FOOD HABITS OF SIX COMMON LIZARDS FOUND IN LOS BAÑOS, LAGUNA, PHILIPPINE ISLANDS [1]

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This report is based upon the examination of the contents of one hundred twenty-six well-filled stomachs of six species of lizards. These lizards were collected by students enrolled in zoölogy during the school year 1927–1928. The relative abundance of the food constituents was ascertained by the frequency of their occurrence in each of the stomachs examined.

The results of this study are embodied in two tables. Table 1 gives the actual composition of the stomach contents examined. Table 2 gives the relative abundance of the food constituents found.

FOOD OF HEMIDACTYLUS FRENATUS DUMÉRIL AND BIBRON

The contents of forty-five stomachs consisted mostly of insect material; five stomachs contained spiders (arachnids) in addition to insects, while one lizard apparently swallowed also crustacean food and a bean besides insects.

Insect food.—The bulk of the stomach contents of twenty-two of the forty-five lizards examined consisted of Orthoptera, mostly roaches (Blattidæ), green crickets (Oecanthidæ), and tree crickets (Gryllacridæ). Small beetles (Coleoptera), the second most important food item of this lizard, were found in thirteen stomachs. Other orders of insects represented in the food of *H. frenatus*, in the order of their frequency, are Diptera (mostly flies), Homoptera (mostly leaf hoppers), Isoptera (mostly winged termites), Hymenoptera (mostly ants), and Odonata (dragon flies).

Animal food other than insects.—Arachnids (spiders) were found in six stomachs only. The order Crustacea was repre-

[1] The data were secured by the writer during his incumbency as assistant professor of zoölogy, College of Agriculture, University of the Philippines.

sented by a species of fresh-water prawn (*Palæmon lanceifrons* Dana) found in a single stomach. It is most likely that the prawn, as well as a bean in the stomach of the same lizard, was picked up from a food cabinet, as this lizard is a frequent visitor to human habitations.

FOOD OF GEKKO GECKO (LINNÆUS)

Seventeen stomachs of this lizard contained insects. One also contained a scorpion (Arachnida) besides insects, and another contained a centipede (Chilopoda) in addition to insects.

Insect food.—Orthoptera (mostly Locustidæ, Blattidæ) and Coleoptera (mostly Curculionidæ and Cerambycidæ) formed the bulk of the food of the geckos.

Animal food other than insects.—Very little noninsect food was found in the stomachs of the geckos. One scorpion (Arachnida) was found in a single stomach, while another stomach yielded three centipedes (Chilopoda).

FOOD OF DRACO SPILOPTERUS (WIEGMANN)

Twenty stomachs of this lizard contained insects. These belonged to only two orders; namely, Hymenoptera and Coleoptera; ants form the bulk of the food. It seems then that this flying lizard has a marked preference for ants. Fire ants of the genus *Odontomachus* (Formicidæ), called "hantic" locally, were common in the stomachs of the flying lizards. Beetles of the family Curculionidæ were found in three stomachs.

FOOD OF MABUYA MULTIFASCIATA KUHL

Insect food.—Fifteen stomachs examined contained insects. This lizard showed a marked preference for Orthoptera, mostly grasshoppers (Locustidæ) and crickets (Gryllidæ). Ten of the fifteen stomachs contained nothing but grasshoppers and crickets. Other insects found were beetles (Coleoptera), moths (Lepidoptera), and ants, bees, and other Hymenoptera.

Animal food other than insects.—Spiders were found in three stomachs examined. A fresh-water snail (*Melania* sp.) was found in a single stomach.

Vegetable constituent.—A piece of leaf was found in a single stomach. This was possibly taken accidentally.

FOOD OF CALOTES MARMORATUS (GRAY)

The bulk of the food of this lizard consisted of beetles of the families Cicindelidæ and Passalidæ, and Orthoptera, mostly grasshoppers and crickets. Other insect foods in the order of their frequency were Hymenoptera (ants and bees), Homoptera (mostly leaf-hoppers), and Diptera (flies and mosquitoes).

Millipedes (Diplopoda) were found in only two stomachs. Vegetable material in the form of leaves and leaf sheaths were found in four stomachs. A tiny bit of decaying twig was found in one stomach.

FOOD OF TROPIDOPHORUS GRAYI GÜNTHER

Ten stomachs of this lizard contained nothing but insects belonging to the following orders, enumerated in the order of their importance: Orthoptera (mostly roaches, Blattidæ), Coleoptera (beetles), and Odonata (dragon flies).

SUMMARY AND REMARKS

1. Although the species of lizards examined are rather common in Los Baños and vicinity, the number of stomachs dissected for each kind is not sufficiently large to enable us to draw definite conclusions. Although a large number of species were present in the collection, only those which had well-filled stomachs were used. Also specimens in excellent condition for museum purposes were not sacrificed for dissection.

2. It is apparent that the six species of lizards examined are all insectivorous. In the 126 stomachs dissected, the bulk of the food consisted of insects. Very few contained food other than insects, the noninsect food constituting only a very minor portion of the stomach contents.

3. It is likewise apparent that these lizards feed more on noxious insects than on beneficial ones.

4. Orthoptera, Coleoptera, Diptera, Lepidoptera, and Homoptera formed the bulk of the insect food of the house lizard. This is to be expected in view of the fact that these insects are the ones usually found attracted by the light during which time this lizard is feeding actively. Diptera that are not attracted by light must have been taken during daytime. At any rate flies are usually found in houses during daytime. The probable reason why winged termites were not represented in a larger percentage in the stomachs of the lizards, although this insect is easily attracted to the light, is its periodic occurrence.

5. Beetles of the families Curculionidæ and Cerambycidæ, and orthopterous insects of the family Blattidæ, formed the bulk of the food of the geckos. This was to be expected in view of

the habit of the geckos of frequenting holes in trees and the underside of bark, which are also the favorite haunts of beetles and roaches. It is because of this habit also that the geckos pick up centipedes and scorpions.

6. The flying lizards, *Draco spilopterus*, showed a marked food preference for ants. Even the fierce, biting fire ants were found in a relatively large proportion in the stomachs of this lizard. Each of the twenty stomachs dissected contained a few beetles.

7. The "chameleon," *Calotes marmoratus*, showed a rather marked preference for Coleoptera and Orthoptera.

8. The shrub lizard, *Mabuya multifasciata*, showed preference for Orthoptera, notably grasshoppers and crickets. This is probably due to the fact that these insects are generally found among grasses and shrubbery, which are the favorite feeding grounds of this lizard. The presence of a fresh-water snail in one of the stomachs of this lizard might be taken as an indication that it visits water once in a while. This gives also a possible explanation to a superstition among the Filipinos that this lizard, locally known as "bankalang," goes to the water to drink after biting, and if it reaches the water ahead of the victim, its bite becomes poisonous and fatal.

9. The food of the spiny lizard, *Tropidophorus grayi*, consisted of insects such as locusts, grasshoppers, leaf hoppers, and dragon flies, which frequent shrubbery and small trees along the creek. This lizard is generally confined to this type of habitat.

TABLE 1.—*Showing the actual composition of the stomach contents of six species of lizards.*

House lizard, *Hemidactylus frenatus* Duméril and Bibron:
- Insecta—
  - Orthoptera; 39 grasshoppers and locusts; 3 cockroaches.
  - Coleoptera; 25 beetles.
  - Diptera; 10 flies; 7 mosquitoes.
  - Lepidoptera; 13 moths.
  - Homoptera; 17 leafhoppers.
  - Isoptera; 8 winged termites.
  - Hymenoptera; 18 ants.
  - Odonata; 1 dragon fly.
  - Insect remains; significant amount.
- Arachnida; 7 spiders.
- Crustacea; 5 small fresh-water prawns.
- Vegetable material; 1 bean seed.
- Inorganic material; a few minute pieces of sand.

TABLE 1.—*Showing the actual composition of the stomach contents of six species of lizards*—Continued.

Flying lizard, *Draco spilopterus* Wiegmann:
- Insecta—
  - Hymenoptera; 400 ants (Formicidæ); 100 "hantic" fire ants; genus *Odontomachus*.
  - Coleoptera; 6 beetles (Curculionidæ).

Gecko, *Gekko gecko* Linnæus:
- Insecta—
  - Coleoptera; 30 beetles (Curculionidæ); 5 beetles (Cerambycidæ).
  - Orthoptera; 9 roaches (Blattidæ); 7 locusts and grasshoppers.
  - Unidentified insect remains; significant.
- Arachnida; 1 scorpion.
- Chilopoda; 1 centipede.
- Vegetable material; 2 small grass leaves and 1 rice hull.

Shrub lizard, *Mabuya multifasciata* Kuhl:
- Insecta—
  - Orthoptera; 13 locusts; 8 crickets.
  - Coleoptera; 2 beetles.
  - Lepidoptera; 4 pupæ of moths or butterflies.
  - Isoptera; 10 winged termites.
  - Hymenoptera; 1 ant.
  - Insect remains; significant quantity.
- Arachnida; 3 spiders.
- Mollusca; 1 fresh-water snail.
- Vegetable matter; 3 minute pieces of straw.

Chameleon, *Calotes marmoratus* Gray:
- Insecta—
  - Coleoptera; 30 beetles (Curculionidæ); 1 beetle (Cicindelidæ); 2 beetles (Passalidæ).
  - Orthoptera; 21 locusts and grasshoppers.
  - Hymenoptera; 50 ants (Formicidæ); 1 bee.
  - Diptera; 1 fly; 2 mosquitoes.
  - Insect remains; significant quantity.
- Diplopoda; 2 millipedes.
- Vegetable material; 3 small leaves and 2 leaf sheaths.

Spiny lizard, *Tropidophorus grayi* Günther:
- Insecta—
  - Orthoptera; 10 locusts and grasshoppers; 2 cockroaches.
  - Hymenoptera; 18 ants.
  - Coleoptera; 4 beetles.
  - Odonata; 3 dragon flies.
  - Insect remains; significant quantity.

TABLE 2.—*Showing the relative abundance of the food constituents.*

HEMIDACTYLUS FRENATUS; 45 STOMACHS.

Food item.	Stomachs in which found.	Percentage of occurrence
Insecta (insects)	45	100.00
Orthoptera	22	48.88
Coleoptera	13	28.88
Diptera	9	20.00
Lepidoptera	7	15.55
Homoptera	6	13.33
Isoptera	3	6.66
Hymenoptera	3	6.66
Odonata	1	2.22
Arachnida (spiders)	6	13.33
Crustacea (prawn)	1	2.22
Vegetable matter	1	2.22
GEKKO GECKO; 17 STOMACHS.		
Insecta (insects)	17	100.00
Coleoptera	9	52.94
Orthoptera	7	41.20
Arachnida (scorpion)	1	5.89
Chilopoda (centipede)	1	5.89
Vegetable matter	2	11.78
DRACO SPILOPTERUS; 20 STOMACHS.		
Insecta (insects)	20	100.00
Hymenoptera (ants)	20	100.00
Coleoptera (beetles)	3	15.00
CALOTES MARMORATUS; 19 STOMACHS.		
Insecta (insects)	19	100.00
Coleoptera	12	63.16
Orthoptera	10	52.63
Hymenoptera	4	21.05
Homoptera	1	5.03
Diptera	1	5.03
Diplopoda (millipede)	2	10.50
Vegetable matter	6	31.57

TABLE 2.—*Showing the relative abundance of the food constituents*—Ctd.

MABUYA MULTIFASCIATA; 15 STOMACHS.

Food item.	Stomachs in which found.	Percentage of occurrence.
Insecta (insects)	15	100.00
Orthoptera	10	66.66
Coleoptera	1	6.66
Lepidoptera	1	6.66
Isoptera	1	6.66
Hymenoptera	1	6.66
Arachnida (spiders)	3	20.00
Mollusca (fresh-water snail)	1	6.66
Vegetable matter	2	12.82

TROPIDOPHORUS GRAYI; 10 STOMACHS.

Food item.	Stomachs in which found.	Percentage of occurrence.
Insecta (insects)	10	100.00
Orthoptera	4	40.00
Hymenoptera	3	30.00
Coleoptera	2	20.00
Odonata	1	10.00