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A survey of the jewel beetles *(Coleoptera: Buprestidae)* from the Townsville district, northern Queensland, Australia

by

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Abstract - An annotated list is provided on the occurrence and host plants of 13 species (7 genera) of *Buprestidae (Coleoptera)* collected during 1981 in the Townsville district, northern Queensland. Species from the following genera and subfamilies were collected: *Chrysobothris, Merimna* (subfamily *Chrysobothrinae*), *Stigmodera* (subfamily *Stigmoderinae*), *Melobasis, Nascio* (subfamily *Buprestinae*), *Cisseis, Neospades* (subfamily *Agrilinae*) and *Trachys* (subfamily *Trachyinae*). The Townsville area is relatively depauperate in buprestids, probably due mainly to a paucity of suitable larval and adult food plants, i.e. low plant diversity.

Riassunto - Un elenco di 13 specie di *Buprestidae (Coleoptera)* [appartenenti ai generi *Chrysobothris, Merimna* (subfam. *Chrysobothrinae*), *Stigmodera* (subfam. *Stigmoderinae*), *Melobasis, Nascio* (subfam. *Buprestinae*), *Cisseis, Neospades* (subfam. *Agrilinae*), *Trachys* (subfam. *Trachyinae*)] raccolte durante il 1981 nel distretto di Townsville (Queensland settentrionale) con note sulle piante ospiti. L'area di Townsville risulta relativamente povera di *Buprestidae*, probabilmente per la scarsa presenza di piante ospiti di larve ed adulti, ossia un'esigua varietà vegetale.

The biology and behaviour of Australian *Buprestidae (Coleoptera)* are poorly known (HAWKESWOOD & PETERSON, 1982) and it has only been during the past decade that data on these subjects have been accumulating. However, there have been very few published field surveys dealing with Australian *Buprestidae* (with the exception of the works by WILLIAMS, 1977; WILLIAMS & WILLIAMS, 1983; HAWKESWOOD, 1978, 1986c). Opportunity arose to survey the *Buprestidae* of the Townsville area, northern Queensland during 1981 and the results are provided here. Most of the field observations and host plant records are new.

CLIMATE

Townsville, the second largest city in Queensland is situated approximately 1550 km by road north of Brisbane (19°15'S, 145°48'E). The area experiences a dry tropical climate with seasonal rainfall. At least 75-80% of the annual average rainfall of 1130 mm falls in the six warmer months of the year from October to March. Areas to the north of Townsville (e.g. Paluma) receive a more substantial rainfall, in excess of 1400 mm, while to the south (e.g. Bowen), only 860 mm per year is average (REID, 1975). The hottest months of the year are December and January, with July the coolest. Average daily maximum temperatures in summer range from 28 to 33 °C, while minimum temperatures range from 22 to 24 °C (REID, 1975).

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VEGETATION

The vegetation of the Townsville district has been adequately covered by ISBELL & MURTHA (1972) and only brief descriptions of the habitats where buprestids were collected, or sought without success, will be outlined.

The main vegetation of the Townsville area and within the vicinity of James Cook University (west of Townsville) consists of a mosaic of *Eucalyptus alba - E. drepanophylla* open woodland and *Melaleuca viridiflora* low open woodland. These two communities normally occur as discrete units, although in many areas they form intricate mosaic patterns. Both ecosystems are common on the alluvial plains in the vicinity of Townsville (ISBELL & MURTHA, 1972). The shrub stratum of the *E. alba - E. drepanophylla* open woodland is usually absent or poorly represented, and the ground flora is dominated by grasses such as *Heteropogon contortus*, with *Themeda australis, Bothriochloa bladhii, Chrysopogon fallax* and *Chloris* spp. (all *Poaceae*). *Maytenus cunninghamii (Celastraceae)* is the dominant shrub species in many of the areas investigated. In some areas, introduced and native weeds have become established in the *E. alba - E. drepanophylla* woodland, e.g. *Sida cordifolia (Malvaceae), Stachytarpheta* sp. *(Verbenaceae), Evolvulus* sp. *(Convolvulaceae)* and *Passiflora foetida (Passifloraceae)*. The establishment of weeds and grasses has been mainly due to frequent fires each summer.

The *Melaleuca viridiflora* low open woodland occurs on the alluvial plains in the vicinity of Townsville, where it may grade into a low woodland (ISBELL & MURTHA, 1972). Although some areas are monospecific, there may be emergents of *Eucalyptus alba, E. drepanophylla* or *E. tessellaris (Myrtaceae)*. The shrub layer is absent and the ground flora usually consists of *Themeda australis* with *Heteropogon contortus* (ISBELL & MURTHA, 1972).

A *Eucalyptus tessellaris - E. tereticornis - Melaleuca leucadendron - E. alba* woodland also occurs on alluvial delta plains to the immediate south-west of Townsville and in certain areas in between Townsville and Bowen. ISBELL & MURTHA (1972: 21) noted that large areas of this ecosystem have been cleared and consequently little is known of the original structure and floristics. The woodland community that remains shows considerable local variation in species abundance. *Eucalyptus polycarpa* is usually associated with the woodland and may be locally prominent while other tree species such as *Planchonia careya (Lecythidaceae)* and *Pandanus* sp. *(Pandanaceae)* are often co-dominant.

Vine thickets occur in deep gullies down the slope of Mt. Stuart and in gullies of Herveys Range, west of Townsville. The species composition of vine thickets is usually diverse and variable depending on the locality. Some of the dominant plants noted by the author in the vine thickets around Townsville include *Cochlospermum gillraevei (Cochlospermaceae), Pleiogynium cerasiferum (Anacardiaceae), Ficus opposita (Moraceae), Harpullia hillii (Sapindaceae), Ervatamia orientalis (Apocynaceae), Eugenia wilsonii (Myrtaceae), Cycas media (Cycadaceae)* and various vines and other plants.

ANNOTATED LIST

Collections and observations were made on at least 5 days per month throughout 1981 in the Townsville area, including montane sites, viz. Mt. Stuart, Mt. Elliot and Herveys Range. Each collecting trip involved at least half a day searching for specimens. In the list below, the collectors are abbreviated as follows: TH = T. Helder; TJH = the author. The James Cook University campus and surrounding bushland is given as JCU. Most of the specimens are housed in the author's collection.

SUBFAMILY *CHRYSOBOTHRINAE*

1. ***Chrysobothris queenslandica*** Hawkeswood

Larvae, pupae and adults of this species were obtained from the dead stems of *Acacia bidwillii* Benth. *(Mimosaceae)* on 5 December 1981, on the JCU campus (HAWKESWOOD & PETERSON, 1982; HAWKESWOOD, 1986a). For further information and collection data on this species, see HAWKESWOOD (1986a).

2. ***Merimna atrata*** (Hope)

Large numbers of this buprestid were observed flying into blue fluorescent lights at two adjacent shopping centres during the nights of 4-7 November, 1981. High mortality rates were observed largely due to deliberate crushing by human feet as the beetles landed on the ground. Despite these actions, a series of undamaged specimens were procured. Little is known of the biology of *Merimna*, but they may breed in a number of hosts (HAWKESWOOD & PETERSON, 1982). Examination of most trees and shrubs for bore holes at the shopping complexes (Nathan Plaza and K-Mart) and on adjacent roadsides over several days failed to locate the host plants. By 8 November, no further adults were attracted to the lights.

Material: 18, Townsville, 5 Nov. 1981, TJH.

SUBFAMILY *STIGMODERINAE*

3. ***Stigmodera loriae*** Kerremans

This appears to be a very rare species, poorly represented in museum collections. Only one specimen was obtained and no observations on the behaviour or host plant preferences were possible.

Material: 1, Pallarenda, 8 km north of Townsville, 15 Jan. 1981, TJH, taken in flight.

SUBFAMILY *BUPRESTINAE*

4. ***Melobasis pusilla*** Carter

This appears to be a rare species. It was described by CARTER (1928) from Bowen in northern Queensland. At Townsville, *M. pusilla* was collected only from the leaves of *Acacia bidwillii* Benth. *(Mimosaceae)*. This is the first food plant record for the species. Adults were not observed on flowers, but visited flowering and non-flowering *Acacia* plants 1.2-1.5 m high (max. height of *A. bidwillii* c. 3 m).

Material: 3, JCU, 25 Nov. 1981, TJH; 2, JCU, 28 Nov. 1981, TJH.

5. ***Nascio simillima*** Van de Poll

While collecting bark samples, the author discovered a dead adult of this species in a tunnel ending immediately below the bark layer of a living *Eucalyptus drepanophylla* F. Muell. *ex* Benth. *(Myrtaceae)* (HAWKESWOOD & PETERSON, 1982). BROOKS (1949) recorded *N. simillima* from *Eucalyptus resinifera* Sm. but did not clearly indicate whether the beetle inhabited the leaves only, the bark

only or both.

Material: 1, JCU, 10 April 1981, TJH.

SUBFAMILY *AGRILINAE*

6. ***Cisseis fulgidicollis*** Macleay

Like most *Cisseis* species, the adults of *C. fulgidicollis* inhabit and feed on the foliage of wattles, *Acacia* spp. *(Mimosaceae)*. The species was originally described from King George Sound (as King's Sound) in northern Western Australia by MACLEAY (1888). CARTER (1923) included the species in his *Cisseis* key and listed its distribution as northern Western Australia and Queensland (CARTER, 1929). BROOKS (1948) recorded *Acacia mangium* Willd. as an adult food plant for the species.

Material: 1, Herveys Range, 55 km west of Townsville, 7 Mar. 1981, TJH, on leaves of *Acacia aulacocarpa* A. Cunn. *ex* Benth.; 1, JCU, 13 Dec. 1981, TJH, on leaves of *Acacia leptostachya* Benth.

7. ***Cisseis inflammata*** Carter

CARTER (1923) first described the species; the 6 types were collected from the Johnstone River by H. W. Brown, from Cairns by A. M. Lea, and from the Endeavour River near Cooktown by an unknown collector. My collections from the Giru district (19°30'S, 147°07'E) are noteworthy since they may represent the most southerly record of the beetle. BROOKS (1949) recorded *Acacia cincinnata* F. Muell. *(Mimosaceae)* as an adult food plant for the species.

Material: 1, JCU, 8 Feb. 1981, TJH; 5, JCU, 29 Nov. 1981, TJH; 1, 16 km south-west of Townsville, 1 Dec. 1981, TJH; 7, 4 km south of Giru, 7 Dec. 1981, TJH; 3, JCU, 13 Dec. 1981, TJH (All specimens collected from the leaves of *Acacia holosericea* A. Cunn. *ex* G. Don).

8. ***Cisseis regalis*** Thomson

This is one of the most widespread buprestids in northern Queensland. CARTER (1929) recorded it from Queensland only. BROOKS (1948) recorded *Acacia mangium* Willd. *(Mimosaceae)* as an adult food plant for the species.

Material: 2, JCU, 1 Feb. 1981, TJH; 8, JCU, 8 Feb. 1981, TJH; 2, JCU, 1 Mar. 1981, TJH; 2, JCU, 29 Nov. 1981, TJH; 1, 25 km north of Townsville, 2 Dec. 1981, TJH; 3, 4 km south of Giru, 7 Dec. 1981, TJH; 2, JCU, 13 Dec. 1981, TJH (All specimens collected from the leaves of *Acacia holosericea* A. Cunn. *ex* G. Don).

9. ***Cisseis*** sp. [near *C. cupripennis* (Guérin-Méneville)]

This appears to be a rare species. Extensive searches for the species after the initial capture in the Mt. Elliot area, south-west of Townsville (19°30'S, 146°57'E) during May to December 1981, failed to find additional beetles.

Material: 2, Mt. Elliot, 11 May 1981, TH, feeding on flowers of *Flemingia parvifolia* Benth. *(Fabaceae)*.

10. ***Neospades chrysopygia*** (Germar)

Adults appear restricted to *Atylosia reticulata* (Dryander) Benth. *(Fabaceae)* and *Sida cordifolia* L. *(Malvaceae)*. They feed on the pollen of both plant species, and in the case of *A. reticulata,* also the petals. They have not been observed on the leaves of these plants. CARTER (1923) noted the species was common and widely distributed in Queensland, South Australia and Western Australia. In Western Australia, adults appear to be associated with the foliage of *Solanum lasiophyllum* Dun. *(Solanaceae)* and have not been recorded feeding from *Solanum* flowers (HAWKESWOOD, 1980, unpub. data).

Material: On *Sida cordifolia* L.: 2, 4 May; 4, 3 Oct.; 1, 10 Oct.; 5, 1 Nov.; 1, 16 Nov. On *Atylosia reticulata* (Dryander) Benth.: 2, 8 Feb.; 1, 15 Feb.; 1, 7 Oct. (All specimens collected by the author on JCU during 1981).

11. ***Neospades lateralis*** Blackburn

This species appears to be rare and the only specimens obtained were found on the same plant as one *Cisseis fulgidicollis* Macleay. *Acacia aulacocarpa* A. Cunn. *ex* Benth. *(Mimosaceae)* occurs commonly around Townsville, but despite extensive searches throughout the region during the year, only one population of the beetle was found. BLACKBURN (1888) first described the species from the "Northern Territory of South Australia", while CARTER (1929) noted its occurrence as northern Queensland only. Below is the first food plant record for the species.

Material: 5, Herveys Range, 55 km west of Townsville, 7 Mar. 1981, TJH, feeding on leaves of *Acacia aulacocarpa* A. Cunn. *ex* Benth.

12. ***Neospades simplex*** Blackburn

This species appears to be restricted to the leaves and stems of the saplings of two *Eucalyptus* species *(Myrtaceae)* in the Townsville area where adults are often common and feed on the young foliage. BROOKS (1948) recorded *Jacksonia thesioides* A. Cunn. *(Fabaceae)* as an adult food plant. The adults are very active and fly away at the least disturbance. About 40% of the beetles were maiting during the times of observation (usually 12:00-14:00 hrs, Eastern Australian Standard Time). BLACKBURN (1888) first described the species from the "Northern Territory of South Australia", while CARTER (1929) recorded it from Queensland, New South Wales and Victoria only.

Material: 8, JCU, 8 Feb. 1981, TH & TJH, on *Eucalyptus drepanophylla* F. Muell. *ex* Benth.; 3, Mt. Stuart, Townsville, 28 Feb. 1981, TH & TJH, on *Eucalyptus polycarpa* F. Muell.; 10, Mt. Stuart, 5 Mar. 1981, TJH, on *E. polycarpa*.

SUBFAMILY *TRACHYINAE*

13. ***Trachys australis*** Macleay

This species has been taken singly or in pairs (usually in copula) only on the leaves of *Atylosia reticulata* (Dryander) Benth. *(Fabaceae)*. The adults feed on the epidermis and palisade mesophyll tissues, resulting in small furrows on the adaxial leaf surfaces.

Material: 5, Mt. Stuart, 21 Feb. 1981, TH & TJH; 1, Mt. Stuart, 28 Feb. 1981, TJH; 1, JCU, 19 Feb. 1981, TJH; 1, 20 km north of Townsville, 28 Mar. 1981, TJH; 3, JCU, 30 Sept. 1981, TJH; 1, JCU, 3 Oct. 1981, TJH (All specimens taken on the leaves of *Atylosia reticulata*).

DISCUSSION

Only 13 species in 7 genera of *Buprestidae* were collected from the Townsville area (table 1). All of these, excepting *Merimna atrata* (Hope), were collected in *Eucalyptus* woodland, as defined by ISBELL & MURTHA (1972). BROOKS (1941) recorded 8 species of *Buprestidae* from Townsville, viz. *Anilara antiqua* Théry, *Calodema plebeja* Jordan, *Melobasis quadrinotata* Carter, *M. chrysomelina* Théry, *Agrilus deauratus* Macleay, *A. doddi* Carter, *Neospades cruciata* (Fabr.) and *N. cuprifera* Gestro. None of these species were recorded by the present author (table 1). However, of the 13 species listed from Townsville in the presente study, BROOKS (1941) recorded *Neospades lateralis* Blackburn from Dimbulah, *Cisseis inflammata* Carter from Cooktown, *C. regalis* Thomson from Cairns, *Merimna atrata* (Hope) from Cairns, *Nascio simillima* Van de Poll from Cairns and *Melobasis pusilla* Carter from Bowen. In addition, *Cisseis fulgidicollis* Macleay and *Neospades simplex* Blackburn were recorded from the Cairns-Mareeba district (BROOKS, 1948). Thus, this leaves 5 species, viz. *Chrysobothris queenslandica* Hawkeswood, *Cisseis* sp. [near *C. cupripennis* (Guérin-Méneville)], *Neospades chrysopygia* (Germar), *Trachys australis* Macleay and *Stigmodera loriae* Kerremans, which were not recorded from northern Queensland by BROOKS (1941, 1948, 1949, 1965, 1969) over a period of almost 30 years. However, the record of *Neospades cruciata* (Fabr.) from Townsville (BROOKS, 1941) may be a misidentification, the species having been confused with the very closely related *N. chrysopygia* (Germar). *Neospades cruciata* appears to occur mainly in the Cairns-Cooktown area and I am unaware of any recent or past records of this species from the Townsville area. Some specimens of *N. chrysopygia* have coppery markings on the pronotum and elytra (instead of the usual metallic green) which resemble those of *N. cruciata,* possibly leading to confusion in identification. *Neospades chrysopygia* was one of only a few common species at Townsville, so it appears unlikely that BROOKS would have overlooked the species during his field work. BROOKS (1948) recorded "*Cisseis cupripennis* Guer." from the flowers of *Tephrosia astragaloides* Benth. (not "R. Br." as erroneously cited by BROOKS, 1948) from the Cairns-Mareeba district. CARTER (1929) listed this buprestid from New South Wales only. Thus I suspect that the species that Brooks collected is the same (probably undescribed) species as the one collected from the Townsville district (Mt. Elliot) in the present study.

Although there are few detailed surveys of *Buprestidae* of northern Queensland, at least 20 species are now known from Townsville (BROOKS, 1941; HAWKESWOOD, this paper). This total is small compared to the 100 plus species recorded from northern Queensland as a whole (BROOKS, 1941, 1948, 1949, 1965, 1969) and other regions where the fauna has been well documented, e.g. Sydney and the Blue Mountains (WILLIAMS, 1977; HAWKESWOOD, 1978; WILLIAMS & WILLIAMS, 1983). The paucity of buprestid species is most likely attributed to low diversity of plant species compared to the rainforest / wet sclerophyll forests of northern Queensland where Brooks mainly collected (see lists of food plants in BROOKS, 1941, 1948, 1949, 1965, 1969), and the complex plant communities of the Sydney Basin (BEADLE *et al.*, 1972). both these regions possess a great range of copious nectar-bearing plants such as *Myrtaceae* (e.g. *Eucalyptus, Angophora* and *Leptospermum*) which have been shown to be important food plants for a large number of *Buprestidae*. (e.g. WILLIAMS, 1977; HAWKESWOOD, 1978, 1980, 1982, 1987a, 1987b, 1987c; WILLIAMS & WILLIAMS, 1983). These three dominant genera are either poorly represented *(Eucalyptus)* or absent (*Angophora* and *Leptospermum*) in the Townsville area. The only *Myrtaceae* observed flowering in 1981 were *Eucalyptus alba* Reinw. and *Melaleuca viridiflora* Sol. *ex* Gaertn., both of which were not visited by buprestids. Families such as the *Fabaceae* and *Mimosaceae*, which are commonly utilized by buprestids both as adult (WILLIAMS, 1977; HAWKESWOOD, 1978; WILLIAMS & WILLIAMS, 1983) and larval hosts (HAWKESWOOD & PETERSON, 1982; HAWKESWOOD, 1986b, 1988) are also poorly represented in the Townsville area. However, *Atylosia reticulata* (Dryander) Benth. *(Fabaceae)* and *Acacia holosericea* A. Cunn. *ex* G. Don *(Mimosaceae)*

Species	J	F	M	A	M	J	J	A	S	O	N	D	Nos. of beetles collected
Chrysobothris queenslandica												o	8
Merimna atrata										o			18
Stigmodera loriae		o											1
Melobasis pusilla										o			5
Cisseis fulgidicollis			o									o	2
Cisseis inflammata	+	o								o		o	17
Cisseis regalis	+	o	o									o	20
Cisseis sp.					o								2
Neospades chrysopygia		o	+	+	o			+	o	o			17
Neospades lateralis			o										5
Neospades simplex	+	o	o									+	21
Trachys australis		o	o					o	o				12
Nos. of species per month	**3**	**6**	**6**	**1**	**2**	**0**	**0**	**2**	**2**	**4**	**5**		**Total 128**

Table 1: Occurrence of 12 *Buprestidae** and the number of specimens collected of each species from the Townsville area, northern Queensland during 1981. * *Nascio similima* Van de Poll was not included in the above list as the specimen was found dead; o = Observations and collections undertaken; + = Observations only undertaken.

are important adult food plants for *Trachys*, *Neospades* and *Cisseis* at Townsville (HAWKESWOOD, this paper).

Of various species recorded by BROOKS (1941) from Townsville, the most interesting is *Calodema plebeja* Jordan. (This large, spectacular red and black species is usually restricted to rainforests in the Cairns-Atherton Tableland area). If BROOKS' record is correct, then the species could have been collected only from the vine thickets (rainforest remnants) of the steep slopes of Mt. Stuart or Mt. Elliot. However, it is possible that *C. plebeja* was obtained by Brooks from the Mt. Spec - Paluma area (tropical rainforest) about 70 km north-west of Townsville. BROOKS (1969) also recorded four buprestids, viz. *Cyphagastra pistor* Laporte & Gory, *C. vulnerata* Théry, *Chalcotaenia australasiae* Saunders and *C. cupraceus* Waterhouse on Burdekin Plum, *Pleiogynium cerasiferum* (F. Muell.) Domin *(Anacardiaceae)* (probably as leaf feeders). This plant occurs extensively in rainforests and vine thickets of northern Queensland. Although it is commonly present in the vine thickets on the slopes of Mt. Stuart, no buprestids were found despite extensive searches. BROOKS (1969) also made the interesting observations of *Cyphagastra pistor* Laporte & Gory and *C. vulnerata* Théry feeding on the foliage of *Planchonia careya* (F. Muell.) Kunth *(Lecythidaceae)*. This plant occurs commonly and widely throughout the woodlands of the Townsville area, but despite examination of flowering and non-flowering plants during the year, no buprestids were observed.

It is possible that a decline in the diversity of *Buprestidae* has occurred since the early collections of Brooks and other naturalists. In the Townsville area, this decline, if real, would be most likely attributable to the effects of widespread and frequent fires which extensively destroy young shrubs and trees and burn into the vine thickets from the surrounding woodlands where they are initiated.

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