

A Review of the Powder-Post Beetles of Thailand (Coleoptera: Bostrichidae)

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ABSTRACT.– The present state of knowledge of the powder post beetles (Coleoptera: Bostrichidae) of Thailand is summarised to provide a basis for future studies of the fauna and its economic importance in forestry and agriculture, including stored products. We provide a checklist, including information on the local and world distribution, biology and taxonomy of these species. Sixty species are now known to occur in Thailand, of which the following twenty-two species are recorded here for the first time: *Amphicerus caenophradoides* (Lesne), *Bostrychopsis parallela* (Lesne), *Calonistes antennalis* Lesne, *Dinoderopsis serriger* Lesne, *Dinoderus exilis* Lesne, *D. favosus* Lesne, *D. gardneri* Lesne, *Micrapate simplicipennis* (Lesne), *Octodesmus episternalis* Lesne, *O. parvulus* (Lesne), *Parabostrychus acuticollis* Lesne, *Paraxylion bifer* (Lesne), *Phonapate fimbriata* Lesne, *Sinoxylon parviclava* Lesne, *S. pygmaeum* Lesne, *S. tignarium* Lesne, *Trogoxylon punctipenne* (Fauvel), *Xylocis tortilicornis* Lesne, *Xylodrypta bostrichoides* Lesne, *Xylopsocus acutespinosus* Lesne, *X. ensifer* Lesne, *X. radula* Lesne.

KEY WORDS: Coleoptera, Bostrichidae, Thailand, New records, Faunal synopsis

INTRODUCTION

The Bostrichidae is a medium-sized (~500 species) family of beetles (Coleoptera), often referred to as powder post beetles because of their ability to reduce wood or bamboo to a thin external shell covering the frass produced by the boring activities of the adults and larvae. They are of considerable economic importance in forestry and to the wood products industry, especially in tropical countries. Some species have also become pests of stored grain and root crops. In addition, maturation feeding by some species in young stems and shoots of living trees can result in dieback, and increases the risk of breakage by wind and infection by pathogens (Liu et al., 2008a). Some species have been dispersed around the world by

trade in timber and timber products. Taxonomically, the family is one of the best known amongst the beetles, thanks to the revisionary work of Pierre Lesne in a series of publications between 1895 and 1941 (Berland, 1951). Borowski and Węgrzynowicz (2007) have recently catalogued the family (but see Ivie (2010) for corrections to the catalogue). The biology of bostrichids has been reviewed by Lesne (1924), Beeson and Bhatia (1937), Gerberg (1957), and Liu et al. (2008a).

Morphologically and biologically, the species can be divided into two main groups: 1) stout, cylindrical species with a hooded pronotum, which bore into the host tissue as adults, and lay their eggs within their galleries (e.g. Bostrichinae, Dinoderinae); 2) more flattened species, in which the head is visible from above, and

which do not bore into the host plant as adults, but lay their eggs in cracks and crevices in its surface (e.g. *Lyctinae*, *Dysidinae*). In both groups the larvae tunnel through the host tissues making extensive frass-filled galleries. Most species are polyphagous and attack a wide variety of hosts in many different families of plants, but some specialise in attacks on bamboos and rarely breed in other plants. Most rely for food primarily on starches and sugars in the plant tissues, but endosymbiotic bacteria found in bacteriomes associated with the midgut can aid digestion of other constituents of the wood (Crowson, 1981). In the tropics, there are usually one to four generations per year (Liu et al., 2008a). However, life cycles can be prolonged, and adults may emerge after several years of slow development.

Until recently, there has been little research done on the *Bostrichidae* of Thailand. Kamnerdratana et al. (1970) list a few species as injurious to logs in Thailand. Hutacharern and Tubtim (1995) list species known to occur as pests of forests and forest products, and provide lists of host trees. Hutacharern et al. (2007) (under *Bostrichidae* and *Lyctidae*) list species known to occur in Thailand. Some work has been done on the control of pest species attacking stored grain (Sukprakarn and Tautong, 1981; Sukprakarn, 1986). More recently, biological and taxonomic studies have been made in the Southern and Eastern provinces of Thailand (Sittichaya and Beaver, 2009; Sittichaya et al., 2009; Kangkamanee et al., 2011; Sittichaya et al., in press). These studies and other collections made in the North by the first author and others, and studies of the material in some European museums (Liu, 2010), have indicated that many more species occur in the country than previously thought. It is the

purpose of this paper to summarise our present knowledge of the fauna to serve as a basis for further studies on the family, which is one of considerable economic importance in Thailand.

MATERIALS AND METHODS

This synopsis is based on several main sources. We have used the collections made by two of the authors (RAB, WS) in the North and the South of Thailand respectively, and have examined the specimens collected by the TIGER (Thailand Inventory Group for Entomological Research) project in twenty-four of the National Parks of Thailand. Further records were obtained by the third author (LYL) during her examination of the collections of a number of overseas museums. We have also included records from the literature, especially the checklists of forest insects (Hutacharern and Tubtim, 1995), and insects and mites in Thailand (Hutacharern et al., 2007). Identifications have been made by the authors of this paper, with some of the determinations checked by J. Borowski (Warsaw, Poland). Type material of 50 ex 60 species (83%) has been examined by LYL in various museums, but it has not been possible to check the types of all species included in this paper. Photographs of many of the species listed can be found in Liu et al. (2006), Sittichaya et al. (2009), and on the Pests and Diseases Image Library (PaDIL) web site: <http://www.padil.gov.au>.

Checklist Format.— The classification used in the paper follows the catalogue of Borowski and Węgrzynowicz (2007) as corrected by Ivie (2010), and the subfamilies found in Thailand are listed in the order of the catalogue. The genera and

species are listed in alphabetical order within tribes (or subfamily where there is no tribal level). For each species, we give the currently accepted name, the original generic and specific names, and a reference to the original description. The full reference is available in Borowski and Węgrzynowicz (2007) and has not been included in the Literature Cited. Synonyms are not listed because they are available in the same publication. The symbols after the name of the species give the following information: * - a species recorded as new to Thailand; ¶ - type material of species examined by L-Y. Liu; # - identification of species checked by J. Borowski; † - voucher specimen(s) deposited in the insect collection of the Department of Pest Management, Faculty of Agriculture, Prince of Songkla University. Further specimens will be deposited in the insect collection of the Queen Sirikit Botanical Garden, Chiangmai at a later date.

The Thai provinces in which the species is known to occur are listed, followed by detailed new records for: 1) species which are recorded as new to Thailand; 2) uncommon or rare species and those not previously recorded from specific provinces. In the new records, the figures in parentheses are the numbers of specimens examined. The altitude is given in meters above mean sea level. The distribution outside Thailand is then given. This is taken primarily from Borowski and Węgrzynowicz (2007), with additions to the distribution in more recently published literature, especially Liu (2010), or if further information is available from other sources. This is followed by notes on taxonomy (where necessary), and a summary of information on the biology of the species. There is a very large literature pertaining to some of the economically important species,

and only a small selection of references can be given for these.

RESULTS

Based on the material studied, five subfamilies (including six tribes), 28 genera and 60 species of Bostrichidae are known to occur in Thailand. Twenty-two species are recorded for the first time from Thailand. Only two species (*Megabostrychus imadatei* Chûjô and *Octodesmus kamoli* Chûjô) are endemic to the country. The remainder are mostly distributed fairly widely within the Oriental region, and some have become more widely distributed or cosmopolitan as a result of transport by man. Within Thailand, some species (e.g. *Micrapate simplicipennis* (Lesne)) appear to be confined to the North of the country, others to the South (e.g. *Xylopsocus radula* Lesne), but the distribution of many species is poorly known, and further collecting is likely to reveal that many are more widespread than present data suggest (Liu, 2010). There are 44 provinces (out of 76) in Thailand from which there are no records at all.

CHECKLIST OF THE BOSTRICHIDAE OF THAILAND

Subfamily Lyctinae

Tribe Lyctini

Lyctoxylon dentatum (Pascoe)^{¶†}

Minthea dentata Pascoe, J. Ent., London, 2: 141. 1866.

Thai Distribution.— Rayong, Satun, Songkhla, Surat Thani and Trang (Sittichaya and Beaver, 2009; Sittichaya et al., 2009).

Other Distribution.— Japan, Taiwan, Vietnam, West Malaysia, Java, Philippines and Australia. Introduced into or intercepted in East Africa, Europe, North and Central America.

Biology.— Found associated with rubberwood (*Hevea brasiliensis* Muell. Arg.) in southern Thailand (Sittichaya et al., 2009; Kangkamanee et al., 2011). The species prefers to attack wood with a low moisture content. Attack densities can be high, and reinfestation by subsequent generations occurs. The life cycle takes 3 - 4 months.

***Lyctus africanus* Lesne[¶]**

Lyctus africanus Lesne, Bull. Soc. Ent. Fr. 1907: 302.

Thai Distribution.— (unspecified) (Hutacharn et al., 2007); Trat (Sittichaya and Beaver, 2009).

Other Distribution.— Throughout Africa, Madagascar and the Oriental region. Introduced into Europe. Despite its name, it is unclear whether the species is of African or Oriental origin (Halperin and Geis, 1999).

Biology.— This is regarded as one of the most destructive pests of timber and timber products, including plywood (Lesne, 1924; Delobel and Tran, 1993; Halperin and Geis, 1999; Plant Health Australia, 2007). It can also infest dried roots and tubers. The biology of the species is described in detail by Beeson and Bhatia (1937). In Thailand it has been recorded from forest products made from bamboo, *Bauhinia* spp., *Bombax ceiba* L., *Cedrela* spp. and *Hevea brasiliensis* (Hutacharn and Tubtim, 1995).

***Lyctus brunneus* (Stephens)[¶]**

Xylotrogus brunneus Stephens, Illustr. Brit. Ent., Mandibulata 3: 117. 1830.

Thai Distribution.— (unspecified) (Hutacharn et al., 2007).

Other Distribution.— Cosmopolitan.

Biology.— This is one of the most widespread and damaging species of Lyctinae to hardwood timber, and has been dispersed all over the world through trade in timber and wood products. The biology of the species is summarised by Lesne (1924), Beeson and Bhatia (1937), Delobel and Tran (1993), Peters et al. (2002). Like all lyctines, the species oviposits in pores in the wood, and softwoods without pores are not normally attacked, nor are hardwoods with pores smaller than the diameter of the female's ovipositor (Peters et al., 2002). Larvae can develop only in sapwood with a sufficiently high starch and moisture content, and the heartwood is never infested (Peters et al., 2002).

***Lyctus tomentosus* Reitter[¶]**

Lyctus tomentosus Reitter, Verh. K.-K. Zool.-Bot. Ges. Wien, 28(1878): 198. 1879.

Thai Distribution.— Rayong and Samut Songkhram. It was imported to Thailand and established in the Southeast of the country (Sittichaya and Beaver, 2009).

Other Distribution.— Central America (Mexico, Guatemala)

Biology.— The species has been found in rubberwood-sawn timber in Thailand

(Sittichaya and Beaver, 2009). No detailed studies of the biology of the species appear to have been made.

***Minthea humericosta* Lesne[¶]**

Minthea humericosta Lesne, Bull. Soc. Ent. Fr. 41: 131. 1936

Thai Distribution.— Mae Hong Son and Yala (Liu, 2010).

Other Distribution.— New Guinea.

Biology.— Not studied. Presumably similar to other species of *Minthea* (Beeson and Bhatia, 1937; Ho, 1995a).

***Minthea reticulata* Lesne^{¶†}**

Minthea reticulata Lesne, Bull. Mus. Nat. Hist. Nat. Paris, sér.2, 3: 98. 1931.

Thai Distribution.— Krabi, Mae Hong Son, Nakhon Si Thammarat, Phang Nga, Phattalung, Satun and Trat (Sittichaya and Beaver, 2009; Sittichaya et al., 2009).

New Record.— Mae Hong Son, Suan Pu, 1992 (2) (Strand). This record is included as the first evidence that the species occurs in the North of the country as well as in the southern provinces.

Other Distribution.— Australia, Indonesia, New Guinea, Philippines, Taiwan, Vietnam and West Malaysia. Introduced into Europe and USA.

Taxonomy.— The species has often been misidentified as *Minthea rugicollis* (Walker). Distinguishing characters are given by Ho (2000) and Liu et al. (2009).

Biology.— The biology of the species is similar to *Minthea rugicollis* (Walker) and other Lyctini (Lesne, 1924; Beeson and Bhatia, 1937; Ho, 1995a; Liu et al., 2008a). The life cycle takes 2 - 6 months depending on the starch and moisture content of the wood as well as temperature. The adults live for c.11 weeks, and there are three generations a year in Malaysia (Ho, 1995a). The species is associated with rubberwood-sawn timber in southern and South-eastern Thailand (Sittichaya and Beaver, 2009; Kangkamanee et al., 2011).

***Minthea rugicollis* (Walker)[¶]**

Ditoma rugicollis Walker, Ann. Mag. Nat. Hist. ser. 3, 2: 206. 1858.

Thai Distribution.— Nakhon Ratchasima (Kamnerdratana et al., 1970). Chiang Mai and Mae Hong Son.

New Records.— Chiang Mai, ex bamboo in house, 15.ix.1973 (2) (R.A. Beaver); Mae Hong Son, Ban Huai Po, 19° 19' N, 97° 59' E, 1600 - 2000 m, 9-16.v.1991 (1) (L. Dembický).

Other Distribution.— Subcosmopolitan between 40° N and 40° S. Introduced into other areas, but not established in temperate climates (Abood and Murphy, 2006).

Taxonomy.— Distinguishing characters from the closely similar *Minthea reticulata* are given by Ho (2000) and Liu et al. (2009).

Biology.— An important pest of bamboo, rattan and wood products in tropical areas. A major pest of rubberwood in Malaysia (Browne, 1938). Its biology and control are

described by Browne (1938) and Ho (1995a).

Tribe Trogoxylini

Cephalotoma tonkinea Lesne[†]

Cephalotoma tonkinea Lesne, Livre Centenaire, Soc. Ent. Fr.: 623. 1932.

Thai Distribution.— Krabi, Nakhon Si Thammarat and Phang Nga (Sittichaya et al., 2009).

Other Distribution.— Vietnam.

Biology.— Adults were captured from debarked logs of *Hevea brasiliensis* infested by *Heterobostrychus aequalis*, *Sinoxylon anale* and *S. unidentatum* in southern Thailand. Only 2 - 3 specimens were obtained from each infested log. Like species of the closely related genus *Lyctoderma*, it probably lives as a commensal in the adult gallery of larger bostrichids (Lesne, 1932).

Lyctoderma coomani Lesne^{##†}

Lyctoderma coomani Lesne, Livre Centenaire, Soc. Ent. Fr. : 622. 1932.

Thai Distribution.— Rayong and Samut Songkhram (Sittichaya and Beaver, 2009). Mae Hong Son.

New Record.— Mae Hong Son, Ban Huai Po, 1600 m, 9-16.v.1991 (1) (Pacholátko).

Other Distribution.— Vietnam.

Biology.— The species was taken from logs of *Hevea brasiliensis* in southern Thailand. 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 (Lesne, 1932; L-Y. Liu *pers. obs.*). 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.

Trogoxylon auriculatum Lesne[¶]

Trogoxylon auriculatum Lesne, Bull. Mus. Nat. Hist. Nat. Paris, Sér. 2, 4: 654. 1932.

Thai Distribution.— (unspecified) (Hutacharn and Tubtim, 1995, Hutacharn et al., 2007).

Other Distribution.— India.

Biology.— Beeson and Bhatia (1937) record the species from numerous host trees, and note that it is a forest-inhabiting species breeding in dry wood, and not normally found in sawmills and wood factories. It probably has an annual life cycle, and several generations may breed successively in the same host material (Beeson and Bhatia, 1937). Hutacharn and Tubtim (1995) record the species in Thailand from bamboo (*Dendrocalamus strictus* Nees), and from forest products made from bamboo and several species of trees.

Trogoxylon punctipenne (Fauvel)^{*¶}

Lyctus punctipennis Fauvel, Rev. Ent. 23: 155. 1904.

Thai Distribution.— Mae Hong Son and Uthai Thani.

New records.— **Mae Hong Son**, Huai Sua Tao, 11-17.v.1992 (1) (J. Strnady); **Uthai Thani**, 25 km NW Lan-Sak, 65 km NW Uthai-Thani, 110 m, ix.1990 (3) [no collector].

Other Distribution.— Australia, New Caledonia, New Guinea and the Oriental region. New to Thailand.

Biology.— Not studied. Presumably similar to other species of *Trogoxylon*.

Trogoxylon spinifrons (Lesne)[¶]

Lyctus spinifrons Lesne, Bull. Soc. Ent. Fr. 1910: 303. 1910.

Thai Distribution.— Nakhon Ratchasima (Kamnerdratana et al., 1970 as *Lyctus spinifrons*), Mae Hong Son (Liu, 2010).

Other Distribution.— India, New Guinea and Vietnam.

Biology.— Beeson and Bhatia (1937) record the species from numerous host trees. It attacks bamboos and wood products, and appears to have two generations per year. In Thailand, Hutacharn and Tubtim (1995) record the species from bamboo (*Dendrocalamus strictus*), and from forest products made from bamboo and *Pithecellobium dulce* Benth.

Subfamily Dysidinae

Apoleon edax Gorham[¶]

Apoleon edax Gorham, Notes Leyden Mus., 7: 52. 1885.

Thai Distribution.— (unspecified) (Hutacharn et al., 2007; Borowski and Węgrzynowicz, 2007); Chiang Mai.

New Records.— **Chiang Mai**, base of Doi Suthep, ~300 m, at light trap, 21.iv.1971, 28.v.1974 (2); nr Thai-Danish Pine Research Centre, 18° 07' N, 98° 17' E, at light trap, 19.iv.1971 (1) (R.A. Beaver).

Other Distribution.— Throughout southeast Asia from Myanmar to Borneo. Introduced to China.

Biology.— Little is known of the biology of dysidines, and no studies appear to have been made of this monotypic genus. The very long ovipositor and the somewhat flattened body form of dysidines suggest that the females are not woodborers but lay their eggs in cracks and crevices in the bark (Liu, 2009). Beeson and Bhatia (1937) record the species as damaging pests of *Dipterocarpus* spp. The damage was presumably due to the boring activities of the larvae. Recorded from *Hevea brasiliensis* and *Shorea obtusa* Wall. in Thailand (Hutacharn and Tubtim, 1995).

Subfamily Dinoderinae

Dinoderopsis serriger Lesne^{*¶}

Dinoderopsis serriger Lesne, Bull. Mus. Nat. Hist. Nat. Paris, 29: 56. 1923.

Thai Distribution.— Mae Hong Son.

New Record.— [**Mae Hong Son**], Soppong, Pai, 1500 m, 1-8.v.1993 (Pacholátko and Dembický) (3).

Other Distribution.— East and South Africa, Yemen and Laos (Liu, 2010). New to Thailand.

Biology.— Recorded boring into trees in littoral woodland around Lake Kariba (Zimbabwe) resulting in mechanical weakening and breakage (McLachlan, 1970).

Dinoderus bifoveolatus (Wollaston)^{†##}

Rhyzopertha bifoveolata Wollaston, Ann. Mag. Nat. Hist. ser. 3, 2: 409. 1858.

Thai Distribution.— Chiang Mai (Chujo, 1964); Chumphon, Nakhon Si Thammarat and Surat Thani (numerous specimens collected by W. Sittichaya).

Other Distribution.— Circumtropical, as a result of human transport.

Biology.— Breeds in timber, and in the stems and leaf midribs of palms used for baskets and cases, in the stored roots of cassava (*Manihot esculenta* Crantz) and similar root crops, and has also been found in flour (Beeson and Bhatia, 1937; Delobel and Tran, 1993). As in other dinoderines studied, the male produces a sex pheromone that attracts both sexes (Borgemeister et al., 1999).

Dinoderus brevis Horn

Dinoderus brevis Horn, Proc. Ent. Soc. Phil., 17: 549. 1878.

Thai Distribution.— (unspecified) (Beeson and Bhatia, 1937); Chiang Mai and Nakhon Sawan.

New Records.— **Chiang Mai**, Chiang Mai University, Biol. Dept., 15.vii.1971 (1); base of Doi Suthep, ~300 m, boring in rattan chair, 15.ix.1970 (1); Maerim, flight intercept trap, 9.v.1994, 19.xi.1994 (2); **Nakhon Sawan**, [Nakhon Sawan city], ex bamboo, 26.xi.1986 (1) (all R.A. Beaver).

Other Distribution.— Circumtropical, as a result of human transport.

Biology.— Breeding in bamboos and rattans (as noted above), especially when starch content is high, but also recorded tunnelling in the wood of both angiosperm and coniferous trees perhaps for feeding and/or sexual maturation (Beeson and Bhatia, 1937).

Dinoderus exilis Lesne^{*†##}

Dinoderus exilis Lesne, Bull. Mus. Nat. Hist. Nat. Paris, 1932: 653.

Thai Distribution.— Chumphon and Surat Thani.

New Records.— **Chumphon**, Sawi distr., 10° 16' 59'' N, 99° 00' 57'' E, 67 m, 15.iv.2010 (1); 10° 18' 03'' N, 99° 01' 41'' E, 95 m, 15.v.2010 (1); **Muang distr.**, 10° 25' 45'' N, 99° 03' 37'' E, 78 m, 15.v.2010 (1); **Surat Thani**, Ban Na San distr., 8° 47' 25'' N, 99° 24' 54'' E, 15.iv.2010 (1) (all W. Sittichaya).

Other Distribution.— India (West Bengal). New to Thailand.

Biology.— Not studied. Presumably similar to other species of *Dinoderus*.

Dinoderus favosus Lesne*^{¶†}

Dinoderus favosus Lesne, Bull. Soc. Ent. France, 1911: 397.

Thai Distribution.— Chiang Mai, Chumphon and Surat Thani.

New Records.— **Chiang Mai**, Doi Pui, 1600 m, ex gallery in *Castanopsis* sp., 3.i.1971 (1) (R.A. Beaver); **Chumphon**, Sawi distr., 10° 16' 59'' N, 99° 00' 57'' E, 67 m, 15.xi.2009 (1); **Surat Thani**, Ban Na San distr., 8° 47' 25'' N, 99° 24' 54'' E, 15.iv.2010 (1) (W. Sittichaya).

Other Distribution.— India (Andaman Is., Assam, Karnataka and West Bengal), Myanmar and Vietnam. New to Thailand.

Biology.— Unlike most species of *Dinoderus*, it is a true wood-boring species, and has been recorded from several host species (Beeson and Bhatia, 1937), and here from *Castanopsis* sp.

Dinoderus gardneri Lesne*[¶]

Dinoderus gardneri Lesne, Bull. Soc. Ent. France, 38: 258. 1933.

Thai Distribution.— Chiang Mai.

New Record.— **Chiang Mai**, Doi Pui, 1300 m, flight intercept trap. 8-12.xi.2004 (1) (W. Puranasakul).

Other Distribution.— India (Kerala). New to Thailand.

Biology.— Bred from papaya (*Carica papaya* L.) and an unidentified climber (Beeson and Bhatia, 1937).

Dinoderus minutus (F.)^{¶†}

Apate minutus Fabricius, Syst. Ent.: 54. 1775.

Thai Distribution.— Chantaburi, Chiang Mai, Chonburi, Chumphon, Krabi, Mae Hong Son, Nakhon Si Thammarat, Phang Nga, Phattalung, Phetchabun, Phitsanulok, Rayong, Samut Songkhram, Songkhla, Surat Thani and Trang (Sittichaya et al., 2009).

Other Distribution.— Cosmopolitan.

Biology.— The species primarily breeds in bamboos (especially *Dendrocalamus* spp. and *Phyllostachys* spp.), and is a major pest of cut bamboos. It also attacks stored products of many kinds, and may become an important pest of dried cassava. It was recorded breeding in rubberwood in Thailand by Sittichaya et al. (2009). The biology has been described by Lesne (1924), Beeson and Bhatia (1937), Garcia (2005) and Liu et al. (2008a) amongst others. There is a large literature on biological and chemical control methods. A useful recent discussion of possible integrated pest management methods is given by Garcia (2005).

Dinoderus ocellaris Stephens^{#†}

Dinoderus ocellaris Stephens, Illustr. Brit. Ent., Mandibulata 3: 352. 1830.

Thai Distribution.— Bangkok (Lesne, 1897). Chiang Mai (Chûjô, 1961). Phetchabun, Phitsanulok and Surat Thani (numerous specimens collected by W. Sittichaya).

Other Distribution.— India, Laos, Philippines, Sri Lanka and Vietnam. Probably

introduced into Australia and Fiji. Introduced into Europe, North America and New Zealand.

Biology.— This is another species that breeds primarily in bamboos, although attacks on other host plants do occur (Beeson and Bhatia, 1937). It was frequently collected at light traps in Chiang Mai.

***Prostephanus truncatus* (Horn)**

Dinoderus truncatus Horn, Proc. Ent. Soc. Phil. 17: 549. 1878.

Thai Distribution.— (Unspecified) (Sukprakarn and Tautong, 1981; Huta-charern et al., 2007). Presumably imported, and not known to be established in Thailand.

Other Distribution.— North and Central America. Introduced into Africa and Europe.

Biology.— This species has become a major pest of stored products, especially cassava, maize (*Zea mays* L.), and sweet potato (*Ipomaea batatas* (L.) Lam.), in tropical Africa, and there is an extensive literature dealing with the biology and control of the species (e.g. Hodges, 1986; Delobel and Tran, 1993; Hill et al., 2002; Meikle et al., 2002; Nansen and Meikle, 2002; Hill et al., 2003).

***Rhyzopertha dominica* (F.)^{††}**

Synodendron dominicum Fabricius, Ent. Syst.: 359. 1792.

Thai Distribution.— Chiang Mai (Chûjô, 1961); Songkhla and Nakhon Sri Thammarat

(numerous specimens collected by W. Sittichaya).

Other Distribution.— Cosmopolitan.

Biology.— This is an important pest of stored grain and similar stored products high in starch. In Thailand it is an important pest of stored rice and barley (Sukprakarn, 1986). There is an extensive literature on the biology and control of the species (e.g. Lesne, 1924; Dobie et al., 1991; Delobel and Tran, 1993; Edde and Phillips, 2006; Jia et al., 2008).

Subfamily Bostrichinae

Tribe Bostrichini

***Amphicerus anobioides* (Waterhouse)**

Caenophrada anobioides Waterhouse, Ann. Mag. Nat. Hist. ser. 6, 1: 350. 1888.

Thai Distribution.— (unspecified) (Huta-charern et al. 2007); Chiang Mai and Ubon Ratchathani.

New Records.— **Chiang Mai**, Doi Inthanon, 1100 m, light trap, 11.iv.1986 (R.A. Beaver) (1); **Ubon Ratchathani**, Pha Taem NP, Tung Na Meaung waterfall, 15° 30.914' N, 105° 35.369' E, 120 m, malaise trap, 6-12.iii.2007 (P. Tonsu and B. Sapsiri) (1).

Other Distribution.— Arabian Peninsula, Eritrea, Ethiopia, India and Sri Lanka. Thailand is the easternmost limit of the known distribution of this species.

Biology.— In India, the species bores into poles and the sapwood of logs and timber of a variety of host trees. The life cycle is usually annual, but may extend up to three years (Beeson and Bhatia, 1937). Recorded

in Thailand from *Cedrela augustifolia* Sesse and Moc., *C. odorata* L. and *Toona ciliata* M. Roem (Hutacharern and Tubtim, 1995; as *Schistoceros anobioides*). It may be noted that *Schistoceros* Lesne is an unjustified new name for *Amphicerus* LeConte (Ivie, 2010).

***Amphicerus caenophradoides* (Lesne)*^{¶†}**

Bostrychus caenophradoides Lesne, Ann. Soc. Ent. Fr. 64: 174. 1895.

Thai Distribution.— Chaityaphum, Chumphon, Nakhon Si Thammarat, Sakhon Nakhon and Surat Thani.

New Records.— **Chaityaphum**, Pa Hin Ngam NP, Nature trail at Lan Hin Nor, 15° 37.615' N, 101° 23.436' E, 668 m, malaise trap, 21-27.iii.2007 (1) (K. Sa-Nog and B. Adnafai); **Chumphon**, Thung Tako distr., 10° 02' 17'' N, 99° 02' 46'' E, 107 m, 15.ii.2010 (1); Sawi distr., 10° 07' 37'' N, 99° 03' 30'' E, 23 m, 15.i.2010 (2) (W. Sittichaya); **Nakhon Si Thammarat**, Chang Klang distr. 08° 21' 33'' N, 99° 39' 03'' E, 62 m, 15.ii.2010, 15.vi.2010 (3) (W. Sittichaya); 08° 20' 60'' N, 99° 40' 14'' E, 93 m, 15.iii.2010, 15.iv.2010, 15.v.2010 (3) (W. Sittichaya); **Sakhon Nakhon**, Phu Phan NP, mixed decid forest, 17° 9.818' N, 103° 54.573' E, 239 m, malaise trap, 25-31.x.2006 (1) (W. Kongnara); **Surat Thani**, Ban Na San distr., 08° 47' 25'' N, 99° 24' 54'' E, 15.v.2010 (1) (W. Sittichaya).

Other Distribution.— Indonesia (Sumatra), Kampuchea and Vietnam. New to Thailand.

Taxonomy.— This species appears to intergrade with *A. malayanus*, and the latter species should probably be considered a synonym of it. The differences between the

two species are small, and specimens seen by us have various combinations of the characters given by Lesne (1899) to separate the species. *A. caenophradoides* tends to have a more northerly distribution than *A. malayanus*, but the distributions overlap in Thailand and on the island of Sumatra. Pending further studies, we retain the two species here.

Biology.— Probably as *A. anobioides* (see above).

***Amphicerus malayanus* Lesne[¶]**

Bostrychus malayanus Lesne, Notes Leyden Mus., 20: 255. 1898.

Thai Distribution.— (unspecified) (Hutacharern and Tubtim, 1995 as *Schistoceros malayanus*). Nan.

New Record.— Nan, 30 km E of Pua, 1700 m, 2.xi.2002 (1) (Hreblay, Szabó).

Other Distribution.— Indonesia (Kalimantan, Sumatra), Sundarbans (India/Bangladesh) and West Malaysia.

Taxonomy.— see above under *A. caenophradoides*.

Biology.— Recorded in Thailand from *Cedrela augustifolia*, *C. odorata* and *Toona ciliata* (Hutacharern and Tubtim, 1995 as *Schistoceros malayanus*), and from *Heritiera fomes* Wall. in the Sundarbans (Beeson and Bhatia, 1937 as *Schistoceros malayanus*).

***Bostrychopsis parallela* (Lesne)*[¶]**

Bostrychus parallelus Lesne, Ann. Soc. Ent. Fr. 64: 174. 1895.

Dominikia parallela (Lesne): Borowski and Węgrzynowicz, World Cat Bostr., 89. 2007.

Thai Distribution.— Chiang Mai.

New Records.— **Chiang Mai**, at light, 31.v.1971 (1); nr. Chiang Mai University, at light, 13.iv.1974 (1) (R.A. Beaver).

Other Distribution.— Throughout the Oriental region, though not recorded previously from Thailand. Imported to Africa, Europe, Madagascar and N. America.

Taxonomy.— All the species previously placed in *Bostrychopsis* Lesne were transferred to a new genus, *Dominikia*, by Borowski and Węgrzynowicz (2007). However, Ivie (2010) has pointed out that their action was based on a misidentified type species, and synonymised *Dominikia* Borowski and Węgrzynowicz with *Bostrychopsis*.

Biology.— This species is primarily a borer of large, dry bamboos, with a life cycle extending from 1-3 years (Beeson and Bhatia, 1937). It is considered a minor pest of bamboo in the Philippines (Waterhouse, 1993).

***Heterobostrychus aequalis* (Waterhouse)^{¶†}**

Bostrychus aequalis Waterhouse, Proc. Zool. Soc. Lond. 15: 215. 1884.

Thai Distribution.— Chantaburi, Chiang Mai, Chonburi, Chumporn, Krabi, Nakhon Ratchasima, Phang Nga, Rayong, Samut Songkhram, Satun, Songkhla and Trang (Sittichaya et al., 2009). Loei.

New Record.— **Loei**, Na Haeo, light trap on river bank, 13.v.2003 (1) (P. Grootaert, I. Constant, K. Smets).

Other Distribution.— Oriental region to Australia and New Caledonia, Madagascar, Comoro Is. Introduced into Africa, Europe, North America and New Zealand.

Biology.— The species attacks a wide variety of trees, and forest products, including furniture, packing cases, plywood, etc. (Beeson and Bhatia, 1937; Woodruff and Fasulo, 2006). Hutacharn and Tubtim (1995) give numerous records of host species in Thailand. The gallery system, development and seasonal history are described by Beeson and Bhatia (1937) and Ho (1995b). It is the most common species of *Heterobostrychus* in Thailand.

***Heterobostrychus hamatipennis* (Lesne)[¶]**

Bostrychus hamatipennis Lesne, Ann. Soc. Ent. Fr. 64: 173. 1895.

Thai Distribution.— Nakhon Ratchasima (Kamnerdratana et al., 1970). Loei.

New Record.— **Loei**, Na Haeo, light trap at pond edge, 17.v.2003 (1) (I. Constant, K. Smets).

Other Distribution.— Through the Oriental region to Indonesia and Philippines, Japan, Madagascar, Comoro Is. and Mauritius. Introduced to Europe and North America.

Biology.— Similar to *H. aequalis* (Beeson and Bhatia, 1937). Hutacharn and Tubtim (1995) give numerous records of host species in Thailand. Beiriger (2010) gives a brief review of the species in Florida.

***Heterobostrychus pileatus* Lesne[¶]**

Heterobostrychus pileatus Lesne, Ann. Soc. Ent. Fr. 67(1898): 559. 1899.

Thai Distribution.— Nakhon Ratchasima (Kamnerdratana et al., 1970). Chaiphaphum and Chiang Mai.

New Records.— **Chaiphaphum**, Pa Hin Ngam NP, Nature trail at Lan Hin Nor, 15° 37.615' N, 101° 23.436' E, 668 m, malaise trap, 21-27.iii.2007 (1) (K. Sa-Nog & B. Adnafai); **Chiang Mai**, nr. Chiang Mai Univ., 20.vii.1970 (1); Mae Tang, 19° 05' N, 98° 55' E, ex *Dipterocarpus obtusifolius*, 26.ii.1972 (2); Fang Agric. Stn, 600 m, at light, 17.iii.1974 (1) (all R.A. Beaver).

Other Distribution.— India, Kampuchea, Laos, Philippines and Vietnam.

Biology.— Beeson and Bhatia (1937) suggest this a forest-dwelling species rather than a pest of forest products, although it has been recorded in the latter. Recorded from rubberwood (*Hevea brasiliensis*) by Hutacharern and Tubtim (1995) and from *Dipterocarpus obtusifolius* Teijsm. ex Miq. (see above). Other host trees are listed by Beeson and Bhatia (1937).

***Heterobostrychus unicornis* (Waterhouse)[¶]**

Bostrychus unicornis Waterhouse, Ann. Mag. Nat. Hist. ser. 5, 13: 361. 1879.

Thai Distribution.— Nakhon Ratchasima (Kamnerdratana et al., 1970).

Other Distribution.— India, Myanmar, Vietnam, Madagascar, Comoro Is. and Mozambique.

Biology.— Recorded from *Butea monosperma* (Lam.) Taub. and *Shorea robusta* C.F. Gaertn. in India (Beeson and Bhatia, 1937), and from wood products made from timber of *Bombax ceiba*, *Hevea brasiliensis*, *Koompassia malaccensis* Benth. and *Pterocarpus macrocarpus* Kurtz. in Thailand (Hutacharern and Tubtim, 1995).

***Megabostrychus imadatei* Chûjô**

Megabostrychus imadatei Chûjô, Nature Life Southeast Asia, 3: 208. 1964.

Thai Distribution.— Kanchanburi (Chûjô, 1964). Endemic to Thailand.

Taxonomy.— The monospecific genus *Megabostrychus* Chûjô is known only from the male holotype of *M. imadatei*. This is a large beetle (19 mm long) and it is surprising that no further specimens have been collected. The genus is related to *Heterobostrychus*, *Bostrychopsis* and *Lichenophanes* (Chûjô, 1964), but appears to be distinct from these genera. It needs further investigation.

Biology.— Unknown.

***Micrapate simplicipennis* (Lesne)^{*¶}**

Xylopertha simplicipennis Lesne, Ann. Soc. Ent. Fr. 64: 177. 1895.

Thai Distribution.— Chaiphaphum, Chiang Mai, Loei and Phetchabun.

New Records.— **Chaiphaphum**, Pa Hin Ngam NP, 15° 34.913' N, 101° 25.658' E, 444 m, malaise trap, 22-28.xi.2006 (1) (K. Sa-nog and B. Adnafai); **Chiang Mai**, Chiang Mai University, ex cut *Bougainvillea* stem, 10.ii.1972 (1); ex *Samanea*

saman, 18.ii.1972 (6); ex *Bauhinia variegata*, 2.vii.1972 (1) (R.A. Beaver); Doi Phahompok NP, HQ, 19° 57.961' N, 99° 9.355' E, 569 m, malaise trap, 7-14.ii.2008 (1) (Seesom, K.); Maerim, malaise trap, various dates from 1.xii.1993 – 16.ii.2003 (16); ex mango, 16.i.1994 (5) (R.A. Beaver); **Loei**, Phu Ruea NP, nature trail, 17° 28.805' N, 101° 21.242' E, 920 m, malaise trap, 19-26.i., 26.i.-2.ii.2007 (2); Reservoir, 17° 28.826' N, 101° 21.33' E, 931 m, pan trap, 11-12.i., malaise trap, 12-19.i.2007 (2); Hua Dong Tam Sun, 17° 29.54' N, 101° 20.955' E, 1130 m, malaise trap, 19-26.xi.2006 (1); Ma Kraow ditch, 17° 29.652' N, 101° 21.02' E, 1167 m, malaise trap, 12-19.xi.2006 (2); Sa Sawan, 17° 30.735' N, 101° 20.601' E, 1352 m, malaise trap, 19-26.iii.2007 (1) (all P. Tumtip); **Phetchabun**, Nam Nao NP, Forest Protn. Unit - Huay Pralard cave, 16° 44.963' N, 101° 27.833' E, 711 m, malaise trap, 5-12.iii.2007 (1) (L. Janteab).

Other Distribution.— India, Indonesia (Java), Laos, Myanmar and Vietnam. New to Thailand. This is the only Oriental species of the genus, which otherwise has an American and African distribution.

Biology.— Beeson and Bhatia (1937) record the species from sixteen genera of trees and shrubs in India. The species bores into small branch wood and twigs. Two to three generations a year are likely. In Thailand, the authors have collected the species from small stems of *Bauhinia variegata* L., *Bougainvillea* sp., *Mangifera indica* L., *Manihot esculenta*, *Polyalthia longifolia* (Sonn.) Thwaites and *Samanea saman* (Jacq.) Merr.

Parabostrychus acuticollis Lesne*[¶]

Parabostrychus acuticollis Lesne, Bull. Mus. Nat. Hist. Nat. Paris, 19: 192. 1913.

Thai Distribution.— Nakhon Ratchasima.

New Record.— [Nakhon Ratchasima], Corat, 15.v.1996 (3) (Local collectors).

Other Distribution.— India, Nepal, S. China and Taiwan. New to Thailand.

Biology.— Not studied.

Tribe Sinoxylini

Sinoxylon anale Lesne^{¶†}

Sinoxylon anale Lesne, Ann. Soc. Ent. Belg. 41: 21. 1897.

Thai Distribution.— Ayutthaya and Bangkok (Lesne, 1906). Chiang Mai (Chûjô, 1964). Trang (Kamnerdratana et al., 1970). Chaiyaphum, Chantaburi, Chonburi, Chumporn, Krabi, Nakhon Ratchasima, Nakhon Sri Thammarat, Petchaburi, Phattalung, Phang Nga, Phetchabun, Ratchaburi, Rayong, Songkhla, Samut Songkram, Satun, Surat Thani and Surin (Sittichaya et al., 2009).

Other Distribution.— Cosmopolitan in tropical and subtropical areas.

Biology.— Recorded from numerous host trees and bamboos, and from their products (Beeson and Bhatia, 1937; Hutacharn and Tubtim, 1995). The adults sometimes bore into green shoots and twigs for maturation feeding or hibernation, and can cause damage to the tree saplings and seedlings. This is one of the commonest and most

economically important species in India and Thailand (Beeson and Bhatia, 1937; Sittichaya and Beaver, 2009), and is the single dominant pest of rubberwood-sawn timber in southern Thailand (Kangkamanee et al., 2011). Adults emerge throughout the year, and there are no distinct generations (Beeson and Bhatia, 1937). This species and the closely related *Sinoxylon unidentatum* are very active species, and show more aggressive defence behaviour in their breeding habitats than co-occurring bostrichids in other genera (Kangkamanee et al., 2011). The feeding preferences and reproduction on two rubberwood clones have recently been investigated by Sittichaya et al. (2011 in press).

***Sinoxylon atratum* Lesne[¶]**

Sinoxylon atratum Lesne, Ann. Soc. Ent. Belg. 41: 20. 1897.

Thai Distribution.— (unspecified) (Hutacharn and Tubtim, 1995; Hutacharn et al., 2007)

Other Distribution.— India.

Biology.— Recorded from *Cedrela augustifolia*, *C. odorata* and *Toona ciliata* in Thailand (Hutacharn and Tubtim, 1995). In India, it is known to bore into the living shoots of *Santalum album* L., causing dieback (Beeson and Bhatia, 1937).

***Sinoxylon crassum* Lesne^{¶†}**

Sinoxylon crassum Lesne, Ann. Soc. Ent. Belg. 41: 21. 1897.

Thai Distribution.— Ayutthaya and Bangkok (Lesne, 1906). Trang (Kamnerd-ratana et al., 1970). Chaiyaphum, Chiang

Mai, Phetchabun, Prachuap Khiri Khan and Songkhla (numerous specimens collected by W. Sittichaya).

Other Distribution.— From India, through Southeast Asia to the Philippines. Introduced to Europe.

Biology.— Recorded from numerous host trees and bamboos, and from their products (Beeson and Bhatia, 1937; Hutacharn and Tubtim, 1995). It is a common borer of the sapwood of logs and fuel wood in India, but does not penetrate the heartwood (Beeson and Bhatia, 1937).

***Sinoxylon flabrarius* Lesne[¶]**

Sinoxylon flabrarius Lesne, Ann. Soc. Ent. Fr. 75: 543. 1906.

Thai Distribution.— Chiang Mai (Liu, 2010). Nakhon Ratchasima.

New Record.— **Nakhon Ratchasima**, Khao Yai NP, moist evergreen forest at Dan Chang, 14° 28.285' N, 101° 22.57' E, 751 m, 26.xii.2006 - 2.i.2007, malaise trap (1) (W. Sook-kho).

Other Distribution.— India, S. China and Vietnam. Introduced to Europe,

Biology.— Unknown.

***Sinoxylon mangiferae* Chûjô[¶]**

Sinoxylon mangiferae Chûjô, 1936, Trans. Nat. Hist. Soc. Formosa, 26: 407. 1936.

Thai Distribution.— Loei (Liu, 2010).

Other Distribution.— Taiwan.

Biology.— The type series was collected from mango (*Mangifera indica*) by Chûjô (1936), but nothing more is known of the biology of the species.

***Sinoxylon pachyodon* Lesne**

Sinoxylon pachyodon Lesne, Ann. Soc. Ent. Fr. 75: 486. 1906.

Thai Distribution.— (unspecified) (Borowski and Węgrzynowicz, 2007).

Other Distribution.— India, Myanmar.

Biology.— Bred from *Cynometra polyandra* Roxb. and unidentified timber from March to June (Beeson and Bhatia, 1937).

***Sinoxylon parviclava* Lesne*[¶]**

Sinoxylon parviclava Lesne, Bull. Mus. Nat. Hist. Nat. Paris, 24: 490. 1918.

Thai Distribution.— Chaiyaphum, Phetchabun and Ubon Ratchathani.

New Records.— **Chaiyaphum**, Tat Tone NP, nr. water tank, 15° 58.426' N, 102° 2.24' E, 265 m, malaise trap, 5-12.ii.2007 (1) (T. Jaruphan, O. Budsawong); **Phetchabun**, Nam Nao NP, Forest Protn Unit - Huay Pralard cave, 16° 44.963' N, 101° 27.833' E, 711 m, malaise trap, 5-12.iii.2007 (6) (L. Janteab); **Ubon Ratchathani**, Pha Taem NP, Huay Sa Nom waterfall, 15° 27.407' N, 105° 34.867' E, 230 m, malaise trap, 4-11.xi.2006 (1) (Sorawit and Thongdee).

Other Distribution.— Kampuchea, Myanmar, Indonesia (Sulawesi) and Vietnam. New to Thailand.

Biology.— The only known host tree is teak (*Tectona grandis* L. f.) (Beeson and Bhatia, 1937).

***Sinoxylon pygmaeum* Lesne*[¶]**

Sinoxylon pygmaeum Lesne, Ann. Soc. Ent. Belg. 41: 20. 1897.

Thai Distribution.— Chiang Mai and Nakhon Nayok.

New Records.— **Chiang Mai**, Doi Phahom-pok NP, HQ, 19° 57.961' N, 99° 9.355' E, 569 m, malaise trap, 7-14.ii.2008 (1) (Seesom K.); Bo Luang, 18° 09' N, 98° 21' E, 1100 m, 28.iv.1974 (5); Chiang Mai University, ex *Samanea saman*, 23.ii.-1.iii.1972 (10); Fang Agricultural Stn., 600 m, 17.iii.1974 (3) (all R.A. Beaver); **Nakhon Nayok**, Khao Yai NP, 14° 24.781' N, 101° 22.689' E, malaise trap, 26.vii.-2.viii.2006 (1) (P. Sandao).

Other Distribution.— India, Myanmar and Vietnam. New to Thailand.

Biology.— A polyphagous species not uncommon in dry branches and small stems (Beeson and Bhatia, 1937). Attacking a cut sapling of *Samanea saman* in Chiang Mai together with *Sinoxylon anale*.

***Sinoxylon ruficorne* Fähræus[¶]**

Sinoxylon ruficorne Fähræus, Öfvers. Finska Vetensk.-Soc. Forhandl. 28: 665. 1871.

Thai Distribution.— (unspecified) (Hutacharn and Tubtim, 1995; Hutacharn et al., 2007). This species (if correctly identified) has clearly been imported from Africa. There are no later records, and it is

not clear if the species is established in Thailand.

Other Distribution.— Throughout Africa South of the Sahara. Introduced to USA.

Biology.— Recorded from *Hevea brasiliensis* wood products by Hutacharern and Tubtim (1995).

Sinoxylon tignarium Lesne*[¶]

Sinoxylon tignarium Lesne, L'Abeille, 30: 116. 1902.

Thai Distribution.— Chiang Mai.

New Record.— **Chiang Mai**, Doi Suthep, 1300 m, ex EtOH trap, 8-12.xi.2004 (W. Puranasakul) (1).

Other Distribution.— S-W China, N-E India and Vietnam. New to Thailand.

Biology.— Unknown.

Sinoxylon unidentatum (F.)[†]

Sinodendron unidentatum Fabricius, Syst. Eleuth.: 377. 1801.

Thai Distribution.— Chiang Mai, Chonburi, Chumphon, Krabi, Nakhon Si Thammarat, Phang Nga, Phattalung, Rayong, Samut Songkram, Satun, Songkhla, Surat Thani and Trang (Sittichaya et al., 2009).

Other Distribution.— Cosmopolitan.

Biology.— This species has usually been recorded as its synonym, *Sinoxylon conigerum* Gerstäcker. Beeson and Bhatia (1937) list a number of host trees in several families. It is one of the most common

species attacking rubberwood (*Hevea brasiliensis*) in Thailand (Sittichaya and Beaver, 2009; Kangkamanee et al., 2011). The latter authors note that it has similar abundance to *Sinoxylon anale* in eastern areas of S. Thailand, but that if one of the species is abundant at a location, the other is usually rare or absent (Sittichaya and Beaver, 2009). Both species have similar size and food preferences, and may be competitors for the same resources (Kangkamanee et al., 2011).

Tribe Xyloperthini

Calonistes antennalis Lesne*^{¶##}

Calonistes antennalis Lesne, Bull. Soc. Ent. Fr. 41: 138. 1936.

Thai Distribution.— Surat Thani.

New Record.— **Surat Thani**, Ban Na San distr., 15.vii.2010 (1) (W. Sittichaya).

Other Distribution.— West Malaysia. New to Thailand.

Biology.— Unknown.

Octodesmus episternalis Lesne*[¶]

Octodesmus episternalis Lesne, Ann. Soc. Ent. Fr. 69: 618. 1901.

Thai Distribution.— Phetchabun.

New Record.— **Phetchabun**, Khao Kho NP, viewpoint at Khia stream, 16° 39.12' N, 101° 7.81' E, 246 m, litter sample, 5-8.iii.2007 (1) (S. Chachumnan and S. Singtong).

Other Distribution.— India and Myanmar. Introduced to U.S.A. New to Thailand.

Biology.— According to Rai (1971) the species of *Octodesmus* are wood-boring pests of bamboos, timber and their products. No specific information is available for the three species found in Thailand.

***Octodesmus kamoli* Chûjô**

Octodesmus kamoli Chûjô, Nature Life S-E Asia, 3: 209. 1964.

Thai Distribution.— Chiang Mai (Chûjô, 1964). Endemic to Thailand.

Biology.— Not studied. Presumed to be both a woodborer and polyphagous.

Octodesmus parvulus* (Lesne)

Xylopertha parvula Lesne, Ann. Soc. Ent. Belg. 41: 19. 1897.

Thai Distribution.— Ubon Ratchathani.

New Record.— **Ubon Ratchathani**, Pha Taem NP, 15° 27.336' N, 105° 34.87' E, 232 m, malaise trap, 8-16.v.2007 (1) (S. Mingman).

Other Distribution.— India. Introduced into Europe. New to Thailand.

Biology.— Not studied. Presumed to be both a woodborer and polyphagous.

***Paraxylion bifer* (Lesne)*^{¶†}**

Xylion bifer Lesne, Bull. Mus. Nat. Hist. Nat. Paris, 2^e sér., 4: 659. 1932.

Thai Distribution.— Chiang Mai, Chumphon, Lampang, Loei, Nakhon Si Thammarat, Surat Thani and Uthai Thani.

New Records.— **Chiang Mai**, nr. Chiangmai University, 300 m, at light, various dates from 9.v.1971 to 25.iii.1974 (12) (R.A. Beaver); **Chumphon**, Mueang distr., 10° 26' 35'' N, 99° 04' 07'' E, 70 m, 15.viii.2009 (2); Sawi distr., 10° 07' 37'' N, 99° 03' 30'' E, 23 m, 15.vi.2009 (2); Thung Tako distr., 10° 02' 42'' N, 99° 01' 05'' E, 86 m, 15.x.2009 (2) (W. Sittichaya); **Lampang**, Ngao, Thai-Danish Teak Improvement Centre, light trap, 9.vii.1972 (3) (R.A. Beaver); **Loei**, Na Haeo, light trap, 17.v.2003, 15-19.v.2003 (2) (I. Constant, K. Smets, P. Grootaert); **Nakhon Si Thammarat**, Chang Klang distr., 8° 20' 34'' N, 99° 37' 48'' E, 15.iii.2010 (1); 8° 21' 33'' N, 99° 39' 03'' E, 62 m, 15.iv.2010 (1); **Surat Thani**, Ban Na San distr., 8° 47' 48'' N, 99° 24' 52'' E, 53 m, 15.iii.2009 (7); 8° 53' 10'' N, 99° 24' 02'' E, 65 m, 15.iv.2010 (4); 8° 47' 25'' N, 99° 24' 54'' E, 15.viii.2010 (4) (all W. Sittichaya); **Uthai Thani**, 25 km NW Lan Sak, 65 km NW Uthaitхани, 110 m, ix.1990 (3) [no collector].

Other Distribution.— China (Hong Kong), India, Indonesia (Java), Myanmar, Vietnam and West Malaysia. New to Thailand.

Biology.— Not studied. Presumed to be both a woodborer and polyphagous.

***Xylocis tortilicornis* Lesne*^{¶†}**

Xylocis tortilicornis Lesne, Ann. Soc. Ent. Fr. 68: 520. 1901.

Thai Distribution.— Nakhon Sri Thammarat, Sakhon Nakhon, Songkhla and Surat Thani.

New Records.— **Nakhon Si Thammarat**, Chang Klang distr., 15.ix.2009 (1) (W. Sittichaya); **Sakhon Nakhon**, Phu Phan NP, NP Office, 17° 3.488' N, 103° 58.497' E, 318 m, 17-23.i.2007 (1) (S. Tongboonchai); **Songkhla**, Had Yai, EtOH trap, 22.iv.2009 (2); 23.ix.2009 (5) (W. Sittichaya); **Surat Thani**, Ban Na San distr., 15.iii.2010 (1) (W. Sittichaya).

Other Distribution.— China, India, Laos, Sri Lanka and Taiwan. New to Thailand.

Biology.— Recorded from numerous host trees in India (Beeson and Bhatia, 1937). The species breeds mainly in small diameter branches, but also in the sapwood of logs. There are usually two generations per year, but some individuals may take 2 – 3 years to develop.

Xylodectes ornatus (Lesne)^{¶†}

Xylopertha ornatus Lesne, Ann. Soc. Ent. Belg. 41: 19. 1897.

Thai Distribution.— Chiang Mai (Chûjô, 1966), Surat Thani.

New Record.— **Surat Thani**, Ban Na San distr., 8° 46' 47'' N, 99° 22' 46'' E, 96 m, 15.v.2010 (1) (W. Sittichaya).

Other Distribution.— India, Indonesia (Borneo, Sumatra), Laos, Myanmar, Philippines, Taiwan and Vietnam.

Biology.— Recorded from numerous host trees by Beeson and Bhatia (1937). It breeds in all sizes of material from small branches

to large logs, and especially in recently cut wood. The seasonal cycle of emergence is described by Beeson and Bhatia (1937).

Xylodrypta bostrichoides Lesne^{*¶}

Xylodrypta bostrichoides Lesne, Ann. Soc. Ent. Fr. 68: 523. 1901.

Thai Distribution.— Chiang Mai.

New Record.— **Chiang Mai**, Doi Suthep, i.2006 (1) (S. Sonthichai).

Other Distribution.— India (Assam). New to Thailand.

Biology.— Unknown.

Xylopsocus acutespinosus Lesne^{*¶}

Xylopsocus acutespinosus Lesne, Ann. Soc. Ent. Fr. 75: 424. 1906.

Thai Distribution.— Chiang Mai.

New Records.— **Chiang Mai**, Doi Suthep-Pui, 1500 m, 7.xi.1986 (2) (R.A. Beaver).

Other Distribution.— India, Laos, Myanmar and Nepal. New to Thailand.

Biology.— The two specimens listed above were boring into a small dead sapling of an unidentified species.

Xylopsocus capucinus (F.)^{¶†}

Apate capucinus Fabricius, Species Ins.: 62 1781.

Thai Distribution.— Chaiyaphum, Chiang-mai, Krabi, Nakorn Sri Thammarat, Phattalung, Phang Nga, Satun, Songkhla,

Surat Thani and Trang (Sittichaya et al., 2009).

Other 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 and USA.

Biology.— In northern India, the adults emerge mainly between May and November, with an annual life cycle, that may be extended for a further one or occasionally two years (Beeson and Bhatia, 1937). 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. (2008b), and is likely to be typical for all the *Xylopsocus* species considered here.

Xylopsocus ensifer Lesne*^{¶†}

Xylopsocus ensifer Lesne, Ann. Soc. Ent. Fr. 75: 425. 1906.

Thai Distribution.— Nakhon Si Thammarat and Surat Thani.

New Records.— **Nakhon Si Thammarat**, Chang Klang distr., 8° 22' 21'' N, 99° 44' 14'' E, 150 m, 15.x.09 (2), 15.xi.09 (1); **Surat Thani**, Ban Na San distr., 8° 47' 25'' N, 99° 24' 54'' E, 15.x.09 (2) (all W. Sittichaya).

Other Distribution.— Myanmar and West Malaysia. New to Thailand.

Biology.— Not recorded. Presumed to be similar to other species of *Xylopsocus*.

Xylopsocus radula Lesne*[†]

Xylopsocus radula Lesne, Ann. Soc. Ent. Fr. 69: 634. 1901.

Thai Distribution.— Chumphon, Nakhon Si Thammarat, Songkhla and Surat Thani.

New Records.— **Chumphon**, Thung Tako distr., 10° 02' 22'' N, 98° 59' 13'' E, 107 m, 15.i.10 (1); Sawi distr., 10° 19' 23'' N, 99° 01' 25'' E, 103 m, 15.x.09 (1); **Muang** distr., 10° 26' 35'' N, 99° 04' 07'' E, 70 m, 15.ix.09 (2), 15.x.09 (1); **Nakhon Si Thammarat**, Chang Klang distr., 8° 21' 33'' N, 99° 39' 03'' E, 62 m, 15.i.10 (1); 8° 20' 59'' N, 99° 40' 14'' E, 15.ii.10 (7); **Songkhla**, Had Yai, 7° 00' 13'' N, 100° 30' 16'' E, ex dry *Lansium domesticum* branches, 22.iv.2009 (80); 7° 00' 13'' N, 100° 30' 16'' E, ex fresh mango branches, 22.iv.2009; **Surat Thani**, Ban Na San distr., 8° 47' 25'' N, 99° 24' 54'' E, ex fresh durian branches, 09.ix.09; 8° 47' 48'' N, 99° 24' 52'' E, 53 m, 15.xii.09 (3); 8° 53' 10'' N, 99° 24' 02'' E, 60 m, 15.ii.10 (5) (all W. Sittichaya).

Other Distribution.— India, Indonesia (Sumatra), Myanmar and West Malaysia. New to Thailand.

Biology.— In India, the species is usually found together with *Xylopsocus capucinus* (Beeson and Bhatia, 1937). However, in the South of Thailand, it is most common in freshly cut or recently dead wood, whilst *X. capucinus* prefers dry wood (W. Sittichaya pers. obs.).

Xylothrips flavipes (Illiger)^{¶†}

Apate flavipes Illiger, Magaz. InsKunde, Braunschweig, 1: 171. 1801.

Thai Distribution.— Nakhon Ratchasima (Kamnerdratana et al., 1970). Chantaburi, Chiang Mai, Chonburi, Chumphon, Krabi, Mae Hong Son, Nakhon Si Thammarat, Phang Nga, Phattalung, Phetchabun, Phitsanulok, Rayong, Samut Songkhram, Songkhla and Surat Thani, Trang (Sittichaya et al., 2009).

Other Distribution.— Madagascar and the Indian Ocean islands; Arabian peninsula; throughout South and Southeast Asia from India to the Indonesian archipelago and Taiwan. Introduced into Europe and North America.

Biology.— Like almost all bostrichids, this is a polyphagous species (Beeson and Bhatia, 1937). Recorded in Thailand from *Dipterocarpus* sp., *Hopea odorata* Roxb., *Mangifera indica* (Kamnerdratana et al., 1970) and wood products of *Choerospondias axillaris* Burt & Hill (Hutacharern and Tabtim, 1995). 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.

Subfamily Apatinae

Apate submedia Walker[¶]

Apate submedia Walker, Ann. Mag. Nat. Hist. ser. 3, 2: 286. 1858.

Thai Distribution.— (unspecified) (Sukprakarn and Tauthong, 1981; Hutacharern et al., 2007).

Other Distribution.— India (South) and Sri Lanka. This is the only Asian representative of an otherwise African and Madagascan genus.

Biology.— This species is recorded as a pest of stored products in Thailand by Sukprakarn and Tubtim (1981) and Sukprakarn (1986). We know of no other records from stored products. Species of *Apate* Fabricius are large beetles (usually 10 - 25 mm long) that bore into the stems and branches of dead and fallen trees (Lesne, 1924; Browne, 1968). *Apate submedia* has been recorded from *Casuarina equisetifolia* in India by Stebbing (1914).

Phonapate fimbriata Lesne[¶]

Phonapate fimbriata Lesne, Ann. Soc. Ent. Fr. 78: 568. 1909.

Thai Distribution.— Loei.

New Record.— Loei, Na Haeo, light trap at edge pond, 17.v.2003 (1) (I. Constant and K. Smets).

Other Distribution.— India, Indonesia (Sulawesi), S. China and Vietnam. New to Thailand.

Biology.— The only recorded host is *Calycopteris floribunda* (Roxb.) Lam. (Beeson and Bhatia 1937). The biology of most *Phonapate* species is poorly known. *Phonapate nitidipennis* (Waterhouse) is a pest of date palm (*Phoenix dactylifera* L.) in the Middle East, attacking the leaf midribs and fruiting stalks (El-Sherif et al., 1998 as *P. frontalis* Lesne). Its life history is summarised by Atia et al. (2009 as *P. frontales* [sic]).

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