Gyrinus cavatus and *G. minutus* (Coleoptera: Gyrinidae) in British Columbia with comments on their nearctic distributions

REX D. KENNER

c/o SPENCER ENTOMOLOGICAL MUSEUM,
UNIVERSITY OF BRITISH COLUMBIA, VANCOUVER, BC V6T 1Z4

ABSTRACT

The distributions of *Gyrinus cavatus* Atton and *G. minutus* Fabricius in British Columbia (BC) were determined by examining adult specimens from a number of museum collections. *Gyrinus cavatus* appears to be restricted to the eastern half of the province except in the far north; *G. minutus* is more widespread. Outside BC, *G. cavatus* is widely distributed with a range extending from Newfoundland to Alaska and south as far as Kansas, with an apparently isolated population in southern Utah. *Gyrinus minutus*, although generally more northern in distribution, extends south along the Rocky Mountains as far as Colorado.

Key words: Gyrinidae, *Gyrinulus*, *Gyrinus*, *cavatus*, *minutus*, *rockinghamensis*, British Columbia, Yukon, Alaska, nearctic, distribution

INTRODUCTION

The Gyrinidae are a small family of distinctive beetles that are superbly adapted to their aquatic lifestyle (Ferkinhoff and Gundersen 1983, Hilsenhoff 1990). North American Gyrinidae are classified in four genera, two of which, *Dineutus* MacLeay and *Gyrinus* Müller, occur in British Columbia (BC) (Roughley 1991). *Dineutus* is represented by a single species, *Dineutus assimilis* (Kirby), whose status in BC is questionable (Hatch 1953). The genus *Gyrinus* is represented in British Columbia by 17 species (Roughley 1991; Oygur and Wolfe 1991). One subgenus, *Gyrinulus* Zaitzev, includes three species in North America: *Gyrinus minutus* Fabricius, *G. cavatus* Atton and *G. rockinghamensis* LeConte. The former two species occur in BC and their distribution forms the subject of this study. *Gyrinus rockinghamensis* is known from the east coast of North America (Fall 1922; Oygur and Wolfe 1991).

Atton (1990) showed that what was called *G. minutus* in North America was in fact two species: *G. minutus,* with a relatively northern holarctic distribution, and *G. cavatus,* with a more southerly distribution. Atton gave only Canadian localities for the two species and he listed only two localities in BC for *G. cavatus*: Windermere and Mile 744 on the Alaska Highway. Oygur and Wolfe (1991) did not recognize *G. cavatus*, thus their distribution map for *G. minutus* includes possible *G. cavatus* records. To better understand the status of *G. cavatus* in BC, I have collected locality information by examining specimens from a number of museums.

MATERIALS AND METHODS

During the course of this investigation, several thousand *Gyrinus* spp. specimens from 20 museums and a private collection were examined, including 799 *G. minutus* and *G. cavatus*, and several hundred *G. rockinghamensis*. In addition, G.G.E. Scudder (University of British Columbia) supplied a list of records based on the specimens in the Canadian National Collection in Ottawa (CNC), which I did not examine. No particular

effort was made to be comprehensive in coverage of eastern North America. The following museums and collectors kindly loaned material for this investigation:

American Museum of Natural History, L. Herman
W. F. Barr Entomological Museum, University of Idaho, F. W. Merickel
California Academy of Sciences, D. H. Kavanaugh
Carnegie Museum of Natural History, R. L. Davidson
Entomology Section, Oregon Department of Agriculture, R. L. Westcott
Essig Museum of Entomology, University of California, Berkeley, C. Barr
W. T. James Entomological Collection, Washington State University, R. S. Zack
Lyman Entomological Museum, McGill University, C. C. Hsiung
Museum of Zoology, University of Michigan, M. F. O'Brien
National Museum of Natural History, P. J. Spangler
Natural History Museum of Los Angeles County, B. V. Brown
Oregon State Arthropod Collection, Oregon State University, D. Judd
A. B. Richards, Lakewood, Colorado
Royal British Columbia Museum, R. A. Cannings
Royal Ontario Museum, D. Currie
Snow Entomological Museum, University of Kansas, R. W. Brooks
Spencer Entomological Museum, University of British Columbia, K. Needham
Strickland Museum, University of Alberta, D. Shpeley
University of Nebraska State Museum, G. Hall
University of Wyoming Insect Museum, S. R. Shaw
J. B. Wallis Museum, University of Manitoba, R. E. Roughley.

Gyrinus cavatus, *G. minutus* and *G. rockinghamensis* were separated using the characters given in Fall (1922), Atton (1990) and Oygur and Wolfe (1991). *Gyrinus cavatus* has dark abdominal sterna and a pale mesosternum with a medial sulcus and deep right-triangular anterolateral depressions. *Gyrinus minutus* is completely dark ventrally with a sulcate mesosternum having shallow oblique-triangular anterolateral depressions. *Gyrinus rockinghamensis* is completely pale ventrally and has a mesosternum with only a very shallow or no medial sulcus and very shallow or no anterolateral depressions. Body length is also useful in separating *G. cavatus* and *G. minutus;* it was measured as specified by Atton (1990), using an eyepiece graticule on a stereomicroscope and is reported as mean ±SE with *n* being the number of specimens. A detailed list of the specimens examined can be obtained from the author and should eventually be available on the Internet.

RESULTS AND DISCUSSION

Based on the specimens examined during this study, along with the records from the CNC and Atton (1990), the distribution of *G. cavatus* extends from Newfoundland to Alaska. The following jurisdictions should be added to the distribution given in the "Checklist of Beetles of Canada and Alaska" (Roughley 1991): AK, ON, PQ and NF (SK, the type locality, was also omitted). In the contiguous United States, it occurs from Maine to New Jersey on the east coast, then west from Indiana and Michigan through Illinois, Iowa, Nebraska and Kansas, north to the Canadian border (Wisconsin, Minnesota, South and North Dakota and Wyoming). I have no records for Montana or Idaho but I have seen one specimen labelled simply "Wash" and eight specimens labelled "Was. T."or "W. T." (Washington Territory, an older designation for the Pacific Northwest, P.J. Spangler, National Museum of Natural History, personal communication) which may imply its occurrence in Washington. In addition, there is an apparently disjunct population in Utah.

In spite of its broad range, *G. cavatus* is relatively uniform morphologically with no obvious regional variation other than the exception discussed below. Some individual variability in ventral color was apparent but some of that may be due to differences in preservation and treatment. Many specimens of *G. cavatus* have a slight convexity in the sides of the median sulcus of the mesosternum that results in a slightly oval widening of the sulcus near its mid-point. In a few specimens, that convexity is exaggerated to the point where a flat-bottomed oval depression is formed in the medial sulcus. This occurs in a majority of the specimens from the Aquarius Plateau in south-central Utah but also occurs in a few specimens from other areas. The specimens from Utah are larger than elsewhere (Table 1). This larger size is not simply a matter of increasing size with decreasing latitude as the specimens from Kansas, at about the same latitude as Utah, are similar in size to those from northern Canada.

Table 1

Body length (BL) of three *Gyrinulus* species by location: range, mean ± SE and sample size (*n*).

Locality	Species	BL (♂) (mm)	BL (♀) (mm)
all areas except Utah	*G. cavatus*	3.00 – 4.00 3.67 ± 0.012 (151)	3.50 – 4.35 3.99 ± 0.012 (140)
Utah	*G. cavatus*	3.85 – 4.10 3.96 ± 0.038 (9)	4.2 (1)
Canada and Alaska	*G. minutus*	3.75 – 4.45 4.11 ± 0.013 (144)	4.00 – 4.85 4.48 ± 0.015 (127)
Wyoming	*G. minutus*	4.00 – 4.45 4.28 ± 0.035 (15)	4.35 – 4.95 4.55 ± 0.035 (17)
Colorado	*G. minutus*	4.3 (1)	-
all areas	*G. rockinghamensis*	3.45 – 4.05 3.69 ± 0.015 (70)	3.55 – 4.30 3.98 ± 0.023 (47)

The distribution of *G. minutus* also stretches across Canada and Alaska although I have very few records from the eastern provinces: one record from Newfoundland, three from Quebec and one labelled "H. B." (Hudson Bay, R.L. Davidson, Carnegie Museum of Natural History, personal communication). It is restricted to the more northerly parts of Manitoba and Saskatchewan and is widespread in the Northwest and Yukon Territories and Alaska. In Alberta, it is found as far south as Edmonton, except in the Rocky Mountains, where it is found at least as far south as Jasper. Its distribution appears to extend south along the Rocky Mountains with records from Wyoming and Colorado. It seems likely that it will be found in the southern Canadian Rockies and Montana.

Gyrinus minutus is also relatively uniform in appearance over its large range in North America; Atton (1990) found no difference between nearctic and palearctic specimens. The male specimens from Wyoming and Colorado are slightly larger than those from Canada although the females are little different (Table 1).

The distributions of *G. cavatus* and *G. minutus* in BC, Yukon Territory and Alaska, based on this work and the sources cited above, are shown in Figure 1. In BC, *G. cavatus* appears to be restricted to the eastern half of the province except in the far north; *G. minutus* is more widespread but is not found west of the Coast Mountains. The few records for these species in BC suggest that either they are relatively uncommon or that limited collecting was done in the appropriate habitat or season. The lack of data precludes any possibility of determining habitat preferences which dictate the distributions. I have two sites in BC at which both species were collected, Barkerville and Summit Lake at mile 392 on the Alaska Highway. In addition, there are four such

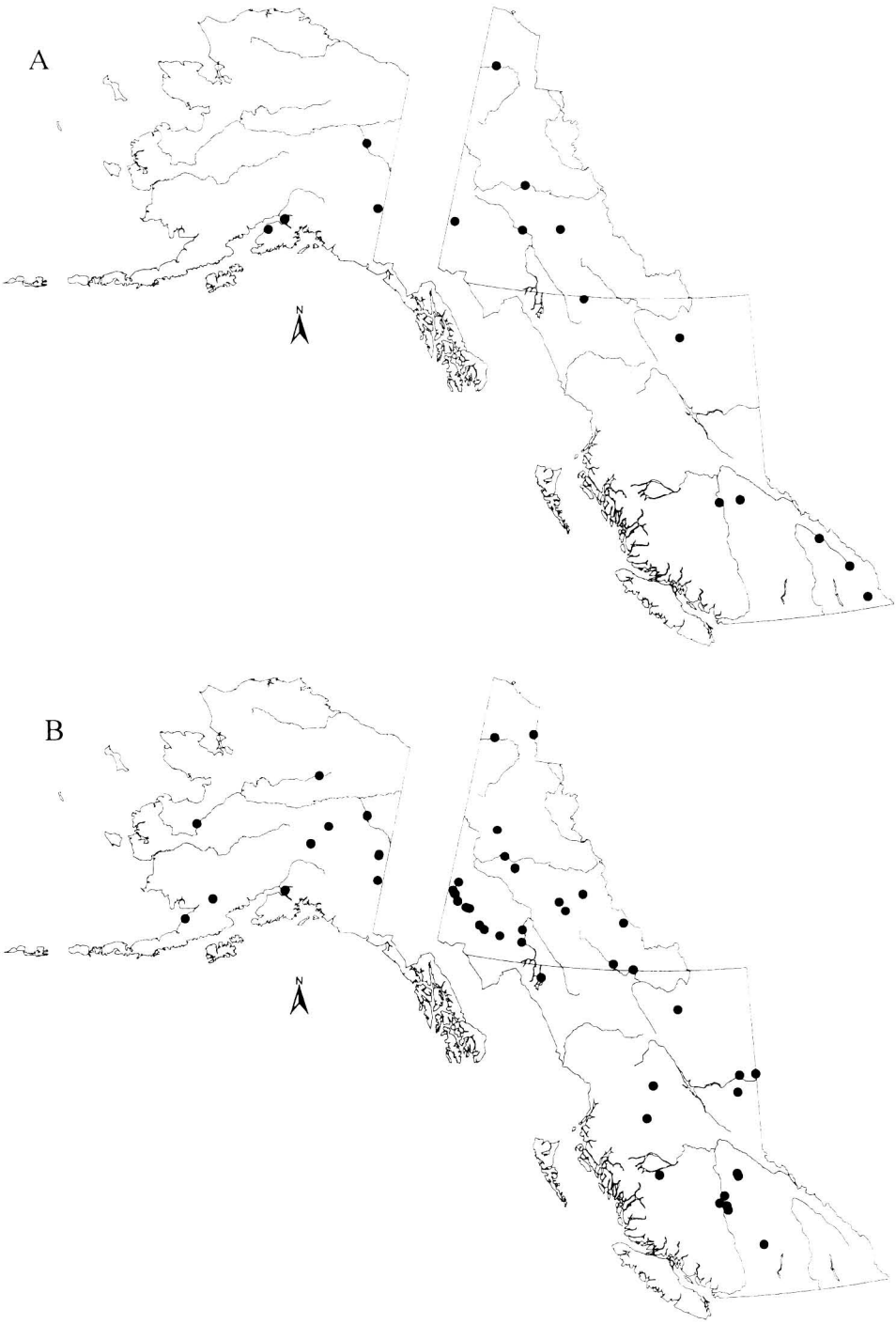

Figure 1. The distribution of *Gyrinus cavatus* (A) and *G. minutus* (B) in British Columbia, Yukon Territory and Alaska based on the data on the labels of the specimens I examined, the data on the labels of the specimens in the Canadian National Collection (Ottawa) and localities given in Atton (1990). Alaska is plotted on a smaller scale than British Columbia and Yukon Territory.

sites in Alaska, three in the Yukon, four in the Northwest Territories and three in Alberta.

I have records for both *Gyrinus cavatus* and *G. rockinghamensis* in New Jersey but the overlap in their ranges is probably more extensive. The two species are superficially very similar, being almost identical in size (Table 1) and both have pale mesosterna. I have seen several examples of *G. cavatus* specimens which were misidentified as *G. rockinghamensis* (see, for example, Figure 5 in Oygur and Wolfe (1991) which is clearly a male *G. cavatus*). The characters discussed above should be adequate to reliably separate the two species.

Studies such as the one reported here can only give a general sense of the overall distribution for the species concerned. The locality labels on most specimens, especially the older ones, give only the general location and carry no information on the habitat in which the collection was made. Even so, one can look for correlations between the ranges and geographic features or ecological zones. Although this study accomplished what it set out to do, it generates several new questions. For example, what is the southern limit for *G. minutus* across the prairie provinces and in eastern North America? Roughley (1991) indicates that *G. minutus* occurs in every province and territory in Canada except Prince Edward Island, but Roughley (1991) is based in part on data that predate the description of *G. cavatus*. Do some of these records actually refer to *G. cavatus*? Another question concerns the apparent gap in the distribution of *G. cavatus* between New Jersey and Indiana. Does *G. cavatus* not occur in the intervening states? Another study similar to this one but with a more eastern geographical focus would probably answer such questions.

ACKNOWLEDGEMENTS

I thank the curators and staff of the various museums that loaned material for this study, A. B. Richards for promptly informing me of the Colorado record for *G. minutus*, R. E. Roughley for advice and copies of keys, G. G. E. Scudder for transcribing the records from the Canadian National Collection in Ottawa, L. Lucas for producing the maps in Figure 1 and K. Needham for allowing me unlimited access to the collections of the Spencer Entomological Museum and space to work.

REFERENCES

Atton, F. M. 1990. *Gyrinus (Gyrinulus) cavatus* sp.nov. from North America described and compared with *Gyrinus (Gyrinulus) minutus* Fabricius (Coleoptera: Gyrinidae). Canadian Entomologist 122: 651–657.

Fall, H. C. 1922. The North American species of *Gyrinus* (Coleoptera). Transactions of the American Entomological Society 48: 269–306.

Ferkinhoff, W. D. and R. W. Gundersen. 1983. A key to the whirligig beetles of Minnesota and adjacent states and Canadian provinces (Coleoptera: Gyrinidae). Scientific Publications of the Science Museum of Minnesota 5: No. 3. pp. 53.

Hatch, M. H. 1953. The Beetles of the Pacific Northwest, Part 1: Introduction and Adephaga. University of Washington Press, Seattle. pp. 340.

Hilsenhoff, W. L. 1990. Gyrinidae of Wisconsin, with a key to adults of both sexes and notes on distribution and habitat. The Great Lakes Entomologist 23: 77–91.

Oygur, S. and G. W. Wolfe. 1991. Classification, distribution and phylogeny of North American (north of Mexico) species of *Gyrinus* Müller (Coleoptera: Gyrinidae). Bulletin of the American Museum of Natural History 207. pp. 97.

Roughley, R. E. 1991. Gyrinidae. In "Checklist of Beetles of Canada and Alaska", Bousquet, Y. (ed.), Res. Branch; Agriculture Canada Pub. 1861/E. pp. 430.