

**A review of the distribution and natural history
of *Apiocera barri* and *Nemomydas pantherinus*
(Diptera: Apioceridae and Mydidae), two rare asiloid flies
from the southern Interior of British Columbia**

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ABSTRACT

Canada's only apiocerid fly, *Apiocera barri* Cazier, and sole western mydid fly, *Nemomydas pantherinus* (Gerstäcker), (Diptera: Apioceridae and Mydidae) are rare species practically restricted to the antelope-brush, *Purshia tridentata* (Pursh) de Candolle (Rosaceae), steppe of the southern Okanagan Valley of British Columbia. Some aspects of their natural history are outlined. The distributional records of the species are recorded and mapped in the context of antelope-brush steppe in the Okanagan Valley. This ecosystem has been reduced to one-third of the area occupied in the 1860s. Because these two flies are conspicuous, rare, and dependent to a large extent on antelope-brush steppe, they are good candidates for further study in the federal and provincial efforts to conserve this threatened ecosystem and its many rare species.

INTRODUCTION

The families Apioceridae and Mydidae are sister clades in the dipteran superfamily Asiloidea (Yeates and Irwin 1996). In western North America, the two families are associated with arid or semiarid habitats. Canada's only apiocerid, *Apiocera barri* Cazier, and sole western mydid, *Nemomydas pantherinus* (Gerstäcker), (Diptera: Apioceridae and Mydidae) are rare species practically restricted to the grasslands of British Columbia (BC) in the southern Okanagan Valley. The only other mydid in Canada is *Mydas clavatus* (Drury), a very large fly living mostly on beaches of the Great Lakes in southern Ontario (Marshall 2006).

These two families have similar biogeographical histories. Both ranged widely in western and southern Pangaea before its breakup in the late Jurassic (180 to 160 million years ago) and the distribution of the apiocerids and the plesiomorphic mydid subfamilies (Raphiomidinae and Megascelinae) is congruent with the known geological sequence of the separation of the Gond-

wanian continents (Yeates and Irwin 1996).

The antelope-brush steppe of BC's southern Okanagan Valley (Figs. 1-3) is one of the most endangered ecosystems in Canada and contains many nationally rare species of plants and animals (Schluter *et al.* 1995). This ecosystem is dominated by the antelope-brush/needle-and-thread grass plant community (*Purshia tridentata* (Pursh) de Candolle (Rosaceae) and *Hesperostipa comata* (Trinius & Ruprecht) Barkworth (Poaceae)) (Dyer and Lea 2003). Although *Purshia* is most commonly found in this plant community, peripheral communities, including ponderosa pine woodland, also may contain this shrub. The antelope-brush / needle-and-thread grass community is red-listed in BC and is globally imperiled owing to limited world distribution and substantial decreases in area related to agricultural development and urbanization. One hundred four rare invertebrates including 33 provincially listed species at risk occur there (Dyer and Lea 2003). Some of these species are also listed federally by the fed-

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Figure 1. Antelope-brush steppe on the east side of Osoyoos Lake north of Osoyoos, British Columbia; view to north. The darker shrubs, especially prevalent in the background, are antelope-brush, *Purshia tridentata*; the paler ones are big sagebrush, *Artemisia tridentata* Nuttall (Asteraceae). Photo: Robert A. Cannings, 1981.



Figure 2. Antelope-brush steppe north of Oliver, British Columbia; view to north. McIntyre Bluff, on the left, is near the south end of Vaseux Lake. The pale shrubs in the foreground are common rabbit-brush, *Ericameria nauseosus* (Pallas) Nesom & Baird (Asteraceae). Photo: Stephen R. Cannings, 1979.

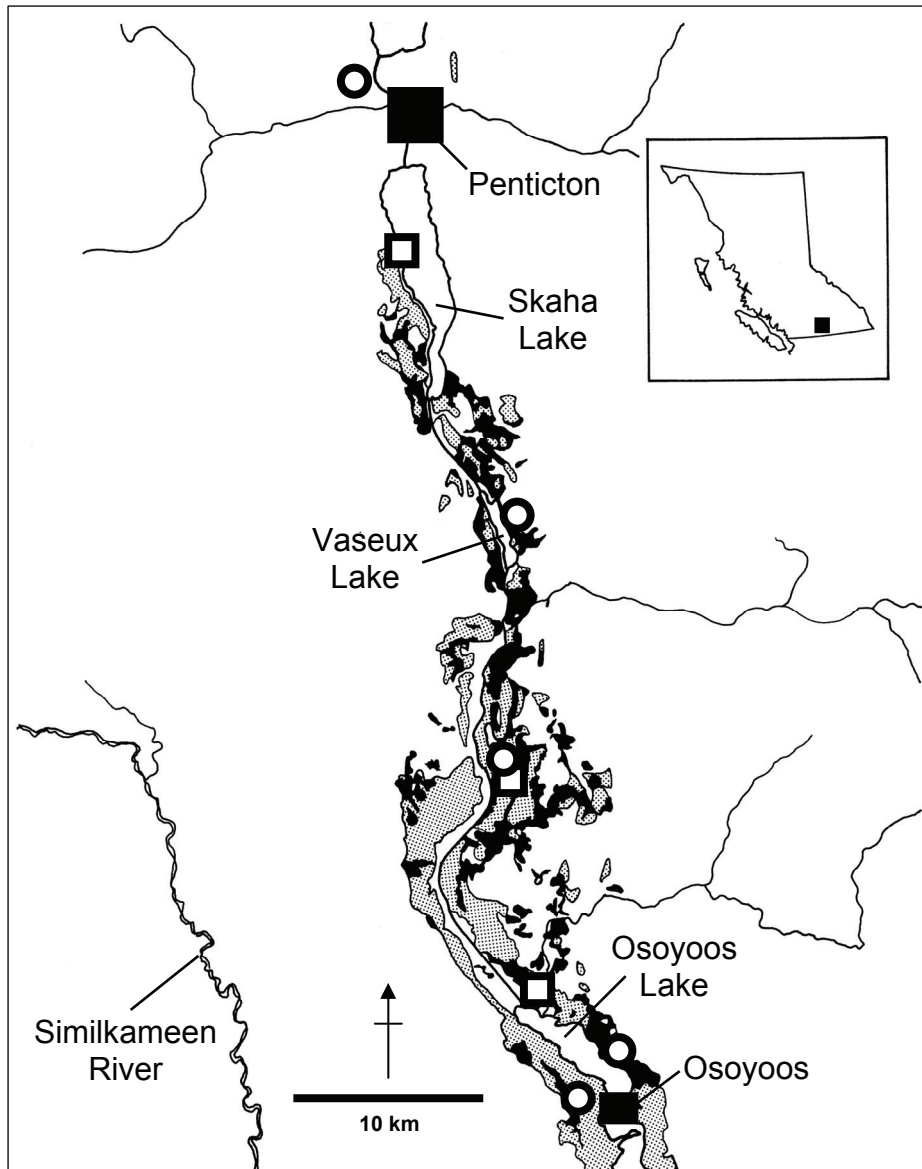


Figure 3. Distribution of *Apiocera barri* (○) and *Nemomydas pantherinus* (□) in British Columbia. Some symbols represent several records at approximately the same locality. *Nemomydas pantherinus* has been collected in two locations outside the range of this map: at Vernon to the north (119°15'N x 50°15'N) and near Grand Forks to the east (49°01'N x 118°32'W). Insert shows location of the South Okanagan in British Columbia. The original (1860) range of the antelope-brush / needle-and-thread grass community is shown in grey; the recent distribution (2001) is in black.

eral Committee on the Status of Endangered Wildlife in Canada (COSEWIC).

COSEWIC and the BC Ministry of Environment's Ecosystems Branch (MOE) are involved in the documentation of species at risk in BC. The former (COSEWIC 2006)

develops lists and status reports of species of national relevance and, in conjunction with the BC Invertebrate Recovery Team (MOE 2006), adopts recovery plans for nationally endangered invertebrate species occurring in BC. In addition, the BC Con-

servation Data Centre (CDC) (MOE 2006) maintains data on species and habitats at risk within the province and develops conservation ranks for them. For the sake of practicality and efficiency, COSEWIC and MOE are focusing attention on a few rare arthropod species in the antelope-brush ecosystem that are reasonably well-known and amenable for inventory and other study. Behr's hairstreak (*Satyrium behrii* (W.H. Edwards)) and the ground mantid,

(*Litaneutria minor* (Scudder)) are obvious choices that are currently being studied. *Apiocera barri* and *N. pantherinus* are large (2 cm long) and conspicuous flies that apparently are truly rare and largely restricted to the threatened antelope-brush steppe ecosystem. As such, they are excellent candidates for official conservation listing. The information outlined below is the first overview of the available distributional data on these two species.

MATERIALS AND METHODS

Data were collected from 22 and 18 specimens of *A. barri* and *N. pantherinus*, respectively, from the following institutions: Canadian National Collection of Insects, Agriculture and Agri-food Canada, Ottawa, ON (CNCI), Royal British Columbia Museum, Victoria, BC (RBCM), Spencer Entomological Museum, University of British Columbia, Vancouver, BC

(UBCZ), and US National Museum of Natural History, Washington, DC (USNM).

In addition, 34 paratypes of *A. barri* collected at Osoyoos are deposited in a number of American collections, including the American Museum of Natural History (New York) and the California Academy of Sciences (San Francisco) (Cazier 1982).

RESULTS

Apiocera barri

Apiocerids, often mistakenly termed "flower-loving flies" (they seldom visit flowers) spend much of their time on open sand or soil in hot, dry areas where they imbibe water from soil and honeydew from beneath aphid-infested plants (Cazier 1982). Females lay eggs in sandy soil at the base of plants and the larvae apparently prey on soil invertebrates (McAlpine *et al.* 1981).

Apiocera, the only apiocerid genus, contains 137 described species in four subgenera. Each subgenus is restricted to one of four discrete geographical regions: western North America (including northern Mexico), southwestern South America, South Africa, and Australia. This disjunct distribution resulted from the break-up of Pangaea and Gondwanaland and the subsequent displacement of the continental plates (Yeates and Irwin 1996). The North American subgenus, the earliest lineage within the genus (Yeates and Irwin 1996), contains 58 named species (Cazier 1982). *Apiocera*

barri occurs from the southern Okanagan Valley in BC south through eastern Washington, western Idaho and eastern Oregon to southern California (Cazier 1982). In BC it is most common in the sandy habitat dominated by *Purshia* on the east side of Osoyoos Lake (Fig. 1), but it occurs rarely at least as far north as the *Festuca* (Poaceae) grassland patches growing on sandy loam at Penticton. Adults have been collected only from 13 July to 17 August.

Canadian records (Fig. 3): Oliver, 13.vii.1923, C.B. Garrett (♀, CNCI); Oliver, 24.vii.1923, E.R. Buckell (♂, ♀, CNCI); Oliver, 24.vii.1923, P.N. Vroom (2♂, ♂♀ *in cop.*, CNCI; ♂, ♀ (RBCM); ♂, USNM); Osoyoos, 10.viii.1936, E.R. Buckell (♂♀ *in cop.*, CNCI, ♂, UBCZ); Osoyoos, 13.viii.1942, E.R. Buckell (4♀, CNCI); Osoyoos, Indian desert [east side Osoyoos Lake], 12.viii.1986, M.J. Sarell (♂, RBCM); same location, 13.viii.1986, M.J. Sarell (♀, RBCM); same location, 17.viii.1986, M.J. Sarell (♂, RBCM); Osoyoos Lake, east side, 14.viii.1969,

J. Bigelow, M. Mortenson and M. Cazier (24♂, 10♀, paratypes deposited in various US collections [Cazier 1982]); Penticton, West Bench, 3.viii.1986, R.A. Cannings (♂, RBCM); Vaseux Lake, 7.viii.1978, R.A. Cannings (♂, UBCZ).

Nemomydas pantherinus

Adult mydids, with their long antennae and colourful bodies, are probably wasp mimics. Adults may be predators but probably most feed at flowers and those with atrophied mouthparts (such as *Nemomydas*) may not feed at all (McAlpine *et al.* 1981). Little is known about the larvae; some species prey on beetle larvae in rotting wood and sandy soil (McAlpine *et al.* 1981).

Mydids are widely distributed, especially in dry tropical, subtropical and Mediterranean climates. The earliest lineages, Raphiomidinae and Megascelinae, were recently transferred from the Apioceridae to the Mydidae (Yeates and Irwin 1996). This old and widely scattered family contains about 355 species in 65 genera worldwide (Dikow 2006). There are 23 genera in the New World and at least 54 North American species (B.C. Kondratieff, pers. comm.). *Nemomydas* contains 21 species in North and Central America and eastern Asia (B.C. Kondratieff, pers. comm.).

Nemomydas pantherinus is distributed in intermontane grasslands and dry forests

from southern British Columbia south to California (Stone *et al.* 1965). In Canada, this distinctive, yellow and black fly is evidently restricted to the dry, sandy grasslands of the southern Okanagan Valley and adjacent Boundary region to the east. Most Canadian records are from Oliver and Osoyoos in the extreme southern Okanagan where adults have been collected only from 5 July to 2 August.

Canadian records (Fig. 3): Grand Forks, 5.5km W on Hwy 3, 28.vii.1980, J.M. Cumming (♀, CNCI); Oliver, 19.vii.1923, E.R. Buckell (♀, CNCI); Oliver, 20.vii.1923, E.R. Buckell (♂, CNCI); Oliver, 24.vii.1923, E.R. Buckell (♀, CNCI); Oliver, 22.vii.1923, P.N. Vroom (2♂, ♀, CNCI); Oliver, 24.vii.1923, P.N. Vroom (♀, CNCI); Oliver, 20.vii.1953, J.E.H. Martin (♀, CNCI); Osoyoos, Haynes Lease Ecological Reserve, Throne area [north end Osoyoos Lake], 2.viii.1987, S.G. Cannings (♂, UBCZ); same locality, 27.vii.1988, C.S. Guppy (3♂, RBCM), G.E. Hutchings (2♂, RBCM); same locality, 8.vii.1979, R.A. Cannings (♂, UBCZ); Skaha Lake, Kaleden, 49°25'N x 119°36'W, 25.vii.1997, Russell Cannings (♂, RBCM); Vernon, 5.vii.1907, E.P. Venables (♀, UBCZ).

DISCUSSION

Apiocera barri and *N. pantherinus* are rare in Canada. All but two of the collection localities for both species are from lowland grasslands in the southern Okanagan Valley (two *Nemomydas* records are from just outside that area) – habitats that have been frequently examined by entomologists for almost a century. The Canadian ranges of both species are centred on the threatened antelope-brush steppe ecosystem from Penticton south to Osoyoos. Within this ecosystem, the dominant antelope-brush / needle-and-thread grass plant community has declined dramatically. In 1860, about the time of the first European settlement in the area,

10,053 ha were present but by 1938 only 7,425 ha (74%) remained. Most of this change was the result of fruit tree planting and the growth of towns between about 1900 and 1930. The reduction has continued at a rate of about 2% per year in recent times, decreasing from 4,438 ha (44%) in 1995 to 3,386 ha (33%) in 2001 (Dyer and Lea 2003). Figure 3 illustrates the decline from 1860 to 2001. The latest reductions are largely related to vineyard expansion. Only 18% of the extant plant community, representing 7% of the original 1860 area, is protected; 58% is on Indian Reserves and 29% is on private lands (Dyer and Lea 2003). Because of these pressures on the

extreme northern populations of these large and conspicuous flies, the two species are good candidates for further inven-

tory and for conservation planning by COSEWIC and MOE.

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