Collecting Lottia alveus (Conrad, 1831)in Boundary Bay, British Columbia

by George Holm

Fig. 1 Lottia alveus from Grants Island, Alaska

The last time that Bert Draper flew up from his home in Los Angeles, California to give a talk to our club was in 1995 for the April meeting. Bert flew in to the Vancouver International Airport where I met him. He stayed at my home and drove with me to the meeting.

Bert had stayed at my home before when he had presented a program to our club and on each occasion he had brought a small gift for me. This last time his gift consisted of one specimen of the eelgrass limpet *Lottia alveus (Conrad, 1831).* The specimen had been collected by George Willett at Grants Island in Alaska, probably during the noted malacologist's trip there in 1918-19, and it had lately been in the collection of E. P. Chase. Bert told me when he gave me the shell that it was a rare specimen to have in a collection as the species was considered extinct.

Lottia alveus is a challenging species to write about and searching for information about it has proven that to me. Some sources say that the species still exists on both the Atlantic and Pacific coasts of North America and other sources mention it as living on the Pacific coast and being extinct on the Atlantic side. Dr. Frank Bernard in his "*Prodrome for a distributional check-list and bibliography of the recent marine mollusca of the west coast of Canada* "(1967), the most complete listing of its day of British Columbia marine shells, does not mention the species at all.

Rae Baxter in *Mollusks of Alaska* (1987), has the species as being found in southeastern Alaska and questionably in British Columbia.

In literature the species name can be found under *Acmaea*, *Collisella* and *Lottia*. It is a true species, but it has been variously described as a mutation of, or a form of, other species.

Good examples of this are when W. H. Dall (1914) described *Acmaea alveus parallela* Dall,1921 from the northwest coast of America as being a "recognizable mutation" of *Acmaea patina* (Esch.) *Carp.*, and "corresponding to the *A. alveus* of the Atlantic coast," and in *American Seashells* (1974) where the Atlantic species is listed with *Acmaea testudinalis testudinalis* (Müller, 1776) as "*form alveus* Conrad, 1831, a thin, elongate, heavily mottled ecological variant which lives on eel-grass".

Lottia alveus lives and feeds exclusively on the eelgrass *Zostera marina* making it very vulnerable to extinction if its habitat is damaged or destroyed. On the west coast of North America, Dr. D. R. Lindberg in a private correspondence wrote that "*L. alveus* has been reported from about 10 localities in the Pacific NW ranging from Vancouver Island to the Juneau area" of S. E. Alaska "and including the Queen Charlotte Islands." On the Atlantic shores, however, it was described as having been a very common species on eelgrass prior to 1930.

It is the Atlantic sub-species, *Lottia alveus alveus* (Conrad, 1831), that garners all the attention, as a simple search on the internet proves. The last specimens of it were collected in 1929, just prior to the dramatic decline of the "North Atlantic Eelgrass" in the early 1930s. In spite of extensive searches since that time, it has not been found and is considered the first modern marine invertebrate known to have become extinct in an ocean basin.

I have collected in Boundary Bay many times during the past forty years. It is a large bay with much varied habitat that is situated north of the border which separates Washington State and British Columbia. White Rock and the City of Surrey are to the east, the City of Delta is to the north and west where the City of Delta meets up with Point Roberts, Washington, the tip of a peninsula which can only be accessed by land through the south Delta suburb of Tsawwassen.

In thinking back, I can recall seeing small limpets on the eelgrass during those early years, but I was just a "beginner learner" and I thought at the time that they were merely immature specimens of limpets of which I could collect better and larger specimens along the beach. As my first major shell book at the time was "American Seashells", (seventh printing, 1965), in which the description of alveus was "an ecological variant" of a species which lives on shore, this at the time made perfect sense to me. In later years, I did not venture into the eelgrass area because of the very soft bottom found there in some places, well remembering the time in that place when I had that "sinking feeling" while the tide was coming in.

It was Robert Forsyth a few years ago, who got me to thinking about Lottia alveus again. He and another local shell club member, Larry Williams, had gone to the bay during winter and had searched through the wind-rows of eelgrass which had washed up on the beach. Robert showed me some small specimens of limpets which they had found and which he had tentatively identified as Lottia alveus. Since that time, I had wanted to return to the bay to see if I could find the species on the eelgrass myself, but circumstances prevented me from doing that until recently.

My interest in the species was renewed again this past June when Vancouver collector Peter Egerton said that he thought he had collected Lottia alveus on the eelgrass in Boundary Bay. Peter had contacted me earlier and asked me about local areas where he might collect, in order to take advantage of the excellent low tides for that month. I couldn't have been happier that he chose to go to Boundary Bay. My own chance to go and check out Boundary Bay came the following month on July 25, on a very pleasant sunny day. The tide was still going out when I got to Centennial Beach in Tsawwassen. The area of the eelgrass where I wanted to search is about a kilometer out from the beach in a northeast direction. It is an area where, when the tide is out, a channel appears to snake out from the shore and looks very much like a small river separating the sand flats of the southwestern area of the bay from the more muddy northern shore. I checked the eelgrass from where it was left exposed on the sand by the tide and then moved slowly into an area where the water had not drained from the channel. I slowly turned the blades of the grass as I went along and, after some time, in about six inches of water, I found the first limpet! It was a beautiful adult specimen with dark and light rays on its shell that made it appear like a jewel on the blade of the eelgrass. I was immediately reminded of the specimen that I had received from Bert Draper. Now, I had found and collected *Lottia alveus* (Conrad, 1831), the first new species that I have found in years, and I had found it on my first collecting trip in a very long time!

Fig. 2 Lottia alveus collected by Peter Egerton at Boundary Bay.

I found a few more limpets in the shallow water area but they were far apart and thoughts of "Sanibel stoop" and other back bending afflictions began to cross my mind. The species became more common when I moved into the deeper parts of the channel and the best collecting I found was in about a foot and a half to two feet of water and when I gently moved the eel-grass with my hand to expose the undersides of the stalks.

That one day I collected a total of twenty seven limpets, the largest of which measured 16 mm. in length by 8 mm. in width and 6 mm. in height. The smallest was 5 mm. long, and the majority of the rest were between 12 and 13 mm. in length.

I returned to the beach two day later only to find that the tide was still in when I got there. Unfortunately, I could not wait the couple of hours it would take for it to go out and expose the sand flats, so I had to wait another month for my next chance to search the area again. I sent some questions about *Lottia alveus* to Dr. David Lindberg at the University of California, Berkley. I had discovered in the "Abstracts of the Joint Congress (2000) of the American Malacological Society and the Western Society of Malacologists", that he, along with others, had presented a talk there about *L. alveus* and other sea grass limpets.

Dr. Lindberg was very helpful with his answers and was also very elated to hear of Lottia alveus being found in Boundary Bay. He and his graduate student Emina Begovic are finishing some work on marine plant limpets as part of her dissertation work at Berkley. Emina wants to compare the DNA between the Atlantic and Pacific populations and she had searched much of Vancouver Island for the species the previous year without finding a single specimen.

For DNA sequencing, the specimens have to be preserved in Ethyl alcohol. I had preserved the animals from the specimens I had collected in Ethyl "rubbing" alcohol so I wanted to return to the bay to collect some fresh specimens which I could properly preserve for her.

Monday, August 20, was that day and again I was lucky with the weather. I hurried out to the eelgrass area, but this time I only observed one very juvenile limpet during my search which I did not collect. The eelgrass had changed. It had lost the crisp, healthy look it had the previous month and was coated with much detritus as well as what I suspect was sargassum weed and other floating sea weeds, much of it in varying stages of decay.

The tide was already starting to come in when I arrived and I therefore only had a half hour in which to conduct my search. I don't believe the end result would have been very much different that day even if I had arrived there earlier.

I mailed some preserved animals of the specimens I had previously collected and Dr. Lindberg and Emina were able to extract DNA from them. It shall be interesting to see what differences in the DNA of the Atlantic and Pacific species that they may find.

I had an opportunity to return to Boundary Bay in October and found *Lottia alveus* in a different part of the bay and living under different conditions. I shall write about that trip at another time.

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The editor thanks Peter Egerton for allowing him the use of his excellent picture of Boundary Bay *Lottia* specimens and for scanning the Alaska specimen for this issue.

Please visit his web site "Peter's Seashells" where you will see many more local marine species on the "Seashells of British Columbia" pages. http://www.petersseashells.ca

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Article Update

Molecular sequencing of the Atlantic and Pacific eel grass limpets referred to as *alveus* and *parallela* indicated that they are not sister taxa.. The correct name for the Pacific eel grass limpet is *Lottia parallela* (Dall, 1921). The Atlantic eel grass limpet, *Lottia alveus* (Conrad, 1831) has not been located again and is still considered extinct.