

# A Study of the Prevalence and Abundance of Chewing Lice (Phthiraptera) in Selected Poultry Farms in Benin City, Edo State

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**Abstract:** An investigation on the prevalence of chewing lice in three selected poultries located in Ekosodin, EDPA and Adolor in Benin metropolis in Edo state was conducted fortnightly from March to April, 2016 to determine the chewing lice species richness, lice abundance, composition, sex ratio and percent prevalence. *Menocanthus stramineus*, *Menopon gallinae* and *Lipeurus caponis* were the only chewing lice species recorded. The largest population of chewing lice species occurred in Adolor and least in EDPA. The most prevalent species across the three localities was *M. stramineus* with a mean prevalence of (56%), followed by *M. gallinae* (34%) and *L. caponis* (10%). Statistical analysis showed that the abundance of *M. stramineus* significantly differed among locations; Ekosodin, Adolor and EDPA ( $F_{2,23} = 42.18$ ;  $P < .001$ ) and between sexes with females being more abundant. ( $F_{1,23} = 9.44$ ;  $P = 0.007$ ) while *M. gallinae* differed significantly among the different locations but did not differ in sexes unlike *L. caponis* that did not differ significantly both in location ( $F_{2,23} = 0.66$ ;  $P = 0.528$ ) and between sex ( $F_{1,23} = 0.05$ ;  $P = 0.824$ ) with females being more abundant in all. Therefore, further studies to access the impact of these lice species on the health and production performance including cost effectiveness of control strategies and thorough education of poultry managers are strongly recommended.

**Keywords:** Chewing Lice, Poultry, Benin City, Prevalence, Abundance

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## 1. Introduction

Birds can be found virtually in every town and city around the globe. They live side by side with humans as a source of food, hobby and experimental purposes, [1]. The Poultry industry occupies an important position in the provision of animal protein (meat and egg) to man and generally plays a vital role in the national economy as a revenue provider. Several health problems can affect birds but parasite infections play a major role. They constitute a major source of infection and transmission of diseases [2].

Serious pest problems are more likely to occur on laying flocks than on broilers. The major external parasites of poultry are lice, mites and ticks, while lice and mites are the most common [3]. Deaths resulting from infestations of external parasites are rare, but production losses often occur because of the irritation caused to the birds [4]. Louse

(plural: lice) is the common name for members of the order Phthiraptera, which contains nearly 5,000 species of wingless insect. The effects of louse parasitism on birds are often severe, including retarded growth, low egg production and susceptibility to other infections [1].

The order previously had two suborders, Mallophaga (Chewing lice) and Anoplura (Sucking lice); but recent classification shows Mallophaga is paraphyletic and four suborders are recognized, Anoplura, Rhyncophthirina, Ischnocera and Amblycera. Of the approximately 2,500 species of Mallophaga, it is estimated that more than 2,000 are parasites of birds and that only 467 are parasites of mammals [5]. Chewing lice (Phthiraptera: Amblycera, Ischnocera) are important poultry ectoparasites. Living mainly on the skin and within the feathers of chicken (*Gallus gallus domestica*) [6].

## 2. Materials and Methods

### 2.1. Study Area

The study was carried out in Ugbowo, Benin city, the capital of Edo state, Ovia North East Local government area. Specimens were collected from three poultry farms in Ekosodin, EDPA, and Adolor, in Ugbowo, Benin city.

### 2.2. Sample Collection Procedure

Birds (*Gallus gallus domestica*) were examined under day light with the aid of hand lens to locate the lice on different parts of the birds over a white cloth spread on the floor. This was done firstly by physically restraining the birds to minimize movement. The feathers around the head, breast, thighs, dorsal and ventral region, wing and cloacal areas were thoroughly examined for the presence of lice. Hairbrush was used to brush thoroughly the feathers of the birds in order to dislodge the lice. To collect moving lice, a dissecting forceps and hand picking were used to capture fast moving lice over the white cloth. The lice for each bird were collected in various glass vials containing 10% formalin and transported to the laboratory of Animal and Environmental Biology, UNIBEN, for sorting and identification.

### 2.3. Insect Identification

Identification of louse samples was done to species level following their morphological description and location on the host. The parasites were identified by preparing slide where each was viewed with an electronic microscope (Olympus Techmal Binocular Microscope, Model-XSZ-107BN) and the images captured with photographic lens (Amscope Microscope Digital Camera Model-MU1400) for easy identification, using keys and description given by [7] and [5]

### 2.4. Data Analysis

The data obtained were analysed using simple percentage for prevalence rate and General Linear model Analysis of Variance (GLM ANOVA.) Where differences were detected between locations and sex, Tukey's Honestly Significant Difference test (HSD). All analyses were done using Genstat 9.0 (VSN International, Hemel Hempstead, UK).  $P < 0.05$  was accepted to be statistically significant.

## 3. Result

120 poultry birds were randomly examined in a 2 months survey carried out fortnightly. A total of 3 lice species and 222 individuals were recovered belonging to the order Phthiraptera, Sub orders Amblycera and Ischnocera of two families the Menoponidae and Philopterae. The species of lice encountered were the *Menopon gallinae* (shaft louse), *Menocanthustramineus* (the body louse) and *Lipeurus caponis* (the wing louse).



Figure 1. Female *Menocanthus stramineus*.



Figure 2. Male *Menocanthus stramineus*.



Figure 3. Female *Menopon gallinae*.



Figure 4. Male *Menopon gallinae*.



Figure 6. Male *Lipereus caponis*.



Figure 5. Female *Lipereus caponis*.

### 3.1. Overall Lice Prevalence

The overall prevalence of lice species in the three locations by percentage shows that the chewing lice was most prevalent in Adolor (37.8%) followed closely by Ekosodin (36.5%) and EDPA (25.7%) (Figure 1).

The prevalence of infested chicken in relation to study location shows that 101 of the 120 chickens examined were infested as shown in table 1.

The rate of prevalence of the various lice species shows that *M. stramineus* was most prevalent throughout the period of study infecting 60 (59.4%) chickens (Table 2).

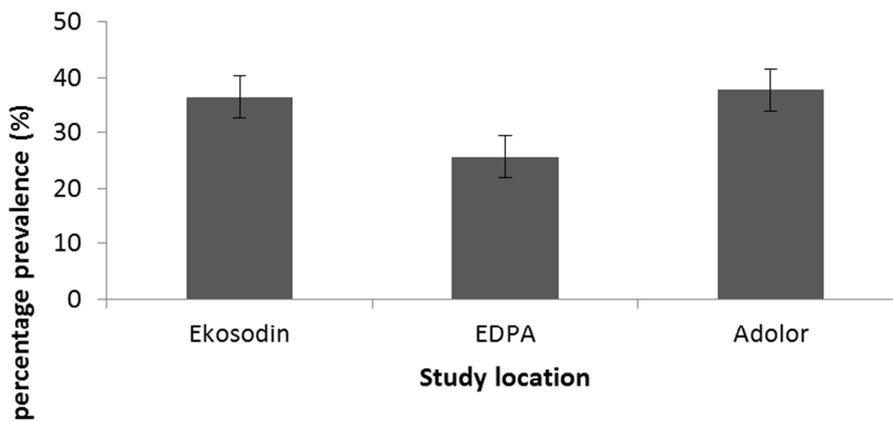


Figure 7. Percentage prevalence ( $\pm$ SE) of chewing lice in poultries in the study locations.

Table 1. Prevalence in relation to study locations.

Study Location	No of Chicken examined n=120	Number of Chicken Infested	Relative Prevalence (%)
Ekosodin	40	35	87.5
EDPA	40	30	75
Adolor	40	36	90
Total	120	101	84.2

Table 2. Prevalence of lice species.

Lice Species	No of Birds Infected	Prevalence (%)
<i>M. gallinae</i>	30	29.7
<i>M. stramineus</i>	60	59.4
<i>L. caponis</i>	11	10.9

3.2. Abundance of Lice Species in Relation to Sex and Location

The abundance of *L. caponis* did not significantly differ among locations; Ekosodin, Adolor and EDPA. ( $F_{2,23} = 0.66$ ;  $P = 0.528$ ) and between sex ( $F_{1,23} = 0.05$ ;  $P = 0.824$ ), although this specie appeared to be more in Ekosodin (Figure 2). The abundance of *M. gallinae* significantly differed among

locations ( $F_{2,23} = 41.15$ ;  $P < .001$ ) with the highest abundance in Ekosodin but did not significantly differ between sexes ( $F_{1,23} = 0.65$ ;  $P = 0.430$ ) (Figure 3). The abundance of *M. stramineus* significantly differed among locations; Ekosodin, Adolor and EDPA ( $F_{2,23} = 42.18$ ;  $P < .001$ ) and between sexes with females being more abundant. ( $F_{1,23} = 9.44$ ;  $P = 0.007$ ) (Figure 4).

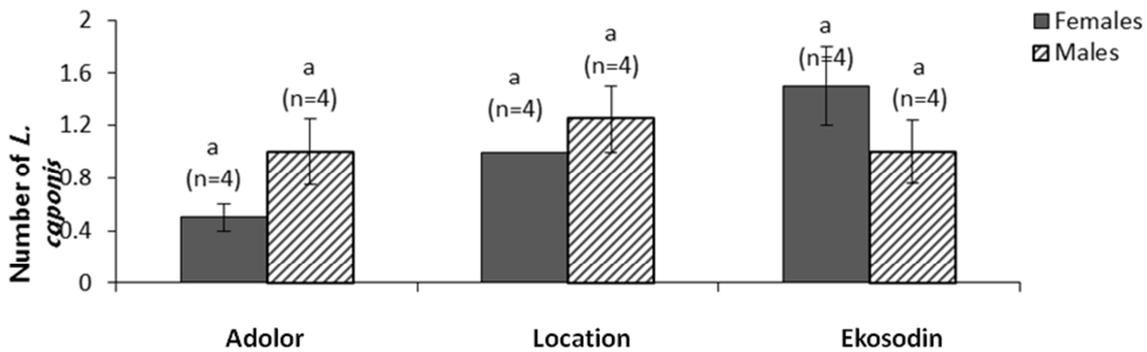


Figure 8. Mean abundance (±SE) of males and females of *Lipereus caponis* in some poultries in locations within Benin metropolis.

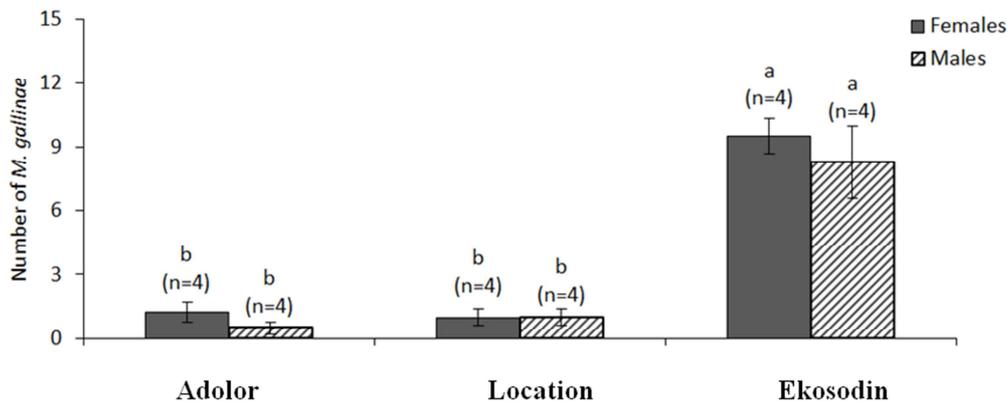


Figure 9. Mean abundance (±SE) of males and females of *Menopon gallinae* in some poultries in locations within Benin metropolis.

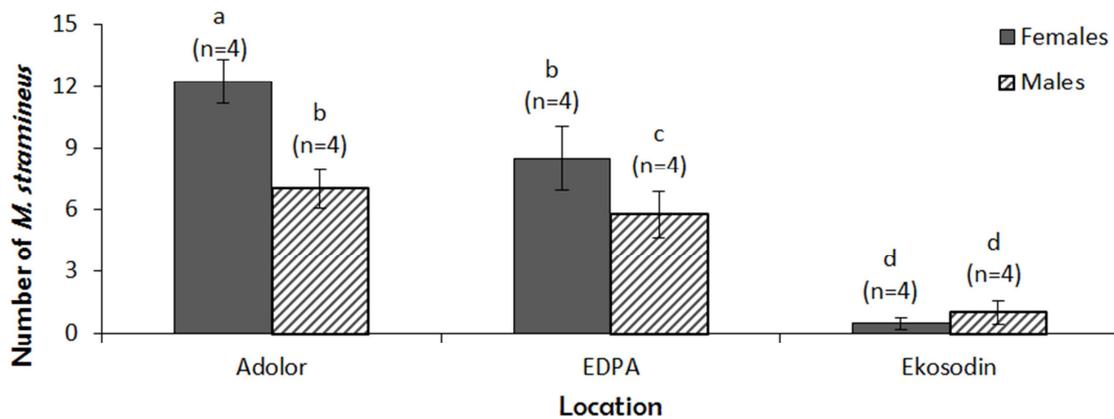


Figure 10. Mean abundance (±SE) of males and females of *M. stramineus* in some poultries in locations within Benin metropolis.

The percentage abundance of the three lice species statistically differed in the Ekosodin poultry ( $F_{2,11} = 26.48$ ;  $P < .001$ ) with *M. gallinae* (82%) having the highest percentage abundance and *M. stramineus* (7%) having the least percentage abundance (Figure 5). The percentage abundance of the lice species is statistically significant in the EDPA poultry ( $F_{2,11} = 20.03$ ;  $P < .001$ ) with *M. stramineus* (75%) having the highest percentage abundance and *L. caponis* (12%) having the least percentage abundance (Figure 6). The percentage abundance of the lice species is statistically significant in Adolor poultry ( $F_{2,11} = 96.84$ ;  $P < .001$ ) with *M. stramineus* (85%) having the highest percentage abundance and *L. caponis* (7%) having the least (Figure 7).

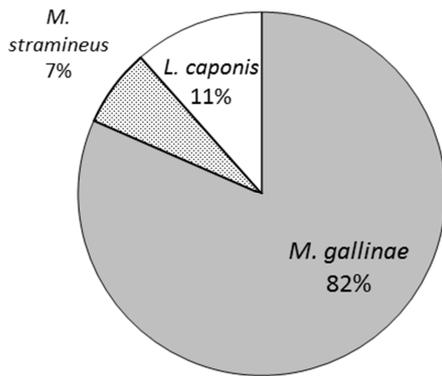


Figure 11. Percentage abundance of three lice species in a poultry located in Ekosodin.

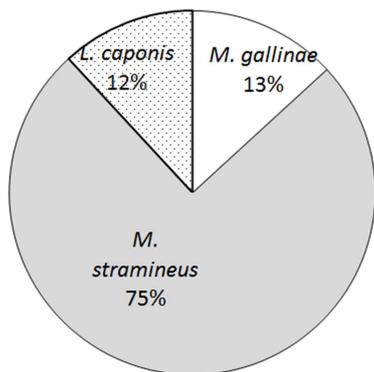


Figure 12. Percentage abundance of three lice species in a poultry located in EDPA.

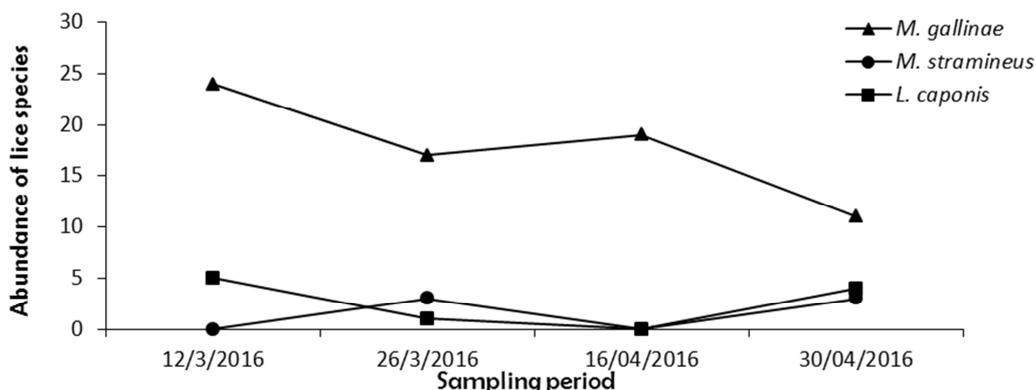


Figure 14. Temporal abundance of some lice species in Ekosodin, Benin City.

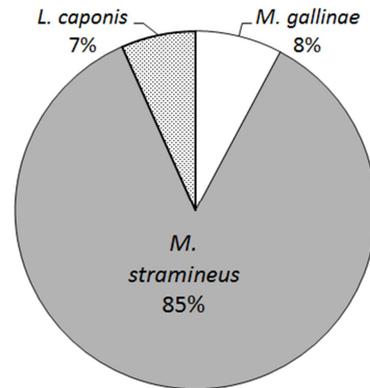


Figure 13. Percentage abundance of three lice species in a poultry located in Adolor.

### 3.3. Temporal Abundance

The abundance of lice species during the period of sampling in Ekosodin reveals that *M. gallinae* specie was most abundant on the beginning and least abundant on the last sampling period. *M. stramineus* specie showed the least abundance on the beginning and on the third sampling period and the most abundance on the second and the last sampling period. *L. caponis* specie showed the most abundance on the beginning and on the last sampling period and the least abundance on the third sampling period (Figure 8). The abundance of the three lice species during the period of sampling in EDPA reveals that *M. stramineus* specie was most abundant at the beginning and lowest at the last sampling period. *M. gallinae* specie showed the most abundance on the beginning and the least abundance on the last sampling period. *L. caponis* showed the most abundance at the beginning, all through the second and the third sampling periods and the least abundance on the last sampling period (Figure 9). The abundance of the three lice species during the period of sampling at Adolor reveals that *M. stramineus* and *M. gallinae* species were most abundant on the third and least abundant on the last period of sampling. *L. caponis* species showed the most abundance on the first and the third sampling period and the least abundance on the second and on the last sampling periods (Figure 10).

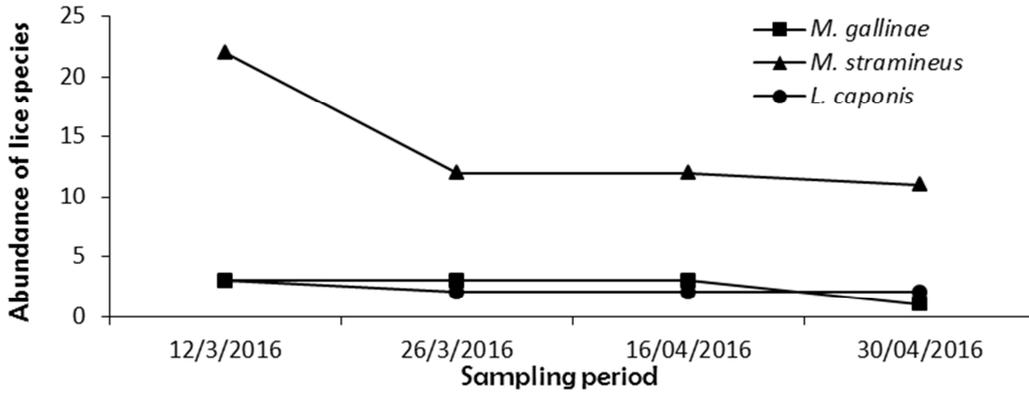


Figure 15. Temporal abundance of some lice species in EDPA, Benin City.

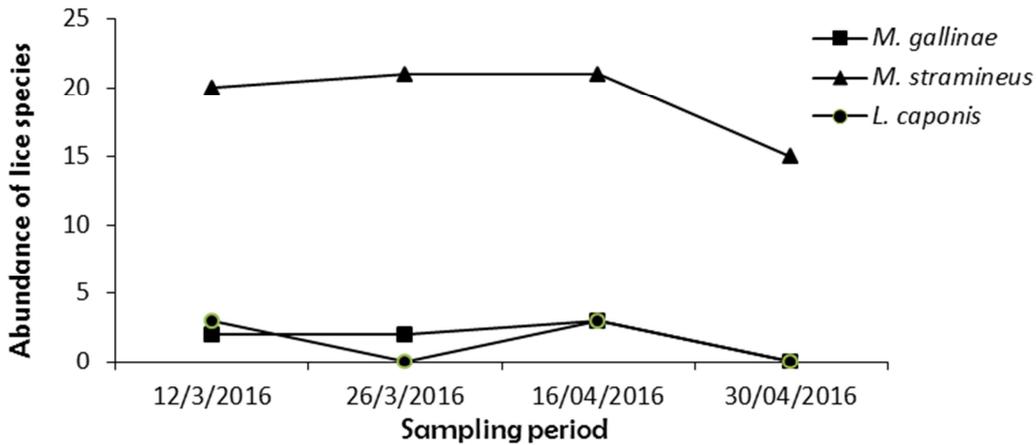


Figure 16. Temporal abundance of some lice species at Adolor, Benin City.

### 4. Discussion

From this study, the prevalence of chewing lice species from the poultries examined was 84.2% from the three poultries in Ugbowo, Benin. This is comparable to studies in other parts of Nigeria and around the world by [8] in Anambra, [4] in Enugu, [9] in Sokoto, and [1] in Kano with 40.5%, 62.2%, 46.25% and 25.5% prevalences respectively [10] in Bangladesh, [11] in Ethiopia, [12] in Zimbabwe, [13] in North-eastern Algeria, [14] in South Africa, [15] in Malawi, [6] in Czech Republic, which reported high prevalences of chewing lice in poultry hens and included all the species found in this study. This study showed that three species of Phthiraptera which include *Menocanthus stramineus*, *Menopon gallinae* and *Lipereus caponis* were collected from the three sample locations, with *M. stramineus* being the highest recorded followed closely by *M. gallinae*, [21] reported 3 lice species including *M. stramineus* and *L. caponis*, [22], [23] reported 4 species including *M. gallinae* and *M. stramineus*; *M. gallinae* and *L. caponis* respectively, [24] reported six species of lice including *M. stramineus*, *M. gallinae* and *L. caponis*. This is in accordance with the works of [16], [17], [10], [3] and [18] and [24] which reports *M. stramineus* and *M. gallinae* as being the most pathogenic ectoparasite of chickens and in contrast to works of [With *M. stramineus* having a population abundance of (74%) and

*Lipereus caponis* having the least population of louse collected, this contrasts with the works of [9] that recorded *M. gallinae* (8.1%) as the most abundant followed by *M. stramineus* (6.9%) and *L. caponis* (5.0%) in Sokoto metropolis and [19] which records *M. gallinae* as the most prevalent followed by *M. stramineus* in Dalahu Region, Kermanshah Province, Iran, [21] which records *M. stramineus* (1.28%) as least prevalent in Ambo, Ethiopia, [22] recording *M. gallinae* (48%) most prevalent than *M. stramineus* (22.7%) in Ukraine and [23] recording *M. gallinae* (50%) more prevalent to *L. caponis* (22.1%) in California.

The dominance of *M. stramineus* occurred in Ekosodin and Adolor sampling stations. *M. stramineus* (chicken body louse) is a voracious feeder [3], which could be a reason for its widespread dominance. The birds that had *M. stramineus* infestation (29%) were noticeably ill and experienced weight loss; this is in agreement with the report of [14]. Although domestic chickens are host to several louse species, one of the most widespread and severe pests of poultry worldwide is the chicken body louse, *Menocanthus stramineus* [12].

*Menopon gallinae* (shaft louse) was the most prevalent in the second sampling location; they have abdominal segments each with a single transverse row of hairs on the dorsum. The abundance of *M. gallinae* significantly differed among locations in accordance with reports from [14] which states

that the abundance of *M. gallinae* significantly differed in four selected rural localities of KwaZulu-Natal studied in comparison to the other species but not between the males and the females in South Africa.

Female species were dominant for all three species across the three sampling localities, thus increasing the population of lice in the next generation

No significant difference was recorded in the abundance of *Lipereus caponis* across the three localities and sexes. The low prevalence of *L. caponis* among the different locations agrees with report from [14] but is in contradiction with the works of [3] which recorded a significant difference and [20] which records high prevalence. These differences may be due to management, climatic and geographic difference among these studies.

## 5. Conclusion

The high percentage prevalence observed in this study may be as a result of poor management system where chickens are kept in large numbers in the same cage, which may enable one ectoparasite to move freely from one chick to the other with ease.

Poultry production is an important sector of livestock industry in Nigeria, and may play a vital role in national development through generation of revenue at individual and cooperative levels. Therefore, further studies to assess the impact of these lice species on the health and production performance including cost effectiveness of control strategies and thorough education of poultry managers are greatly recommended.

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