The Feeding Regime of Goliath Frog (*Conraua goliath*) (Boulenger, 1906) in the Equato-guinean Zone of Cameroon

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Article history; Received: October 5th 2020; Revised: October 25th 2020; Accepted: December 25th 2020

Abstract
The feed preferences of *Conraua goliath*, an endogenous frog in central Africa were assessed in the present study. A total of 65 frogs (22 males, 22 females and 21 unspecified frogs) were obtained from hunters in 3 localities namely: Loum, Penja, and Nlonako in the Moungo division, littoral region of Cameroon. The methods of dissection, measurement, and stomach content analysis were used. The results revealed a large diversity of preys in the stomach namely: myriapods (25%), plants leaves and steems (21.19%), insects (19.56%), indigestible matters (19.56%), arachnids (4.89%), crustaceans (4.34%), mollusks (3.26%), amphibians (0.54%), annelids (0.54%) and reptiles (0.54%). The numerical percentage and the frequency of myriapods occurrence were significantly (P < 0.05) higher in males captured in the locality of Loum (100% and 35.55%) compared to the females (28.57% and 18.18%). Comparing the state of maturity, the numerical percentage and the frequency of occurrence of insects (100% and 42.85%) and indigestible matters (100% and 42.85%) were significantly higher in the youngs frogs (61.11% and 20.89%) captured in Loum compared to the adults (22.22% and 7.46%). Frogs of high weight (>1000g) recorded significantly (P < 0.05) higher occurrence and numerical frequency of myriapods (100 and 70%), indigestible and detritus materials (100 and 40%) in low-weight frogs (<400g) and plants leaves and steems (50 and 47.36%) in medium-weight frogs (400 – 1000g). In conclusion, goliath frog is an omnivore fed on a variety of preys and plants according to their availability in the environment.

Key words: *Conraua goliath*, feed preferences, frog, stomacal conten

Introduction
The world is facing a massive decline in its biodiversity of the amphibians (IUCN, 2020), due to over exploitation and the fragmentation of their habitats (Collins and Storfer, 2003; Bellard et al., 2016). In 2006, among the 4035 amphibian species that depended on water during their life cycle, 1356 approximately 33.6% were considered threatened (Maxwell et al., 2016). Emerging infectious diseases, such as chytridiomycosis, (Harp et al., 2006; Voordouw et al., 2010; Cunningham et al., 2015), climate change (Walthier et al., 2002; Parmesan and Yohe, 2003; Foden et al., 2013; Maxwell et al., 2016), chemical contaminants (Blaustein et al., 2002) and the introduction of predatory species (Kats and Ferrer, 2003) are factors that affect the dynamism of the populations, causing a drop in their number. However, it must be noted that most of the overfished amphibians in the world are edible frogs (Neveu, 2004; Casimir et al., 2016). This is the case of *Conraua goliath*, a giant African frog listed as endangered species by IUCN (2004).

In Cameroon, goliath frogs is endemic to the Moungo and Nkam regions where its constituted an integral part of the eating habits of the indigenous population. The conservation of this species through its domestication remains the best prospect to ensure its sustainability (Teletchea, 2017). Data on the diet of a species can help to identify the environmental conditions favorable to its development as well as the consequences induced by the degradation of its living environment (Parker and Goldstein, 2004).
Thus, explaining the fluctuation of their population (Lips et al., 2005) and defined conservation strategies (Batista et al., 2011). Studies on bioecology and feeding habit of the goliath frog are limited. Only few studies have been carried out on neighboring species, in Europe, Asia, America and Africa (Bellakhal et al., 2010; Benício et al., 2011; Camera et al., 2014). The objective of this study is to contribute to the preservation and enhancement of endogenous species through a fairly extensive analysis of its feeding regime in the natural environment.

**Material and Methods**

**Area of Study**

This study was carried out in the Mounngo division, Littoral region of Cameroon (Figure 1), precisely in Loum (LN: 4°41 ‘and LE: 009°43’), Penja (LN: 4°45 ‘and LE: 009°45’) and Nlonako (LN: 4°40’ and LE: 009°43’) with an average altitude of 665m.

**Relief, Pedology, Climate and Hydrography**

The study area is characterized by three main types of relief, namely the plains along the Mounngo river and the surroundings of Penja, the scattered plateaus, and mountain ranges. The soils are dominated by inceptisols (volcanic soils) on its northern and western part. The southern and eastern parts are dominated with sandy soil, silty-sandy and clay-sandy textures. The climate is of equatorial type, strongly influenced by the Guinean monsoon. It is characterized by a short dry season (November to March) and a long rainy season (April to October). The average annual precipitation is 2700 mm, the temperature varies between 20 and 27°C and a relative humidity of 75%. The hydrographic network is dense and includes three main rivers namely the Dibombè, Mabombè, Nkam river, multitude of rivers and streams. These rivers are permanent and their rate of flow varies with the season.

![Figure 1: Localization of the area of study](image)

**Flora and Fauna**

The flora along the rivers is very diverse and dominated by a dense rain forest. We note the presence of industrial plantations (pepper, cocoa, plantain cultivation), *Puereria pubescens* species as a ground cover plant and a diversity of plant species. The fauna is terrestrial (*Potamochoerus porcus, Manis tricuspis, Cercocetus* sp., hinds, antelopes, hares, and Arthropods), aerial (*Acedinidae, Anatidae, Myliobatidae*), and aquatic (*Clariidae, Cyprinidae, Cichlidae, Channidae, Potnidae, Channidae, sea turtles, *Conraua goliath, Rana esculenta, Conraua robusta, Crocodilia* sp., *Varanus niloticus*). Many predatory snakes and aquatic invertebrates are also encountered there.
Diet, Gender and Morphometric Characteristics of the Intestine

A total of 65 specimens of *Conraua goliat* were obtained from fishermen in the localities of Loum, Penja and Nlonako (23, 36 and 6 specimens respectively). Frogs were fished at night using trap and hawk. Each sample was weighed using a portable 1g precision balance, then sacrificed to keep the stomach contents intact. Thereafter, they were marked according to the locality and the date of capture, then conditioned in a cooler and transported to the laboratory of Ichthyology and Applied Hydrobiology of the University of Dschang, and examined within 12 hours.

The sex of the frogs was determined by observing the colour of the belly (yellow in the male and white in the female), then confirmed after dissection with the presence of eggs in the female. Maturity was determined by the examination of the gonads. Based on this review, frogs were classified as immature (undifferentiated sex) or mature (males, females). The frogs were carefully dissected using a pair of scissors and a scalpel. The digestive system of the frogs were removed, the intestine cut just below the esophagus, at the level of the anal opening and then unrolled. The length of the intestine (Li), was measured from the pyloric valve to the anus using a 0.1cm tape and the weight of the intestine (Wi) was obtained using an electronic scale balance (Sartorius Competence) of 0.01g precision. The analysis of the stomach contents according to the method described by Hynes (1950) was used to determine the nature of food consumed by frogs. Thus, the stomach of each frog was cut just below the esophagus and stored in 10% formalin to keep the stomach contents intact. The contents were emptied in a petri dish and then weighed. The length and width of the stomach were measured using the caliper. The stomach contents were identified at a taxonomic level up to the family with respect to the state of conservation of the stomach using the identification keys of Needham and Needham (1974), Delvare and Abertenc (1989) and Klass-Douwe and Dijkstra (2014).

The macroscopic food fragments were counted in petri dishes, with the eyes and / or under a binocular stereoscopic magnifier (magnification ×10) and the observation test of the microscopic fragments were carried out using an optical microscope (magnification x 40). The elements thus identified were grouped into feed categories or items. The volume of each prey was estimated using the ellipsoid formula: $V = \frac{4}{3} \pi \times \frac{2}{3} L \times \frac{2}{3} l \times \frac{2}{3} W$ (where, $L$ = length; $l$ = width; $V$ = volume of prey; $\pi = 3.14$) (Magnusson, 2003). Stomach containing food fragments or filled stomach, totally, half or a quarter filled and those without any food fragments (empty stomach) were evaluated (Tiogue et al., 2015).

Data Collected

Analysis of the stomach contents was used to calculate the following parameters of food preferences:
- Frequency of occurrence (% O) (Rosecchi and Nouaze, 1987; Gray et al., 1997)
$$\% O = \left( \frac{F_i}{\sum F_i} \right) \times 100$$
where $F_i = n_i / N_T$ and $F_i =$ Frequency of item $i$; $n_i =$ number of stomachs containing item $i$ and $N_T =$ Total number of full stomachs examined.
- Numerical percentage (% N) (Lauzanne, 1975; Hyslop, 1980):
$$\% N = \left( \frac{n_{xi}}{N_{xt}} \right) \times 100$$
where $n_{xi} =$ Total number of individuals in item $i$; and $N_{xt} =$ Total number of all food items.
- Percentage weight (%W) (Lauzanne, 1977): $% W = W_T \times 100 / W_i$, with $W_T =$ Total weight of item $i$; and $W_i =$ total weight of all food items identified.
- Volumetric percentage (%V) (Hyslop, 1980): $% V = V_p / V_i \times 100$, where $% V =$ volumetric percentage, $V_p =$ volume of food category and $V_i =$ volume of the intestine or stomach.
- Relative index of importance (%RII) (Pinkas et al., 1971): $%RII = \% O \times (\% N + \% O)$.

The method of Hureau (1970) modified by Geistdoerfer (1975) analyses the stomach contents and classify the prey:
- Preferential (PMP) and occasional (OMP) main prey: If $Q>100$ and $F>30\%$ and $Q>100$ and $F<30\%$ respectively
- Frequent secondary prey (FSP) and accessories (PSA): If $10<Q<100$ and $F>10\%$ and $10<Q<100$ and $F<10\%$ respectively.
Complementary prey of the first order (CPFO) and of the second order (CPSO): $Q<10$ and $F>10\%$ and $Q<10$ and $F<10\%$.

Where $F$ is the frequency index of a prey with $F = \frac{\text{Number of stomachs containing the item i}}{\text{Total number of full stomachs}} 	imes 100$, $Q$ is the food quotient with: $Q = \%C_w \times \%C_n$ or $C_n$ being the percentage by number and $C_w$ is the percentage by weight of a prey. $%C_n = 100 \times \frac{\text{Number of individuals of each type of prey}}{\text{Total number of prey ingested per individual}}$ and $%C_w = 100 \times \frac{\text{Weight of each type of prey consumed}}{\text{Total weight of prey ingested per individual}}$.

**Statistical Analysis**

The data collected were subjected to analysis of variance (ANOVA). Where there was significant differences between the means, Duncan’s Multiple Range test was applied to separate them at 5% significance level. The statistical software SPSS 20.0 (Statistical Package for Social Sciences) was used for these analysis and the map location of the capture sites with the MAPINFO 7.8 software.

**Results**

The different categories of prey consumed by *Conraua goliath* in the localities of Loum, Penja and Nlonako are summarized in Table 1. It appears that the preys were divided into 5 categories, namely preferential primary prey (diplopod, indigestible matters and detritus), frequent secondary prey (decapod, beetle and plant materials), accessory secondary prey (gastropod), first-order complementary prey (aranea, chilopod, orthoptera) and second order complementary prey (anoure, squamata, odonate, hemiptera, hymenoptera, dermaptera, annelid, diptera). These include the presence of terrestrial, aquatic and semi-aquatic prey. The diplopods and plant matters were more numerous and abundant in the stomachs. The percentage weight and relative index of importance were respectively higher. Indigestible matter and litter have a high frequency of occurrence in the stomach.

**Table 1: Category of food (taxon) consume by Conraua goliath**

<table>
<thead>
<tr>
<th>Categories of feed</th>
<th>N(%)</th>
<th>W(%)</th>
<th>V(%)</th>
<th>RH(%)</th>
<th>O(%)</th>
<th>Q(%)</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annelid</td>
<td>1.08</td>
<td>0.01</td>
<td>0.01</td>
<td>3.92</td>
<td>3.57</td>
<td>0.02</td>
<td>$Q&lt;10%$ and $%O&lt;10%$: (CPSO)</td>
</tr>
<tr>
<td>Aranea *</td>
<td>4.89</td>
<td>0.29</td>
<td>0.11</td>
<td>80.45</td>
<td>16.07</td>
<td>1.43</td>
<td>$Q&lt;10%$ and $%O&gt;10%$: (CPFO)</td>
</tr>
<tr>
<td>Chilopod</td>
<td>3.80</td>
<td>1.77</td>
<td>0.93</td>
<td>59.22</td>
<td>12.5</td>
<td>6.74</td>
<td>$Q&lt;10%$ and $%O&gt;10%$: (CPFO)</td>
</tr>
<tr>
<td>Coleoptera*</td>
<td>11.41</td>
<td>1.91</td>
<td>0.46</td>
<td>403.00</td>
<td>33.92</td>
<td>21.89</td>
<td>$10%&lt;Q&lt;100%$ and $%O&gt;10%$: (FSP)</td>
</tr>
<tr>
<td>Decapode *</td>
<td>4.34</td>
<td>10.65</td>
<td>23</td>
<td>390.75</td>
<td>46.32</td>
<td>10%</td>
<td>$Q&lt;10%$ and $%O&gt;10%$: (FSP)</td>
</tr>
<tr>
<td>Dermatoptera</td>
<td>2.17</td>
<td>0.03</td>
<td>0.05</td>
<td>11.96</td>
<td>5.35</td>
<td>0.08</td>
<td>$Q&lt;10%$ and $t%O&lt;10%$: (CPSO)</td>
</tr>
<tr>
<td>Indigestibles matter and detritus</td>
<td>20.10</td>
<td>7.56</td>
<td>1.58</td>
<td>1045.71</td>
<td>48.21</td>
<td>152.11</td>
<td>$Q&gt;100%$ and $%O&gt;30%$: (PMP)</td>
</tr>
<tr>
<td>Diplopod</td>
<td>20.65</td>
<td>59.81</td>
<td>10.62</td>
<td>1396.18</td>
<td>4235.29</td>
<td>1235.29</td>
<td>$Q&gt;100%$ and $%O&gt;30%$: (PMP)</td>
</tr>
<tr>
<td>Diptera</td>
<td>1.08</td>
<td>0.02</td>
<td>0.0049</td>
<td>3.89</td>
<td>3.57</td>
<td>0.03</td>
<td>$Q&lt;10%$ and $%O&lt;10%$: (CPFO)</td>
</tr>
<tr>
<td>Gasteropod *</td>
<td>3.260</td>
<td>8.06</td>
<td>1.99</td>
<td>37.51</td>
<td>7.14</td>
<td>26.28</td>
<td>$10%&lt;Q&lt;100%$ and $%O&lt;10%$: (PSA)</td>
</tr>
<tr>
<td>Hemiptera *</td>
<td>0.54</td>
<td>1.42</td>
<td>0.60</td>
<td>2.04</td>
<td>1.78</td>
<td>0.77</td>
<td>$Q&lt;10%$ and $%O&lt;10%$: (CPFO)</td>
</tr>
<tr>
<td>Hymenoptera</td>
<td>0.54</td>
<td>0.03</td>
<td>0.04</td>
<td>0.97</td>
<td>1.78</td>
<td>0.001</td>
<td>$Q&lt;10%$ and $%O&lt;10%$: (CPFO)</td>
</tr>
<tr>
<td>Plant matters</td>
<td>20.65</td>
<td>1.55</td>
<td>47.60</td>
<td>1950.25</td>
<td>28.57</td>
<td>32.04</td>
<td>$10%&lt;Q&lt;100%$ and $%O&gt;10%$: (FSP)</td>
</tr>
<tr>
<td>Odonate</td>
<td>0.54</td>
<td>0.09</td>
<td>0.016</td>
<td>0.99</td>
<td>1.78</td>
<td>0.05</td>
<td>$Q&lt;10%$ and $%O&lt;10%$: (CPFO)</td>
</tr>
<tr>
<td>Orthoptera</td>
<td>3.80</td>
<td>1.73</td>
<td>0.41</td>
<td>52.794</td>
<td>12.5</td>
<td>6.60</td>
<td>$Q&lt;10%$ and $%O&gt;10%$: (CPFO)</td>
</tr>
<tr>
<td>Anoure</td>
<td>0.54</td>
<td>3.96</td>
<td>2.53</td>
<td>5.50</td>
<td>1.78</td>
<td>2.15</td>
<td>$Q&lt;10%$ and $%O&lt;10%$: (CPFO)</td>
</tr>
<tr>
<td>Squamata</td>
<td>0.54</td>
<td>1.05</td>
<td>10.02</td>
<td>18.87</td>
<td>1.78</td>
<td>0.57</td>
<td>$Q&lt;10%$ and $%O&lt;10%$: (CPFO)</td>
</tr>
</tbody>
</table>

N: numerical percentage; W: weight percentage; V: volumetric percentage; RH: relative index of importance; O: frequency of occurrence; Q: food quotient; PMP: Preferred main prey; OMP: Occasional main prey; FSP: Frequent secondary prey; PSA: Secondary accessory prey; CPFO: First order complementary prey; CPSO: Second order complementary prey. *: Aquatic and semi-aquatic prey; the largest clue is in bold.
The categories of food illustrated in photo 1 was composed of detritus, indigestible matters, plants (plant matter), invertebrate (insects, crustacean, molluscs, myriapod, arachnid and annelid) and vertebrate (amphibians and reptile).

**Figure 1:** Gallery of food categories consumed by *Conraua goliath* (a) Diplopode; (b) beetle; (c) amphibian; (d) decapod (e); gastropod (f); plant matter (g) indigestible matter; (h); hemiptera; (i) odonate; (j) chilopod.
The frequency of occurrence of prey according to the gender and state of maturity as illustrated in Figures 2 and 3 shows that, irrespective of the factors considered, organic matter of animal origin was significantly higher (P <0.05) in the stomachs of *Conraua goliath*. Their frequency of occurrence was significantly represented (P <0.05) in the stomachs of males (95.23%). The values obtained in adults (86.48%) and youngs (89.47%) frogs were comparables. The frequency of occurrence (42.85%) of plant organic matter recorded in males were significantly higher compared to the frequency of indigestible and detritus materials (19.04%).

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**Figure 2:** Frequency of occurrence of the type of organic matter consumed by *Conraua goliath* according to the gender

**Figure 3:** Frequency of occurrence of the type of organic matter consumed by *Conraua goliath* according to the state of maturity

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**Food Preferences by Locality and Gender of Conraua goliath**

**Figure 4:** Frequency of occurrence and numerical percentage of myriapods by gender of *Conraua goliath*

**Figure 5:** Frequency of occurrence of myriapods and insects by locality
The frequency of occurrence and the numerical percentage of myriapods (figure 4) recorded significantly higher values in males (42.85 and 85.71%) compared to females (18.18 and 37.50%). The prey was more diversified in the stomachs of frogs captured at Loum, followed by Penja and Nlonako respectively. Reptiles and annelids were absent irrespective of the location and gender. With equal diversity, the myriapods were significantly (P <0.05) more frequent and numerous regardless of the locality considered. Depending on the localities (figure 5), myriapods and insects were significantly less frequent (25 and 0%) in Nlonako compared to the frogs from Penja (55 and 40%) and Loum (60 and 55%).  

**Food Preferences According to Locality and State of Maturity of Conraua goliath**

Food preferences of *Conraua goliath* with respect to the locality and state of maturity (Figures 6) indicate that regardless of the localities and states of maturity, frogs mainly consumed myriapods (25%), plant materials (21.19%), insects (19.56%), indigestible materials and detritus (19.56 %), arachnids (4.89%), crustaceans (4.34%), gastropods (3.26%), annelids (0.54%), amphibians (0.54%) and reptiles (0.54%). Depending on the locality, insects were more frequent in the stomachs of adults frogs found in Loum (table 2). In this particular locality, the frequency of occurrence, of insects (100 and 42.85%) and indigestible matter (100 and 42.85%) were significantly higher in youngs frogs captured in comparison to the adults frogs respectively (61.11 and 20.89%) and (22.22 and 7.46%).

![Feed category](image)

**Figure 6:** Food preferences of *Conraua goliath* regardless the locality and state of maturity

**Table 2:** Frequency of occurrence and numerical percentage of insects and indigestible matter by state of maturity in Loum

<table>
<thead>
<tr>
<th>Feed category</th>
<th>Youngs frogs</th>
<th>Adults frogs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Myriapods</td>
<td>100</td>
<td>61.11</td>
</tr>
<tr>
<td>Plant materials</td>
<td>21.19</td>
<td>20.89</td>
</tr>
<tr>
<td>Insects</td>
<td>19.56</td>
<td>22.22</td>
</tr>
<tr>
<td>Indigestible materials</td>
<td>19.56</td>
<td>7.46</td>
</tr>
<tr>
<td>Arachnids</td>
<td>0.54</td>
<td>0.54</td>
</tr>
<tr>
<td>Gastropods</td>
<td>4.89</td>
<td>0.54</td>
</tr>
<tr>
<td>Crustaceans</td>
<td>3.26</td>
<td>0.54</td>
</tr>
<tr>
<td>Amphibians</td>
<td>0.54</td>
<td>0.54</td>
</tr>
<tr>
<td>Reptiles</td>
<td>0.54</td>
<td>0.54</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Insects</th>
<th>Frequency of occurrence</th>
<th>Numerical percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Youngs frogs</td>
<td>100</td>
<td>42.85</td>
</tr>
<tr>
<td>Adults frogs</td>
<td>61.11</td>
<td>20.89</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indigestible matters</th>
<th>Frequency of occurrence</th>
<th>Numerical percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Youngs frogs</td>
<td>100</td>
<td>42.85</td>
</tr>
<tr>
<td>Adults frogs</td>
<td>22.22</td>
<td>7.46</td>
</tr>
</tbody>
</table>

**Food Preferences Based on Weight**

The food preferences of *Conraua goliath* with respect to weight summarized in table 3 shows that the preys were more diversified (9 feed categories) in the stomach of frogs of low weight (<400g), moderately diversified (7 categories) in frogs of high weight (> 1000g), and less diversified (6 categories) in those of medium weight (400 to 1000g). Annelids were present only in frogs of low
weight. Frogs of high weight (>1000g) recorded significantly (P<0.05) higher occurrence and numerical frequency of myriapods (100 and 70%), indigestible and detritus materials (100 and 40%) in low-weight frogs (<400g) and plants leaves and steems (50 and 47.36%) in medium-weight frogs (400 – 1000g).

**Table 3**: Food preferences with respect to weight of *Conraua goliath*

<table>
<thead>
<tr>
<th>Food categories</th>
<th>&lt; 400g</th>
<th>400 – 1000g</th>
<th>&gt; 1000g</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annelids</td>
<td>+</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Arachnids</td>
<td>+</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>Myriapods</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Insects</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Crustaceans</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>indigestible and detritus materials</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Gasteropods</td>
<td>+</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>Plant materials</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Amphibians</td>
<td>-</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Reptiles</td>
<td>+</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

(+): present; (-): absent

**Discussion**

The analysis of the stomach contents of *Conraua goliath* shows that this frog consumes a wide varieties of feed. Feed from animal origin are predominant both in frequency of occurrence, and in numerical percentage suggesting that this frog is omnivorous with carnivorous tendency. These preys are terrestrial, aquatic and semi-aquatic in nature, indicating that frogs foraged in water and on land. This result corroborates the results of the studies carried out in Tunisia on *Rana saharica*, in which adults consume 96.32% of terrestrial preys and 3.68% of aquatic preys (Bellakhal et al., 2010). Study on *Rana ridibunda* in Russia (Mordovia) revealed that this species fed mainly on aquatic preys (Ruchin and Ryzhov’s, 2002). Other investigations on the diet of ranidae revealed that they fed exclusively on terrestrial preys (Berry, 1965; Jenssen and Klimstra, 1966; Beschkov, 1970; Whitaker et al., 1981; Hirai and Matsui, 1999; 2001a). Feed from plant origin is also frequent in the stomachs in high number irrespective of the factor of variation considered. The ingestion of plant materials is recurrent in many anurans (Batista et al., 2011; Maragno and Souza, 2011; Pazinato et al., 2011; Sabagh et al., 2012). However, many authors reported that they are accidentally ingested during food capture (Whitaker et al., 1977; Evans and Lampo, 1996; Anderson et al., 1999; Teixeira et al., 1999).

The variability in the frequency of occurrence and the number of feed with respect to locality, sex, state of maturity, size and weight of *Conraua goliath* is attributed to the fact that the choice of preys is above all it’s availability and also edaphic characteristics of the surrounding environment (Werner et al., 1995; Das, 1996; Low and Török, 1998; Hirai and Matsui, 1999; 2001b), due to the dynamics of prey populations (Hirai and Matsui, 2001a; Maneyro et al., 2004; Santos et al., 2004). This variability can also be linked to the fact that in the same species, there would be disparities in the diet according to gender and size. Studies on *Leptodactylus latrans* in Uruguay and Argentina shows great overlap in diet that exists between males and females (Maneyro et al., 2004; Sanabria et al., 2005). However, certain investigations attested that there is no difference in diet between the gender. This is the case of *Rhinella scitula* in Brazil (Maragno and Souza, 2011) and *Ptychadena mascareniensis* in Madagascar (Vences et al., 2004).

The composition of *Conraua goliath* diet is more diversified in youngs ones, thus reflecting opportunistic and passive eating behaviors. Studies on the diet of genus Leptodactylus, show that there is a large quantity of larvae and more sedentary groups, describing an opportunistic feeding behavior (Maneyro et al., 2004; Rodrigues et al., 2004; Sanabria et al., 2005; De Carvalho et al., 2008; Solé et al., 2009; Solé and Rödder, 2010). This can be explained by the fact the consumption of larger prey in small numbers by frogs is sufficient to cover their needs, unlike small prey.
Conclusion
The goliath frog is an omnivore with a carnivorous tendency and fed on a variety of preys according to their availability in the environment. Preys are more diversified in young frogs than adults ones with the myriapods been the more frequent and numerous.

Acknowledgement
Grateful acknowledgement is expressed to the international fund for Science (IFS) for the financial support of the present work. The authors wish to thank all participating fishermen and laboratory technicians for their cooperation.

Author’s Contributions
MONTHE MOUMEGNI Liliane Fleurette, YEMDJIE MANE Divine Doriane, NGOUANA TADJONG Ruben and MAFOUO SONHAFOUO Vanessa went to the field to carry out the research and collect the samples. KANA Jean Raphael supervised the overall research work. MONTHE MOUMEGNI Liliane Fleurette, YEMDJIE MANE Divine Doriane and KANA Jean Raphael wrote the first draft before being revised by NGOUANA TADJONG Ruben, MAFOUO SONHAFOUO Vanessa and TCHOUMBOUE Joseph and approved by all the authors.

References
Cunningham AA. Matthew WP. Katie B. Liam F. 2015. Emerging disease in UK amphibians. *Veterinary Record*, 176: 468 http://dx.doi.org/10.1136/vr.h2264


Harp EM. Petranka JW 2006. Ranavirus in wood frogs (Rana sylvatica); Potential sources of transmission within and between ponds. Journal of Wildlife Diseases, 42: 307–318. DOI: 10.7589/0090-3558-42.2.307


Pinkas I. Oliphant MS. Iverson ZL. 1971. Foods habits of albacore blue fin, tuna and bonito in California waters. State of california the resources agency department of fish and game. Fish bulletin 152.


