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Agaocephalini and Dynastini from Cayo district, Belize
(Coleoptera: Scarabaeidae: Dynastinae)

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New records of dynastine scarab beetles in the tribes Oryctini, Agaocephalini and Dynastini from Cayo district, Belize (Coleoptera: Scarabaeidae: Dynastinae)

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Abstract. Six species of the tribe Oryctini, one species of Agaocephalini, and two species of Dynastini are presently recorded from the Cayo district of western Belize. The following five species are newly recorded from Belize: *Heterogomphus mniszechi* (Thomson), *Strategus longichomperus* Ratcliffe, *S. jugurtha* Burmeister, *Spodistes mniszechi* (Thomson), and *Dynastes hercules* (Linnaeus). The following two species are newly recorded from Cayo: *Enema endymion* Chevrolat and *Strategus aloeus* (Linnaeus). Biological and distributional comments relating to these records are presented and briefly discussed.

Résumé. Six espèces de la tribu Oryctini, une espèce de la tribu Agaocephalini et deux espèces de la tribu Dynastini sont signalées du district de Cayo situé dans l'ouest de l'état du Belize. Les deux espèces suivantes sont signalées pour la première fois de Cayo: *Enema endymion* Chevrolat et *Strategus aloeus* (Linnaeus). Cinq espèces représentent de nouvelles citations pour le Belize: *Heterogomphus mniszechi* (Thomson), *Strategus longichomperus* Ratcliffe, *S. jugurtha* Burmeister, *Spodistes mniszechi* (Thomson) et *Dynastes hercules* (Linnaeus). Des commentaires sur la biologie et la répartition de ces espèces sont présentés et brièvement discutés.

Key words / Mots clefs. Rhinoceros beetles, dynastines, Central America, new country records, new district records.

Introduction

There are approximately 800 species belonging to the subfamily Dynastinae recorded from the New World (Ratcliffe and Cave 2006), where they are distributed in a great variety of ecoregions and elevations but are most diverse in tropical forest areas. The biology of many species is unknown, although those that have been studied usually either pass the larval stage feeding on decaying plant matter, especially in rotting logs and stumps, where they may act as significant nutrient recyclers, or feeding on plant roots (Ratcliffe 2003). Adults of most species are nocturnally active and are attracted to artificial lights where they are routinely collected. The larvae of several species of Dynastinae are known to be potentially injurious to plants of economic importance and have been recorded as pests, especially of coconut palms (e.g., *Strategus centaurus* Kolbe in Brazil [Costa Lima 1953]) or sugarcane and corn (e.g., *Podischnus agenor* Olivier) but also of cultivated lawns in towns (e.g., *Oryctes agamemnon* Burmeister and *Pentodon algerinum* Herbst in the United Arab Emirates - personal observation). Members of this subfamily are amongst the largest insects on Earth, with *Dynastes hercules* Linnaeus regularly attaining a length of 15 cm or more. The subfamily contains many species displaying striking sexual dimorphism, normally expressed in horns and protuberances on the head and pronotum of the males. Emlen (2008) reviewed the evolution of horns in beetles and other animals, and it is known that males of some species of Dynastinae can use their horns in combat with other individuals over access to breeding sites or females.

The New World fauna of Dynastinae is composed of six tribes (from a world total of eight tribes). I present here some detailed, recent records for species belonging to three of these tribes (Oryctini, Agaocephalini and Dynastini) collected in the Cayo district of western Belize. Of these three tribes, the Oryctini and Dynastini are distributed across most tropical regions, but are especially diverse in the New World, being represented there by about 135 and 50 species, respectively. The tribe Agaocephalini is restricted to the Neotropics and contains 45 described species.

There has been relatively little documentation of scarab beetles from Belize in comparison to some of its neighboring countries, despite, or perhaps because of, the fact that Belize still retains large areas of undisturbed habitat, including extensive areas of tropical lowland broadleaf forest in the center and south



Figure 1-2. 1) Las Cuevas Research Station and surrounding rainforest vegetation, Cayo district, Belize, June 2006. 2) Rainforest vegetation at Pook's Hill, Cayo district, Belize, June 2006. Photographs by Conrad Gillett.

of the country. However, a comprehensive biodiversity inventory of the Dynastinae of Belize (and also Mexico and Guatemala) is currently in preparation (Ratcliffe and Cave 2008).

Materials and methods

The following records mostly relate to specimens collected during an expedition to Belize undertaken by me in May and June of 2006. The remaining records are taken from specimens collected during similar expeditions undertaken previously by entomologists associated with The Natural History Museum, London. Some of the specimens from these expeditions are housed in the collections of that museum.

All of the collecting took place at sites in Cayo district. Cayo is situated in the west-central part of Belize and is bordered by Guatemala to the west. It is the largest of the six districts in Belize and is predominantly covered in tropical moist forest, especially in the south where the Mayan mountains rise to an altitude of above 1000 m.

Most collecting was undertaken in the vicinity of the Las Cuevas Research Station (approximately 16°44'N; 88°59'W), situated in the Chiquibul forest reserve at an elevation of 550 m in the Mayan mountains (Fig. 1). The site is surrounded by undisturbed tropical moist forest. Collecting was also undertaken at the Pook's Hill reserve (approximately 17°9'N; 88°50'W), which lies about 50 km to the north of Las Cuevas and is also situated in tropical moist forest (Fig. 2). Additional collecting was also done at the street lights of San Ignacio town center (approximately 17°9'22'N; 89°4'17'W), the capital of Cayo district. The three main collecting sites are indicated approximately in Fig. 3.

Specimens were usually collected either through the use of mercury vapor lights or by checking other electric lights at field stations or street lights in towns. Specimens were studied using a binocular microscope when necessary and were identified using the keys in Endrödi (1985), Ratcliffe (2006), Morón et al. (1997), and the photographs in Lachaume (1992). Several of the specimens studied were identified by Brett Ratcliffe and Ronald Cave as part of their ongoing project on the Dynastinae of Mexico, Belize and Guatemala, which prompted me to write this note in order to make these records available. Localities and temporal data are presented and a map of the collecting localities is provided (Fig. 3). Comments on biological observations and geographic distribution are presented and discussed where available and relevant.

Collection repositories are indicated by the following acronyms: **BMNH** – The Natural History Museum, London, UK; **MGCB** – Michael P.T. Gillett Collection, Birmingham, UK; **JKCE** – James Kitson collection, Edinburgh, UK.

Tribe ORYCTINI**Genus** *COELOSIS* Hope, 1837*Coelosia biloba* (Linnaeus, 1767)**Specimens examined.** 3 (2 males and 1 female). BMNH and MGC.B.**Localities.** Las Cuevas (3)**Temporal data.** June (3)**Distribution.** Central Mexico to southern Argentina. Bates (1888) recorded the species from Cayo, and Blackwelder (1944) recorded it from British Honduras. As discussed above, Endrödi (1976) recorded it from Stann Creek district.**Remarks.** This species is known to be myrmecophilous, having been associated with leaf-cutter attine ants (Lachaume 1992; Ratcliffe 2006), which are abundant at Las Cuevas. Two specimens were collected dead in 2006. Although no biological data is available for these specimens, it is notable that in more than two weeks of light trapping at Las Cuevas in 2006, not a single specimen of this species was captured, possibly indicating that the main period of adult activity for this species had passed by the time the two dead specimens above were collected. This species can be amongst the commonest Oryctini attracted to artificial light in certain areas (Yannig Ponchel pers. comm.).

Endrödi (1976) mentioned a locality for this species in Honduras, which actually represents a record from Belize. The locality in question is Middlesex, Stann Creek (sic) district. Stann Creek is a district in eastern Belize (the country formerly known as British Honduras), which undoubtedly explains the confusion. Other records from 'Honduras' reported in Endrödi's monographs could also possibly actually relate to British Honduras (Belize) and care should be taken when interpreting them (e.g., Ratcliffe 2003: 225).

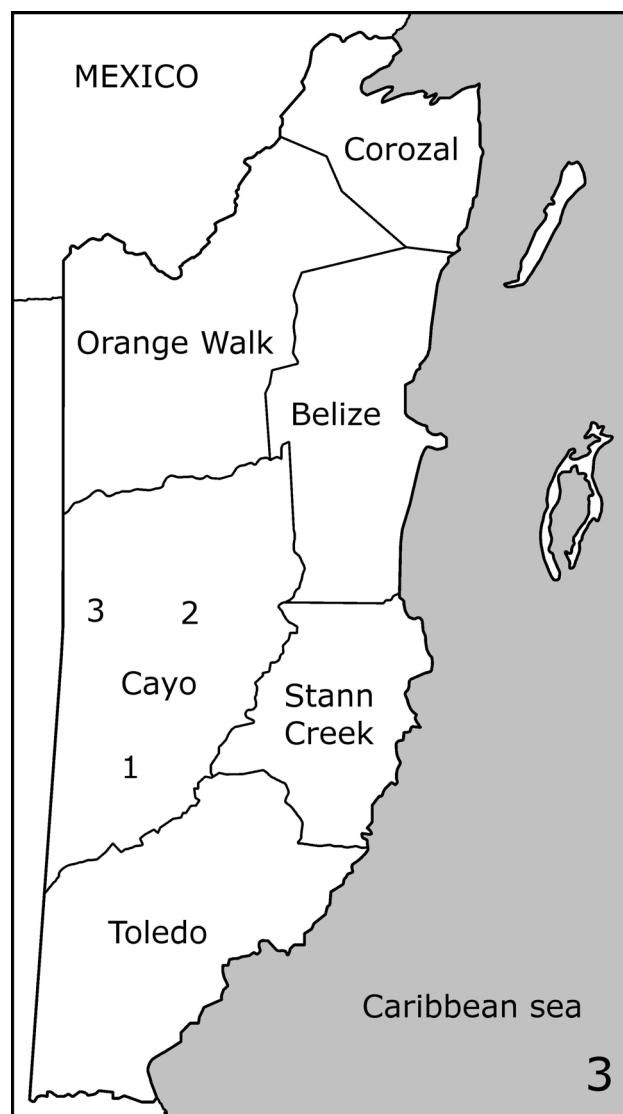


Figure 3. Map indicating the three sites (numbered) where collecting was undertaken in Cayo district during May and June 2006. 1) Las Cuevas Research Station. 2) Pook's Hill Lodge. 3) San Ignacio town.

Genus *ENEMA* Hope, 1837*Enema endymion* Chevrolat, 1843
(Fig. 4)**Specimens examined.** 20 (12 males and 8 females). BMNH, MGC.B and JKCE.**Localities.** Las Cuevas (12), Pook's Hill (2), San Ignacio (6).



Figure 4-8. Dynastinae collected at Las Cuevas research station, Cayo, Belize, during June 2006. Male specimens illustrated. **4)** *Enema endymion*. **5)** *Strategus aloeus*. **6)** *Strategus longichomperus*. **7)** *Strategus jugurtha*. **8)** *Spodistes mnischei*. Photographs by James Kitson.

Temporal data. May (8), June (12).

Distribution. Southern Mexico to Brazil and Bolivia (Ratcliffe and Cave 2006). Bates (1888) and Blackwelder (1944) recorded it from British Honduras. **New district record** for Cayo.

Remarks. This species was remarkably abundant at all sites visited in Belize in May and June 2006. Evidently individuals were emerging *en masse* with the onset of the annual rainy season, beginning in late May/early June in that part of Central America. The beetles were seen by the hundreds in San Ignacio and often covered the pavements and roads of the area during the day, where many of them were crushed by pedestrians and vehicles.

Of the many hundreds of specimens of this species attracted to lights at Las Cuevas, I was able to collect a single male which possessed exceptionally well developed secondary sexual characters. In this specimen the cephalic horn is much longer than that of all other males seen (including all specimens in the BMNH) and, moreover, there is a well-developed bifurcate forward projecting protuberance on the anterior portion of the pronotum. The specimen, in fact, superficially resembles a small male of *Enema pan* (Fabricius), although it is the typical brown color of *E. endymion*.

I observed *E. endymion* emerging from the open grass area surrounding Las Cuevas Research Station at around dusk (approximately 18:30 local time). Many beetles would quickly take off, and many were attracted to our lights. Beetles were also seen to burrow into the soil of the grassy area and into the ground surrounding the lights and the main building. From about 20:00, adult flight activity significantly declined. During the daytime it was exceptional to see a live beetle around the station, probably indicating that most beetles either dispersed with the onset of daylight or that they were lodged in bur-

rows in the ground. Several specimens were collected in unbaited pitfall traps and also in traps baited with human dung to collect Scarabaeinae in the forest. Almost certainly these were accidentally captured by the traps and not actually attracted to them. If anything, it probably indicates the great abundance of these beetles roaming the forest floor. During daytime forays into the forest, occasional specimens of *E. endymion* would be seen crawling over the ground, suggesting that under the shady cover of the forest, this species can be diurnal.

Genus *HETEROGOMPHUS* Burmeister, 1847

Heterogomphus mnischei (Thomson, 1859)

Specimens examined. 1 (1 female). MGCB.

Localities. Las Cuevas (1)

Temporal data. June (1)

Distribution. Southern Mexico to Bolivia and Brazil. (Ratcliffe and Cave 2006). **NEW COUNTRY RECORD** for Belize.

Remarks. Only this single specimen was captured in more than two weeks of collecting, indicating either the scarcity of this species or that the adults are preferentially active during another period of the year.

Genus *STRATEGUS* Kirby, 1828

Strategus aloeus (Linnaeus, 1758)
(Fig. 5)

Specimens examined. 9 (4 males and 5 females). BMNH, MGCB and JKCE.

Localities. Las Cuevas (8), Pook's Hill (1)

Temporal data. May (1), June (8)

Distribution. Southern USA to central Bolivia and Brazil (Alvarez et al. 2008). The species has been recorded from British Honduras under the name *Strategus julianus* Burmeister by Bates (1888) and by Blackwelder (1944), and as *S. aloeus* from Belize (Stann Creek) by Ratcliffe (1976).

Remarks. In May and June 2006, more females than males of this species were recorded from Las Cuevas and Pook's Hill. Surprisingly, this very widespread species was not as abundant as the other sympatric species of the genus in Cayo (see below). The specimens studied from Cayo are smaller and less robust than typical South American specimens of the same species. Biological information for this species was discussed by Ratcliffe and Cave (2006). **New district record** for Cayo.

Strategus longichomperus Ratcliffe, 1976
(Fig. 6)

Specimens examined. 12 (4 males and 8 females). MGCB and JKCE.

Localities. Las Cuevas (9), Pook's Hill (3)

Temporal data. May (3), June (9)

Distribution. Mexico to Honduras (Ratcliffe and Cave 2006). **NEW COUNTRY RECORD** for Belize.

Remarks. This and the following species were the most common species of *Strategus* at Las Cuevas. The females were more common at light than the males by a ratio of approximately 3:1.

***Strategus jugurtha* Burmeister, 1847**
(Fig. 7)

Specimens examined. 10 (5 males and 5 females). BMNH, MGCB and JKCE.

Localities. Las Cuevas (9), Pook's Hill (1)

Temporal data. May (1), June (9)

Distribution. Mexico, through central America to Peru (Ratcliffe and Cave 2006). **NEW COUNTRY RECORD** for Belize.

Remarks. This species also displayed a greater proportion of females over males captured at the lights. No further biological information was obtained.

Tribe AGAOCEPHALINI

Genus *SPODISTES* Burmeister, 1847

***Spodistes mnischechi* (Thomson, 1860)**
(Fig. 8)

Specimens examined. 10 (4 males and 6 females). BMNH, MGCB and JKCE.

Localities. Las Cuevas (10)

Temporal data. June (10)

Distribution. Southern Mexico and northern Central America. Recorded from Guatemala, El Salvador, Honduras and Nicaragua (Endrödi, 1970; Ratcliffe 2003). Also doubtfully recorded from Panama and Colombia (see comment in Ratcliffe 2003). **NEW COUNTRY RECORD** for Belize.

Remarks. Females of this species were more abundant than males in June 2006. No further biological data is available.

Tribe DYNASTINI

Genus *MEGASOMA* Kirby, 1825

***Megasoma elephas* (Fabricius, 1775)**

Specimens examined. 4 (2 males and 2 females)

Localities. Las Cuevas (2), Pook's Hill (2)

Temporal data. September (2), no date (2)

Distribution. Southern Mexico to Venezuela (Ratcliffe and Cave 2006). The species was recorded from Cayo by Bates (1888) and from British Honduras by Blackwelder (1944). The distribution map in Lachaume (1985) appears to include Belize within the distribution of the species.

Remarks. The two specimens collected at Las Cuevas were donated to me by Andrew Matthews (University of Edinburgh) but were not retained as they had deteriorated and disarticulated. The species is active towards the end of the rainy season and is often attracted to lights (A. Matthews, pers. comm.)

Genus *DYNASTES* Macleay, 1819

Dynastes hercules (Linnaeus, 1758)

Specimens examined. 2 (1 male and 1 female). BMNH.

Localities. Las Cuevas (2)

Temporal data. June (2)

Distribution. Southern Mexico to Bolivia and southeastern Brazil. Although Lachaume (1985) published a distribution map which appears to include Belize within the distribution of this species, he did not explicitly state this. **NEW COUNTRY RECORD** for Belize.

Remarks. These two specimens were collected dead by Daegan Inward in the proximity of the Las Cuevas Research Station (D. Inward, pers. comm.). No specimens of this species were collected during more than two weeks of light trapping at the site in June 2006, possibly indicating its scarcity in the area or that its peak adult activity period had already passed.

Discussion

The fauna of Oryctini, Agaocephalini and Dynastini hitherto known from Cayo predominantly contains widespread species distributed throughout much of southern Mexico and Central America. Every species recorded in this paper from Belize also occurs in Mexico and Honduras (Morón et al. 1997; Ratcliffe and Cave 2006), and most also occur in the other Central American countries (Ratcliffe 2003; Ratcliffe and Cave 2006). Of these species, only *S. longichomperus* and, to a lesser extent, *S. mniszechi* appear to have more limited distributions in northern central America and southern Mexico. Belize is effectively a part of the low-lying Yucatan peninsula which appears to have a reduced diversity of dynastine scarabs compared to the more rugged terrain in Central America and southern Mexico. The mountain pine ridge, one of the most elevated areas in Belize (reaching more than 1000 m altitude), and having north-temperate floral and faunal affinities, roughly separates the low-lying north of the country from the more mountainous and forested south (including much of Cayo) and may act as a barrier to dispersal of species from the mountainous backbone of Central America into the north of Belize and the Yucatan peninsula. Therefore, the forested and hilly country in the Cayo district can be expected to contain the highest diversity of these beetles in Belize. Given its geographical position, the Cayo district would be expected to contain a fauna similar to the neighboring portion of Guatemala. Several other widespread species of Oryctini and Dynastini may very likely be recorded from Cayo or other districts of Belize in the future; these may eventually include the following: *Enema pan* (Fabricius); *Heterogomphus chevrolati* Burmeister; *Podischnus agenor* (Olivier); *Xyloryctes lobicollis* Bates; *Golofa tersander* Burmeister; *Golofa pizarro* Hope; *Dynastes hyllus* Chevrolat. However, it is unlikely that further species of the tribe Agaocephalini will be recorded from Cayo or anywhere else in Belize, because the distribution of the two other species of *Spodistes* occurring

in northern Central America lie either on the Pacific face of mountain slopes (*S. monzoni* Warner) or far to the south (*S. beltianus* [Bates]) (Ratcliffe and Cave 2006).

Because scarab beetle assemblages have been shown to be useful in biogeographic studies to identify areas of endemism (Schuster and Cano 2006), it is clear that there remains much to be learned from the fauna of Dynastinae and other scarab beetles in Belize.

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