

Bostrichid beetles

(Family: Bostrichidae)

<i>Dinoderus bifoveolatus</i>	West African ghoon beetle
<i>Dinoderus brevis</i>	
<i>Dinoderus distinctus</i>	
<i>Dinoderus japonicus</i>	Japanese ghoon beetle
<i>Dinoderus minutus</i>	Bamboo false powder post beetle
<i>Dinoderus ocellaris</i>	
<i>Prostephanus truncatus</i>	Larger grain borer
<i>Rhyzopertha dominica</i>	Lesser grain borer

Summary

Feeding strategy	primary pest
Commodities attacked	whole cereal grains, dried root crops, bamboo, rattan, wood
Distribution	worldwide, but <i>P. truncatus</i> restricted to Africa and southern USA to northern South America
Economic importance	<i>R. dominica</i> , <i>P. truncatus</i> – high, <i>Dinoderus</i> spp. – low-medium
Eggs	laid on grain or in tunnels bored by adults
Larvae	scarabaeiform, immobile when mature, live within commodity
Adults	long lived, feed on commodity, can fly

Introduction

Bostrichid beetles are mainly stem, wood and root borers and as a result many are important timber and forestry pests. However, a few genera have become adapted to feeding on cereal grains and dried root crops. Of these, *Rhyzopertha dominica* and *Prostephanus truncatus* rank among the most important pests of stored cereal grains.

Identification

The bostrichids that attack stored products are dark brown to black beetles 3–5 mm long and are cylindrical in cross-section (Figures 22–32). When viewed from above, the head of the beetle is held bent downwards and is concealed by the pronotum. The pronotum is adorned with many small lumps or tubercles. Larvae are scarabaeiform and have functional legs (Figure 30).

In comparison with other storage beetles, bostrichids are distinctive in appearance. Wood borers of the sub-family Lyctinae (Family Bostrichidae) are of somewhat similar appearance and are occasionally found in stores, usually as structural pests. The antennal club of Scolytinae (Family Curculionidae) is usually in the form of a sphere rather than as a loose three-segmented club, while lyctids have a distinctive two-segmented club (Figure 31).

Other bostrichids are occasionally found in stored commodities, especially in the tropics. Of these, the most commonly encountered are species of *Heterobostrychus* and *Sinoxylon*. These feed primarily on timber but may occasionally attack dried roots. Many wood-boring bostrichids are

***Prostephanus* (Figures 25–27)**

- Length about 4 mm. Colour – black (Figure 25).
- Tip of abdomen square when viewed from above or below (Figure 25–26).
- Boundary between end and side of elytra marked with a ridge (Figure 25–26).

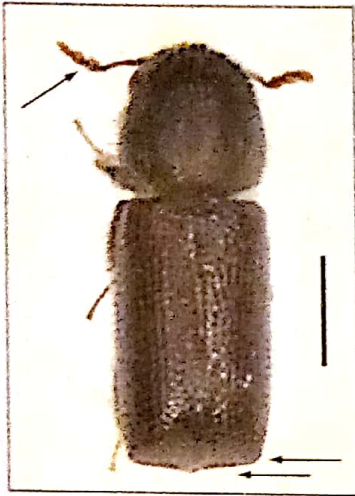


Figure 25 *Prostephanus truncatus*, adult, showing antennae and square tip of elytra with ridge marking junction of side and tip of elytra



Figure 26 *Prostephanus truncatus*, adult, underside, showing square tip of elytra



Figure 27 *Prostephanus truncatus*, infestation on maize cobs

***Rhyzopertha* (Figures 28–32)**

- Length 3 mm – narrower in cross-section than *Dinoderus* species. Colour – dark reddish brown (Figure 28, 29).
- Tip of abdomen tapered when viewed from above or below (Figure 28).
- When viewed from the side, the ends of the elytra curve gradually (Figure 29).

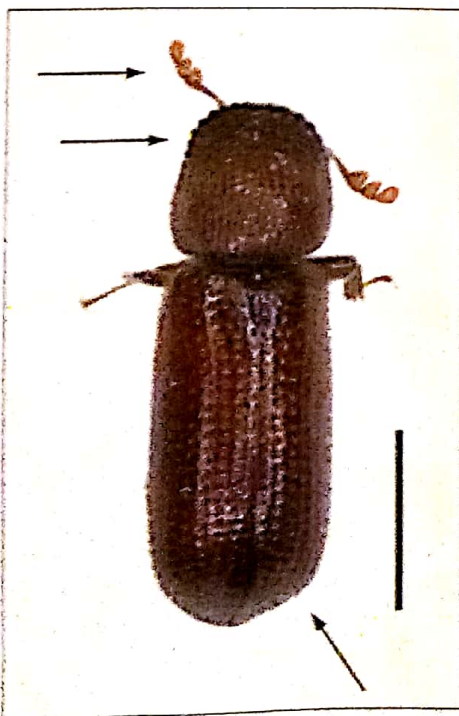


Figure 28 *Rhyzopertha dominica*, adult, showing antennae, thorax and tapered tip of elytra



Figure 29 *Rhyzopertha dominica*, adult, side view, showing thorax and gradual slope of tip of elytra

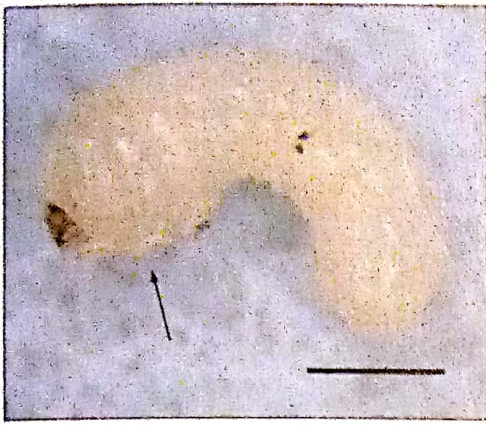


Figure 30 *Rhyzopertha dominica*, larva, with fully functional legs



Figure 32 *Rhyzopertha dominica*, infestation on wheat



Figure 31 *Lyctus brunneus* (left), detail of antennae with two-segmented club, and *Rhyzopertha dominica* (right), detail of antennae with loose three-segmented club

Life cycle

Details for *R. dominica* and other species are similar. Eggs are laid singly or in batches of up to about 20 in cracks or crevices in food media or amongst flour and debris produced by adult burrowing. Newly hatched larvae either bore into grains or feed amongst the matrix of damaged grains and flour produced by the adults. Young larvae of *R. dominica* are free living and can search out cracks and weaknesses in grains. As they mature, larvae become increasingly 'C' shaped (scarabaeiform) and more immobile (Figure 30). Larvae are not cannibalistic, and high densities will co-exist. In the case of *P. truncatus*, 8–10 larvae can successfully develop within a single maize kernel. Pupation occurs within a grain or in the matrix of debris and flour. Adults are long-lived, can fly well and feed voraciously. Some 400 eggs can be laid under optimal conditions by a female over a life span of 3 months or more.

Physical limits and optimum rate of multiplication

Species	Conditions within which breeding takes place	Shortest development period, with optimum conditions	Maximum monthly rate of increase
<i>Dinoderus</i> spp.		c. 180 days at 35°C, 75% r.h	c. 3.5
<i>Prostephanus truncatus</i>	18–36°C, 40–90% r.h	26 days at 30°C, 75% r.h	25
<i>Rhyzopertha dominica</i>	20–38°C, > 30% r.h.	25 days at 34°C, 70% r.h	20

Both *P. truncatus* and *R. dominica* can breed under a wide range of climatic conditions, but they are more tolerant of hot conditions and dry grain than other major pest species, notably *Sitophilus* spp. (Coleoptera : Curculionidae). Relative to *P. truncatus* and *R. dominica*, the rate of population growth of *Dinoderus* spp. is low.

Economic importance

Dinoderus spp. are best known as pests of goods or structures made from bamboo and rattan. Worldwide the most frequently encountered species is *D. minutus*. *Dinoderus* spp. can be damaging pests of maize cobs and dried cassava stored under conditions of tropical subsistence agriculture. However, they are not usually encountered in well managed commercial storage systems.

R. dominica is a major pest of whole cereals, especially of wheat, barley, sorghum and rice. However, it is much less serious as a pest of maize. It may also attack compacted milled products. Along with *Sitophilus* spp., it ranks as the most important pest of stored cereals worldwide. *R. dominica* is an important pest in all types of grain storage whether traditional, bag or bulk, including the most modern mechanised bulk handling systems.

P. truncatus is a major pest of maize and dried cassava under conditions of subsistence agriculture, especially where maize is stored on the cob. Infestation can occur prior to harvest. Under such conditions, damage caused by this pest is severe. Its recent arrival in Africa has caused considerable additional hardship for many communities. While *P. truncatus* is only a minor pest in bulk or bagged maize in commercial storage, such systems have been implicated in transporting this pest into new areas. As a consequence, *P. truncatus* is specifically targeted by quarantine authorities in many countries to prevent its introduction and / or restrict its spread.

Type of damage and symptoms

Damage caused by these insects to stored commodities is distinctive and heavy (Figures 27, 32). Adults burrow extensively leaving tunnels and irregular-shaped holes, and produce large amounts of flour. Feeding and burrowing by larvae further adds to the damage. Weight loss due to flour production outweighs losses due to direct consumption. Severe infestations of these insects can easily lead to the physical destruction of the commodity, its packaging and even the storage structure if left unchecked. Grain heavily infested with *R. dominica* has to some people a very characteristic sweet odour. Unlike populations of grain weevils (*Sitophilus* spp.), infestations of bostrichids do not appear to cause significant heating and moulding of infested grains. *R. dominica* is known to be highly allergenic and persons repeatedly exposed to this insect or commodities infested by it often develop respiratory complaints.

Ecology