

Occurrence of *Halipegus occidualis* (Digenea: Derogenidae) and other Trematodes in *Rana pretiosa* (Anura: Ranidae) from Idaho, U.S.A.¹

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Abstract. Fifty-nine spotted frogs, *Rana pretiosa* (26 juveniles, 33 adults) from five pond sites in northern Idaho were examined for endoparasites. *Halipegus occidualis* was found in the eustachian tubes and oral cavity of eight spotted frogs. This finding represents a new host and new state locality for this trematode parasite. *H. occidualis* was found only in adult frogs (8/33, 24%; 8/59, 14% in all frogs) and occurred in a mean intensity of 4.0. Oral suckers were smaller (0.35 mm vs. 0.47 mm, diameter) than those reported for eastern specimens. The left testis always was anterior to the right. Infections of *H. occidualis* were from three of the five localities. Two other trematodes, *Haematoloechus varioplexus* and *Haplometrana intestinalis*, were found in the lungs and intestinal tracts, respectively. The greatest mean intensity of infection in adult frogs was 16.9 for *H. varioplexus*. When all frogs were considered, *Haplometrana intestinalis* was most prevalent (30/59, 51%).

The spotted frog, *Rana pretiosa* (Baird & Girard, 1853), is native to the Pacific Northwest, and is common in the panhandle of northern Idaho (Nussbaum et al., 1983). The species ranges from extreme southeast Alaska, western Alberta, and Wyoming through north central Idaho west to the Pacific coast in Washington and Oregon, and south to northern Utah and central Nevada (Stebbins, 1985). Although the parasites of this highly aquatic frog were studied by several workers (Lehmann, 1965; Lucker, 1931; Olsen, 1937a,b, 1938; Schönberger, 1945; Waitz, 1961), little is known of its parasites in the panhandle region of Idaho. Waitz (1961) initiated a preliminary survey of parasites of the genus *Rana* from Idaho, but identified only one helminth species, *Haplometrana intestinalis* Lucker, 1931, in *R. pretiosa*. However, he did find *Haematoloechus varioplexus* Stafford, 1902 (= *H. parviplexus* = *H. buttensis* = *H. similiplexus* = *H. floedae* = *H. uniplexus*) in *Rana pretiosa* × *Rana sylvatica* hybrids (hybrids determined in part from unique parasite prevalences). Subsequently, experimental studies showed that these two species are incapable of producing viable embryos (Dumas, 1966), and we concluded that Waitz's hybrids were *Rana pretiosa*. Therefore, his conclusions relative to the parasite community structure in *Rana pretiosa* from Idaho are in need of revision. The purpose of this paper is to present new information on the occurrence and prevalence of the trematode parasites of the spotted frog from northern Idaho.

MATERIALS AND METHODS

Twenty-six juveniles [frogs in their first or second season after metamorphosis; mean snout-vent length (SVL), 36.9 ± 5.1 mm; range, 30.9–47.7 mm] and 33

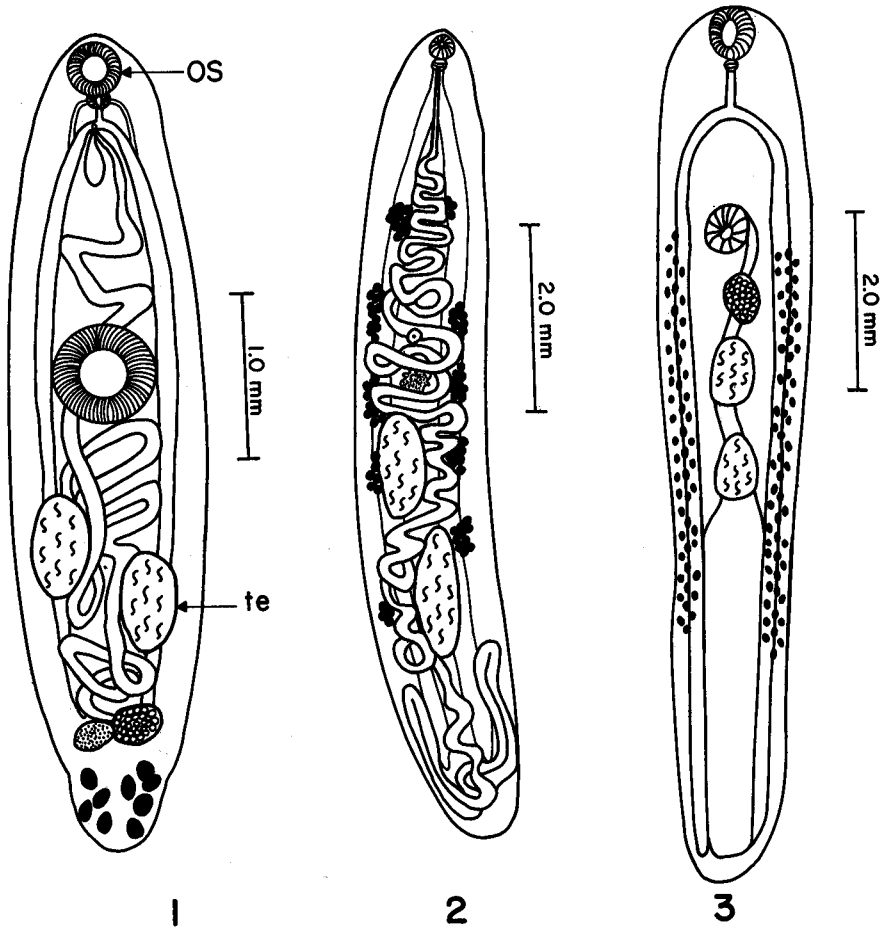
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adults (based on inspection of gonads; mean SVL, 68.2 ± 10.9 mm; range, 53.6–95.9 mm) of *Rana pretiosa* were collected with the aid of a dip net during April and May 1990 and April, May, and August 1991. Frogs were collected from five sites: Schultz's Pond near Moscow, Latah County, Idaho; Potlatch Pond and Rock Creek Pond near Potlatch, Latah County, Idaho; Big Meadow Creek Pond near Troy, Latah County, Idaho; and Moose Creek Reservoir near Bovill, Latah County, Idaho. All sites are separated from each other by at least 5 km, and little or no movement of frogs occurs among ponds. Frogs in these sites are isolated from other native species of *Rana* by approximately 70 km. Frogs were killed, dissected, and preserved in 10% formalin and subsequently transferred to 40% isopropyl alcohol. Oral cavities and eustachian tubes were examined with the aid of a sharp probe. Stomachs, small and large intestines, and lungs were excised and examined. Parasites were fixed and preserved in formalin-acetic-alcohol (FAA), stained in Ehrlich's hematoxylin, and mounted in Permount® on microscope slides. Identification of parasites and their body measurements were made with the aid of a binocular microscope and a calibrated ocular micrometer. Representative parasites were deposited in the USNM Helminthological Collection (81914–81916), Beltsville, Maryland, and frogs from which these parasites were taken were deposited in the Lower Vertebrate Collection, University of Idaho (IA 655-3, 655-7, and 655-2).

RESULTS AND DISCUSSION

Thirty three (56%) spotted frogs were infected with one or more individuals of *Halipegus occidualis* Stafford, 1905 (Fig. 1), *Haematoloechus varioplexus* (Fig. 2), and *Haplometrana intestinalis* (Fig. 3). Six (18%) adult hosts were infected concurrently with *Halipegus occidualis*, *Haematoloechus varioplexus*, and *Haplometrana intestinalis*, 10 (30%) with both *H. varioplexus* and *H. intestinalis*, and 1 (3%) with both *H. occidualis* and *H. varioplexus* (Table I). Four (12%) adult *Rana pretiosa* harbored no parasites. Five (19%) juvenile frogs (three from Schultz's Pond and two from Potlatch Pond) were infected only by *Haplometrana intestinalis*. For adult frogs, the greatest mean intensity (16.9) was recorded for *H. varioplexus*. The greatest prevalence was recorded for *Haplometrana intestinalis* for adults (19/33, 58%) and for all frogs (30/59, 51%).

Flukes of the genus *Halipegus* Looss, 1899 are widely distributed in North America. *Halipegus amherstensis* Rankin, 1944 was reported from *Rana clamitans* Latreille, 1801 in Massachusetts (Rankin, 1944), Maine (Bouchard, 1951), and from *Rana montezumae* Baird, 1854 in Mexico (Caballero, 1947). *Halipegus occidualis* was reported from *R. clamitans* and *Rana catesbeiana* Shaw, 1802 in Canada (Stafford, 1900, 1905), from *R. clamitans* in Michigan and Maryland (Krull, 1933, 1935), and from *R. catesbeiana* in Nebraska (Brooks, 1976). *Halipegus eccentricus* Thomas, 1939 was reported from *R. clamitans* and *R. catesbeiana* in Michigan (Thomas, 1939) and from *R. clamitans* and *Rana pipiens* Schreber, 1782 in Wisconsin (Williams & Taft, 1980). Macy et al. (1960) reported *Halipegus occidualis* in *Rana aurora* Baird & Girard, 1852, *Taricha granulosa* Skilton, 1849, and *Dicamptodon ensatus* Eschscholtz, 1833



FIGS. 1-3. Fig. 1. *Halipegus occidualis*. Fig. 2. *Haematoloechus varioplexus*. Fig. 3. *Haplometrana intestinalis*. os, oral sucker; te, testis.

from two isolated locations in the Cascade Mountains of northwestern Oregon, and is the only report of a species of *Halipegus* from the northwestern United States. The occurrence of *Halipegus occidualis* in *Rana pretiosa* constitutes a new host record. Idaho is a new locality record for *H. occidualis* and its occurrence here expands its known distribution in the Pacific Northwest.

Microscopic examination revealed that the oral suckers of Idaho specimens were smaller (0.35 mm vs. 0.47 mm diameter) than those reported for eastern specimens by Krull (1935). The left testis was anterior to the right in all Idaho specimens, whereas testes position was variable in eastern (Krull, 1935) and Oregon (Macy et al., 1960) specimens. Other morphometric data of this trematode parasite corresponded to the findings of Krull (1935) and Macy et al. (1960). Bouchard (1951) reported no geographical limitation on the range of *Halipegus amherstensis* from Maine. We found no geographic limitation on

TABLE I

Pond site, host snout-vent length (SVL), and parasite occurrence and intensity in adult *Rana pretiosa* from Latah County, Idaho, spring 1990 and spring and summer 1991

Pond site	SVL (mm)	Parasite intensity		
		<i>Halipegus occidualis</i>	<i>Haematoloechus varioplexus</i>	<i>Haplometrana intestinalis</i>
Schultz	62.5	—	—	4
	64.5	6	1	7
	64.9	3	4	5
	69.9	—	13	17
	70.1	—	4	6
	72.5	—	—	15
	80.7	4	10	—
	95.9	5	40	15
	Potlatch	54.0	—	—
69.5		—	70	6
73.1		—	16	21
Rock Creek	56.2	—	1	—
	69.1	—	—	—
	69.5	—	1	4
	70.3	—	6	—
	71.5	—	—	10
	72.5	6	—	—
	72.7	—	5	3
	78.5	—	13	2
	81.3	—	8	10
	81.7	3	36	12
81.9	2	61	8	
89.6	—	—	—	
Big Meadow Creek	56.4	—	3	—
	57.3	—	—	2
	58.3	—	—	8
Moose Creek	53.6	—	—	2
	54.1	—	—	3
	54.8	—	8	22
	55.9	—	—	5
	59.1	—	—	10
	60.0	3	21	5
	69.2	—	—	3
Mean intensity		4.0	16.9	8.2

the range of *Halipegus occidualis*. In a survey of the helminths of Wisconsin anurans, Williams & Taft (1980) reported a prevalence of *Halipegus eccentricus* of 43% in *Rana clamitans* (n = 412) and 4.5% in *R. pipiens* (n = 22). We found a prevalence of 14% for *H. occidualis* in *R. pretiosa* from Idaho.

Haematoloechus varioplexus was reported from a wide variety of anurans (Bouchard, 1951; Ingles, 1936; Irwin, 1929; Kennedy, 1981; Stafford, 1902, 1905; Williams & Taft, 1980). Waitz (1961), in a preliminary survey of helminths infecting the genus *Rana* from Idaho, reported no lung flukes from

Rana pretiosa, with the exception of a single fluke, which he deemed accidental. Because of the misidentification of hybrids, Waitz (1961) concluded that *Rana pretiosa* was not a normal host for this trematode parasite. However, *Rana pretiosa* was reported as a host for *H. varioplexus* (see Kennedy, 1981), and the present study confirms the presence of *H. varioplexus* in *Rana pretiosa* from Idaho.

The most prevalent parasite found during our investigation was the trematode, *Haplometrana intestinalis*, originally described from *Rana pretiosa* in the State of Washington (Lucker, 1931). Olsen (1937a), on the basis of morphological variation, described *Haplometrana utahensis* from *Rana pretiosa* in Utah. Walton (1949) also reported *H. intestinalis* and *H. utahensis* from *R. pretiosa*. However, Waitz (1959) revised the genus *Haplometrana*, reducing *H. utahensis* to synonymy with *H. intestinalis* and reported *H. intestinalis* in *R. pretiosa* from Idaho. Olsen (1937a) reported that the prevalence of *H. utahensis* was 31%, but Waitz (1959) reported 68% prevalence in *R. pretiosa* and 48% prevalence in *Rana pretiosa* × *Rana sylvatica* hybrids (= *Rana pretiosa*). We found a prevalence of 76% in *Rana pretiosa* during the present investigation, suggesting that the variation (31–76%) probably reflects local geographic variation and differences in sample size, demonstrating that care must be used when inferring taxonomic or zoogeographic relationships among hosts on the basis of parasite prevalence.

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