

# HERMIT CRABS FROM THE COAST OF RAS BEIRUT, LEBANON

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## Résumé

Dix espèces de Bernard l'Ermite ont été décrites récemment des eaux de la côte libanaise de Ras Beyrouth et, sauf pour *Diogenes pugilator* (P. Roux, 1829), elles ont pu être conservées en collection.

*Calcinas ornatus* (P. Roux, 1830), *Dardanus* (= *Pagurus*) *callidus* (Risso, 1827), *Pagurus cuanensis* (Bell, 1846) et *Pagurus prideauxi* (Leach, 1815) sont décrits pour la première fois, des eaux libanaises.

De plus, nos collections présentent *Paguristes oculatus* (Fabr., 1775), *Clibanarius ergthropus* (Latreille, 1818) et *Pagurus anachoretus* (Risso, 1827) dans les eaux de Ras Beyrouth mais ne contiennent pas encore les crabes récemment décrits : *Catapaguroides timidus* (P. Roux, 1830) et *Anapagurus laevis* (Bell, 1846).

Knowledge of the hermit crabs in the eastern Mediterranean has been confined to only a limited number of early studies. As for Lebanon, there are no identifications published on hermit crabs. More is known on the hermit crabs of the eastern Mediterranean from researches conducted along the coasts of Libya (Colosi, 1923), Egypt (Audouin, 1826; Holthuis, 1956; Balss, 1936), Israël (Steinitz, 1933; Carmin, 1935; Bodenheimer, 1935, 1937; Holthuis and Gottlieb, 1958), Syria (Gruvel, 1931), Turkey (Ostroumoff, 1896), and Greece (Guérin-Méneville, 1932).

Monod reported the occurrence of *Diogenes pugilator* (P. Roux, 1829) from St. Georges Bay, Beirut, Lebanon in 1931. This is the first reported species of hermit crabs from Lebanon. A significant comprehensive account on the pagurids of the eastern Mediterranean region is by Holthuis and Gottlieb (1958) which deals with the hermit crabs of the coast of Israel. A list of the species of hermit crabs that they have identified from the Israeli coast appears in Appendix I. Laubier (1) in 1965, collected a hermit crab north of Beirut and identified it as *Eupagurus prideauxi*.

Fadlallah (1975), in his recent study of the systematics and ecology of benthic macroinvertebrates in the eastern Mediterranean, Lebanon, reported the occurrence for the first time of five species of hermit crabs from the

(1) Laboratoire Arago, Banyuls-sur-Mer, France.

Ras Beirut area, Lebanon. He listed them as follows: *Hapagurus anachoretus* (Risso), *Paguristes oculatus* (Fabr.), *Clibanarius erythropus* (Risso), *Catapaguroides Urnidus* (Roux) and *Anapagurus laevis* (Thomp.). Fadlallah's collections were all made during the months of July, August and September of 1974. There is no mention of specific depths of sampling for any of the hermit species collected nor any other pertinent information except for the inclusion of both *Eupagurus anachoretus* and *Catapaguroides timidus* as being among his «most frequently collected crustaceans». But, as Fadlallah put it, the identification of the hermit crab species collected during his study «was not authenticated by expert examination».

During the Spring and Summer of 1975, from April to August, collections of hermit crabs were conducted in the Ras Beirut coastal region. Emery and George (1963) have already briefly outlined the general and varied features of Lebanese shores and, in particular, those relevant to the Ras Beirut area where all our collections of hermit crabs were made.

Six different species of hermit crabs have been identified. Three are here reported for the first time while the remaining three have already been reported almost simultaneously by Fadlallah (1975). All in all, ten species of hermit crabs are now known from Lebanon. (Refer to Appendix II for a list of hermit crabs from Lebanon).

Thanks are here addressed to Professor J. Forest of the *Muséum National d'Histoire Naturelle, Laboratoire de Zoologie, Paris* for his help in the identification and verification of our collected species of hermit crabs, and S.I. Kayal (c/o American University of Beirut, Lebanon) for helping in the SCUBA collecting of specimens in deeper water.

Our six species of hermit crabs are substantiated by specially preserved specimens (1), each showing its catalogue number (e.g., AUBMNH-P/HC-1 to AUBMNH-P/HC—6) of the Museum of Natural History at the American University of Beirut (AUBMNH), Lebanon. At an earlier date, six species were forwarded to Professor J. Forest at the *Muséum National d'Histoire Naturelle* of Paris (*Laboratoire de Zoologie*) and each of these species is here referred to by the letters of MNHN.

The present work is to be considered as a preliminary but essential list of the now known species of hermit crabs in the coastal waters of Lebanon. Other species which have not been collected so far might still be expected to occur off the coastal waters of Lebanon. This is based on the available ranges in the eastern Mediterranean as pointed out by Holthuis and Gottlieb (1958) and includes such species as *Dardanus arrosor* Risso, 1827; *Pagurus sculptimanus* Lucas, 1846; *Pagurus alatus* Fabricius, 1775 and *Anapagurus bicorniger* A. Milne-Edwards and Bouvier, 1892.

A list follows with a brief description of each of the six species collected during our present survey. Furthermore, Appendix III includes a dichotomous classification key to the Mediterranean Israel Paguridae as prepared by Holthuis in 1959 and which is also applicable to the Lebanese hermit crabs.

#### 1. - *Paguristes oculatus* Fabricius, 1775.

Five specimens were collected at a depth of 8-15m, from April to August. Two specimens labeled AUBMNH-P/HC—1 and one MNHN are available for comparison examination. Carapace length ranged from 5-9mm.

(1) A quick method to remove a hermit crab from its shell is to gently break the shell or drill a small hole through it where the tip of the abdomen fastens and then gently prod the hermit with a sharp instrument (MacGinitie and MacGinitie, 1968, p. 294). Hermit crabs removed from their shells may be preserved in 50-80 percent ethyl alcohol. Ghusayn (1975) prefers to inject 8 percent formalin into the body cavity of a hermit crab before preserving it in 70 percent ethyl alcohol.

Although *Paguristes oculatus* occurs in the entire Mediterranean Sea, it has been specifically reported from the eastern Mediterranean off the coasts of Greece, Turkey, Israel, Egypt and Libya.

Fadlallah's (1975) reporting of *Paguristes oculatus* for the first time from Ras Beirut, Lebanon, is now verified.

## 2. - *Clibanarius erythropus* Larreille, 1818.

Over twenty specimens were collected in the rocky surf zone where they are normally in abundant numbers from April to August, and are found occupying several different empty gastropod shells. Two specimens labeled AUBMNH-P/HC—2 and one MNHN are available for comparison examination. Carapace length ranged from 3-10mm.

*Clibanarius erythropus* also lives in the entire Mediterranean and particularly in the eastern part of the basin it has been reported from the coasts of Rhodes, Turkey, Israel, Egypt and Libya.

The occurrence of *C. erythropus* from Lebanon is now verified in support of Fadlallah's (1975) first reporting it from Ras Beirut, although a specimen has been collected and identified by G. Kassis (c/o UNICEF, Beirut, Lebanon) as *C. misanthropus* Steinitz, 1933 on July 15, 1966 at a depth of about 1-2m off Rabbits Island in the North of Lebanon. This specimen is also available for comparison examination and is labeled AUBMNH-P/HC—2a.

## 3. - *Calcinus ornatus* P. Roux, 1830.

Six specimens were collected at a depth of 7-14m in July and August. Three specimens labeled AUBMNH-P/HC—3 and one MNHN are available for comparison examination. Carapace length ranged from 3-9mm.

Although *C. ornatus* is known from the entire Mediterranean, it has been reported from the eastern Mediterranean only off the coasts of both Egypt and Israel. *Calcinus ornatus* is now reported for the first time from Ras Beirut, Lebanon.

## 4. - *Dardantis* (= *Pagurus*) *callidus* Risso, 1827.

Seven species were collected at a depth of 8-13m from April to August. Three specimens labeled AUBMNH-P/HC—4 and one MNHN are available for comparison examination. Carapace length ranged from 6-18mm.

*D. callidus* lives in the entire Mediterranean but as far as the eastern Mediterranean is concerned, it has been recorded only from

the coasts of Libya and Israel. Hence, it does not seem to be of common occurrence.

*Dardanus* (= *Pagurus*) *callidus* is here reported from Ras Beirut, Lebanon, for the first time.

#### 5. - *Pagurus cuanensis* Bell, 1846.

Five specimens were collected at a depth of 8-15m in May, June and July. Three specimens labeled AUBMNH-P/HC—5 and one MNHN are available for comparison examination. Carapace length ranged from 4-8mm.

*P. cuanensis* lives in the entire Mediterranean. In the eastern Mediterranean it has been reported from the coasts of Turkey, Israel and Egypt.

*Pagurus cuanensis* is now reported for the first time from Ras Beirut, Lebanon.

#### 6. - *Pagurus anachoretus* Risso, 1827.

Eight specimens were collected at a depth of 8-15m in June, July and August. Three specimens labeled AUBMNH-P/HC—6 and one MNHN are available for comparison examination. Carapace length ranged from 5-9mm.

*Pagurus anachoretus* inhabits the entire Mediterranean and it has been reported in the eastern Mediterranean from the coasts of Greece, Israel and Egypt.

The occurrence of *P. anachoretus* from Lebanon is now verified in support of Fadlallah's (1975) first reporting of it as *Eupagurus anachoretus* (Risso) from Ras Beirut.

In addition to the above species, special mention is here given to the hermit crab collected in 8-9-1965 by L. Laubier. It is *Pagurus prideauxi* Leach, 1815 which is known to inhabit the entire Mediterranean but has been reported from the eastern Mediterranean only off the coasts of Crete and Israel. Our specimen is here reported for the first time from Lebanon (North of Beirut) and is now labeled AUBMNH-P/HC—9 and is also available for comparison examination. It was collected North of Beirut off Tabarja Beach and identified as *Eupagurus prideauxi*. L. Laubier found it at a depth of 18-25 fathoms (approx. 23-46m) on a sandy to muddy bottom mixed with organic detritus. It has a carapace 8mm long. Holthuis and Gottlieb (1958) collected their specimens of *P. prideauxi* off the Israel coast at a depth of some 79m with carapace lengths ranging from 7-12mm.

## APPENDIX I

A list of the species of hermit crabs (family Paguridae, suborder Anomura) reported from the eastern Mediterranean coast of Israel by Holthuis and Gottlieb (1958):

1. *Paguristes oculatus* (Fabricius, 1775)
2. *Clibanarius erythropus* (Latreille, 1818)
3. *Calcinus ornatus* (P. Roux, 1830)
4. *Diogenes pugilator* (P. Roux, 1829)
5. *Dardanus arrosor* (Herbst, 1796)
6. *Dardanus callidus* (Risso, 1827)
7. *Pagurus sculptimanus* (Lucas, 1846)
8. *Pagurus spinimanus* (1) (Lucas, 1846)
9. *Pagurus alatus* (Fabricius, 1775)
10. *Pagurus prideauxi* (Leach, 1815)
11. *Pagurus anachoretus* (Risso, 1827)
12. *Catapaguiroides timidus* (P. Roux, 1830)
13. *Anapagurus laevis* (Bell, 1846)
14. *Anapagurus bicorniger* (A. Milne-Edwards and Bouvier, 1892)

## APPENDIX II

A list of ten species of hermit crabs now reported from the eastern Mediterranean coast of Lebanon:

1. *Diogenes pugilator* (P. Roux, 1829)
2. *Paguristes oculatus* (Fabricius, 1775)
3. *Clibanarius erythropus* (Latreille, 1818)
4. *Calcinus ornatus* (P. Roux, 1830)
5. *Dardanus* (= *Pagurus*) *callidus* (Risso, 1827)
6. *Pagurus cuanensis* (Bell, 1846)
7. *Pagurus anachoretus* (Risso, 1827)
8. *Catapaguiroides timidus* (P. Roux, 1830)
9. *Anapagurus laevis* (Bell, 1846)
10. *Pagurus prideauxi* (Leach, 1815)

Monod (1931) reported *Diogenes pugilator* for the first time from St. Georges Bay, Beirut, Lebanon. *D. pugilator* specimens examined by Holthuis and Gottlieb (1958) from the coast of Israel were collected at depths of up to 30m with carapace lengths ranging from 3-7mm. *D. pugilator* has also been reported from the eastern Mediterranean off the coasts of Turkey, Egypt and Libya, and is known to inhabit the entire Mediterranean.

*Paguristes oculatus*, *Clibanarius erythropus* and *Pagurus anachoretus* have been reported for the first time from Ras Beirut, Lebanon by Fadlallah (1975). Our collections now verify the occurrence of these three species in the coastal waters of Ras Beirut.

*Catapaguiroides timidus* and *Anapagurus laevis* have also been reported by Fadlallah (1975) for the first time from Ras Beirut, Lebanon. They are consecutively labeled as AUBMNH-P/HC—7 and AUBMNH-P/HC—8. We

(1) This is *Pagurus cuanensis* (Bell, 1846) as reported in this paper.

have not collected either one of these two species of hermit crabs in our survey although Fadlallah lists *Catapaguroides timidus* (and *Paguristes oculatus*) among «the most frequently collected crustaceans» encountered during his study.

Holthuis and Gottlieb (1958) reported *Catapaguroides timidus* for the first time from the coast of Israel. Their specimens were collected at depths of 18-38m with carapace lengths ranging from 2-3тг. They also reported *Anapagurus laevis* (Bell, 1846) for the first time from Israel collected at depths of 18-79m during April through September and with carapace lengths of 2-5тг.

*Calcinus ornatus*, *Dardanus* (= *Pagurus*) *callidus* and *Pagurus cuanensis* are here reported for the first time from the coastal waters of Ras Beirut, Lebanon. Also, *Pagurus prideauxi* is now reported for the first time from the coast of North Beirut off Tabarja Beach.

### APPENDIX III

#### Key to the Mediterranean Israel Paguridae by Holthuis (1959).

Abdomen soft, with a membranaceous skin, spirally twisted and kept hidden in empty Gastropod shells (sometimes in worm tubes) which are usually carried along by the Crustacean.

Hermit-crabs

Paguridae

1. Third maxillipeds placed close together. Chelipeds equal, subequal, or the left distinctly larger than the right ..... 2  
Bases of the third maxillipeds separated by a considerable distance.  
The right cheliped larger than the left ..... 7
2. First abdominal somite with a pair of pleopods. Left cheliped only slightly larger than the right ..... *Paguristes oculatus*  
First abdominal somite without pleopods ..... 3
3. Left and right chelipeds of the same size. Finger tips black.  
Second and third legs with longitudinal colour-stripes ..... *Clibanarius erythropus*  
Left cheliped distinctly larger than the right ..... 4
4. Tips of the fingers of the chelipeds dark brown or black, of a horny substance. No spine between the ophthalmic plates ..... 5  
Tips of the fingers of the chelipeds whitish, calcareous ..... 6
5. Chelipeds and first two pereopods with transverse ciliated and denticulated, usually curved ridges ..... *Dardanus arrosor*  
Chelipeds and first two pereopods with spine-tipped tubercles ..... *Dardanus callidus*
6. Between the two ophthalmic plates, a spine is present. Species without a striking colour pattern ..... *Diogenes pugilator*  
No spine between the ophthalmic plates. A colour pattern of bright red spots and lines ..... *Calcinus ornatus*
7. No tube protruding from the male sexual openings ..... 8  
A tube protruding from the male sexual openings ..... 12
8. Larger cheliped with the surface of the palm smooth and punctate, with scattered hairs ..... *Pagurus anachoretus*  
Palm of larger cheliped with ridges, granules, tubercles, or spines on the outer surface ..... 9
9. A longitudinal keel or a row of spines over the median line of the outer surface of the palm of the larger cheliped ..... 10  
Outer surface of palm evenly granular or spinulate ..... 11

10. A large granular tubercle at the basal part of the keel on the palm. The keel itself blunt and irregular ... *Pagurus sculptimanus* (= *P. forbesi*)  
No tubercle at the base of the keel, the latter usually distinct. ....  
*Pagurus alatus*
11. Outer surface of palm evenly granular, practically naked. ....  
*Pagurus prideauxi*  
Outer surface of palm of larger cheliped with numerous spines, which are hidden by a dense pubescence of long hairs. ....  
*Pagurus spinimanus* (= *P. cuanensis*)
12. Sexual tubes from both male openings. A tiny species. ....  
*Catapaguroides timidus*
- Sexual tube from the left male opening only. ....13
13. A pair of small triangular plates between the ophthalmic plates. ....  
*Anapagurus bicorniger*  
No triangular plates between the ophthalmic plates. ....  
*Anapagurus laevis*

### Summary

Ten species of hermit crabs are now reported from the coastal waters of Ras Beirut, Lebanon and, except for *Diogenes pugilator* (P. Roux, 1829), all are substantiated by preserved specimens.

*Calcinus ornatus* (P. Roux, 1830), *Dardanus* (= *Pagurus*) *callidus* (Risso, 1827), *Pagurus cuanensis* (Bell, 1846), and *Pagurus prideauxi* (Leach, 1815) are here reported for the first time from Lebanese waters.

Furthermore, our collections verify the occurrence of *Paguristes oculatus* (Fabricius, 1775), *Clibanarius erythropus* (Latreille, 1818) and *Pagurus anachoretus* (Risso, 1827) in Ras Beirut waters but not yet the recently reported *Catapaguroides timidus* (P. Roux, 1830) and *Anapagurus laevis* (Bell, 1846).

### Zusammenfassung

Über zehn Arten von Einsiedlerkrebsen in den küstengewässern von Ras Beirut, Libanon, liegen jetzt Berichte vor. Mit Ausnahme von *Diogenes pugilator* (P. Roux, 1829) sind alle durch praeservierte Exemplare vertreten.

*Calcinus ornatus* (P. Roux, 1830), *Dardanus* (= *Pagurus*) *callidus* (Risso, 1827), *Pagurus cuanensis* (Bell, 1846) und *Pagurus prideauxi* (Leach, 1815) wurden zum ersten Mal in Libanesischen Gewässern gefunden.

Ausserdem verifizieren unsere Sammlungen das Vorkommen von *Paguristes oculatus* (Fabricius, 1775), *Clibanarius erythropus* (Latreille, 1818) und *Pagurus anachoretus* (Risso, 1827) in den Gewässern von Ras Beirut. *Catapaguroides timidus* (P. Roux, 1830) und *Anapagurus laevis* (Bell, 1846), über deren Auftreten erst Kürzlich berichtet wurde, sind jedoch nicht eingeschlossen.

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