

## STORED PRODUCT BEETLES (COLEOPTERA) OF SIKKIM

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### ABSTRACT

So far, no account was available on beetles associated with stored products from Sikkim. In the present study author has dealt with nine species belonging to the families Anobiidae, Bruchidae, Cleridae, Curculienidae, Dermestidae, Silvanidae and Tenebrionidae. A key to the species and illustrations are also given.

### INTRODUCTION

During April-May 1983, Coleoptera Section of Zoological Survey of India conducted a survey of Sikkim led by Mr. B. N. Das. During the survey author has examined a number of food products and collected 86 beetles which cause damage to various stored products. The twelve different stored products examined are Cumin

seed, Green gram, Dry fish, Maize grain, Pulses ('Matar', 'Maskalai', 'Musur', 'Arhor' and 'Chola'), Suji, Groundnut and Flour. There is no published information of beetles attacking stored products from Sikkim and in the present communication author has studied nine species belonging to seven families from that region. A short account of each species and a key to the species is given.

TABLE 1 : Stored Product Beetles from Sikkim

Name of Species	Family	Product Infested	Association
1. <i>Stegobium paniceum</i> (L.)	Anobiidae	Cumin Seeds ( <i>Cuminum</i> sp)	—
2. <i>Callosobruchus maculatus</i> (F.)	Bruchidae	Green gram ( <i>Phaseolus aureus</i> )	<i>Sitophilus oryzae</i> (L.)
3. <i>Necrobia rufipes</i> (Degeer)	Cleridae	Dry fish	<i>Necrobia ruficollis</i> (F.) <i>Dermestes maculatus</i> (Degeer)
4. <i>Necrobia ruficollis</i> (F.)	Cleridae	Dry fish	<i>Necrobia rufipes</i> (Degeer) <i>Dermestes maculatus</i> (Degeer)

Name of species	Family	Product Infested	Association
5. <i>Sitophilus oryzae</i> (L.)	Curculionidae	Maize grain ( <i>Zea mays</i> ) 'Matar' Pulses ( <i>Pisum sativum</i> ) 'Maskali' Pulses ( <i>Phaseolus mungo</i> ) 'Musur' Pulses ( <i>Lens esculentus</i> ) 'Athor' Pulses ( <i>Cajanus cajans</i> ) 'Chola' Pulses ( <i>Cicer arietinum</i> ) Green gram ( <i>Phaseolus aureus</i> ) Suji	<i>Tribolium castaneum</i> (Herbst) <i>Oryzaephilus surinamensis</i> (L.) <i>Callosobruchus maculatus</i> (F.)
6. <i>Dermestes maculatus</i> Degeer	Dermestidae	Dry fish	<i>Necrobia rufipes</i> (Degeer) <i>Necrobia ruficollis</i> (F.)
7. <i>Oryzaephilus mercator</i> (Fauvel)	Silvanidae	Groundnut ( <i>Arachis hypogea</i> )	<i>Tribolium castaneum</i> (Herbst)
8. <i>Oryzaephilus surinamensis</i> (L.)	Silvanidae	Flour Maize grain ( <i>Zea mays</i> )	<i>Sitophilus oryzae</i> (L.) <i>Tribolium castaneum</i> (Herbst)
9. <i>Tribolium castaneum</i> (Herbst)	Tenebrionidae	'Matar' Pulses ( <i>Pisum sativum</i> ) 'Chola' Pulses ( <i>Cicer arietinum</i> ) Groundnut ( <i>Arachis hypogea</i> ), Suji, Flour	<i>Oryzaephilus mercator</i> (Fauvel) <i>Oryzaephilus surinamensis</i> (L.) <i>Sitophilus oryzae</i> (L.)

#### Family ANOBIIDAE

Representatives of this family are commonly known as 'Death Watch beetles'. Species are usually small, 2-6 mm in length, shape subcylindrical or oval, colour brown or piceous, head deflexed and often covered by pronotum, antenna serrate or pectinate, legs contractile, tarsi 5-5-5 and its segment 1 usually long. Most of the Anobiids are wood borers and the family includes several serious pests of timber. The family includes two species that are associated with stored

products, *Lasioderma serricorne* (F.) and *Stegobium paniceum* (L.)

#### *Stegobium paniceum* (L.)

(Pl. III, Fig. A)

Common Name : Drugstore Beetle

This species is known to be a general feeder, attacking a great variety of stored foods, seeds and other materials. In the present study only two examples were collected from Cumin seeds at Ranipool Market, Ranipool. These were found in

association with one *Tribolium castaneum* (Herbst) and these beetles perforate the cumin seeds by feeding upon them. In India, this species is recorded from West Bengal, Kerala and Maharashtra.

#### Family BRUCHIDAE

Bruchidae, commonly known as 'Pea and bean beetles' may be recognised by their characteristic shape, head small with a short snout-like prolongation, dull-coloured oval chunky body covered with fine hairs, which is often ornamented with spots, antenna clavate, eyes often with a deep emargination which extends backwards from the base of antennae, legs stout with hind femora markedly developed tarsi pseudo-tetramerous, species usually less than 6 mm long. Most of the Bruchidae live on the seeds of Leguminosae and several species are known as pests of cultivated pulse.

#### *Callosobruchus maculatus* (Fabricius)

(Pl. III, Fig. B)

Common Name : Pulse Beetle

This species was found to infest green gram at Ranipool in Sikkim in association with *Sitophilus oryzae* (L.). Infection was low and the kernel of the pulses were hollowed out leading to the exterior through a circular hole and several of these harboured dead specimens. In India this species has been found destroying Chola or Chana (*Cicer arietinum*), pea or motor (*Pisum sativum*), Arhor (*Cajanus cajan*) and Mung (*Phaseolus aureus*).

#### Family CLERIDAE

The Cleridae or Chequered beetles are usually brightly coloured and covered with erect setae, species elongated, varies from 3-24 mm, antenna 11-segmented usually with a distinct club, eyes usually emarginate tarsal formula 5-5-5, abdomen with 5 or 6 visible sternites which are completely covered with elytra. The members of this family are mainly predaceous.

#### *Necrobia rufipes* (Degeer)

(Pl. III, Fig. C)

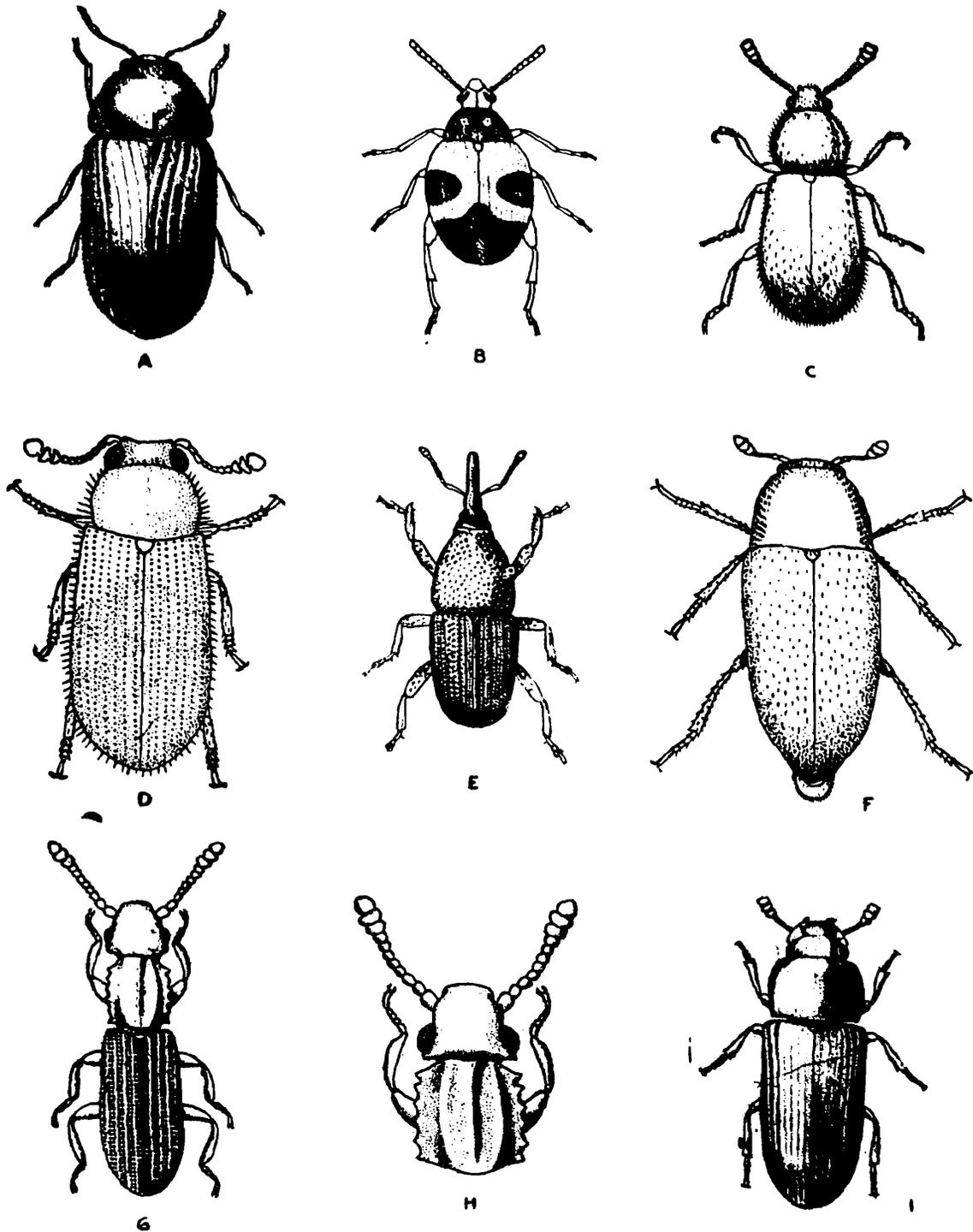
Common Name : Copra Beetle or Red legged ham Beetle

This species was found to infest dry fishes at Gangtok in Sikkim. Infection was low and it was found in association with *Dermestes maculatus* Degeer and *Necrobia ruficollis* (F.). After *Dermestes maculatus* Degeer it forms the next predominant pest of dry fish. It was observed to feed on the surfaces of the fish's body and on disturbed they run rapidly and take to flight. Probably the diet of *N. rufipes* is supplemented by predation on larvae of *D. maculatus*. *N. rufipes* is a cosmopolitan pest causing considerable damage to certain oil seeds and other stored commodities especially those important in protein foods. In India, this species has been recorded from Calcutta, Kurseong and Darjeeling : West Bengal, Shillong : Meghalaya, Srinagar : Kashmir and Coconada : Tamil Nadu.

#### *Necrobia ruficollis* (F.)

(Pl. III, Fig. D)

Common Name : Red shouldered ham beetle



Figs. A-I. A. *Stegobium paniceum* (L.), B. *Callosobruchus maculatus* (F.) C. *Necrobia rufipes* (Degeer), D. *Necrobia ruficollis* (F.), E. *Sitophilus oryzae* (L.), F. *Dermestes maculatus* Degeer, G. *Oryzaephilus surinamensis* (L.), H. *Oryzaephilus mercator* (Fauvel), I. *Tribolium castaneum* (Herbst).

This is a cosmopolitan species which infests products of animal origin only. This species was found to infest dry fish along with *Dermestes maculatus* Degeer and *Necrobia rufipes* (Degeer). Of these three species, *Necrobia ruficollis* (F.) is the least destructive pest. As compared to *Necrobia rufipes* (Degeer) it is less agile although it also feeds directly on the fish.

#### Family CURCULIONIDAE

This is one of the largest groups of Coleoptera which may be recognised by the distinct usually long and slender snout, the generally geniculate antennae inserted on the snout and the generally compact antennal club. Many species are pests of growing crops of many kinds throughout the world, but only a few are pests of crops after harvesting. Some of them are however of outstanding importance, namely the Rice and Grain weevils.

#### *Sitophilus oryzae* (L.)

(Pl. III, Fig. E)

Common Name : Rice Weevil

This is a cosmopolitan species and it was found in such products as Maize grain, Suji and the various pulses. Damage by these beetles are that the grains are hollowed and the kernels are reduced to mere powder. Besides, infestation by this species paves the way for infestation by the other species of beetles as *Tribolium castaneum* (Herbst) and *Oryzaephilus surinamensis* (L.). In most cases of infestation this species was observed to remain at the surface of the product.

#### Family DERMESTIDAE

Representative of this family, commonly known as 'Skin beetles' are mostly scavengers feeding on animal and plant material of high protein content. They may be recognised by being small (1-12mm), usually oval and compact in shape covered with hairs or scales, head small and deflexed, antenna clubbed and lie on antennal cavities in repose and hind coxae excavated.

#### *Dermestes maculatus* Degeer

(Pl. III, Fig. F)

Common Name : Hide beetle or Leather beetle

It is a cosmopolitan species which causes extensive damage to dry fish. Of the three species *Desmestes maculatus* Degeer, *Necrobia rufipes* (Degeer) and *Necrobia ruficollis* (F.) that infest dry fish at Sikkim, *D. maculatus* is the most predominant pest accounting for about 70% of the damage. The beetle feed directly on the flesh of the fish which reduces its nutritive value and may quickly render it totally unfit for human consumption.

#### Family SILVANIDAE

The members of this family are small, flat beetles formerly included under the family Cucujidae. Crowson (1955) treated them under a separate family Silvanidae. They may be recognised by the following characters : 5-5-5 tarsi in both sexes, 11 segmented antenna with or without club, front coxal cavity usually closed, mesocoxal cavity open and elytral puncturation arranged in 8-11 regular rows. Most members of this family are of little or no economic importance except the

three species *Oryzaephilus surinamensis* (L.), *O. mercator* (Fauvel) and *Ahasverus advena* (Waltl) which are serious pests.

***Oryzaephilus mercator* (Fauvel)**

(Pl. III, Fig. H)

Common Name : Merchant Grain Beetle

Infection was very low and only a solitary example was found along with an example of *Tribolium castaneum* (Herbst) in groundnuts. This species unlike *Oryzaephilus surinamensis* (L.) are fond of oil seeds and their products. In India they are severe pests of cashewnuts and it has been recorded also from wheat, cornflakes, unboiled rice and groundnuts.

***Oryzaephilus surinamensis* (L.)**

(Pl. III, Fig. G)

Common Name : Saw Toothed Grain Beetle

This species was found to infest flour and maize grain at Ranipool and Gangtok in Sikkim. Infection was low and it was found in association with *Tribolium castaneum* (Herbst) and *Sitophilus oryzae* (L.). This pest is cosmopolitan in distribution and is found all over India in almost any stored food of vegetable origin, e.g. flour, maida, biscuit, raisins etc. It is a directly destructive pest and causes considerable loss by directly feeding on grains.

Family TENEBRIONIDAE

Large family which can be distinguished by the following characters : body hard, antennal insertion hidden under frons, elytra usually completely covering the abdomen, abdomen with five visible sternites and first

three segments connate, front coxal cavities closed behind, heteromerous tarsi, tarsal segments and claws simple. Comparatively few of its species are pests of stored products.

***Tribolium castaneum* (Herbst)**

(Pl. III, Fig. I)

Common Name : Rust red flour Beetle

It is one of the economically most important species that is cosmopolitan in distribution. Though commonly known as Flour beetle it is versatile and infests a wide range of commodities. Infection in all cases were found to be low and *T. castaneum* (Herbst) feed directly on the products of infestation and causes extensive damage.

*Key to the Stored Product Beetles of Sikkim*

- |  |   |
|--|---|
| 1. Pronotum with six lateral teeth ...   | 2 |
| Pronotum without any lateral teeth ...   | 3 |
| 2. Length of temple of head about as long as 3-4 eye facets and length of eye usually less than twice the length of temple |   |
| <i>Oryzaephilus surinamensis</i> (L.)  |   |
| Length of temple of head about as long as 2-2.5 eye facets and length of eye about 3.5-4 times the length of temple        |   |
| <i>Oryzaephilus mercator</i> (Fauvel)  |   |
| 3. Head produced in front having a feeble or prominent beak ...  | 4 |
| Head without any beak ...  | 5 |
| 4. Prothorax with densely set round or irregular punctures, antenna geniculate   |   |
| <i>Sitophilus oryzae</i> (L.)  |   |
| Prothorax finely punctate, antenna serrate   |   |
| <i>Callosobruchus maculatus</i> (F.)   |   |
| 5. Head deflexed, prothorax hood shaped  |   |
| <i>Stegobium paniceum</i> (L.)   |   |
| Head not deflexed, prothorax never hood shaped ...   | 6 |
| 6. Tarsi 5-5-4 segmented   |   |
| <i>Tribolium castaneum</i> (Herbst)  |   |
| Tarsi 5 segmented ...  | 7 |

7. Pronotum with lateral band of white hairs. Posterior margin of elytra toothed with an acute spine  
*Dermestes maculatus* Degeer
- Pronotum without lateral band of white hairs, Posterior margin of elytra smooth ... 8
8. Entire dorsal surface of the body shiny blue  
*Necrobia rufipes* (Degeer)
- Prothorax and basal fourth of elytra raddish brown and rest of dorsal surface shiny blue  
*Necrobia ruficollis* (F.)

### DISCUSSION

In India, loss due to insect infestation of grains is about 15%. Infestation of stored product beetles of Sikkim were low to moderate in most cases which could be due to the low temperature and humidity at that time. However, most of these beetles cause serious damage to the products of infestation by directly feeding upon them and depredate their nutritional value. It was noted that *Tribolium castaneum* (Herbst) and *Sitophilus oryzae* (L.) are the most predominant pests infesting a wide range of commodities. *Oryzaephilus* spp are of secondary importance so far as destruction of the product is concerned and was found to infest only grains and groundnut. The association of *Dermestes maculatus* Degeer, *Necrobia rufipes* (Degeer) and *Necrobia ruficollis* (F.) were present in the only animal product surveyed, dry fish. *Necrobia rufipes* (Degeer) though recorded to infest many other commodities by predation were not found in any other product. *Callosobruchus maculatus* (F.) or pulse beetle was found to infest only whole grain pulses such as green gram (*Phaseolus aureus*) but were absent in the other varieties of pulses such as 'Matar' (*Pisum sativum*), 'Musur' (*Lens esculentus*)

and 'Arhor' (*Cajanus cajan*s). *Stegobium paniceum* (L.) which is more of a temperate species than tropical is naturally found in Sikkim which have a temperate climate.

The present study represents the result of survey of a small region from Sikkim, while extensive survey of the state could reveal many more species and further information of stored product beetles.

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