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A NEW SPECIES OF PRIONOCERIDAE (COLEOPTERA: CLEROIDEA) FROM THE EOCENE OF BRITISH COLUMBIA, CANADA

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Abstract.— *Prionocerites tattriei* **gen.** and **sp. nov.** (Insecta: Coleoptera: Cleroidea: Prionoceridae) are described from Eocene amber associated with the Hat Creek Coal Formation, Kamloops Group, British Columbia, Canada. This is the first occurrence of the family Prionoceridae in the fossil record and from the Western Hemisphere.

Key words.— Cleroidea, Prionoceridae, new genus, new species, Eocene, Hat Creek Coal Formation, Canada.

INTRODUCTION

The cleroid beetle family Prionoceridae includes three genera and about 150 extant species distributed mostly throughout the warmer parts of the Old World, except Madagascar and Australia. The genus *Lobonyx* Jacquelin DuVal, with 16 species, occurs from southern Europe and North Africa to Asia Minor, Central Asia, India and China. *Prionocerus* Perty includes two species, one in India and Southeast Asia and another extending from Asia to tropical Africa. The closely related genus *Idgia* Laporte, with the bulk of the species, occurs throughout Africa and from Asia Minor to India, China, Japan, the Philippines, Southeast Asia and the Sunda Archipelago. Relatively little is known about prionocerid biology. Adults are often collected in flowers and at least some are known to be pollen feeders. Larvae have been found in soil and leaf litter, as well as under bark. The gut contents of an *Idgia* larva from Sri Lanka were found to contain numerous insect fragments, while the larva of *Lobonyx aeneus* (Fabricius) from a pupal cell at the base of an oak tree in Spain had fibrous vegetable material in the gut, along with a few apparently insect setae. *Idgia* larvae in India were observed feeding on a dead wasp, as well as on dead larvae and a living pupa of a pyralid moth. It appears as if prionocerids, like many members of the related family Melyridae, are pollenophagous as adults and predaceous or saprophagous as larvae (Gardner 1929, Crowson 1964, Constantin 1990).

Larvae of *Lobnonyx aeneus* and those of at least two species of *Idgia* have been described and illustrated by Gardner (1929) and Crowson (1964). These larvae resemble those of Melyridae with respect to several head features, but are distinguished by the presence of pigmented plates, often more than one color, on various tergites, the long, more or less parallel, acute and densely setose urogomphi, and, particularly by the presence of a unque type of what Crowson referred to as "eversible glands" in the vicinity of the abdominal spiracles and on each urogomphus. Although these minute, translucent, tubular, apically flared processes are not necessarily eversible or glandular, they do provide a clear family-group apomorphy, illustrated for

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Lobonyx (Crowson 1964), but also seen in larvae of *Idgia* from India.

In sorting through a quantity of donated Eocene amber from Hat Creek, British Columbia, a single specimen of an unusual larva was discovered (Fig. 1), which bore a remarkable superficial resemblance to those of extant Prionoceridae. Closer examination revealed the presence of apically flared processes (Fig. 2) characteristic of all known prionocerid larvae. The family has no previously reported fossil record. The basal cleroid family Trogossitidae (= Peltidae), however, occurs as far back as the Jurassic (Kirejtshuk and Ponomarenko 1990) and the more closely related family Acanthocnemidae is known from the Upper Cretaceous (Zherichin 1977).

This is the second insect species described from Hat Creek amber; the first was a tiny berothid neuropteran (Archibald and Makarkin 2004). A number of other insects in this amber are currently being examined.

Prionoceridae Lacordaire 1857

Prionocerites gen. nov.

Etymology. Generic name derived from the extant beetle genus *Prionocerus* (Greek, *prion*, *prionos*, saw, and *keras*, *keratos*, horn) and the ending *-ites* (Greek, indicating likeness).

Remarks. In Crowson's (1964) key to known larvae of Prionoceridae, *Lobonyx aeneus* is separated from *Idgia* sp. by having 1) the halves of the head capsule not quite meeting ventrally behind labium, 2) the basal labial palpomere less than twice as wide as long (more than twice as wide in *Idgia*), 3) antennomere 2 not more than twice as wide as long and nearly as long as antennomere 1 (many times as wide as long and much shorter than antennomere 1 in *Idgia*), and 4) ventral sclerites of thorax small, well marked and widely separated, bearing few setae (larger, less well marked, bearing more numerous setae in *Idgia*). Characters 1 and 4 are not visible in *P. tattriei*, while 2 and 3 resemble the condition in *Lobonyx*. The urogomphi and dorsal maculation, on the other hand, are more like those in *Idgia*. Because this larva cannot be placed with certainty in either *Lobonyx* or *Idgia* and the larva of *Prionocerus* is unknown, a new collective genus is proposed for this fossil larva.

As a collective group, a description or diagnosis is not provided. This parataxonomic generic name is proposed to include all fossil larval species referable to the family Prionoceridae, yet whose orthotaxonomic generic position is unclear by the poor or incomplete preservation of their known specimens. Collective groups do not have type species (ICZN 1999: articles 13.3.2, 42.3.1, 66, and 67.14).

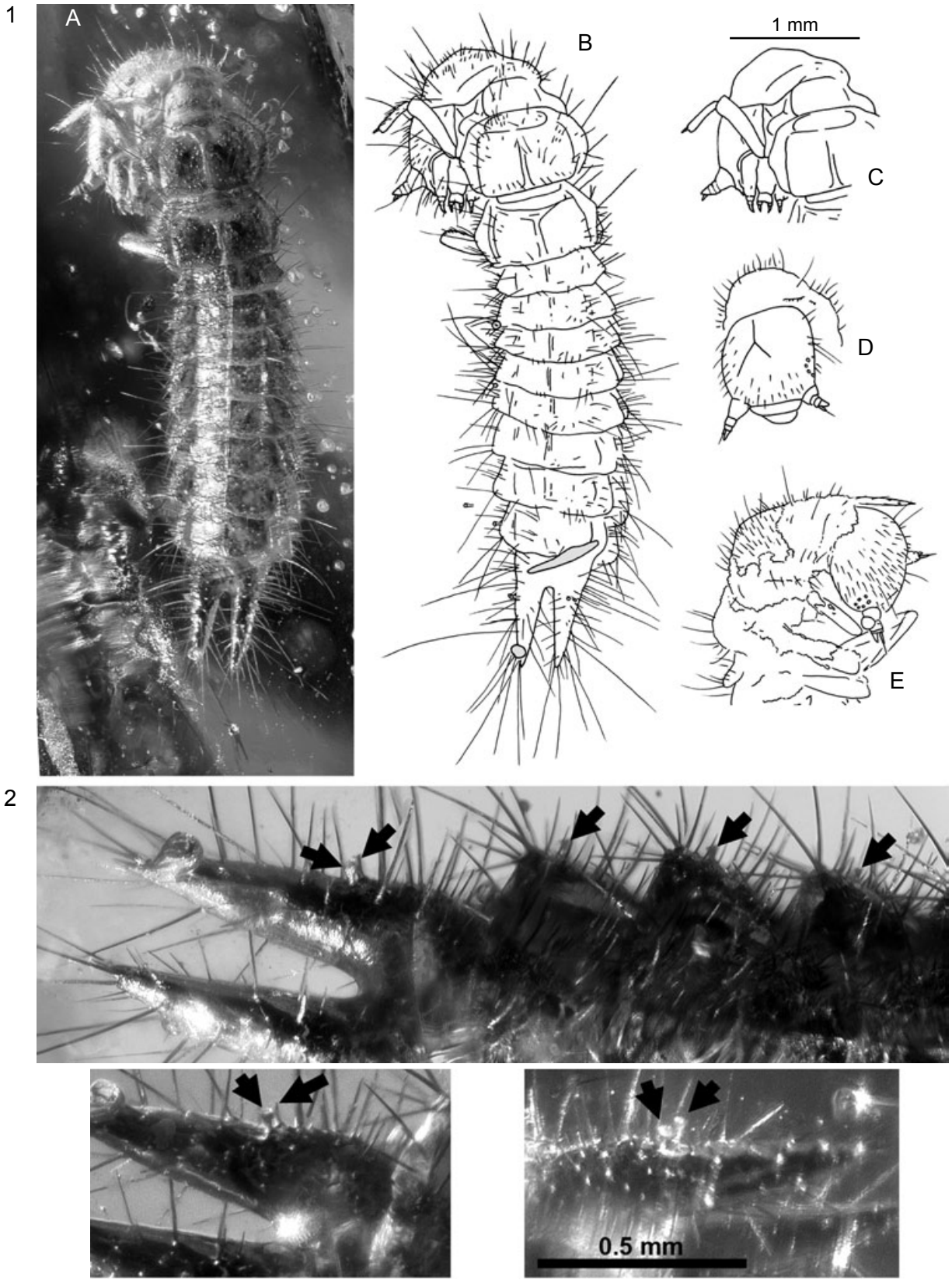
Prionocerites tattriei sp. nov.
(Figs 1A–E, 2)

Diagnosis. With following characters, and those provided in description. Body elongate, parallel-sided, somewhat flattened; head moderately long, prognathous, flattened; legs long, slender; abdomen with two pairs of lateral tergal processes on most segments; long, parallel, acute urogomphi on tergum IX. Sides of head slightly curved, not as parallel as in *Idgia* larvae examined. Thoracic, abdominal terga with pattern of dark markings, vestiture of long, dark, stiff setae similar to those in *Idgia*. Antennae, maxillary, labial palps similar to those in other Prionoceridae with slight differences in relative lengths of antennomeres, palpomeres; antennomere 2 slightly shorter than 1; labial palpomere 1 less than twice as wide as long. Abdominal terga each with one or two pairs of minute, tubular, apically flared processes similar to those of both *Idgia* and *Lobonyx*. Urogomphi of same general type as in other Prionoceridae, but longer, more slender, acute than those in *Lobonyx*. Pigment pattern resembling that in *Idgia*, but with tergum IX, basaed of urogomphi more darkly pigmented.

Etymology. The specific epithet is formed from the surname of Bill Tattrie, who collected the holotype and donated it to us for this study.

Description. Length about 5.4 mm. Body elongate, about 5.6 times as long as wide, more or less parallel-sided, slightly wider at about middle, tapering slightly towards posterior end, slightly depressed. Head lightly pigmented, probably yellow, with large dark markings on either side posteriorly; protergum yellow with pair of small posterolateral black spots; meso-, and metatergum each with pair of moderately large dark maculae on lighter background; abdomen with variable dark tergal markings and urogomphi dark in color; lightly pigmented ecdysial line extending from mesotergum to tergum VI or VII. Vestiture of dense, dark, stiff setae of varying lengths.

Head slightly longer than wide, depressed; sides weakly rounded or subparallel, with long epicranial stem; frontal arms not clearly seen. Number of stemmata not clear, but at least three with distinct lenses. Antennae short, about 0.1 times as long as head width, but located on antennifer which is almost as long as antenna; antennomeres 1 and 2 strongly transverse, 2 slightly shorter than 1; antennomere 3 elongate, narrow; sensorium on antennomere 2 broadly conical, more than half as long as 3. Mandibles not clearly seen; apex appears narrow and subacute. Ventral mouthparts strongly retracted; maxillary articulating area present; cardo distinct; stipes elongate; mala simple; palps 3-segmented with distinct palpifer. Labium consisting of prementum, mentum and submentum; labial palps 2-segmented, separated by more than



Figures 1–2. (1) Holotype of *Prionocerites tattriei*, RBCM.EH2008.015.0001: (A) habitus photograph; (B) habitus drawing; (C–E) drawings of the head and anterior portion. All to scale, 1 mm; (2) "Eversible glands", indicated by arrows. Scale, 0.5 mm.

width of basal palpomere; ligula absent. Hypostomal rods absent.

Protergum slightly longer than and somewhat narrower than meso- or metatergum, each of which has slender anterior and posterior area set off from main body of segment. Legs moderately long and slender; pretarsus with single seta. Thoracic spiracles annular, located on spiracular sclerite near anterior end of mesothorax. Abdomen (excluding urogomphi) about 1.25 times as long as thorax; segment I shorter than any of those following; segments strongly transverse, each with two pairs of laterotergal processes, the ventral pair usually extending slightly beyond the dorsal one. Body of segment IX (without urogomphi) distinctly shorter and narrower than VIII; urogomphi about twice as long as remainder of segment, arising moderately close together, broad at base, evenly tapering to acute apex, posteriorly oriented, not dorsally curved. Sternite IX short, simple; segment X distinct, posteroventrally oriented with transverse anal opening. Abdominal spiracles annular, located at base of each dorsal laterotergal process. Dorsal tergal processes and urogomphi each with one or two minute, tubular, apically flared appendages (Fig. 2).

Type material. Holotype: Specimen number RBCM.EH2008.015.0001, housed in the collection of the Royal British Columbia Museum (RBCM), Victoria, British Columbia, Canada. Well preserved in clear, yellow Hat Creek amber, but with prothorax and head sharply bent ventrally, obscuring much of the dorsal and ventral views of the head and the ventral view of the thorax. The amber was collected *in situ* in subbituminous Hat Creek coal (Hat Creek Coal Formation, Kamloops Group, part of the Eocene Okanagan Highlands region of fossil sites in south-central BC to north-central Washington), situated between Cache Creek and Lillooet in south-central British Columbia, Canada. Hat Creek coal is no older than Eocene by biostratigraphic indicators (Moss *et al*. 2005; references therein); overlying rhyolite has been dated Early Eocene at 51.2 ± 1.4 Ma (Church *et al*. 1979), but Reed (2000) suggested that this rhyolite was subsequently superimposed over the coal deposits. Further recent discussion and review of Hat Creek amber may be found in Archibald and Makarkin (2004) and Moss *et al*. (2005).

DISCUSSION

The presence of an insect in amber that is known to be found today under bark is not surprising, as amber is formed from tree resin that is confidently thought to have sometimes solidified under its bark. Further, a prionocerid larva has been found under an oak in modern Spain, which were present at Hat Creek (Moss *et al*. 2005), although not thought to have been the resin-producing tree.

Nor is it surprising to find an insect in the Eocene of British Columbia that today ranges through warmer parts of the Old World and is absent in the New World. In the Eocene, land bridges through forested regions of mild climate connected North America with Asia across Beringia, and with Europe through Greenland (discussion and review in Archibald *et al*. 2005, Archibald and Makarkin 2006, Archibald *et al*. 2006). The Eocene ranges of multiple plant, vertebrate and insect taxa indicate large-scale intercontinental dispersal across the Northern Hemisphere through this time (above references). Various plants and animals that then flourished in the New World, including the Okanagan Highlands, are now extirpated from these regions, for example, dawn redwood (*Metasequoia*), today found in China, and bulldog ants (Formicidae: Myrmeciinae), today found in the Australian region.

Pollen analysis shows that the Hat Creek coal swamp in which *P. tattriei* lived supported a plant community that contained a combination of temperate and tropical associated elements such as *Picea* (spruce) and *Sabal* (palm). This is consistent with other Okanagan Highlands communities (and many places globally in the Eocene) that contained both low and high latitude associated taxa (as expressed in the modern world), implying that regions of cool mean annual temperature values experienced mild winters, i.e., low seasonality (Moss *et al*. 2005; Greenwood *et al*. 2005). Insects that today range only in warmer, even tropical regions are now well known from upper microthermal to lower mesothermal Okanagan Highlands sites (Archibald and Farrell 2003).

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