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Reassessment of multiple species of *Gymnelus* (Teleostei: Zoarcidae) in Pacific Arctic and boreal regions

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Abstract

Recently described new nominal species and resurrected species in the eelpout genus *Gymnelus* Reinhardt 1834 were re-assessed for validity using fresh material collected in Pacific Arctic regions and a large body of data from a previous systematic review of the genus. The analysis reported here included both DNA barcodes and morphology. Only two species were validated: *G. viridis* (Fabricius 1780) and *G. hemifasciatus* Andriashev 1937. The latter species occurred as two morphotypes for which there is some evidence of difference in ecological preference, but the available environmental data are not robust enough to firmly identify or verify ecophenotypes.

Key words: Zoarcidae, *Gymnelus*, eelpouts, *Gymnelus hemifasciatus*, *Gymnelus viridis*, Arctic, boreal Pacific, DNA barcoding, ecophenotype

Introduction

Species of the eelpout genus *Gymnelus* Reinhardt 1834 are found on the sea floor in shallow Arctic and boreal marine waters. In a systematic review of *Gymnelus* material Anderson (1982) confirmed the validity of four species (*G. hemifasciatus* Andriashev 1937, *G. popovi* [Taranetz & Andriashev 1935], *G. retrodorsalis* Le Danois 1913, and *G. viridis* [Fabricius 1780]) and described one new species (*G. pauciporus* Anderson 1982), for a total of five in the genus. Subsequently Chernova (1998a) redescribed *G. viridis* and resurrected a synonym, *G. bilabrus* Andriashev 1937; revised the descriptions of *G. retrodorsalis* and *G. pauciporus* and described a new species *G. andersoni* (Chernova 1998b); redescribed *G. hemifasciatus* and described a new species *G. knipowitschi* (Chernova 1999a); described four other new *Gymnelus* species from Arctic seas (Chernova 1999b) and four from Far Eastern seas (Okhotsk Sea, northwestern Pacific Ocean, western Bering Sea; Chernova 2000); and suggested a restoration of *G. popovi* to its original genus, *Commandorella* Taranetz & Andriashev 1935 (Chernova 2000). Those actions tripled the number of species in *Gymnelus,* even with removal of *Commandorella.* In Pacific Arctic and boreal regions, some of the new nominal species of *Gymnelus* have been considered phenotypic variants exhibiting morphological plasticity previously known in other eelpouts (mainly polychromatism and variability in cephalic lateralis canals and pores), or ecophenotypes of two widely distributed and recognized species: *G. viridis* (Fabricius 1780) and *G. hemifasciatus* Andriashev 1937 (e.g., Mecklenburg *et al*. 2002; Anderson & Fedorov 2004; Mecklenburg *et al*. 2011).

This paper deals primarily with the two species represented in recent ichthyological and fisheries oceanography investigations in Bering Strait and the East Siberian, Chukchi, and Beaufort seas: the halfbarred pout, *Gymnelus hemifasciatus*, and fish doctor, *G. viridis*. These species have long been familiar to field and laboratory scientists and observers in northern Pacific regions. Accumulation of fresh material for the current analysis began with the first expedition of the Russian–American Long-Term Census of the Arctic (RUSALCA) in 2004, during which Russian and American scientists' identifications of the *Gymnelus* species differed

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