FISH SPRINGS MOLLUSCAN STUDIES: HOUSE AND PERCY SPRINGS

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Introduction. Fish Springs National Wildlife Refuge consists of important water resources for wildlife and in particular for waterfowl. The water source for the wildlife comes from numerous springs on the eastern side of the Fish Springs Range. The springs are known for a diversity of mollusk (Russell, 1971), an endemic species *Stagnicola pilsbryi*, and species of high interest as *Valvata* and *Tryonia.*

Because the springs occur within the jurisdiction of the U.S. Fish and Wildlife Service, and because several aquatic species in Bonneville Basin are becoming rare and endangered, some of the springs at Fish Springs are suitable for relocation of native aquatic fauna as the Least Chub. However, the exotic mosquito fish *Gambusia* efficiently competes with the Least Chub, and prior to the introduction of the Least Chub, the mosquito fish must be removed.

This limited survey of House and Percy Springs molluscan fauna is to determine if unique molluscan species occurs within the springs and whether these molluscan species would be jeopardized by the rotenone fish treatment.

Methods. Various microhabitats in House Spring and its outflow and Percy Spring and its outflow were sampled by a food strainer 12 cm diameter. These microhabitats included spiny naiad *Najas marina*, stonewort *Chara*, bottom sediment, and bottom samples where molluscan shells accumulated. House Spring was drawn down very low and this made sampling accessible at the numerous springs within the House Spring complex. Percy Spring was maintained at a high level, making sampling rather difficult. The survey was performed on June 11, 1998.

Results.

Sample sites (see spring locations on map figure 1):

House Spring A. One sweep through the stonewort: 2 *Melanoides* and 7 *Physella* (both live).

House Spring B. One sweep through stonewort: *Melanoides* (1 dead and 10 live) and *Phyella* (8 live).

House Spring C. Collection of outflow downstream from culvert: a large collection of assemblage shells: *Melanoides* (877 shells), *Tryonia* (14 shells),

Gyraulus circumstriatus (1 shell), *Vertigo modesta* (1 shell), *Pyrgulopsis* (186 shells, 1 live), and *Physellla* (122 shells, 3 live).

House Spring D. Sample east of spring head in spiny Naiad with one sweep: *Melanoides* (76 shells), *Tryonia* (2 shells), *Pyrgulopsis* (6 shells), Physella (9 shells, 8 live).

House Spring E. One sweep of stonewort: *Melanoides* (47 dead); hand picked *Physella* from tree limbs in water (6 live).

House Spring F. One sweep of bottom sediment at a shell assemblage site: *Melanoides* (530 shells, 1 live), *Tryonia* (34 shells), *Pyrgulopsis* (183 shells, 3 live), *Oxyloma* (1 shell), *Gyraulus circumstriatus* (1 shell), *Vertigo* (1 shell), *Physella* (118 shells and 2 live).

House Spring G. Upstream from spring with a sweep in flowing water in stonewort: *Melanoides* (7 live); Observed *Physella* and the leech *Helobdella triserialis*.

House Spring H. One sweep in isolated pond: *Melanoides* (9 shells, 39 live), *Tryonia* (1 shell), *Pyrgulopsis* (1 shell, 1 live), *Physella* (2 shells, 6 live).

House Spring I. One sweep in *Potentilla* in isolated pond east of H. *Pyrgulopsis* (6 live), *Physella* (1 live).

House Spring J. Pick *Physella* from surface muds.

Percy Spring 1. Sweep through surface algal mats. *Melanoides* (30 live), *Pyrgulopsis* (4 shells, 77 live), *Gyraulus circumstriatus* (1 live), *Physella* (6 live).

Percy Spring 2. Sweep of stonewort in flowing water below blocked outflow: *Melanoides* (4 live), *Pyrgulopsis* (100 live). *Pyrgulopsis* were very numerous on the rocks.

Percy Spring 3. Sweep in cane reed and algal mat: *Melanoides* (14 live), *Pyrgulopsis* (60 live), *Physella* (1 shell).

Percy Spring 4. Below Spring level regulator in "sand" sediment. *Melanoides* (17 shells), *Tryonia* (1 shell), *Pyrgulopsis* (7 shells, 29 live), *Physella* (1 shell).

Percy Spring 5. A) in outflow ditch beyond cane reed in "eel grass": *Melanoides* (3 shells, 15 live), *Pyrgulopsis* (1 shell, 14 live), *Physella* (1 live). B) in outflow ditch beyond cane reed in sediment: *Melanoides* (14 shells), *Tryonia* (2 shells), *Pyrgulopsis* (19 shells, 65 live).

Percy Spring 6. "Eel grass" and sediment above water gage: *Melanoides* (9 live), *Pyrgulopsis* (2 shells, 2 live), *Physella* (1 live).

Discussion.

Russell (1971) noted only shells of *Physella utahensis* in his survey of Fish Springs and noted these shells in House Spring, which otherwise was not examined thoroughly. Russell also noted that *P. utahensis* shells were only

found in the springs and that *P. virgata* was widespread in canals and pools. Taylor (1986) noted *Pyrgulopsis kolobensis* (= *Fontelicella longinqua*) (265 live, 15 shells) and *Physella squalida* (= *P. virgata*) (2 live, 30 shells) at House Springs. Hovingh in 1997 with three sweeps found *Pyrgulopsis kolobensis* (22 live), *Physella* (5 live), and *Melanoides* (1 live) and in 1998 with five sweeps of the strainer near the outflow, there were *Pyrgulopsis kolobensis (*6 live), *Physella* (30 live), and *Melanoides* (48 live). *Melanoides* invaded Fish Springs between June 23, 1993 and October 22, 1996). Frest (1996) found *Pyrgulopsis, Tryonia, Melanoides, Physella lordi, Physella gyrina,* and *Pysella virgata* living and as shells in House Springs and shells of *Physella utahensis* (with a question mark) and *Gyraulus parvus.* In the present study, shells of *Tryonia, Gyraulus circumstriatus, Oxyloma,* and *Vertigo* were found, the latter being a small land snail. No *Valvata* or *Stagnicola pilsbryi* have been found in House Springs.

Percy Spring was not examined by Russell or Frest. Taylor (1986) found *Pyrgulopsis* (1 shell), *Physella* (2 shells), *Gyraulus parvus* (2 shells), and *Helisoma subcrenata* (1 shell). In 1997 Hovingh found with four sweeps *Pyrgulopsis* (294 live), *Tryonia* (3 live), *Valvata* (20 live), *Gyraulus circumstriatus* (3 live), *Physella* (4 live), and *Melanoides* (54 live). In the present study, two sweeps yielded *Pyrgulopsis* (137 live), *Physella* (6 live), *Gyraulus circumstriatus* (1 live), and *Melanoides* (44 live).

The preponderance of *Pyrgulopsis* and *Melanoides* characterizes Percy Spring at the present time. The status (declining?) of *Valvata* needs further study to determine if this species is declining or varies in a cyclical manner at Percy and other springs at Fish Springs. At House Springs *Melanoides* and *Physella* are the major molluscan species. The results of vegetative sampling in both springs have largely been unchanged in the studies of Taylor (1986) and Hovingh in 1997 and in this report. except for Melanoides

The *Physella* Problem.

The taxonomy of *Physella* remains very much of a problem and this is noted in the species list of malacologists who have identified *Physella* to the species level at Fish Springs. The presence/absence of *Physella utahensis* at Fish Springs is of high interest in the management of the water regimes. Of note: "Typical *ampullacea* is probably confined to the northwest. Some of the records above may belong to *Physella utahensis* Clench and others to *Physella virgata* Gould, as the Physella problem in Utah has never been cleared up. It is very difficult to separate the young of the large forms from the small forms. [ ] We are satisfied, after seeing field conditions, that identification of small sets, even by responsible authorities, can never satisfactorily solve the problem." Further, after sending Clench some material and selecting extremes to show the variation, [Clench] replies, "this species [*Physella utahensis*] is either very

variable or else there are two or three species mixing or hybridizing in the lake." (From Chamberlin and Jones, 1929).

Russell (1971) noted shells of *Physella utahensis* only in the springs whereas he found living *Physella virgata* widespread in the canals and ponds. Taylor (1986) commentary of Russell's surveys suggests that "but surely there is only one species present" and finds that species to be *Physella squalida* = *P. virgata* (he notes *Physella utahensis* = *P. gyrina*). Frest (report to Fish Springs N.W.R, 1996) notes *Physella utahensis, P. lordi, P. gyrina ampullacea, and P. virgata virgata.* The *Physella* that have been noted at Fish Springs are shown in Figure 2. The distribution of these *Physella* are: *P. gyrina ampullacea* (In Canada from Manitoba west to British Columbia; south to California, east to Arizona and north to Minnesota), *P. lordi* (British Columbia south to Montana, Nevada and California), *P. utahensis* (Wyoming, Colorado and Utah), *P. squalida* (Texas into Mexico, Central and South America, and in Costa Rica), and *P. virgata virgata* (Nebraska west to California, east to Texas and into Mexico) (Burch, 1989).

In this present study, I measured the ratio of spire length to total length from specimens at House Spring J and found Mean (0.28 ±0.04; N=31) with extremes of 0.21 to 0.38. *Physella utahensis* as figured by Wu (see Figure 3) has values of 0.17, 0.22, and 0.23. Two specimens (0.21 and 0.23) from House Spring had comparable ratios. Burch (1989) illustrations of *P. gyrina* and *P. virgata* had values of 0.23 and 0.44 (*P. squalida,* 0.23), respectively. Wu and Beetle (1995) noted *P. gyrina* (one location in Wyoming, only) as having a spire length greater than 0.33 and *P. virgata* with a spire equal to 0.33 of total length. I would suggest that spire length/total length is a highly variable characteristic. One living specimen in House Spring had a shape as *Physella utahensis* but this specimen did not have a distinct columellar fold (see figure 3). Although *Physella utahensis* is a large gastropod, all the *Physella* at Fish Springs had a total length less than 13 mm (two *Physella* shells at Crater Spring were larger with lengths of 22 and 17 mm, but these shells were not globose).

In assessing the presence of *Physella utahensis* at Fish Springs, I would tend to agree with both Chamberlin and Jones (1929) and Taylor (1986) (see above). A thorough study in the intermountain region of *Physella* is needed which would include detailed shell measurements and analysis, biochemical genetic analysis, and geographical analysis. It should be noted that 15,000 years ago, Fish Springs and Utah Lake were covered with 300 m of water and neither aquatic system occurred. The Tryonia is found associated with the Gilbert shoreline at Blue Lake, Fish Springs, Horseshoe Springs and Scuba Springs, suggesting that the body of water creating the Gilbert shoreline 10,000 to 12,000 years ago resulted in the colonization of the numerous low-elevation springs. This colonization was either selective or general, and in the latter case, exterminations occurred to account for the present molluscan distributions at

these low-elevation and presently very isolated springs. Present molluscan colonization occurs either by human transport or by waterfowl, as indicated by the recent infestation of *Melanoides* in Fish Springs, probably from Blue Lake.

Recommendations. Following the use of rotenone at House and Percy Springs, a survey of living *Melanoides* (as a representative of the operculate gastropods including *Pyrgulopsis, Tryonia,* and *Valvata*) and *Physella* (as a representative of non-operculate gastropods) must occur. These two gastropods are the conspicuous snails at House Spring with aperture opening on the left for the *Physella* (see Figure 2,3) and on the right for Melanoides (with its opercula). If the adult gastropods have not survived the treatment, it would be suggested to resurvey a few months later to determine if the eggs survived the treatment by noting the presence of juvenile snails. A conservative measure would be to collect the conspicuous *Physella* at House Springs and temporarily place them in an aquarium for the duration of each treatment (they would eat lettuce) and release them after the treatment.

References.

Burch, J.B. 1989. North American Freshwater Snails. Malacological Publications, Hamburg, Michigan. 365 pp.

Chamberlin, R.V. and D.T. Jones. 1929. A descriptive catalog of The Mollusca of Utah. Bull. U. Utah 19: 203 pp.

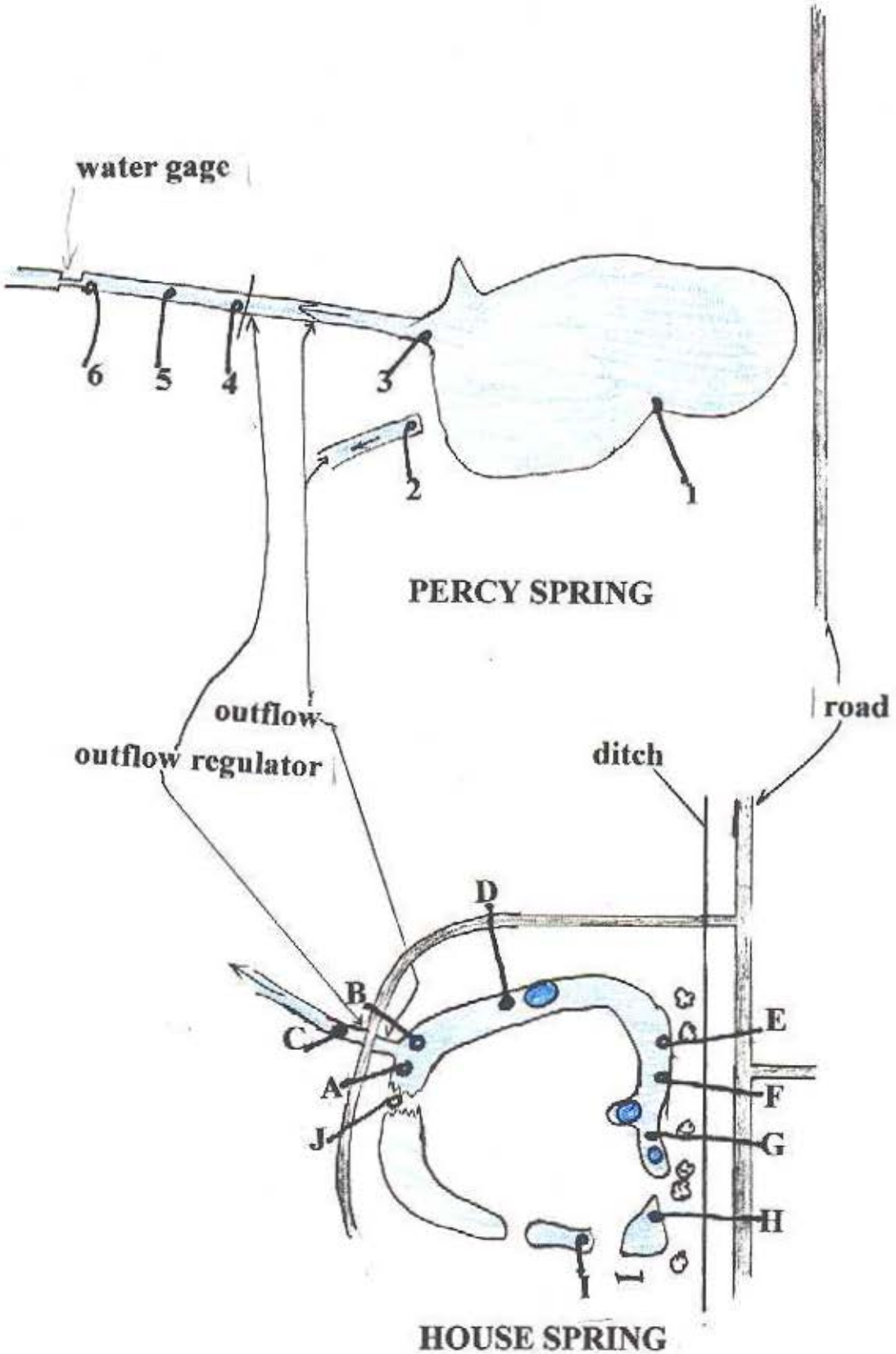
Russell, R.H. 1971. Mollusca of Fish Springs, Juab County, Utah: Rediscovery of *stagnicola pilsbryi* (Hemphill, 1890). Great Basin Naturalist 31: 223-236.

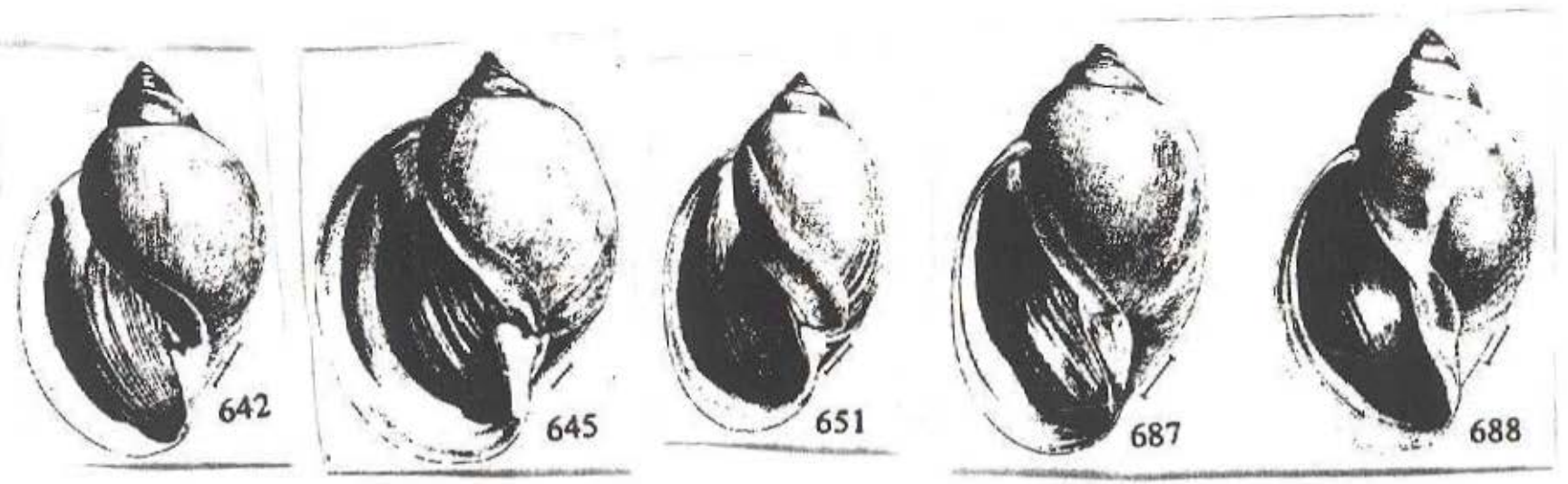
Taylor, D.W. 1986. Status report on Fish Springs Pond Snail. Report to the U.S. Fish and Wildlife Serviced.

Wu, S-K. And D.E. Beetle. 1995. Wyoming Physidae (Gastropoda: Pulmonata: Hygrophila). Malacological Review 28: 81-95.

FIGURE 1

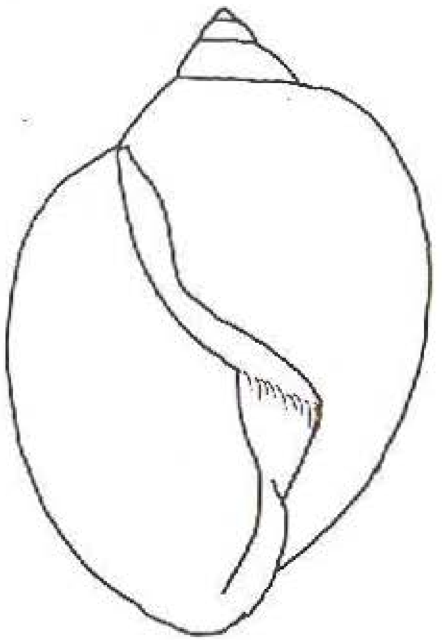
(NOT DRAWN TO SCALE)

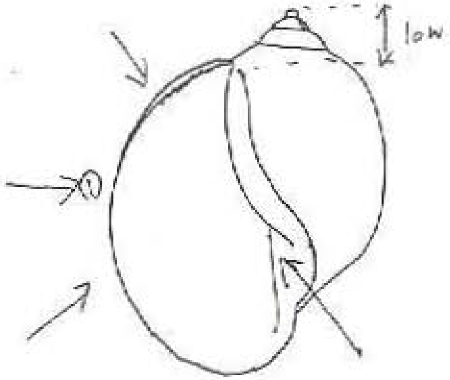




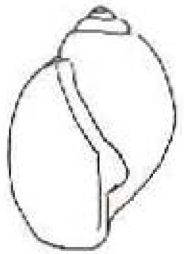
P. lordi *P. utahensis* *P. gyrina ampullacea* *P. squalida* *P. virgata*

FIGURE 2





from Burch Fig. 645



from Chamberlain + Jones

Physella utahensis

U25 12X

UCM 35731

Utah : Utah Co., Mill pond

Utahensis has ① fairly big rounded aperature
② low spire
③ distinct columellar fold.

FIGURE 3