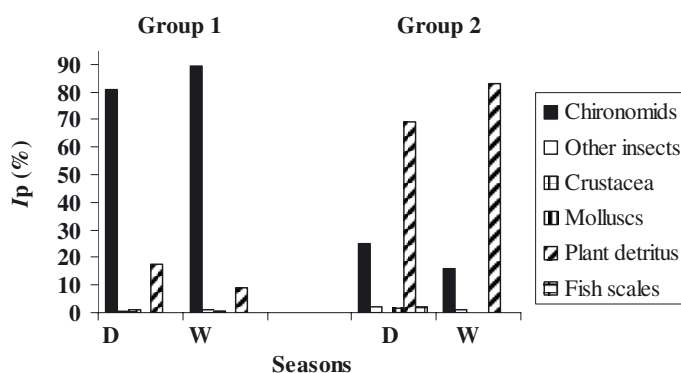
Figure 6

Seasonal composition of the feeding of Synodontis koensis *based on the %I*p *values of main prey categories.*
Group 1 (n = 81) = 50 mm ≤ SL ≤ 60 mm; group 2 (n = 173) = 60 mm < SL ≤ 140 mm; D = dry season; W = wet season.

Figure 6
Composition saisonnière du régime alimentaire de *Synodontis koensis* basée sur les valeurs %*I*p des principales catégories de proie.
Groupe 1 (*n* = 81) = 50 mm ≤ SL ≤ 60 mm ; groupe 2 (*n* = 173) = 60 mm < SL ≤ 140 mm ; D = saison sèche ; W = saison humide.

with *S. koensis* size whereas the *I*p of chironomids decreased. The Spearman test revealed significant similarities between the diets of size classes SC2 to SC5 (Table III). On the other hand, the diets of these classes and that of the class SC1 weren't significantly correlated.

> *DIET VARIATIONS ACCORDING TO SEASON*

As there were no significant changes in the spectrum of food items consumed with size of fish, the data for the size classes SC2 to SC5 were pooled in the group 2 ($60 < SL \leq 140$ mm; $n = 173$) for analysis of seasonal variation in diet. The results are presented in Figure 6. In the group 1 ($50 \leq SL \leq 60$ mm; $n = 81$), the prey types identified showed the dominance of chironomids in the dry season as well as in the rainy one (*I*p = 80.9% and 89.2% respectively). For the group 2, in the dry season, plant detritus and chironomids were the most important ingested preys, constituting 69.18% and 24.9% of the total *I*p, while other prey groups were comparatively lower and of less importance. A similar pattern was observed in the wet season, but with larger quantities for plant detritus (82.8%) and smaller contribution for chironomids (16.0%). The Spearman rank correlation coefficients attested that the seasonal variations in diet composition were significantly similar for both groups (Table III).

DISCUSSION

Feeding studies based on stomach contents are conditioned and influenced by a number of factors, including the stomachs repletion and the degree of digestion of the prey items. The high number of stomachs containing food (84%) found in the diet of *Synodontis koensis* could be related to both its daily feeding cycle and the fish sampling period. Indeed, in the present study, the vacuity index showed markedly lower values during the night, suggesting that *S. koensis* is a nocturnal in feeding habits. This trend has been also evidenced for *Synodontis schall* (Lock, 1982; Idodo-Umeh, 2005) and *S. membranaceus* (Owolabi, 2008). On the other hand, Meye *et al*. (2008) reported that *S. ocellifer* fed mostly at night.

Synodontis koensis consumed mostly plant detritus and chironomid larvae found in the substratum. Similar diets were described previously in Côte d'Ivoire for *S. comoensis* from the Comoé River basin (Koné *et al.*, 2008), *S. bastiani* (Diomandé *et al.*, 2001) and *S. schall* (Diomandé, 2001) from the River Bia. Taken together, the results of these studies bring out the preponderance of chironomid larvae in the diets of some fishes. The large proportion of this item in the diets is a reflection of its abundance in the streams as stated by Dejoux *et al.* (1981). The *Synodontis* and several other catfishes preference for benthic organisms could be largely attributed to the ventral location and the structure of their mouth (Lalèyè *et al.*, 2006). *Synodontis koensis* can be classified as an omnivorous since it combined plant materials (42.1% F_C; 74.4% Ip) with invertebrates (47.3% F_C; 23.2% Ip) in its food.

Most stomachs (72% of full stomachs) contained significant amounts of sand and mud (48.4% of the total stomach contents weight) which provides evidence that *S. koensis* fed on the substrate. Many other *Synodontis* species such as *S. bastiani*, *S. schall* and *S. comoensis* (Yao, 2006) were also found to ingest mud and sand. According to Vilella *et al*. (2002), the possible reasons for the ingestion of sand are: (1) the consumption of biofilm associated to the sediment; (2) the importance of the sand in mechanic digestion of plant items or hard parts of some food items (insects, crustaceans, etc.); or (3) a low efficiency of the gill rakers in avoiding the ingestion of sand with the actual food items.

The consumption of fish scales by *Synodontis* species has been observed by several authors (*e.g.* Lauzanne, 1988; Ofori-Danson, 1992). However, whether or not the *Synodontis*, especially *S. koensis* actively searches for scales or ingest them at random is a question that remains to be investigated. Nevertheless, the frequent presence of this item suggests it might be important in the diet of *Synodontis*. Thus, fish scales may be a source of calcium for the fish feeding on them (Vilella *et al.*, 2002).

Feeding habits differed among size classes principally, in the increasing importance of plant detritus, and decreasing importance of chironomids in the diet with increased fish size. The increasing size and variety of food resources used as specimens grow is a common pattern among fishes (Paugy and Lévêque, 2006). In the present study, these ontogenetic shifts in food preferences could be explained by morphological and physiological ontogenetic shifts, and by energetic requirements for growth. Indeed, larger fish have different feeding requirements than smaller ones and focus on more rewarding prey (larger and heavier), since length increase is related to mouth width and gape increase. Ontogenetic shifts in the diet also can be associated to a possible ecological strategy to reduce intraspecific competition for food in the population (Pallaoro *et al.*, 2006; Jardas *et al.*, 2007).

No significant spatial, nor seasonal difference in the diet of *S. koensis* was noticed. This result could be explained by availability of the preferential prey items (plant detritus and chironomids) within all the study areas and throughout the year.

In summary, the diet of *S. koensis* is similar to other *Synodontis* in view of large proportions of benthic items. Individuals smaller than 61 mm SL show carnivorous habits, feeding preferably on chironomid larvae, while larger individuals exhibit detritivorous diet with plant detritus being the major items.

ACKNOWLEDGEMENTS

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