

# An illustrated key to powder post beetles (Coleoptera, Bostrichidae) associated with rubberwood in Thailand, with new records and a checklist of species found in Southern Thailand

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## Abstract

An illustrated key to seventeen species of Bostrichidae recorded in association with rubberwood in Thailand is provided. A checklist is given of nine species infesting rubberwood sawn timber in sawmills in southern Thailand, with information on distribution, host trees and biology. Three species are recorded for the first time from Thailand: *Cephalotoma tonkinea* Lesne, *Lyctoxylon dentatum* (Pascoe), and *Minthea reticulata* Lesne.

## Keywords

Bostrichidae, Thailand, rubber wood, *Hevea brasiliensis*, key

## Introduction

Rubberwood (*Hevea brasiliensis* Muell. Arg.) is an environmentally friendly wood source, and is an important raw material for wood industries in South and Southeast Asian countries (Edwin and Pillai 2004, Hong 1996, Royal Forest Department of Thailand 2005). It is a non-durable wood, extremely susceptible to staining fungi as

well as insect attack due to its high starch content and low wood extractives (Akhter 2005, CIRAD 2003, Wong et al. 2005). The major insect pests of dried rubberwood sawn timber are powder post beetles belonging to the family Bostrichidae. They are economically important beetles that can extensively damage dried and seasoned wood and wooden artifacts through the boring behavior of both adults and larvae (Akhter 2005, Creffield 1991, Gerberg 1957, Ivie 2002, Peters et al. 2002). In this paper we have followed the classification of the most recently published catalogue of the Bostrichidae (Borowski and Węgrzynowicz 2007). Adults and larvae of most subfamilies of Bostrichidae both bore into and feed on the wood. One exception is the members of the subfamily Lyctinae in which only the larvae are wood feeders (Halperin and Geis 1999, Liu et al. 2008b). In Thailand, Kamnerdratana et al. (1970) reported two powder post beetles, *Sinoxylon anale* Lesne and *S. crassum* Lesne, infesting rubber logs in southern Thailand. Hutacharern and Tubtim (1995) in their checklist of forest insect pests of Thailand, added 10 species associated with *Hevea brasiliensis*: *Apoleon edax* Gorham, *Dinoderus* spp., *Heterobostrychus aequalis* (Waterhouse), *H. pileatus* Lesne, *H. unicornis* (Waterhouse), *Sinoxylon ruficorne* Fähræus, *Xylothrips flavipes* (Illiger), *Lyctus africanus* Lesne, *Lyctus* sp. and *Minthea rugicollis* (Walker). In this paper, we provide an illustrated key to all 17 species of Bostrichidae that have been recorded in association with rubberwood in Thailand. We provide a checklist with notes on distribution and host plants of nine species of bostrichids that infested rubberwood sawn timber in sawmills in southern Thailand, seven of which are newly reported from rubberwood, and three of which are newly recorded from Thailand.

### Key to the Species of Bostrichidae Infesting Rubberwood Sawn Timber in Thailand

1. Head directed to the front, fully visible from above ..... 2
- Head covered by pronotum, not visible from above ..... 9
2. Pronotum not flattened, rounded at sides without lateral margins, disc of pronotum tuberculate (Fig. 5). Antenna 10-segmented with elongate 3-segmented club. Larger species, 10 – 21 mm long. (Dysidinae) ..... *Apoleon edax* Gorham
- Pronotum more or less flattened with complete lateral margins, disc not tuberculate (Figs 1–3). Antenna 11-segmented usually with 2-segmented club (Fig. 12f–h), if 3-segmented, segments less elongate (Fig. 12i, j). Smaller species, at most 4 mm long. (Lyctinae) ..... 3
3. Antennal club 2-segmented. Body moderately flattened. Elytral punctures usually seriate. (Figs 1–3) (Lyctini) ..... 4
- Antennal club 3-segmented. Body very strongly flattened. Elytral punctures confused. (Fig. 4) (Trogoxylini) ..... 8
4. Antennal club with terminal antennomere ovoid becoming attenuated towards apex (Fig. 12f) (*Lyctus*) ..... 5

- Antennal club with one or both antennomeres greatly elongated (Fig. 12g, h) ..... **6**
- 5. Pronotum and elytra with short, fine, yellowish hairs, elytra usually brightly shining (Fig. 1) ..... ***Lyctus africanus*** Lesne
- Pronotum and elytra densely covered with long, coarse, curved hairs, not brightly shining (Fig. 2) ..... ***Lyctus tomentosus*** Reitter
- 6. Antennal club with both segments elongate, subequal in length, segments of funicle without semierect, scale-like setae (Fig. 12h); elytra with short, thick, semierect setae, not arranged in regular rows (Fig. 3c).....  
..... ***Lyctoxylon dentatum*** (Pascoe)
- Antennal club with only terminal segment elongate, segments of funicle with semierect, scale-like setae (Fig. 12g); elytra with regular rows of wide, flattened, erect, scale-like setae. (*Minthea*)..... **7**
- 7. Thoracic fovea deeply and distinctly reticulate; lateral margin of pronotum distinctly toothed and with from 7 to 12 stiff narrow scale-like setae (Fig. 3a) ..... ***Minthea reticulata*** Lesne
- Thoracic fovea punctate, not distinctly reticulate; lateral margin of pronotum rather smooth and with from 13 to 19 broad scale-like setae (Fig. 3b) .....  
..... ***Minthea rugicollis*** (Walker)
- 8. Body strongly shining. Punctures on pronotum and elytra less dense, separated by much more than their own diameter. Pronotum with oblique, elongate rugulosities at sides near posterior angles (Fig. 4a). Antenna (Fig. 12i).....  
..... ***Lyctoderma coomani*** Lesne
- Body dull or weakly shining. Pronotum and elytra very densely punctured, the punctures separated by less than their own diameter. Pronotum without oblique rugulosities near posterior angles (Fig. 4b). Antenna (Fig. 12j).....  
..... ***Cephalotoma tonkinea*** Lesne
- 9. Pronotum rounded anteriorly without larger hooks or teeth at anterior angles. Protibia with 1 apical spine; first tarsomere subequal to second. (Dinoderinae). Scutellum transversely rectangular; pronotum with an obvious pair of foveae near base (Fig. 6)..... ***Dinoderus minutus*** (Fabricius)
- Pronotum flattened anteriorly often with hooks or teeth near the anterior angles (Figs 7–8). Protibia with 2 apical spines; first tarsomere very much shorter than the second. (Bostrichinae) ..... **10**
- 10. Intercostal process of first abdominal ventrite forming a vertical lamina (Fig. 10b). Metepisternum narrowed posteriorly so that metepimeron nearly touches metasternum (Xyloperthini) ..... **11**
- Intercostal process of first abdominal ventrite broader and with a ventral face (Fig. 7d). Metepisternum more broadly truncate behind with metepimeron widely separated from metasternum ..... **12**
- 11. Antenna 10-segmented, all segments of antennal club longer than wide (Fig. 12c). Anterolateral part of pronotum and basal part of pronotal disk smooth, shining without puncturation. Elytral declivity with three pairs of costae at

- the margins, coarsely punctured above, more finely below. (Fig. 11).....  
 ..... *Xylothrips flavipes* (Illiger)
- Antenna 9-segmented, first and second segments of antennal club transverse (Fig. 12d). Anterolateral part of pronotum and basal part of pronotal disk punctured. Elytral declivity without costae, strongly punctured throughout. (Fig. 10)..... *Xylopsocus capucinus* (Fabricius)
12. Segments of antennal club flabellate (Fig. 12e). Mandibles short, blunt, truncate at apices which meet in midline. (Sinoxylini: *Sinoxylon*)..... **13**
- Segments of antennal club not flabellate (Fig. 12b). Mandibles long, pointed at apices, almost always crossing in mid-line. (Bostrichini: *Heterobostrychus*)..... **15**
13. Teeth on elytral declivity contiguous, inserted on sutural interstriae, laterally compressed, triangular, with pointed tips, a prominent costa present on the lateral margin of the declivity at the same level, and another weaker costa more apically and laterally (Fig. 9c). Larger species, 7–9 mm long.....  
 ..... *Sinoxylon crassum* Lesne
- Teeth on elytral declivity not contiguous, inserted lateral to sutural interstriae, lateral margin of declivity without costae. Smaller species, up to 6 mm long..... **14**
14. Elytral disc angularly separated from declivity; elytral margins carinate below, costate above, not rounded; submarginal carina along lateral margin of elytra curving dorsally at its posterior end to join carina forming lower margin of elytral declivity. Punctures of elytral disc increasing in size posteriorly, very coarse at upper margin of declivity. (Fig. 9a, d) .....  
 ..... *Sinoxylon anale* Lesne
- Elytral disc curving gradually into declivity; declivital margins rounded; submarginal carina along lateral margin of elytra continues to run parallel to elytral margin to reach suture. Punctures of elytral disc not greatly increasing in size towards declivity. (Fig. 9b, e) ..... *Sinoxylon unidentatum* (F.)
15. Posterior angles of pronotum lobed and projecting. Posterior part of pronotum with large, deep punctures. Male with two tubercles on elytral declivity, the outer forming an elongate costa, the inner forming a strong, pointed tooth directed inwardly and upwardly (Fig. 7c); frons without a nearly impunctate shining area in middle. Female without strong tubercles on elytral declivity, emargination between anterior angles of pronotum broad, extending about three quarters of distance between eyes; frons without a tuft of hairs. (Fig. 7) ..... *Heterobostrychus aequalis* (Waterhouse)
- Posterior angles of pronotum rounded, at most slightly projecting. Posterior part of pronotum without large, deep punctures. Male frons with a shining almost impunctate area in middle. Female frons with a tuft of hairs; emargination between anterior angles of pronotum narrower ..... **16**
16. Pronotum as wide as long. Male with inner tooth on elytral declivity pointed in lateral view (Fig. 8f); frons distinctly gibbous in lateral view; hooks on anterior angles of pronotum smaller than in female (Fig. 8c, d). Female with



hairs of frontal tuft shorter and sparser on upper part of frons, a dense tuft on the tubercle just above the epistoma; anterior angles of pronotum separated by about one-quarter of distance between eyes.....

.....*Heterobostrychus unicornis* Waterhouse

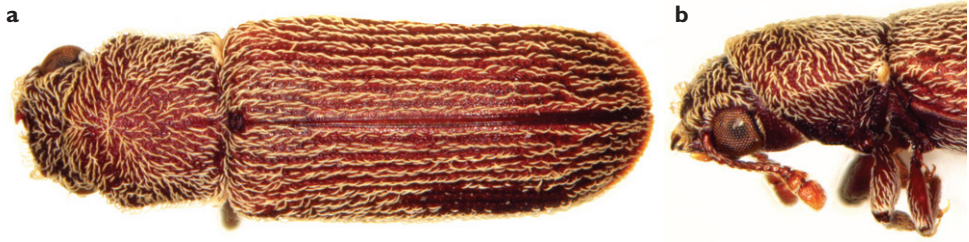
- Pronotum longer than wide. Male with inner tooth on elytral declivity stouter, bluntly tipped in lateral view, directed inwardly but not upwardly (Fig. 8e); clypeus not gibbous in lateral view, in same plane as frons; hooks on anterior angles of pronotum larger than in female (Figs 8a, b, 10). Female with hairs of frontal tuft longer and denser, lacking a pilose tubercle just above epistoma; anterior angles of pronotum separated by about one-third of distance between eyes.....*Heterobostrychus pileatus* Lesne

**Checklist of species associated with rubberwood in southern Thailand**

In the checklist, a dagger (†) indicates a species newly recorded from Thailand, an asterisk (\*) indicates a dominant pest species of rubberwood sawn timber in southern Thailand. Records of the Thai provinces in which species have been collected include unpublished data from specimens in the collections of R. A. Beaver and W.



**Figure 1.** *Lyctus africanus* Lesne, 1907. Dorsal view **a** lateral view of head **b** and frontal view of head **c**.



**Figure 2.** *Lyctus tomentosus* Reitter, 1878. Dorsal view **a**, lateral view of head and pronotum **b**.

Sittichaya. For the species newly recorded from Thailand, the number of specimens that were collected by the senior author is given in parentheses after the locality data. Detailed locality data is given only for species that are newly recorded in Thailand. Figures in parentheses included in the new records indicate the number of specimens collected. It should be noted that there is little information available on the biology of most of the xylophagous species of Bostrichidae (Liu et al. 2008b). We have thought it useful to briefly summarise what is known about the host trees and biology of the species listed here.

### Subfamily Bostrichinae: Tribe Bostrichini

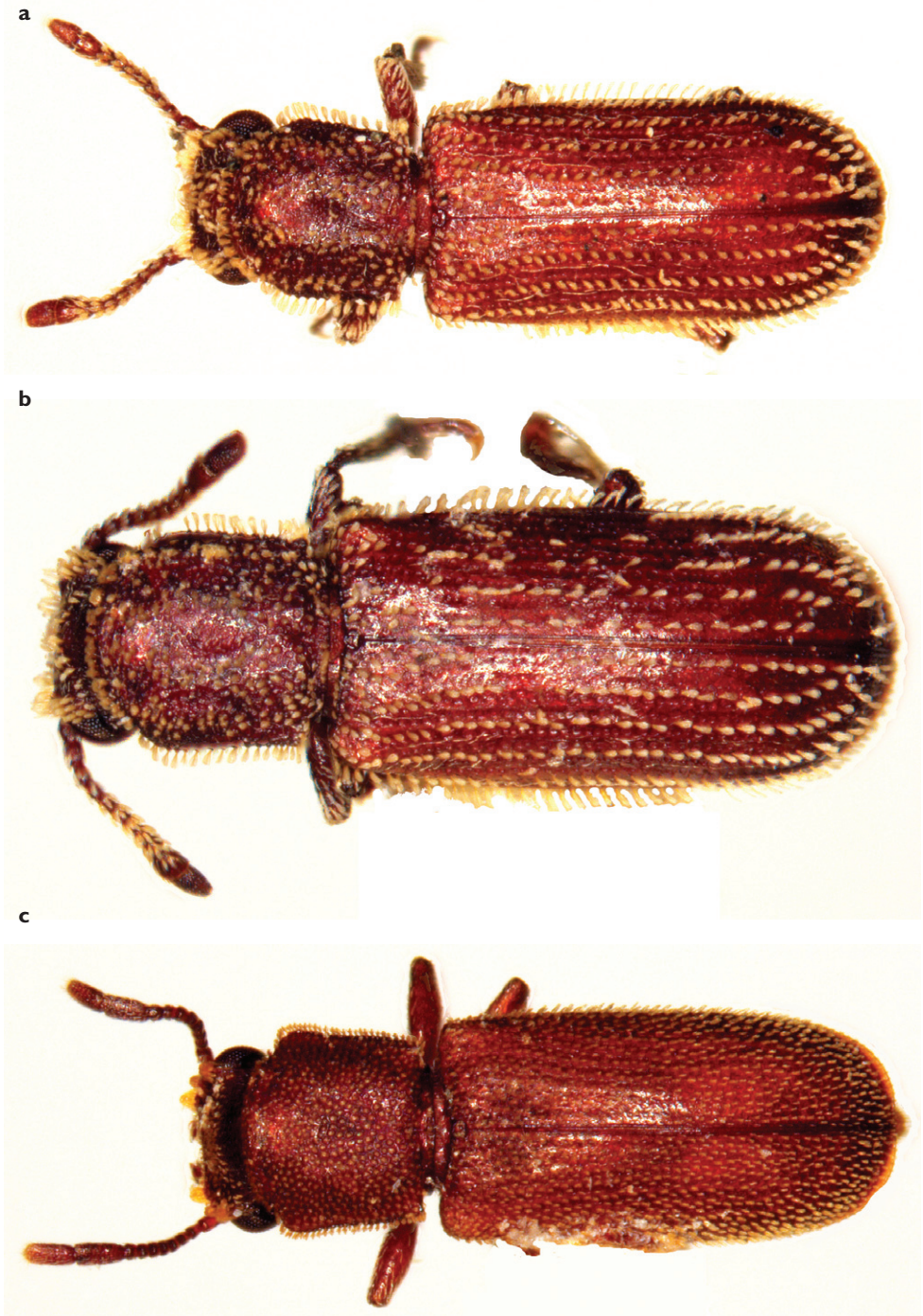
#### *Heterobostrychus aequalis* (Waterhouse)\*

Fig. 7

**Distribution.** Very widely distributed in the Oriental region, from India and China to the Indonesian archipelago and New Guinea. Introduced into Africa (including Madagascar), Australia, Europe, Hawai'i, Mariana Is., New Caledonia, New Zealand, North America, South Africa and Venezuela, and established in some of these countries (Binda and Joly 1991, Borowski and Węgrzynowicz 2007, Chûjo 1958, Majka 2007, Starr and Starr 2003). Recorded in Thailand from the provinces of Chantaburi, Chiangmai, Chonburi, Chumporn, Krabi, Nakhon Ratchasima, Phang Nga, Rayong, Samut Songkhram, Satun, Songkla and Trang.

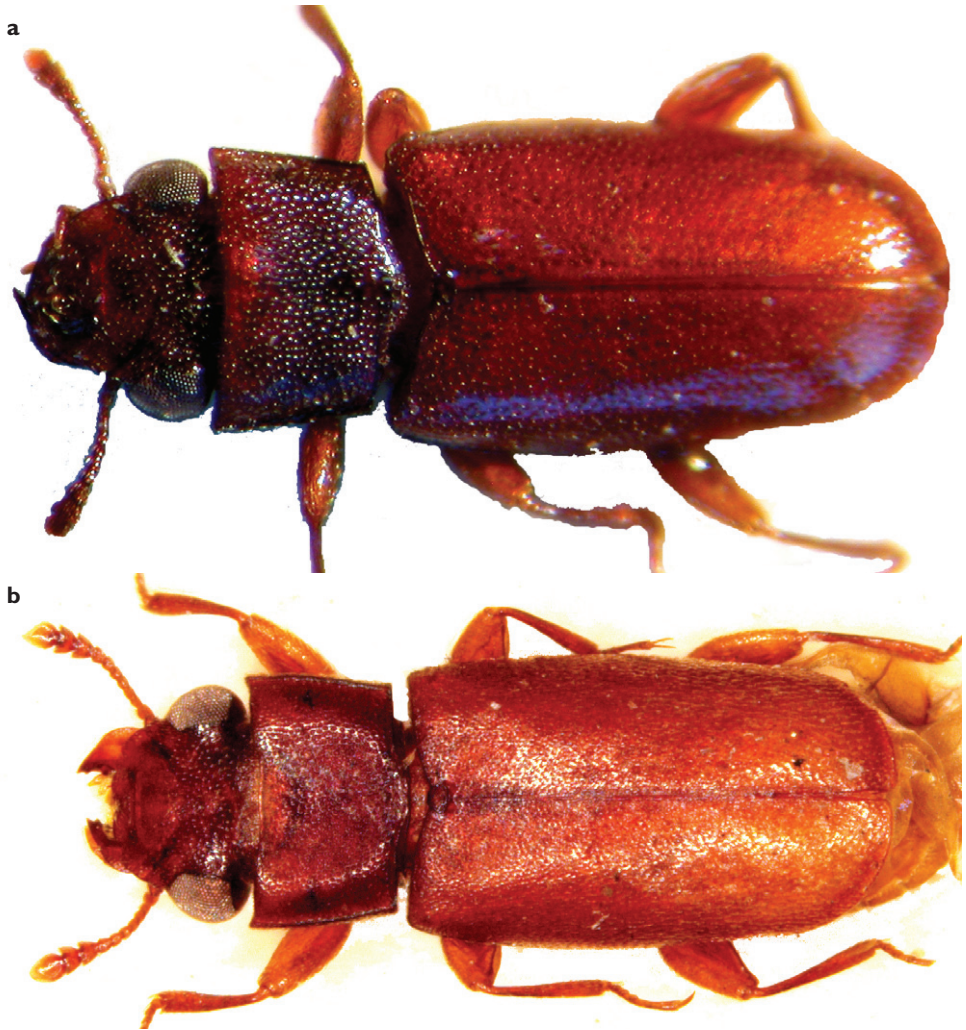
**Host Plants.** Polyphagous attacking almost any woody plant in suitable condition. Recorded in Thailand from *Bambusa arundinacea*, *Bombax anceps*, *Cassia fistula*, *Cedrela angustifolia*, *C. odorata*, *Dendrocalamus strictus*, *Dipterocarpus tuberculatus*, *Koompassia malaccensis*, *Lagerstroemia calyculata*, *Parashorea stellata*, *Pterocarpus macrorarpus*, *Toona ciliata*, *T. sureni* (Hutacharern and Tubtim 1995). Previously recorded from *Hevea brasiliensis* by Hussein (1981) in Malaysia, and Mathew (1982) in India.

**Biology.** The biology of the species is discussed by Beeson and Bhatia (1937), Ho (1995a) and Woodruff and Fasulo (2006). The species breeds not only in logs, but in planks, furniture and plywood. However, it is confined to wood containing starch, and the heartwood is not usually affected. In India it has an annual life cycle. Figures given by Ho (1995a) suggest that two generations a year may occur in Malaysia.



**Figure 3.** Dorsal views of *Minthea reticulata* Lesne, 1931 **a** *Minthea rugicollis* (Walker, 1858) **b** and *Lyctoxylon dentatum* (Pascoe, 1866) **c**.





**Figure 4.** Dorsal views of *Lyctoderma coomani* Lesne, 1932 **a** *Cephalotoma tonkinea* Lesne, 1932 **b**.

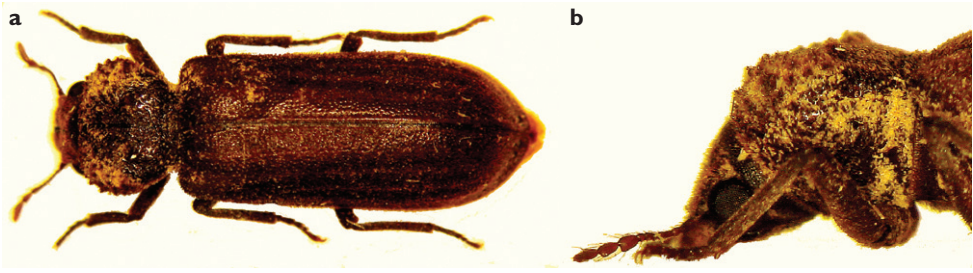
### Tribe Sinoxylini

#### *Sinoxylon anale* Lesne\*

Fig. 9a, d

**Distribution.** An Oriental species that has become almost cosmopolitan as a result of transport by man in infested timber. Recorded in Thailand from the provinces of Chaiyaphum, Chantaburi, Chiangmai, Chonburi, Chumporn, Krabi, Nakhon Ratchasima, Nakhon Sri Thammarat, Petchaburi, Phattalung, Phang Nga, Phetchabun, Ratchaburi, Rayong, Songkla, Samut Songkram, Satun, Surat Thani, Surin and Trang.

**Hosts.** Polyphagous attacking almost any woody plant in suitable condition. Recorded in Thailand from: *Acacia mangium*, *A. auriculiformis*, *Leucaena diversifolia*,



**Figure 5.** *Apoleon edax* Gorham, 1885. Dorsal view **a** lateral view of head **b**.

*L.leucocephala*, *L.diversifolia* (Hutacharern and Choldumrongkul 1989), *Areca catechu*, *Albizia lebbekoides*, *Anogeissus acuminata*, *Casuarina equisetifolia*, *C. junghuhniana*, *Dalbergia sissoo*, *D. cochinchinensis*, *Dendrocalamus strictus*, *Koompassia malaccensis*, *Pterocarpus macrocarpus*, *Terminalia chebula* (Hutacharern and Tubtim 1995). Previously recorded from *Hevea brasiliensis* in Thailand by Kamnerdratana et al. (1970), and by Hussein (1981) in Malaysia.

**Biology.** The biology of the species is discussed by Beeson and Bhatia (1937) and Liu et al. (2008b). The life cycle may take only three months, but can extend over a period of years. The average life cycle in rubber wood is 84 days at room temperature ( $27.30 \pm 0.67^\circ\text{C}$ ) (W. Sittichaya unpublished). The larval galleries do not normally penetrate the heartwood. The adults sometimes bore into living shoots to feed or hibernate, and may cause damage to young saplings. However, they do not breed there.

### *Sinoxylon unidentatum* (F.) †\*

Fig. 9b, e

**Distribution.** An Oriental species that has become almost cosmopolitan as a result of transport by man in infested timber. The species has usually been recorded under the name of its synonym, *Sinoxylon conigerum* Gerstaecker (Borowski and Węgrzynowicz 2007). Recorded in Thailand from the provinces: Chiangmai, Chonburi, Chumporn, Rayong, Samut Songkram, Satun, Songkla, Phattalung, Nakorn Sri Thammarat, Surat Thani, Phang Nga, Krabi and Trang

**Hosts.** Apparently polyphagous attacking almost any woody plant in suitable condition. No hosts appear to have been recorded in Thailand. Previously recorded from *Hevea brasiliensis* in Malaysia by Tomimura (1993). *Hevea brasiliensis* is given as a major host by CAB International (2004).

**Biology.** The biology of the species appears not to have been studied in detail, but is likely to resemble that of other species of *Sinoxylon* (Beeson and Bhatia 1937, Liu et al. 2008b). A summary of what is known is given in CAB International (2004 as *S. conigerum*). Tomimura (1993) showed that the adults and larvae reduced the starch content of rubber wood, but not the levels of holocellulose and lignin.



**Figure 6.** *Dinoderus minutus* (Fabricius, 1775). Dorsal view **a** and lateral view **b**.

### Tribe Xyloperthini

#### *Xylopsocus capucinus* (F.)

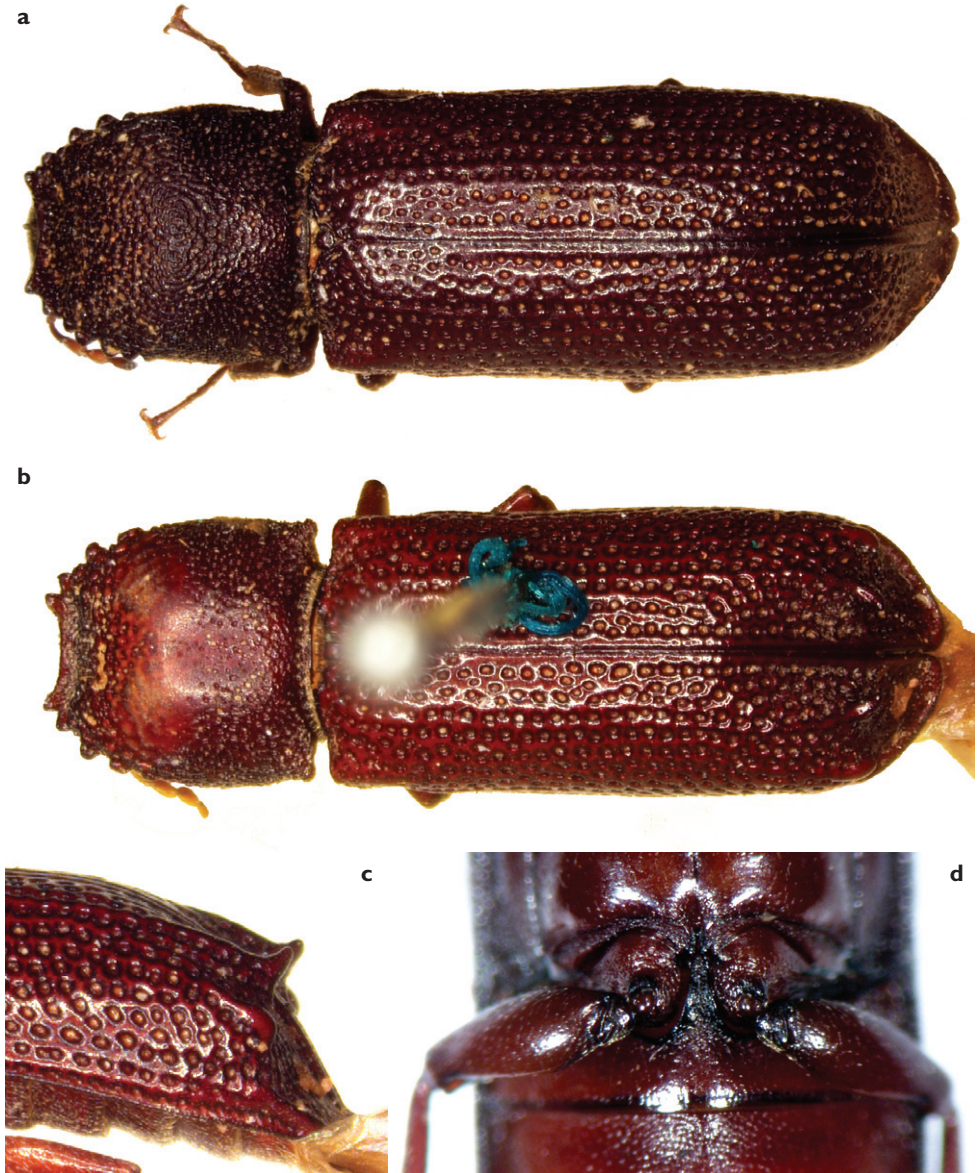
Fig. 10

**Distribution.** throughout South and Southeast Asia from India to the Indonesian archipelago, New Guinea, New Caledonia, and the Melanesian islands; Introduced into Africa, South America, USA Recorded in Thailand from the provinces Chaiyaphum, Chiangmai, Krabi, Nakorn Sri Thammarat, Phattalung, Phang Nga, Satun, Songkla, Surat Thani and Trang.

**Hosts.** Apparently polyphagous attacking almost any woody plant in suitable condition. Previously recorded from *Hevea brasiliensis* in Malaysia by Miller (1934) and Hussein (1981). No hosts appear to have been recorded previously in Thailand.

**Biology.** Beeson and Bhatia (1937) note that in northern India, the adults emerge mainly between May and November, with a annual life cycle, that may be extended for a further one or occasionally two years. Woodruff et al. (2005) give further information from the published literature. The biology of the closely related species, *Xylopsocus bicuspis* Lesne is described by Liu et al. (2008a).





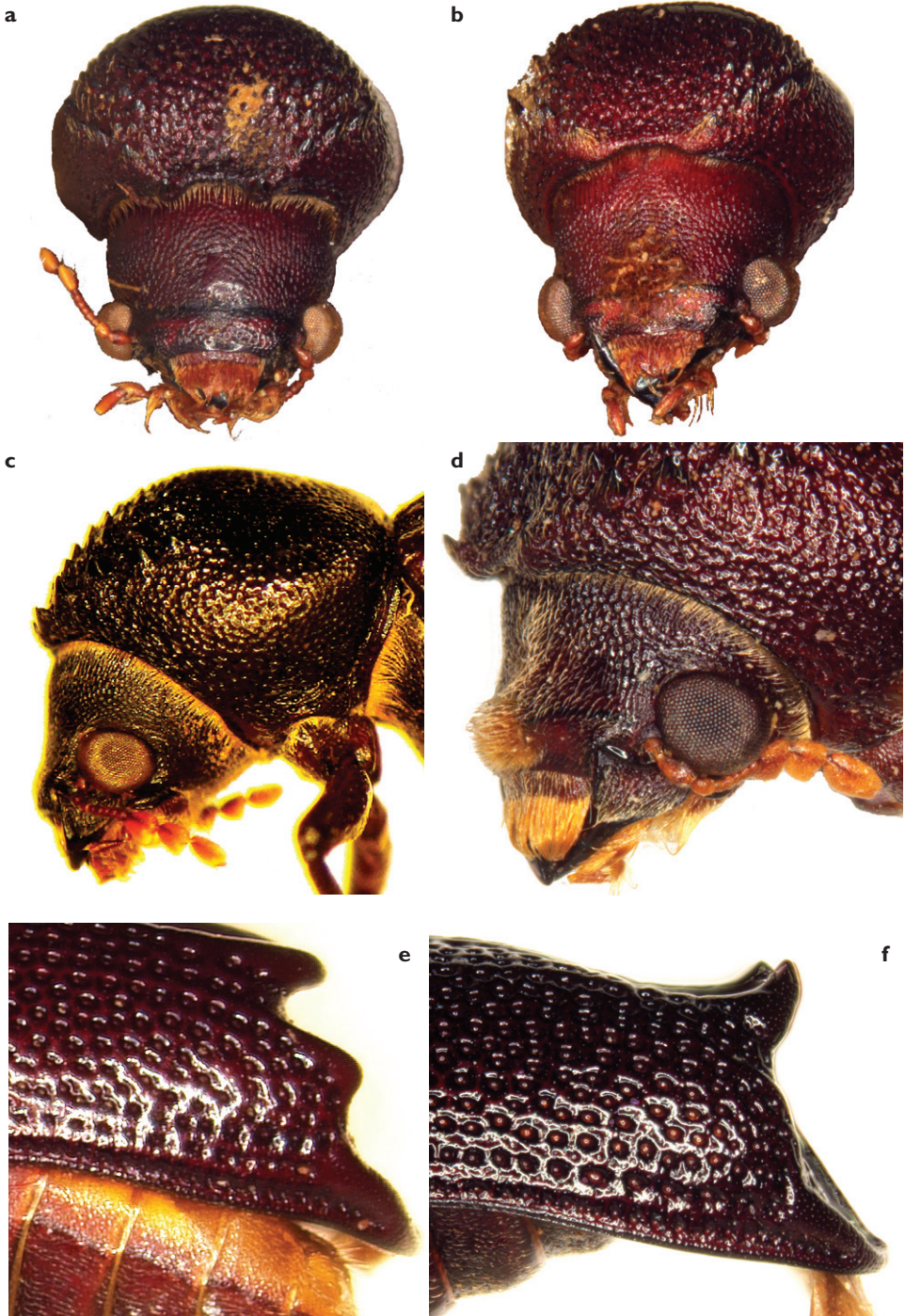
**Figure 7.** *Heterobostrychus aequalis* (Waterhouse, 1884). Dorsal view of female **a** and male **b** lateral view of male elytral declivity **c** intercostal process of the first abdominal ventrite **d**.

*Xylothrips flavipes* (Illiger)

Fig. 11

**Distribution.** Madagascar and the Indian Ocean islands; Arabian peninsula; throughout South and Southeast Asia from India to the Indonesian archipelago. (Replaced in Australia, New Zealand, New Guinea and the Pacific islands by the closely relat-





**Figure 8.** Head and pronotum of *Heterobostrychus pileatus* Lesne, 1899 (frontal view, **a**-male, **b**-female), and *Heterobostrychus unicornis* (Waterhouse, 1879) (**c**-male, frontal view; **d**-female, lateral view). Lateral view of male elytral declivity (**e**-*H. pileatus*, **f**-*H. unicornis*).



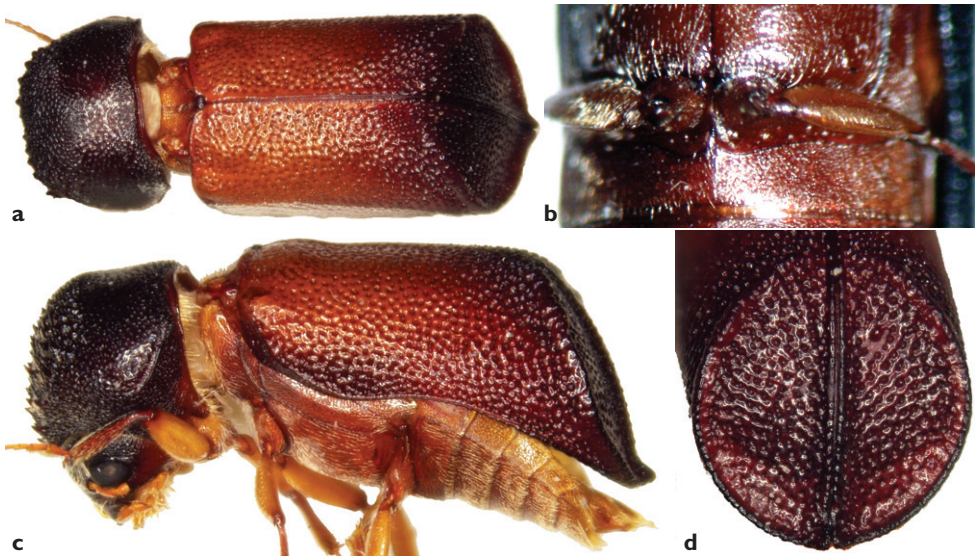
**Figure 9.** Dorsal view of *Sinoxylon anale* Lesne, 1897 **a** and *Sinoxylon unidentatum* (Fabricius, 1801) **b** Lateral view of *S. anale* **d** and *S. unidentatum* **e**. Elytral declivity of *Sinoxylon crassum* Lesne, 1897 **c**.

ed species, *Xylothrips religiosus* (Boisduval)). Introduced into Europe, USA Recorded from Thailand in the provinces Chaiyaphum, Chantaburi, Chiangmai, Krabi, Nakhon Ratchasima, Nakhon Sri Thammarat, Phang Nga, Phetchabun, Rayong, Songkla, Surat Thani, Satun and Trang.

**Hosts.** As with almost all bostrichids, this is a polyphagous species. Previously recorded from *Hevea brasiliensis* in Malaysia by Hussein (1981). In Thailand recorded from *Dipterocarpus* sp., *Hopea odorata*, *Mangifera indica* (Kamnerdratana et al. 1970) and *Choerospondias axillaris* (Hutacharern and Tabtim 1995).

**Biology.** Beeson and Bhatia (1937) note that the species completes two generations a year in northern India, and occasionally a third generation. The minimum life cycle is about three months. They found peak emergence occurred in April.





**Figure 10.** *Xylopsocus capucinus* (Fabricius, 1781). Dorsal view **a** lateral view **c** intercoxal process of the first abdominal ventrite **b** and elytral declivity **d**.

### Subfamily Dinoderinae

#### *Dinoderus minutus* (L.)

Fig. 6

**Distribution.** Cosmopolitan. The species is perhaps of Oriental origin but has been transported around the world and has established itself throughout tropical and subtropical regions, especially where bamboo is grown. It is frequently intercepted in the temperate zone. Recorded in Thailand from the provinces Chantaburi, Chiangmai, Chonburi, Chumporn, Krabi, Nakhon Sri Thammarat, Phattalung, Phang Nga, Phetchabun, Phitsanulok, Rayong, Samut Songkram, Songkla, Surat Thani and Trang.

**Hosts.** The species breeds primarily in bamboos (e.g. *Bambusa*, *Dendrocalamus*, *Phyllostachys*). It occasionally makes tunnels in the wood of trees, but rarely breeds there. In Thailand, the species is recorded from *Bambusa arundinacea*, *Dendrocalamus giganteus*, *D. hamiltonii*, *D. strictus*, *Gigantochloa nigrociliata*, *Thyrsostachys oliveri* (Hutacharern and Tabtim 1995). All of these species are bamboos. There appear to be no previous records from *Hevea brasiliensis*.

**Biology.** Observations made by the first author show that the species was breeding in rubberwood (W. Sittichaya unpublished). Numerous young adults were obtained from rubberwood logs kept in breeding cages, and from dissected logs. Studies of the biology of this and related species of *Dinoderus* are described by Lesne (1924), Beeson and Bhatia (1937) and Liu et al. (2008b). The length of the life cycle depends on temperature. In the tropics, breeding continues throughout the year, and there can be six to seven generations in a year, but usually there are two to four.



**Figure 11.** *Xylothrips flavipes* (Illiger, 1801). Dorsal view **a** and lateral view **b**.

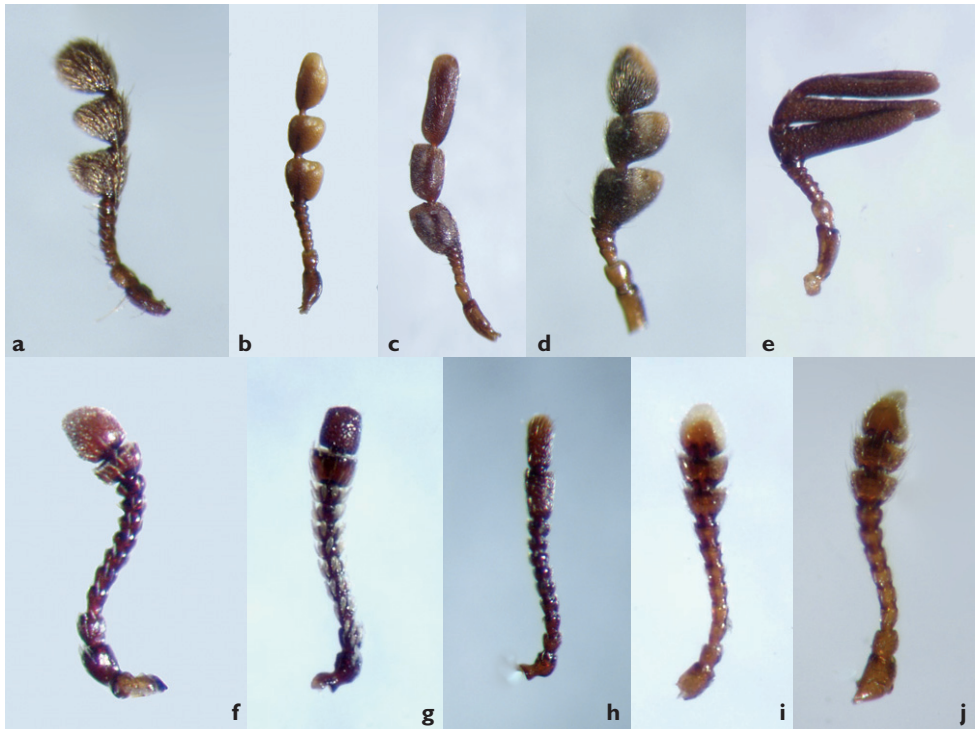
**Subfamily Lyctinae: Tribe Lyctini**

***Lyctoxylon dentatum* (Pascoe) †**

Fig. 3c

**Distribution.** Japan, Taiwan, Vietnam, Malay Peninsula, Java, Philippines (Borowski and Węgrzynowicz 2007, Liu et al. 2006, Walker 2008a); introduced to Europe, Panama, USA (including Hawai'i), East Africa (Starr and Starr 2003, Borowski and Węgrzynowicz 2007), and Canada (Majka 2007), and intercepted in England (Gerberg 1957), Germany (Geis 1995), Italy (Ratti and Rampini 1977), and the Netherlands (Brakman 1966). Not previously recorded from Thailand.

**New records.** Thailand: Krabi prov., Khlong Thom distr., 07.XI.2007 (3); Nakhon Sri Thammarat prov., Chawang distr. 08.VII.2007 (5); Cha-uat distr. 08.VII.2007 (1); Phang Nga prov., Thapput distr., 17.VII.2007 (10), 08.VII.2007 (7), 06.III.2008 (11); Phattalung prov., Khao Chaison distr., 07.III.2008 (11); Satun prov., Khuan Kalong distr., 07.VII.2007 (5); Songkla prov., Chana distr., 03.III.2008 (3); Suratthani prov., Ban Na Doem distr., 05.III.2008 (12); Trang prov., Muang distr., 06.XI.2008 (1) (all coll. W. Sittichaya).



**Figure 12.** Bostrichid antennae. Upper row from left to right: **a** *Dinoderus minutus* (Fabricius) **b** *Heterobostrychus aequalis* (Waterhouse) **c** *Xylothrips flavipes* (Illiger) **d** *Xylopsocus capucinus* (Fabricius) **e** *Sinoxylon anale* Lesne; lower row from left to right: **f** *Lyctus tomentosus* Reitter **g** *Minthea reticulata* Lesne **h** *Lyctoxylon dentatum* (Pascoe) **i** *Lyctoderma coomani* Lesne **j** *Cephalotoma tonkinaea* Lesne

**Hosts.** None recorded. There are no previous records of an association of the species with *Hevea brasiliensis*.

**Biology.** Observations by the first author (W. Sittichaya, unpublished) show that the species prefers to attack breeding material with a very low moisture content. The infestation density in rubberwood can be very high with reinfestation of previously attacked material by new generations. The lifecycle in rubber wood in southern Thailand lasts approximately 3–4 months.

### *Minthea reticulata* Lesne †\*

Fig. 3a

**Distribution.** Australia, Indonesia, Malaysia, New Guinea, Philippines, Taiwan, Vietnam; introduced to Great Britain, USA (including Hawai'i). Not previously recorded from Thailand.

**New Records.** Thailand, Krabi prov., Muang distr., 16.VII.2007 (5); Nakhon Sri Thammarat prov., Cha-uat distr., 08.VII.2007 (2); Thung Song distr.,

08.VII.2007 (4); Thung Yai distr., 08.VII.2007 (2); Phang Nga prov., Thap Put distr., 17.VII.2007 (6); Muang distr., 17.VII.2007 (2); Phattalung prov., Khao Chaison distr., 09.XI.2007 (1); Satun prov., Khuan Kalong distr., 7.VII.2007 (7) (all coll. W. Sittichaya).

**Hosts.** Previously recorded from *Dyera costulata*, *Gonystylus* spp, *Hevea brasiliensis*, *Dillenia* spp. (Ho 1995b).

**Biology.** The biology of the species does not seem to have been studied in detail, but is assumed to be similar to *Minthea rugicollis* (Walker) and other Lyctini (Beeson and Bhatia 1937, Lesne 1924, Liu et al. 2008b). Only the larvae are xylophagous. The life cycle takes 2–6 months depending on the starch and moisture content of the wood as well as temperature. The average life span of adults is 77 days (Ho 1995b).

### Tribe Trogoxylini

#### *Cephalotoma tonkinea* Lesne †

Fig. 4b

**Distribution.** Previously recorded only from Vietnam (Lesne 1932). New to Thailand.

**New records.** Thailand, Krabi prov., Muang distr., 07.VII.2007 (5); Nakhon Sri Thammarat prov., Chawang distr., 25.VII.2007 (4) (all coll. W.Sittichaya).

**Hosts.** None recorded. The species was obtained from debarked logs of *Hevea brasiliensis*.

**Biology.** Adults were captured from logs infested by *Heterobostrychus aequalis*, *Sinoxylon anale* and *S.unidentatum*. Only 2 – 3 specimens were obtained from each infested log. Observations by Lesne (1932) on species of the closely related genus *Lyctoderma*, indicate that the adult lives in the adult gallery of larger bostrichids, where its small size and strongly flattened form enable it to slip beneath the larger beetle and avoid being crushed against the walls of the gallery. The adult feeds on small particles of wood in the gallery of the larger species. It can thus be classed as a commensal of other bostrichids. The larvae are presumed to be xylophagous.

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