2nd Hand Snails via Hermit Crab By-catch – or – Let the Hermit Crabs do the work!

by Bill Merilees December 29th, 2015 - all photos by the author

In the commercial fishing industry by-catch is the term given to the creatures that are 'caught' along with the commercial species being targeted. To scientists and naturalists with an interest in biodiversity, taxonomy or a species natural history, often it is the by-catch that is the more interesting. For an 'amateur' marine biologist, with a passion for learning about our mollusc fauna, finding ways to sample new habitats is a continuing challenge – and – the subject of this article.

While visiting Tsehum Harbour (near Swartz Bay, Vancouver Island) I got wind of the fact that local spot-prawn fishermen were landing a considerable by-catch of large hermit crabs. My curiosity was immediately aroused. This could be a unique opportunity to obtain samples of hermit crabs and their gastropod shells from deep water rocky bottoms where spot prawns are harvested. A few questions to the fueling barge attendant, gave me a ship's name "*Just in Time II"* and her Skipper, Bob Fouracre. I contacted Bob who told me the prawn season was just ending but to contact him again next spring (May 2015). This I did.

On June 2nd, with brother-in-law Darryl (jet-lagged & just off the plane from Australia!) we headed for Sidney, B.C. (not Sydney, Australia). Two cases of Lucky Lager were exchanged for two large bags of freshly frozen hermit crabs in 'their' shells – 246 specimens in all! What a bonanza!!

These hermit crabs had been harvested from just east of Darcy Island (48* 34' N., 123* 17' W) in Haro Strait at depths of 44 to 57 fathoms. (264 to 342 feet or 80 to 104 metres). One of the benefits of this sample was the acquisition of DNA samples from the slipper limpets (*Crepidula* species) that often frequent the apertures of dead snail shells inhabited by hermit crabs.

Back home, when these snails and their occupants were sorted, nine different species of large gastropods (**Table 1**); three species of hermit crabs; and two commensal species, one a nereid worm, and the slipper limpet were examined. Most of the gastropod shells were rather worn, or encrusted by barnacles and other marine life, but a small number were in pretty good shape. (**Photo 1**). There were also a small number of live mollusks species in this collection. Species names used here follow Lamb & Hanby, 2005, and Jensen, 2014.

Top row: *Euspira pallida, Cryptonatica aleutica (2), the scallop - Chlamys rubida, & Ceratostoma foliatum.* Bottom row: *Neptunea lyrata* (2), *Fusitriton oregonensis, Nucella lamellosa* (2) – frilled & smooth individuals. **Note:** *Neptunea tabulata* and *Latisipho hallii* not included in this photo.

Table 1: Gastropod Species occupied by Hermit Crabs and commensal inhabitants:

Species	Number	With Hermit Crabs	Without	Commensal Worms	Commensal Slipper Limpets
Cryptonatica aleutica	129	87	42	84	4
Euspira pallida	37	29	8	17	0
Ceratostoma foliatum	36	24	12	9	3
Nucella lamellosa	28	26	2	8	1
Fusitriton oregonensis	6	5	1	7+	2
Neptunea lyrata	6	3	3	2	0
Euspira lewisii	2	2	0	2	1
Neptunea tabulata	1	0	1	0	0
Latisipho cf *hallii*	1	1	0	?	0
	246	177	69	128	11

The three species of hermit crabs found to occupy these snail shells were the Alaskan Hermit, *Pagurus ochotensis* Brandt, 1851. (**Photo 2**), the Bluespine Hermit, *Pagurus kennerlyi* (Stimpson, 1864). (**Photo 3)**, and the Widehand Hermit, *Elassochirus tenuimanus* (Dana, 1851). (**Photo 4**). During the harvesting process, a considerable number of hermit crabs were apparently 'distressed' to the point that they deserted their shells leaving their 'homes' behind. About one quarter of the crabs (69 of 246 = 28 %) took this action.

When cross referenced to shell size and shell form in this sample, these three species exhibited marked preferences for the type and size of the shells they occupied. (**Table 2**).

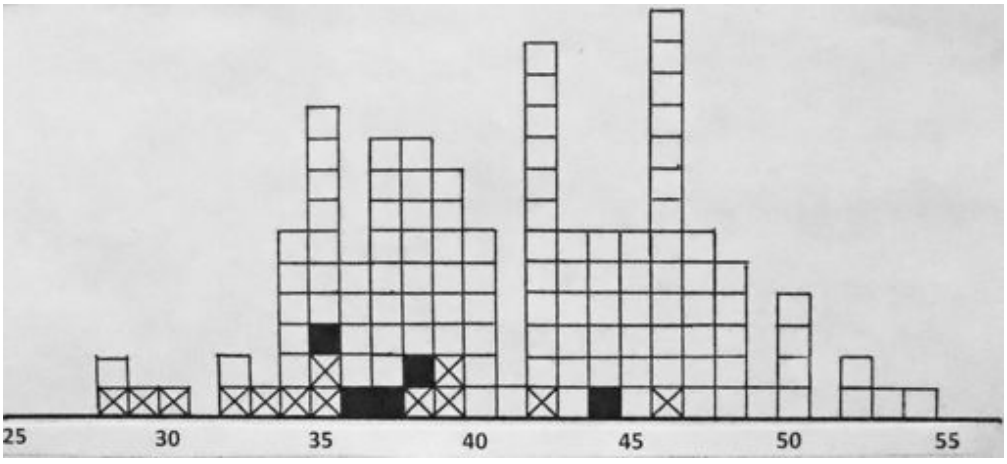
Table 2: Hermit Crab shell preferences:

Snail species	*Pagurus ochotensis*	*Pagurus kennerlyi*	Elassochirus tenuimanus
Cryptonatica aleutica	68	6	13
Euspira pallida	6	2	22
Ceratostoma foliatum	0	23	1
Nucella lamellosa	0	26	0
Fusitriton oregonensis	1	4	0
Neptunea lyrata	2	0	0
Euspira lewisii	2	0	0
Neptunea tabulata	0	0	0
Latisipho hallii	0	1	0
Total	79	62	36

2. The Alaskan Hermit, *Pagurus ochotensis.* This species is among the largest of our West Coast Hermit Crabs with a carapace length up to 5 cm (2"). It prefers larger snail shells with a 'roomy' interior. The histogram (**Figure 1**) for *Cryptonatica* illustrates this preference. Even though *Nucella* and *Ceratostoma* are relatively large shells (mean shell length 72 mm & 76.4 mm respectively) their interior space is confined when compared to *Cryptonatica* (Mean shell length 42mm) and *Euspira lewisii*.

Figure 1: *Cryptonatica aleutica* Occupants:

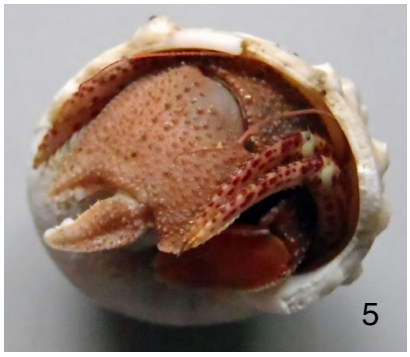
	Number	Mean Shell Size
☐	106	41.3 mm
■	5	38.0 mm
☒	13	35.4 mm
Total	124	



Shell Height in mm

3. The Bluespine Hermit, *Pagurus kennerlyi.* With a carapace that can reach 3 cm this was the smallest of the hermit crab species in this sample. It showed a very strong preference for the larger, heavier, but narrow apertures of *Nucella* and *Ceratostoma* snail shells.

4.The Widehand Hermit, *Elassochirus tenuimanus.* With a carapace size up to 4 cm and a gigantic right pincher, this is a very striking hermit crab. When threatened it can retract into its shell and use this pincher in a similar manner to a snail's operculum (**photo 5)**. Shells of *Euspira pallida* (Mean shell length 32 mm) and the smaller sized *Cryptonatica*, (**see Figure 1**) were its preference in this sample.



6. The Red-and-white-banded Sea-nymph, *Cheiloneris cyclurus.* **Note:** The colour of this specimen is quite different from that illustrated by Lamb & Hanby AN47. This may be due to it having been frozen?

The most surprising observation was the presence of large (up to 20 cm (8") long) commensal nereid worms (**photo 6**) living in 50% of the shells examined. These worms inhabited the spire of the shell, occupying the confined space behind the abdomen of the hermit crab. One worm was found in the umbilicus of *Euspira lewisii.*

This is not a 'new' observation. Thanks to sleuthing by Sheila Byers and Rick Harbo, a reference to this phenomenon for Puget Sound was located (Harrington, 1897). Through dredging in 10-20 fathoms Harrington collected 4 species of hermit crabs that when, [supposedly put in an aquarium], "*these crabs slowly advance from their retreats, one or two or sometimes three beautifully striped Nereids will emerge from the opening of the shell, and, if the crab be feeding, will proceed to the mouth parts of the latter and share the feast*". (p. 215).

Question: Would this observation not make for a fascinating public aquarium exhibit?

From his observations Harrington then proceeded to discuss the nature of this worm's commensal habits and formally describe *Nereis cyclurus* (now *Chelioneris cyclurus*) as a new species.

7. The Slippershell, *Crepidula williamsi* Coe, 1947. *Only 11/246 (4.5 %) of the snail shells had the slipper limpet Crepidula williamsi as determined by recent DNA evidence (M. Castelin, Fisheries and Oceans Canada, Pers. Com.*)

Despite the rough handling the prawn traps receive as they are raised to the surface; their contents dumped onto the sorting table; prawns 'picked'; the traps re-baited and re-set; a small number of live snails and one bivalve were included in this collection. This incidental 'catch', always a pleasant surprise, is presented in **Table 3.**

Calliostoma annulatum	2
Amphissa reticulata	3
Chlamys rubida	2

Conclusion: The opportunity to sample habitats that are not easily accessible to most marine naturalists invariably brings unexpected surprises. The experience reported here was exceptional. The author's only regret was that he could have been better prepared as some interesting observational data was lost. Thank goodness, there hopefully should be 'next time'!

Acknowledgements:

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