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Diet of two sympatric frogs species (*Hoplobatrachus occipitalis* and *Ptychadena mascareniensis*) in the Southern region of Ivory Coast (Aboisso and Maféré)

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Abstract
The diets of *Hoplobatrachus occipitalis* and *Ptychadena mascareniensis* were studied from January 2020 to June 2020 according to seasons, size classes and sex in two localities (Aboisso and Maféré) in southern Côte d'Ivoire. Analysis of the stomach contents of 169 specimens (34 specimens of *P. mascareniensis* and 135 specimens of *H. occipitalis*) revealed 14 food categories: Insects, Amphibians, Annelids, Arachnids, Arthropoda, Mollusks, Myriapoda, Nematodes, Fish, Reptiles, Trematodes, animal debris, Macrophytes, indeterminate foods. In both localities, *P. mascareniensis* is omnivorous with insectivorous tendencies, and *H. occipitalis* is omnivorous with carnivorous tendencies. Coleoptera and Orthoptera are the insects orders most frequently consumed by these species in these localities. The diets of these two species in these localities vary from season to season and from habitat to habitat. In each habitat, the diet of juveniles is different from that of adults for all species except *P. mascareniensis* at Maféré, where no juveniles were sampled. Only in Aboisso did the diet of juveniles differ according to sex.

Keywords: Diet, edible frogs, *Hoplobatrachus occipitalis*, *Ptychadena mascareniensis*, Ivory Coast

1. Introduction
The feeding activities of amphibians are in some cases influenced by seasonal variations [1] Indeed, the diet of amphibians is generally influenced by the availability of food in their environment [2]. However, there is a relationship between the abundance of prey in the environnement and their frequency of occurrence in anuran stomachs [3-4]. This explains the different diets of these amphibians in different habitats [5-6-7]. Frog species have a diet of small prey such as insects. This is the case for *Ptychadena longirostris* and *P. oxyrhynchus* [8] and the tree frog *Scinax squalirostris* [9]. The presence of plant fragments in the stomach contents of Amphibians has been mentioned [10-11-12]. However, specimens of *Ptychadena mascareniensis* and *Hoplobatrachus occipitalis* from Banco National Park have a diversified diet. The species *Ptychadena mascareniensis* appears to be an omnivore with insectivorous tendencies, and *Hoplobatrachus occipitalis* an omnivore with carnivorous tendencies [13-11]. The latter species consumes much more diverse and larger prey. This is due to its much larger size than that of *Ptychadena mascareniensis* [7]. In view of these various analyses, it would be important to know the variation in the diet of *P. mascareniensis* and *H. occipitalis* in the localities of Aboisso and Maféré (Côte d'Ivoire). Hence the interest in studying the diet of two sympatric frog species, *P. mascareniensis* and *H. occipitalis*, in these study areas (Aboisso and Maféré).

2. Materials and Methods
2.1 Study site
This study was carried out in Aboisso, a town 115 km from Abidjan, located between 5°28'27"N and 03°13'28"W, and in Maféré, located between 5°24'13"N and 03°2'29"W, 144 km from Abidjan (Figure 1). The Aboisso site is characterized by a high level of agricultural activity (onions, bananas, okra, taro, lettuce, etc.) and the Maféré site by oil palms and cassava.

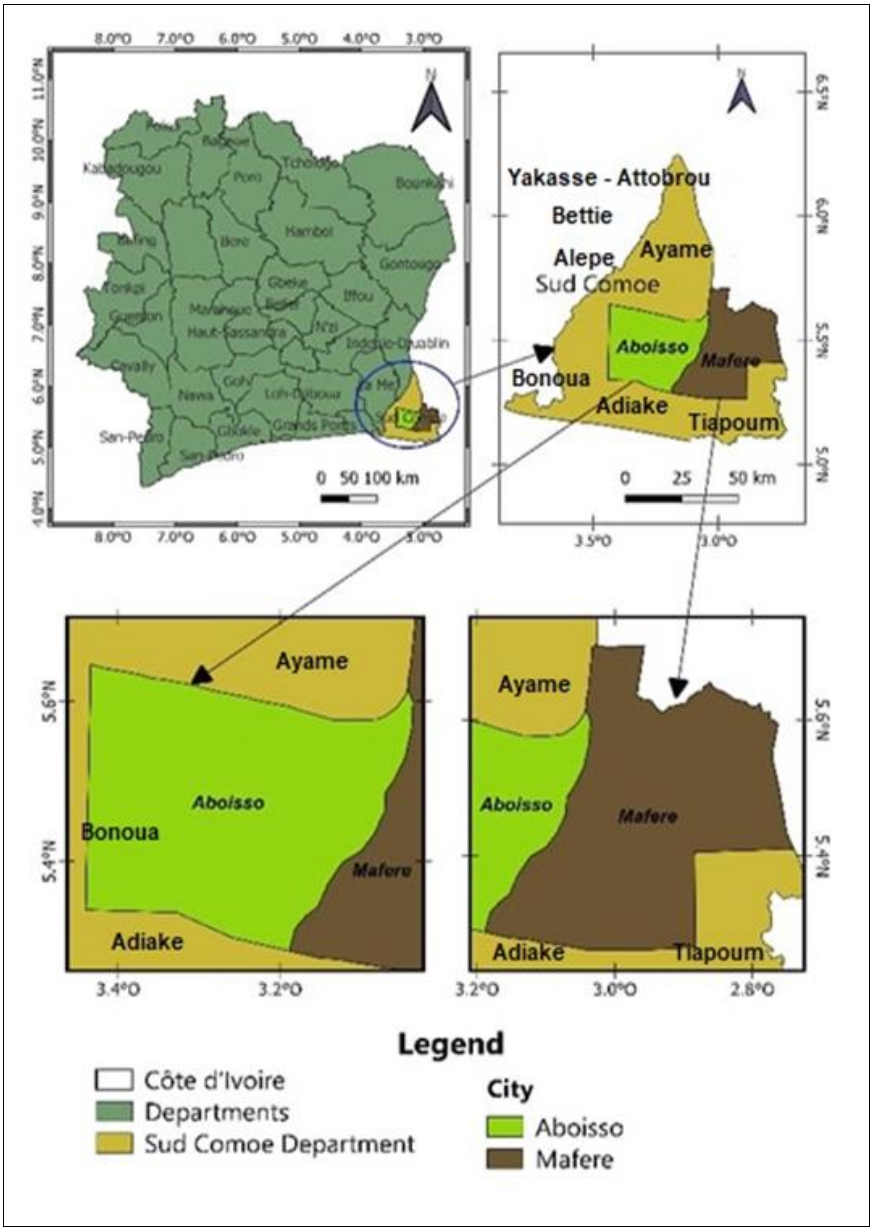

Fig 1: Aboisso and Maféré sampling areas.

Fig 2: A view of the Aboisso (A) and Maféré (B) sampling sites.

2.2 Frog sampling methods

Sampling by two hunters took place twice a season in each of the two localities. Capture sessions lasted two hours per site. The frogs, dazzled by the light of a torch, were immobilized and captured using home-made technical equipment (pitchforks). Dead specimens identified using the determination keys proposed by [14-15] were immediately transported to the laboratory in aquaria. We accompany hunters in the field, and once specimens of *P. mascareniensis* and *H. occipitalis* have been captured, they are sold to us immediately. In the laboratory, each specimen is weighed to the nearest milligram and measured to the nearest millimetre. After frog dissection, the stomach and gonad are weighed and preserved in a pillbox containing 10% alcohol. In the laboratory, each stomach is opened and its extracted contents poured into a petri dish containing water. The various food particles are separated and identified under a binocular magnifying glass, using the determination keys of [16-17-18].

They are then counted and weighed. Various indices were chosen to characterize the diet of the frog species studied.

2.3 Percentage of occurrence (%F)
This method involves counting the number of stomachs in which a prey item (or category of prey item) is present. The figure found is expressed as a percentage of the total number of stomachs containing food. [19-20-21-22] proposed the formula for its determination (1).

$$\%F = \frac{\text{Number of stomachs containing prey i}}{\text{Number of stomachs containing food}} X\ 100 \quad (1)$$

2.4 Numerical percentage (%N)
It expresses as a percentage the total number of prey inventoried in all the stomachs examined. Its formula is as follows (2).

$$\%N = \frac{\text{Total number of individuals of prey i}}{\text{Total number of prey}} X\ 100 \quad (2)$$

2.5 Weight percentage (%P)
This involves determining the weight of each prey category for the entire sample. The result is expressed as a percentage of the total prey weight (3).

$$\%\ P = \frac{\text{Total weight of prey i}}{\text{Total weight of all prey}} X\ 100 \quad (3)$$

2.6 Relative importance index (IRI)
We used the Relative importance index (IRI) which incorporates the numerical (N), weight (P) and occurrence (F) methods. It gives a better interpretation of the diet by taking into account both the qualitative aspect of the diet through the percentage of occurrence and the quantitative aspect with the numerical and weight data. Its formula is as follows (4):

$$IRI = (N + P)\ X\ F \quad (4)$$

To determine food preferences, the classification of [23] was used. This involves determining the index value for each food. This value is then expressed as a percentage of the sum of all indices. Foods are then ordered in descending order according to the value of the index percentage obtained.
Starting with the top-ranked food, the index percentages of the various foods are added up progressively until they account for 50% or more of the total index. These foods are known as preferred foods. Food categories whose index added to that of the preferentials reaches at least 75% are considered secondary. The other foods on the list are accessory.

2.7 Statistical analysis
Non-parametric tests were carried out using Mann-Whitney (n < 30). These tests were used to compare the diets of the species studied, and were carried out using STATISTICA version 7.1 software.

2.8 Food overlap index
The dietary overlap index (Cλ), proposed by [24] and modified by [25], is used to assess the degree of dietary overlap between sympatric species. It is defined by formula (5)

$$C_\lambda = \frac{2\sum_{i=1}^{s} a_i \times b_i}{\sum_{i=1}^{s} a_i^2 + \sum_{i=1}^{s} b_i^2} \quad (5)$$

Where
s = is the number of prey items; ai and bi = represent the proportion of a given prey item i consumed by species a and b respectively. Cλ varies between 0 and 1, taking the value 0 when prey are completely distinct and 1 when they are identical. Any value greater than or equal to 0.6 is considered significant [26-27].

3. Results
3.1 General diet
Examination of food-containing stomachs in Aboisso identified 8 food categories in each of the two species (Table I). In *P. mascareniensis*, insects (IRI = 64.94%) were the preferred food and macrophytes (IRI = 12.17%) the secondary food. All other foods are incidental. (4)

Table 1: Compositions of general diets and relative importance index (in%) of different food categories of *Ptychadena* mascareniensis and *Hoplobatrachus occipitalis* from Aboisso and Maféré: F = percentage of occurrence; P = percentage by weight; N = percentage by number.

Relative importance index (IRI en %)																
Ingested prey	***Ptychadena mascareniensis***								***Hoplobatrachus occipitalis***							
	Aboisso				**Maféré**				**Aboisso**				**Maféré**			
	F	**N**	**P**	**IRI**	**F**	**N**	**P**	**IRI**	**F**	**N**	**P**	**IRI**	**F**	**N**	**P**	**IRI**
Coleoptera	10	21,73	7,16	18,09	12,5	11,11	3,94	3,58	10,63	11,57	2,36	0,3	8,04	7,66	4,4	6,77
Diptera	5	4,34	0,34	1,47	0	0	0	0	1,41	1,05	0,25	0,13	0,5	0,36	0,02	0,01
Heteroptera	5	8,69	10,23	5,92	25	33,33	68,73	48,54	4,25	4,21	2,08	1,86	2,51	3,64	0,25	0,68
Homoptera	0	0	0	0	0	0	0	0	1,41	1,57	0,13	0,16	0	0	0	0
Hymenoptera	5	4,34	0,51	28,96	6	7,5	2,7	2,4	12,05	22,63	5,04	23,2	10,55	12,04	1,46	0,95
Isoptera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mantoptera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Neuroptera	0	0	0	0	0	0	0	0	0,7	0,52	0,26	0,03	2,01	1,45	0,64	0,29
Notoptera	5	4,34	6,14	3,28	0	0	0	0	1,41	1,05	2,53	0,35	0	0	0	0
Lepidoptera	5	4,34	0,68	1,57	2,3	3,7	2,6	0,02	4,96	5,26	3,83	3,14	6,03	4,74	1,04	2,44
Odonata	0	0	0	0	0	0	0	0	0	0	0	0	1	1,09	0,63	0,12
Orthoptera	10	8,7	0,34	5,65	37,5	33,33	25,91	39,8	12,05	8,94	8,91	0,97	5,52	4,37	3,3	2,96
∑ Insects	45	56,48	25,4	64,94	50	44,44	29,85	94,38	48,87	56,8	25,39	30,14	36,16	35,35	11,74	14,22
Amphibians	5	4,34	15,35	6,16	0	0	0	0	4,25	3,68	41,93	47,44	5,52	4,37	56,98	32,68
Annelids	5	4,34	0,34	1,47	0	0	0	0	3,54	4,73	1,64	1,57	2,01	4,01	0,33	0,61

Arachnida	5	4,34	2,38	2,1	12,5	11,11	0,56	2,78	6,38	4,73	0,47	2,31	0	0	0	0
Arthropoda	0	0	0	0	0	0	0	0	0	0	0	0	1	0,72	0,05	0,04
Mollusks	0	0	0	0	0	0	0	0	0	0	0	0	4,01	1,45	0,12	0,22
Myriapoda	10	7,69	9,55	11,42	12,5	11,11	0,84	2,84	4,25	3,68	1,22	1,45	13,56	20,43	6,48	25,5
Nematodes	0	0	0	0	0	0	0	0	0	0	0	0	0,5	0,36	0,01	0,01
Fish	0	0	0	0	0	0	0	0	0	0	0	0	1,5	1,09	6,95	0,84
Reptiles	0	0	0	0	0	0	0	0	0	0	0	0	1,5	1,09	1,9	0,31
Trematodes	0	0	0	0	0	0	0	0	0	0	0	0	0,5	0,36	0,01	0,01
Animal debris	10	8,7	35,15	0,07	0	0	0	0	5,67	6,13	8,96	6,01	8,04	5,83	3,49	5,23
Macrophytes	10	6,19	10,75	12,17	0	0	0	0	12,76	6,07	6,24	8,58	12,06	5,05	6,34	12,72
Indeterminate	5	3,5	0,17	0,05	0	0	0	0	5,67	3,4	4,01	1,58	5,02	3,7	3,3	1,16
Sands	5	4,35	0,85	1,62	0	0	0	0	2,21	2,63	3,62	0,92	4,02	9,85	1,47	3,17

The most important insects orders in the diet of this species are Hymenoptera (28.96%) and Coleoptera (18.09%). In *H. occipitalis*, Amphibians (IRI = 47.44%) and Insects (IRI = 30.14%) make up the bulk of the food bolus. The overlap index evaluated between the diets of these 2 frog species in Aboisso is significant (Cλ = 0.61).

Relative to Maféré, 3 types of food were identified in *P. mascareniensis* and 13 in *H. occipitalis*. The first species feeds mainly on insects (IRI = 94.38%), with Heteroptera (IRI = 48.54%) and Orthoptera (IRI = 39.86%) as the dominant orders. The second consumes Amphibians (IRI = 32.68%) and Myriapoda (IRI = 25.5%) as preferred prey and Insects (IRI = 14.22%) and Macrophytes (IRI = 12.72%) as secondary foods. The overlap between the diets of these two frogs at Maféré was not significant (Cλ = 0.26).

3.2 Seasonal variations in diet

Table II summarizes the Relative importance index (IRI en %) of foodstuffs identified in the stomachs of specimens of these two species over the course of climatic seasons.

In Aboisso, *P. mascareniensis* dry-season and rainy-season diets consist mainly of insects, with index values of 86.62% and 76.82% respectively.

There was no significant difference between the two diets (P = 0.28; Mann Whitney test). In the rainy season, the stomach contents of *H. occipitalis* consisted of insects (IRI = 58.78%) as preferred prey and amphibians (IRI = 14.59%) and macrophytes (IRI = 12.47%) as secondary food. In the dry season, the species prefers to feed on insects (IRI = 22.89%) and amphibians (IRI = 38.76%), with animal debris as a secondary food (IRI = 19.55%). Foods consumed by *H. occipitalis* in Aboisso during the dry season were statistically different from those consumed during the rainy season (P = 0.24; Mann-Whitney test).

In Maféré, during the dry season, insects (IRI = 51.39%) and myriapoda (IRI = 48.59%) are the preferred and secondary foods respectively for *P. mascareniensis*. In the rainy season, Myriapoda (IRI = 56.47%) become their preferred prey and Insects (IRI = 30.42%) their secondary food. Other foods are incidental. For this species, in this locality, the foods consumed during the dry season do not differ significantly from those consumed during the rainy season (P = 0.47; Mann-Whitney test). As for *H. occipitalis*, in the dry season, Amphibians (IRI = 33.08%) and Myriapoda (IRI = 26.12%) are its preferred foods and Insects (IRI = 22.22%) its secondary foods. In the rainy season, this frog prefers to feed on myriapoda (IRI = 23.13%) and insects (IRI = 22.11%). Macrophytes (IRI = 16.07%) and amphibians (IRI = 15.77%) are its secondary foods. In this locality, its diet varies from season to season (P = 0.61; Mann-Whitney test).

Table 2: Diet compositions and Relative importance index (IRI en %) of different food categories of *P. mascareniensis* and *H. occipitalis* according to the dry (SS) and rainy (SP) seasons in Aboisso and Maféré: n = number of stomachs.

Relative importance index (IRI en %)								
Ingested prey	***Ptychadena mascareniensis***				***Hoplobatrachus occipitalis***			
	Aboisso		**Maféré**		**Aboisso**		**Maféré**	
	SP (n = 12)	SS (n = 6)	SP(n=10)	SS (n=6)	SP (n= 32)	SS (n=23)	SP (n=59)	SS (n=28)
Coleoptera	35,1	0	14,12	22,95	7,86	13	2,65	9,88
Diptera	2,1	0	0	0	0,27	0	0	0,08
Heteroptera	1,12	44,49	0	0	3,49	0,27	0,46	0,99
Homoptera	0	0	0	0	0,01	0	0	0
Hymenoptera	3	0	49,82	0	29,77	7,61	10,75	8,47
Isoptera	0,7	0	0	0	0	0,09	0	0
Mantoptera	0,97	0	0	0	0	0	0	0
Neuroptera	0,3	0	0	0	0	0,31	0,21	0,42
Notoptera	4,76	0	0	0	0,74	0	0	0
Lepidoptera	3,15	2,12	5,13	63,67	0,97	9,53	1,86	2,32
Odonata	0,5	0	0	0	0	0	0,37	0
Orthoptera	2,4	5,48	7,75	0	19,65	3,54	5,81	0,6
∑Insects	53,29	52,08	76,82	86,62	63,1	34,26	22,11	22,22
Amphibians	10,48	0	3,08	0	11,34	11,23	15,77	33,08
Annelids	2,28	0	0	0	0	12,39	1,71	0
Arachnida	2	0	1,2	0	16,79	5,59	2,65	4,01
Arthropoda	0,4	0	0	0	0	0	0	0
Mollusks	2	0	4,86	11,2	0	0	0,36	0,08
Myriapoda	11,78	0	0	0	1,37	1,28	23,13	26,12
Nematodes	3,12	0	0	0	0	0	0	0,08
Fish	0	0	12,11	0	0,37	0	2,98	0

Reptiles	0	0	0	0	0	0	0,63	0,09
Trematodes	0	0	1,5	0	0	0	0	0
Animal debris	14,51	0	4,62	1,43	1,44	19,19	6,53	3,35
Macrophytes	0	47,89	2,83	0	0	9,48	16,07	0,75
Indeterminate	0,05	0	2,04	0,75	0,64	4,05	0,73	1,64
Sands	0,03	0	0,39	0	0	0	7,21	0,19

3.3 Diets according to the size of the individuels

The food spectrum of juveniles and adults of *P. mascareniensis* and *H. occipitalis* in Aboisso and Maféré are illustrated in Table III. Juveniles and adults of *P. mascareniensis* had 7 and 4 feeds respectively in Aboisso, compared with 3 for adults in Maféré. No juveniles of *P. mascareniensis* were sampled in this locality. The corresponding figures for juveniles and adults of *H. occipitalis* are 5 and 11 feeds (Aboisso) and 8 and 11 (Maféré).

Table 3: Composition of diets and Relative importance index (IRI en %) of *P. mascareniensis* and *H. occipitalis* specimens in Aboisso and Maféré according to size class; n = number of full stomachs.

Relative importance index (IRI en %)							
Ingested prey	***Ptychadena mascareniensis***			***Hoplobatrachus occipitalis***			
	Aboisso		**Maféré**	**Aboisso**		**Maféré**	
	Juveniles	**Adults**	**Adults**	**Juveniles**	**Adults**	**Juveniles**	**Adults**
	n = 6	n = 12	n = 16	n = 14	n = 41	n = 18	n = 62
Coléoptera	16,95	13,09	3,58	2,1	0	3,38	7,89
Diptera	0	4,03	0	0	0,23	0	0
Heteroptera	0	22,15	48,45	0	1,32	0	0,27
Homoptera	0	0	0	0	0	10	0
Hymenoptera	5,09	0	2,4	0	0,05	0	7,65
Isoptera	0	0	0	0	0	0	0
Mantoptera	0	0	0	0	0	0	0
Neuroptera	0	0	0	0	0,58	0	0,09
Notoptera	11,18	0	0	0	0,07	0	0
Lepidoptera	5,28	0	0	4,74	2,62	6,3	2,74
Odonata	0	11,34	0	0	0,25	0	0,16
Orthoptera	0	11,34	39,86	5,8	19,22	0	3,13
∑ Insects	38,5	50,61	94,38	12,64	27,56	9,68	21,93
Amphibians	21,15	0	0	59,09	45,44	0	27,61
Annelids	4,91	0	0	5,99	0,61	26,39	24,01
Arachnida	0	7,06	2,78	16,82	0,83	12,06	1,94
Arthropoda	0	0	0	0	0	8,29	0
Mollusks	0	0	0	5,46	3,54	0	0,01
Myriapoda	13,77	0	2,84	0	1,85	0	0
Nematodes	0	0	0	0	0	0	0,01
Fish	0	0	0	0	0,31	25,57	5,05
Reptiles	0	0	0	0	0	0	0,09
Trematodes	0	0	0	0	0	0	0,03
Animal debris	15,98	3,9	0	0	4,18	8,26	0,56
Macrophytes	0	34,36	0	0	13,47	9,71	0,93
Indeterminate	0,18	0	0	0	0,55	0	0,04
Sands	5,46	0	0	0	1,6	0,3	0

In Aboisso, Insects (IRI = 50.61%) are the preferred food of *P. mascareniensis* adults, who feed secondarily on Macrophytes (34.36%). As for juveniles of the same species, they prefer insects (IRI = 38.5%) and amphibians (IRI = 21.15%), and their secondary foods are animal debris (IRI = 15.98%.

As for *H. occipitalis*, amphibians (IRI = 45.44%) and insects (IRI = 27.56%) are its preferred prey, and macrophytes (13.47%) its secondary food. On the other hand, juveniles consume amphibians (IRI = 59.09%) preferentially and Arachnids (IRI = 16.82%) as secondary prey.

Statistical analysis reveals that in Aboisso, the diet of juvenile specimens differs from that of adults (P = 0.0127; Mann-Whitney test, n1= 10; n2= 8; U= 12; Z= - 2.49).

In Maféré, Insects (IRI = 94.38%) are the main food of *P. mascareniensis* adults. No juvenile specimens of *P. mascareniensis* were sampled in this habitat. For *H. occipitalis*, amphibians (IRI = 27.61%) and annelids (IRI = 24.01%) are the preferred foods, while Insects (IRI = 21.93%) and fish (5.05%) are the secondary prey of adults. For juveniles of this frog, Annelids (IRI = 26.39%) and Fish (IRI = 25.57%) are their preferred foods, and Arachnids (12.06%), Macrophytes (9.71%) and Insects (9.68%) their secondary foods. In this locality, the diet of *P. mascareniensis* juveniles differs from that of adults (P - value = 0.048; Mann-Whitney test, n1= 9; n2= 17; U= 40; Z=1.96).

3.4 Diet according to sex

Diets according to sex in *P. mascareniensis* and *H. occipitalis* in Aboisso and Maféré are illustrated in Table IV. In Aboisso, *P. mascareniensis* females feed preferentially on insects (IRI = 57.19%) and annelids as secondary food (IRI = 30.53%).

Males consume Insects (IRI = 48.02%) and Myriapods (IRI = 20.81%) as preferred foods and Amphibians (IRI = 11.1%) as secondary prey. The Mann-Whitney test indicates a statistically significant difference (P = 0.039) between the

diets of females and males of this species in this habitat. Females and males of *H. occipitalis* feed respectively on Amphibians (IRI = 54.94%) and Nematodes (IRI = 58.73%) as preferred foods and Insects as secondary foods with respective index proportions of 24.48% and 24.27%. The diet did not vary significantly between the sexes (P = 0.355; Mann-Whitney test) in this frog in this locality.

In Maféré, *P. mascareniensis* females and males feed mainly on insects, with respective indices of 91.98% and 95.11%. Mann-Whitney tests showed no significant difference between the two diets (P = 0.71). For *H. occipitalis*, the trophic composition of females is more varied. They feed on insects (IRI = 22.99%), amphibians (IRI = 22.53%) and myriapoda (13.67%) as preferred prey, and macrophytes (10.09) and fish (8.37%) as secondary foods.

Table 4: Diet compositions and Relative importance index (IRI en %) of *P. mascareniensis* and *H. occipitalis* specimens in the Aboisso and Maféré locality as a function of sex; n = number of full stomachs.

Relative importance index (IRI en %)								
Ingested prey	***P. Mascareniensis***				***H. occipitalis***			
	Aboisso		**Maféré**		**Aboisso**		**Maféré**	
	Females	**Males**	**Females**	**Males**	**Females**	**Males**	**Females**	**Males**
	n = 8	**n = 4**	**n = 8**	**n = 8**	**n = 29**	**n = 12**	**n = 40**	**n = 22**
Coleoptera	14	12,25	2,18	1,4	11,95	6,69	7,27	5,69
Diptera	0	7,08	0	0	0	0,89	0	0
Heteroptera	22,56	9,48	47,54	22,65	1,69	0,76	1,12	1,12
Homoptera	0	0	0	0	0	0,19	0	0
Hymenoptera	0	1,87	2,4	53,12	9,61	0	5,6	6,46
Isoptera	0	0	0	0	0	0	0	0
Mantoptera	0	0	0	0	0	0	0	0
Neuroptera	20,5	0	0	0	0,26	0	0,42	0,77
Notoptera	0	5,37	0	0	0,78	0	0	0
Lepidoptera	0	1,98	0	0	0,19	6,91	3,15	2,89
Odonata	16	0	0	0	0	0	1,7	0
Orthoptera	4,49	9,99	39,86	19,94	0	8,83	3,73	0,05
∑ Insects	57,19	48,02	91,98	95,11	24,48	24,27	22,99	16,98
Amphibians	0	11,1	0	0	54,94	6,39	22,53	42,72
Annelids	30,53	1,77	0	0	0,46	0,68	1,08	4,75
Arachnida	7,53	3,04	0	2,78	1,79	0,18	1,93	3,76
Arthropoda	0	0	0	0	0	0	0	1,18
Mollusks	0	0	0	0	2,59	3,67	0,74	4,88
Myriapoda	0	20,81	1,78	0	2,3	1,25	13,67	14,03
Nematodes	0	0	0	2,11	0	58,73	0	0,56
Fish	0	0	0	0	0	1,2	8,37	0
Reptiles	0	0	0	0	0	0	3,04	0
Trematodes	0	0	0	0	0	0	0,35	0,59
Animal debris	4,73	3,32	0	0	4,29	3,54	7,47	0
Macrophytes	0	9,8	0	0	4,62	0	10,09	0,58
Indeterminate	0	0	0	0	0,98	0	0	1,38
Sands	0	2,08	0	0	3,57	0	7,65	4,5

As for males, they consume Amphibians (IRI = 42.72%) and Insects (IRI = 16.98%) as their preferred foods, and Myriapods (IRI = 14.03%) and Mollusks (IRI = 4.88%) as their secondary foods. Statistical analysis revealed a non-significant difference between the diets of male and female specimens (P= 0.59; Mann-Whitney test).

4. Discussion

Specimens of *Ptychadena mascareniensis* and *Hoplobatrachus occipitalis* from Aboisso and Maféré have a diversified diet. The two species studied are therefore omnivorous. On the basis of weight index, *P. mascareniensis* appears to be an omnivorous species with insectivorous tendencies, and *H. occipitalis* an omnivorous species with carnivorous tendencies. This carnivorous diet of *H. occipitalis* has already been reported by [28] in Nigeria and by [13] in the Banco National Park. Moreover, the latter species consumes much more diverse and larger prey regardless of habitat. This could be explained by its much larger size than that of *P. mascareniensis*.

In terms of habitat-specific diets, significant differences were observed between the diets of *Ptychadena mascareniensis* and *Hoplobatrachus occipitalis*. On the whole, the two Anuran species, which in common consume only insects, feed on a variety of prey. However, at Maféré, the food bolus of *P. mascareniensis* is quite poor. It contains only four insects orders (Coleoptera, Heteroptera, Hymenoptera and Lepidoptera), whereas that of *H. occipitalis* contains eight (Coleoptera, Diptera, Heteroptera, Hymenoptera, Neuroptera, Lepidoptera, Odonata and Orthoptera). This difference is well confirmed by the overlap index.

With regard to the seasonal variation in the diet of these two species, the results indicate that, with the exception of *P. mascareniensis* in the Maféré locality. The proportions of insects consumed during the rainy seasons are greater than those consumed during the dry seasons. This abundance of insects in the food bolus during the rainy season could be explained by the availability of these prey in the environment. Our results corroborate those of [29-13-2] in Banco National Park for *P. mascareniensis* and *H. occipitalis* and *Amnirana albolabris* respectively. The reduction in the number of insect orders in the food bolus during the dry season at Maféré in *P. mascareniensis* could also be explained by the fact that, as most of the sites are surrounded by crops and herbaceous surfaces, farmers use fire as a means of clearing land to

establish their crops. The presence of these bush fires in the habitat of these specimens would contribute to the disappearance of certain vertebrates and insects.

Diets according to size class show statistically significant variations between juveniles and adults of both Anuran species. Juveniles of both species, with the exception of Aboisso, consume mainly insects, while adults have a more diversified diet in these two frog species. This finding was also made by [7-13-11]. In *Ptychadena mascareniensis* and *Hoplobatrachus occipitalis* from the Banco National Park, the latter reported that adults consume larger prey than juveniles. The abundance of small-sized insects as essential resources in the food spectrum of juveniles is linked to the small size of their oral cavity, as pointed out by [30]. Indeed, in *H. occipitalis*, this author noted that prey size is proportional to the width of the oral cavity.

The present study reveals a dissimilarity between the diet of male and female specimens of *Ptychadena mascareniensis* only in Aboisso. In *H. occipitalis*, on the other hand, diet did not vary with sex at any locality. In the latter species, both males and females consume large quantities of amphibians and insects. Our results are contrary to data from [7-13] in Banco National Park. The latter report that in *H. occipitalis*, diet varies with sex, with females consuming mainly Hymenoptera and Arachnida and males a more eclectic diet. The presence of Heteroptera, Neuroptera and Odonata in females and Diptera and Notoptera in males of *P. mascareniensis* could be due to food preferences inherent in the biology of these individuals.

Conclusion

Ultimately, the food consumed by these frogs is diverse, with a dominance of vegetable crop pests and amphibians. On the basis of weight index, *P. mascareniensis* is omnivorous with insectivorous tendencie while *H. occipitalis* is omnivorous with carnivorous tendencie. Diet varies according to size class, sex and season.

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