Johnson, D.L. 2004. The Northern Scorpion, *Paruroctonus boreus*, in southern Alberta, 1983-2003. Arthropods of Canadian Grasslands 10: (in press). Published by the Biological Survey of Canada, Ottawa.

The Northern Scorpion, *Paruroctonus boreus*, in southern Alberta, 1983-2003

Dan L. Johnson

The Northern scorpion (*Paruroctonus boreus*; Class Arachnida, Order Scorpiones, Family Vaejovidae) is the only species of true scorpion found in Canada. It is found in 12 U.S. states, from northern Arizona (K. McWest, pers. com.) to southwestern Canada (Gertsch and Soleglad, 1966,1972; Hjelle, 1972, Johnson and Allred, 1972, Tourtlotte, 1974). In southern Alberta, it is found in dry, eroded riverbank slopes (usually not north-facing), where it inhabits rock fissures in sandstone or shale, or in narrow cavities under surface stones.

Fig. 1. *P. boreus* (captured near Lethbridge) eating a cricket in captivity

Distribution:

In Alberta, this species occurs in the valleys of the Oldman River, St. Mary River, Milk River and South Saskatchewan River. Specimens have been recorded from near Drumheller to Jenner, along the Red Deer River (G. Hilchie, D. Johnson, C. Wershler, others), east to Empress, and in southwestern Saskatchewan near the Alberta border (museum records, Estuary and Leader; K. Roney, pers. com.; Buckle, 1972; collected near Acadia and Suffield, D. Johnson; others). Populations near Medicine Hat and Milk River are usually reported as being the most numerous and active (e.g., Seven Persons Coulee, G. Duke, and others; D. Johnson, and others, such as collections by S. Schultz, pers. com.). Numerous sitings at Onefour and Manyberries are known

mainly from drier years. In addition, this species has been collected in the southern Okanagan Valley of British Columbia (museum records, R. Cannings, pers. com.; Kurata, 1930).

Feeding:
P. boreus confined individually in containers in the field or lab readily consumed soft-bodied prey in the approximate size range 4-20 mm (D. Johnson, 1986-2003, unpubl.). Prey accepted in the cages included immatures (3rd to 5th instar) of grasshoppers of moderate size (such as *Melanoplus* species), adults of smaller grasshopper species (such as *Aeropedellus clavatus* and *Psoloessa delicatula*), crickets, ground spiders (Gnaphosidae), and Lepidoptera (Arctiidae and Noctuidae). Robust adult grasshoppers (*Dissosteira carolina*) were avoided. *P. boreus* often completely consumed the prey, including appendages, by chewing and ingesting. This is unlike the Sun scorpion (Arachnida, Solifugae: *Eremobates* spp.) found in Alberta and B.C., which in similar arenas was observed to pierce grasshoppers and crickets with the chelicerae, and shift them back and forth alternately, and vertically (like bicycle pedals), sucking the liquid contents from the prey.

Fig. 2. Feeding continues (ca. 15 minutes) until even the legs of the prey may be consumed.

Field observations:
Personal observations during 1983-2003 were based on annual sampling of approximately 20 to 40 trips per year, mostly daytime sampling but also after dark, with search periods of approximately 1-2 hours per trip, but not regularly scheduled on the same dates or stratified across the region. Pitfall trapping was found to be an inefficient method of collecting or sampling the Northern scorpion. The Northern scorpion is adept at walking around the rim of a container. Directed searches during the day, involving turning over stones, or at night with the assistance of portable UV lights, generally yield more positives (typical of collecting methods for other scorpion species).

Observations from searches, and observations contributed by others, indicated that population densities were low throughout this 21-year period, but relatively higher during dry, warm years, especially 1983-88 and 2000-2001. During intervening moister, cooler period, Northern

scorpions were found at lower densities in southern Alberta, requiring longer search times, if found at all. Heavy rain in southern Alberta in mid-June, 2002, may be the cause of reduced populations in that area in 2002 and 2003.

Change over time:
The Northern scorpion has been reported from Alberta in entomological collections and literature since the 1920's. Anecdotal information (numerous; e.g., K. White, S. Lapp, pers. com.) suggests greater populations were found in Alberta, especially near Medicine Hat, during the dry years. Recollections of finding larger numbers of scorpions in former times usual come from people who describe seeing them during one of the dry periods, for example, 1960-62, 1972-74 and 1983-88, when scorpions may have been more common and more active, and collecting conditions were more inviting. The changes in density may reflect the direct effects of weather on survival and reproduction, or the availability of prey (often grasshoppers, which are more common following a series of dry years). There is not sufficient evidence to conclude a general decline in abundance of the Northern scorpion in Canada; a sampling program is planned, to clarify this question.

Warmer weather expected under climate change scenarios might result in more frequent and more northern observations, if *P. boreus* increases in population density and moves along the river valleys. Construction of unbroken river bank barriers related to urban and suburban development is likely to obstruct the slow movement of scorpion migrants and result in more frequent contacts with humans as scorpions collect in nearby habitat or enter homes. This would not represent a significant risk to human health, but could affect scorpion numbers through mortality of encountered migrants, increased levels of pet collecting, and ill-advised pest control actions. In some cases, the Northern scorpion has invaded homes in Lethbridge and Medicine Hat, including during relatively moist years, possibly as a means of avoiding cool or moist weather conditions.

Population estimation:
A map of the distribution of *P. boreus* in Alberta was compiled by Johnson (2004). The Canadian distribution map will be updated by field surveys planned for 2004-2007, augmented by volunteer mail-in and web-based recording. Development of a likelihood-of-encounter GIS model based on habitat suitability and the scorpion survey database is in progress. An on-line survey is in place at the following website (after March 8, 2004):

http://people.uleth.ca/~dan.johnson/scorpions/

Address for contributing observations by mail:
Dan Johnson
Professor of Environmental Science
Department of Geography
University of Lethbridge
4401 University Drive West
Lethbridge, AB T1K 3M4 Canada
E-mail: dan.johnson@uleth.ca www.uleth.ca/~dan.johnson

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