

Observations on the Feeding Habits of
*Allopeas gracile** (HUTTON)
(Gastropoda: Pulmonata: Subulinidae)
in Field and Laboratory

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(with 2 text-figures and 1 table)

オオオカチョウジガイの食性

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オオオカチョウジガイ *Allopeas gracile* (HUTTON) は雑食性ではない広い植物食性をもっている。時には嫌いな植物の採餌を避けて飢餓に陥いる。幼生は好みの植物を識別できない。

Abstract

Allopeas gracile (HUTTON) has a wide choice of plant matter to feed upon, yet they are not omnivorous. Sometimes they prefer starvation to eating plant matters not liked by them. Young ones are unable to discriminate between preferred and not preferred food.

Introduction

HYMAN (1967) reported both herbivorous and carnivorous stylommatophore species. GRAHAM (1955) and KARLIN (1956) reported the phytophagous habits of different species of *Allopeas*. PILSBRY and BEQUAERT (1927) reported the occurrence of *Allopeas gracile* in the green houses. But no detailed study has yet been made on the ecology of *Allopeas gracile*. In order to fill up the lacunae of our knowledge on this aspect of *Allopeas gracile* we have been undertaking extensive field and laboratory observations on this species since 1969.

MITRA and BISWAS (1974) have already touched upon the necrophagus habit of this common garden snail of Calcutta, *Allopeas gracile* (HUTTON), in an earlier paper. The present paper deals with the phytophagous habits of this snail in its usual habitat and laboratory. For field observations a small garden belonging to one of us (T.R.M.) was selected. It is a small patch used for raising vegetables as well as flowers and contains the following species of plants, *Clitoria ternatea*,

* Same as *Opeas gracile*, but recently its name is not used by the Japanese malacologists.

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Limonia crenulata, *Hiptage benghalensis*, *Nerium indicum*, *Ixora coccinea*, *Dolichos lablab*, *Aegle marmelos*, *Vinca rosea*, *Ipomoea pes-caprae*, *Hibiscus rosa-sinensis*, *Murraya paniculata*, *Punica granatum*, *Gardenia jasminoides*, *Ervatamia coronaria*, *Jasminum humile*, *Carissa carandas*, *Tecoma capensis*, *Hibiscus mutabilis*, *Bougainvillea* sp., *Capsicum* sp., *Citrus* sp. The preference of *Allopeas gracile* (HUTTON), of different ages, for leaves, or parts of leaves, of different species of the above listed plants was directly observed in the garden by T.R.M. Both freshly fallen leaves as well as those under different stages of decay were used for these observations.

In the laboratory experimental snails were kept in three wide mouthed glass jars, half filled with garden soil moistened with rain water. Leaves of ten species of plants, collected from different parts of Calcutta, were offered to the experimental animals in either fresh condition or stale and decomposing. Preferences of individual snails were carefully noted and the observations so made are recorded here. Laboratory investigations were made between 10:30 and 19:00 hours of the day.

Observations

In the Garden: In the field the snails feed normally on freshly fallen or slightly decomposed littered leaves of following eight species: *Clitoria ternatea*, *Limonia crenulata*, *Nerium indicum*, *Hiptage benghalensis*, *Ixora coccinea*, *Dolichos lab lab*, *Capsicum* sp. and *Citrus* sp. In addition decomposed leaves of *Hibiscus rosa-sinensis*, *Ipomoea pes-caprae* and *Vinca rosea* were also accepted. Fresh leaves of *Aegle marmelos* were taken often times.

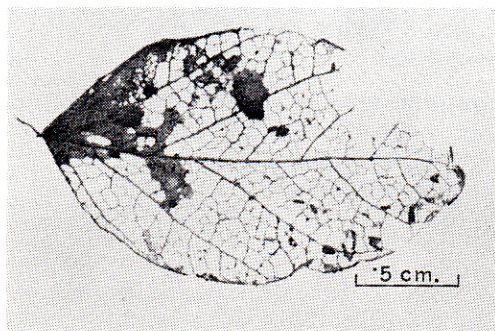
The parts of leaves consumed by the snails vary from species to species. In case of *Clitoria ternatea*, *Limonia crenulata* (Fig. 2), *Dolichos lablab* and *Citrus* sp. only the soft parts were eaten. Whole leaf, except the hard midrib, was devoured in case of *Hibiscus benghalensis*, *Nerium indicum*, *Ixora coccinea*, *Aegle marmelos* and *Capsicum* sp. The snails did not eat freshly fallen leaves of *Hibiscus rosa-sinensis*, *Vinca rosea*, and *Ipomoea pes-caprae* but avidly consumed decomposed leaves of the same. Leaves of *Gardenia jasminoides*, *Jasminum humile*, *Ervatamia coronaria*, *Punica granatum* and *Murraya paniculata* did not attract the snails. They came near and "sniffed" them, but withdrew without eating them. Leaves of *Tecoma capensis* and *Hibiscus mutabilis* which normally did not fall in the monsoon were not accepted. Old mature leaves of *Aegle marmelos* were also eaten when offered to the snails after plucking (Fig. 1).

In the Laboratory: Experiments were conducted in the laboratory to find out preferences of these snails for parts of leaves. Veinous portions of *Clitoria ternatea* and *Limonia crenulata* were outright rejected though the snails had to starve for three days. But when fallen leaves of these plants were offered they



Fig. 1.

1. Shell of *Allopeas gracile*.
2. A typical leaf of *Aegle marmelos*.
3. Mid rib and the thread of *Aegle marmelos* leaf under observation.

Fig. 2. Leaf of *Limonia crenulata* after the activities of the snail.

immediately began eating. In the case of freshly plucked etiolated (yellow) leaves of *Clitoria ternatea* and *Limoni acrenulata*, young snails attempted to eat them but withdraw after a few nips; the adults felt the petioles with antennae and

Table 1. Food preferences of *Allopeas gracile* (HUTTON)

Name of plants	Edible			Non-edible
	Fallen	Plucked	Stale or decomposed	
1. <i>Clitoria ternatea</i> L.	+	--	+	-
2. <i>Limonia crenulata</i> ROXB.	+	--	+	-
3. <i>Hiptage benghalensis</i> KURZ.	+	--	+	-
4. <i>Nerium indicum</i> MILL.	+ (Softening preferred)			-
5. <i>Ixora coccinea</i> L.	+ (-do-)	--	+	-
6. <i>Dolichos lablab</i> L.	+	--	+	-
7. <i>Cassia sophera</i> L.	+	--	+	-
8. <i>Aegle marmelos</i> CORR.	(Not observed)	+	+	-
9. <i>Michalia champaca</i> L.	+ (Only fleshy part of the petiole)			-
10. <i>Bougainvillea</i> sp.	+	(Not observed)	+	-
11. <i>Capsicum</i> sp.	+	-	+	-
12. <i>Citrus</i> sp.	+	-	+	-
13. <i>Vinca rosea</i> L.	-	-	+	-
14. <i>Ipomoea pes-caprae</i> SW.	-	-	+	-
15. <i>Hibiscus rosa-sinensis</i> L.	-	-	+	-
16. <i>Croton sparsiflorus</i> MORUNG	-	-	+	-
17. <i>Mangifera indica</i> L.	-	-	+	-
18. <i>Calotropis gigantea</i> (L) R. BR.	-	-	+	-
19. <i>Bauhinia</i> sp.	-	-	+	-
20. <i>Aralia</i> sp.	-	-	+	-
21. <i>Murrava paniculata</i> (L) JACK	-	-	-	+
22. <i>Eranthemum platiferum</i> NEES	-	-	-	+
23. <i>Ficus benjamina</i> L.	-	-	-	+
24. <i>Punica granatum</i> L.	-	-	-	+
25. <i>Gardenia jasminoides</i> ELLIS	-	-	-	+
26. <i>Jasminum humile</i> L.	-	-	-	+
27. <i>Carissa carandus</i> L.	-	-	-	+
28. <i>Hibiscus mutabilis</i> L.	(Not observed)	-	(Not observed)	?
29. <i>Tecoma capensis</i> LINDL.	(Not observed)	-	(Not observed)	?
30. <i>Ervatamia coronaria</i> STAFF.	-	-	(Not observed)	?

- +: i) Consumed in cases of edible plants
 ii) Not consumed in cases of nonedibles
 -: i) Rejected in case of edible plants
 ii) Accepted in case of nonedibles
 ?: Not clearly known.

rejected the leaves. Sufficiently softened leaves of *Nerium indicum* were accepted by the snails who began devouring them from the rough thick undersurface and consumed the whole leaf except the midrib. Fresh leaves of *Vinca rosea* were not eaten on the first day, next day the snails tentatively felt them with antennae but did not eat. As soon as decomposition started the snails began eating them. Leaves of *Punica granatum* were refused by the adults, but the young snails attempted to eat them a little and then discontinued. Leaves of *Gardenia jasminoides* attracted

adults and young ones, but none ate them. Freshly fallen leaves of *Hibiscus rosasinensis* and *Mangifera indica* were not eaten still their decomposition after which they were accepted as food. Leaves of *Croton sparsiflorus* and *Calotropis gigantea* were eaten one day after they were offered. A small part of the leaf of *Aralia* sp. was eaten first day only, and left untouched subsequently, till its decomposition attracted the snails again. They ate entire leaf of *Cassia sophera* but only the flesh parts (not the skin) of the petiole of *Michelia champaca*. Semi-decomposed leaves of *Bauhinia* sp. were eaten by the snails but the leaves of *Ficus benjamina* and *Eranthemum platiferum* were outright rejected.

In order to test their power of detection of acceptable food, the leaves of *Clitoria ternatea*, liked by these snails, were separated from the snails by 5 centimeter thick bed of twigs and leaves of *Tecoma capensis*. The snails managed to reach through the inedible *Tecoma* leaves to the zone of *Clitoria ternatea* within a short time.

In addition, one of us (T.R.M.) observed the same species of snail feeding on fallen leaves of *Shorea robusta* and other forest species of plant.

Discussion

Allopeas gracile (HUTTON) seems to have a wide choice of leaves to feed upon, yet it is not omnivorous and will prefer starvation to eating leaves of species not liked by it. The snails prefer semi-decomposed and decomposed leaves of most plants and do not like hard and dry portions. The following table (Table 1) gives the feeding preferences of *Allopeas gracile* (HUTTON) on 30 species of plants observed by us.

Leaves of about 66% of the thirty plant species are acceptable as food to these snails, but preference for different parts of leaves vary from species to species. Of the 20 species of plants, leaves are eaten in 19 species, but only petiole is eaten in one species, viz., *Michelia champaca*. Hard parts, specially the midrib, are left unconsumed invariably.

The young ones are unable to discriminate between the preferred plant leaves, and those not edible. In a number of cases leaves of species rejected by adults were tried by the young individuals and later on rejected when found unsuitable. It appears, therefore, that there is no inherited mechanism in *Allopeas gracile* which automatically causes rejection of inedible leaves, and this faculty seems to be acquired by each individual through experience.

Antenna appears to be the principal organ involved in feeling the food prior to eating.

By eating decomposing leaves in dead litter these snails seem to play an important role in improving the soil layers, as has been remarked for the European snail *Trichia villosa* by FRÖMMING (1960).

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