

ZOOLOGY

A Natural History Study of Leech (Annelida: Clitellata: Hirudinida) Distributions in Western North America North of Mexico

By Peter Hovingh. 2016. Alphagraphics. 460 pages, freely available, print or electronic (DVD). "This is a free and public available document for the benefit of naturalists, scientists, those who manage natural resources, and the curious." For a copy, contact Alphagraphics, 9247 South State Street, Sandy, Utah, USA, 84070.

Specifically for Canadian field biologists, this work will serve as a standard and current reference for freshwater leech occurrence over a large area of western Canada. Recent works for other parts of Canada include Madill (1988), Ricciardi (1991), Grantham and Hann (1994), Schalk *et al.* (2001), Madill and Hovingh (2007), and Langer *et al.* (2018).

In general, this is also a major contribution to the distribution and taxonomy of leeches. It began with the purpose of determining the geographical distribution of freshwater leeches and possible aquatic connectives explaining this distribution. It was initially aimed at the question of which leech fauna occurred in isolated springs of the eastern Great Basin and how and when the leeches got there. These and related questions are discussed in detailed sections on high elevation, the Pacific Coast, Columbia-Snake River drainages, the Great Basin, the Colorado River Basin, and the Western Great Plains.

The basic tools of analysis are geography, fish distributions, and drainage basins. It will be of interest to Canadians that the collections from field surveys supporting the work in Canada and Alaska are at the Canadian Museum of Nature, Ottawa (CMN-A). There are eight main sections. Those of most interest to Canada are the first and third sections: 1. Species descriptions and distributions; and 3. Latitudinal postglacial movement. Each section has a table of contents, abstract, introduction, methods, contents, and a comprehensive and very useful list of references.

"Species descriptions and distributions" includes distribution maps for 48 species followed by notes on 38 species accounting for distribution, taxonomy, and distinctive features. Distributions are thought to have developed in the Cretaceous period with differentiation of genera in the Paleocene epoch. The maps and information are current, but illustrations of the leeches are also useful in recognition. These illustrations are derived from one of the classic identification tools of Klemm (1982), which is available by online request (see Literature Cited, below). The text on individual species provides specific information on distributions. The distribution of the Fish Leech (*Piscicola geometra*), for example, is noted as congruent with that of a major host, Northern Pike (*Esox lucius*), and collection data for Canadian collections is in the appendix on page 187.

The taxonomic details are helpful. It is noted, for example, that previous ecological and distributional studies of *Theromyzon rude*, previously the North

American bird leech, cannot assume the correct name unless reproductive organs were examined and described. This means that the very high levels of parasitism of waterfowl reported north of Yellowknife by Bartonek and Trauger (1975) may have involved another species, despite the fact that these authors were careful with identification at the time (see discussion of identification in Trauger and Bartonek 1977). The high levels of parasitism by *Theromyzon* and the fact that more species of waterfowl had been reported as parasitized by leeches in the Northwest Territories than anywhere else in North America (Trauger and Bartonek 1977 published a map) is still of interest, but the need for correct names in retrieving scientific information makes it important to track the changes and redefined species. For *Theromyzon* it will be helpful to consult the work of Oosthuizen and Davies (1992, 1993) and Davies and Oosthuizen (1993). The latter includes a helpful chart for the identification of all North American species.

In "Latitudinal postglacial movement" it is suggested that five leech species may have occurred in unglaciated Beringia, and four species may have occupied glacial refugia on the west coast from Haida Gwaii northward. Postglacial colonization followed dispersal patterns similar to those of fish. Spread from postglacial refugia in eastern Canada has been discussed elsewhere (Madill and Hovingh 2007). An interesting story is associated with the leech *Cystobranchus mammillatus*, which is hosted by the Eurasian Burbot (*Lota lota lota*). This fish subspecies occurs east to the Mackenzie Delta but the North American Burbot (*Lota lota maculosa*) occurs north to Great Slave Lake. Very little mixing has been reported in the Mackenzie River Basin. It seems possible that the North American subspecies reached the basin from the unglaciated territory to the south (Missouri-Mississippian), whereas the mainly Eurasian subspecies occupies its unglaciated Beringian territory. In North America, the leech has thus far been reported only from the Mackenzie Delta. Could it be a true disjunct (from western Siberia) surviving in the relatively mild delta region, and lost from the intervening territory as a result of Pleistocene climatic extinctions? To the remarkable fauna of the Northwest Territories, we can add (at least for now) a fish leech that is found nowhere else in North America.

This work is full of interesting material. As well as being a very helpful source on the natural history and taxonomy of leeches, there is detailed coverage of geological and climatic history and the distribution and

taxonomy is updated over the classic work of Klemm (1985) and others. Much of what has been written about North American leeches is referenced here making the work a useful foundation for a better understanding of a fascinating group.

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