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THE POLYPLACOPHORA OF GRAN CANARIA, INCLUDING A WORLDWIDE SURVEY OF THE BROODING SPECIES

LOS POLIPLACOFOROS DE GRAN CANARIA, CON UN COMPENDIO MUNDIAL DE LAS ESPECIES INCUBADORAS

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SUMMARY

The occurrence and habitat of seven species of Polyplacophora from Gran Canaria (Canary Islands) are described. Two of these species, *Lepidochitona piceola* and *Acanthochitona crinita* are recorded for the first time from Gran Canaria.

***Lepidochitona stroemfelti* appeared to exhibit brooding behaviour. An up to date worldwide survey of brooding species of Polyplacophora is given, in which four new cases are reported.**

RESUMEN

Se describe la ocurrencia y hábitat de siete especies de Poliplacóforos de Gran Canaria (Islas Canarias). Dos de estas especies, *Lepidochitona piceola* y *Acanthochitona crinita*, se citan por vez primera en Gran Canaria.

***Lepidochitona stroemfelti* presenta un comportamiento incubador. Se incluye un compendio mundial actualizado de las especies incubadoras, en el que se mencionan cuatro nuevos casos.**

Key words: Polyplacophora, reproduction, taxonomy, Gran Canaria.
Palabras clave: *Poliplacóforos, reproducción, taxonomía, Gran Canaria.*

INTRODUCTION

Relatively little is known about the Polyplacophora fauna of the Canary Islands. Literature is scanty and the most important work on this area remains that of Bergenhayn (1931).

In March 1985 the author visited Gran Canaria in order to study the occurrence of members of this class. Special attention was paid to note the habitat preferences of some little known species and to collect study-material. In total about 700 specimens belonging to six species were collected in eight localities. Two species, *Lepidopleurus cajetanus* (Poli, 1791) and *Lepidochitona canariensis* (Thiele, 1909) were not found, although they were expected to occur commonly in Gran Canaria. Due to a cold I was unable to dive and thus no material was obtained from depths greater then 0.6 m below low water mark. All material on which this study is based is stored in my private collection, except if otherwise indicated.

The last worldwide survey of all known brooding species of Polyplacophora was published by Pearse (1979). The chiton material collected in Gran Canaria provided new information on this

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phenomenon, therefore an up to date survey of all known brooding species has been included in this paper.

The following abbreviations are used: ITZ = Instituut voor Taxonomische Zoologie, Amsterdam and MM = Mr. M. Meyer, Durban, South Africa.

COLLECTING STATIONS (Fig. 1)

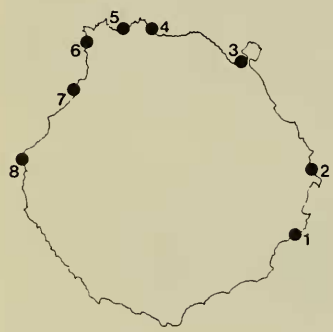


Fig. 1.— Collecting stations.

1) Arinaga
2) Playa del Ojo de la Garza
3) Las Canteras
4) La Atalaya
5) Galdar
6) Sardina
7) Puerto de las Nieves
8) Puerto de la Aldea

RESULTS

Lepidopleurus cajetanus (Poli, 1791)

No specimens were collected by me on Gran Canaria. However, I possess two specimens of this species collected by E. Rolán from Las Canteras in January 1969.

Leptochiton algesirensis (Capellini, 1859)

One of the most common species of Gran Canaria. A total of 187 specimens were found in Arinaga, Playa del Ojo de la Garza, Las Canteras and Puerto de las Nieves.

It is found under stones on sand from the low tide zone to about 0.5 m depth. Only a few were found intertidally under stones in small shallow pools.

Lepidochitona piceola (Shuttleworth, 1853) (Fig. 2)

Of this species 91 specimens were collected in the following localities: Las Canteras, Sardina and Puerto de las Nieves.

Fig. 2.- *Lepidochitona piceola* (Shuttleworth, 1853) Sardina, Gran Canaria. colln. ITZ. 14,7 x.

This is not a very rare species as stated by Van Belle (1984: 75), but is difficult to find as

it occurs only very locally on some parts of surf exposed rocks wedged in crevices just under high tide level. The colour which blends with the colour ot the rock surface and the small size of this species are two other factors which makes *L. piceola* difficult to discover. The rock substrate is typical for this species, no specimens were found on or under loose stones. Their habitat shows great similarity with that of *Lepidochitona corrugata* (Reeve, 1848) as does the general appearance of *L. piceola*. It can easily be distinguished by the dorsal girdle spicules which are very different in size and shape and by the smaller size of the animals which seems to be a specific character (of all specimens collected the largest one measured 9.3 mm).

The marginal spicules were not studied after the publication of Bergenhayn (1931: 16, pl. 1, fig. 23). According to Kaas & Van Belle (1981: 23, 1985: 91) the measurements of Bergenhayn are probably incorrect. The marginal spicules of my specimens vary in length between 110 and 160μm. In shape and form they are indentical with Bergenhayns figure and description.

This is the first record of *L. piceola* from Gran Canaria.

Lepidochitona stroemfelti
(Bergenhayn, 1931) (Figs. 3-7)

This is a common species on Gran Canaria of which 314 specimens were collected in Arinaga, Playa del Ojo de la Garza and Galdar. In addition I possess 45 specimens collected by E. Rolán near Playa del Ojo de la Garza in January 1969.

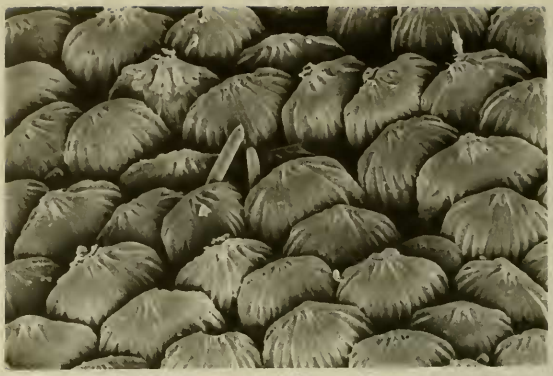
This species prefers blackish basalt pebble beaches with sandy bottoms, where they can be found in high densities under smooth basalt stones, half or completely buried in the sand. It occurs mainly intertidally from almost high tide —or mid tide zone to about 30 cm below low water mark, mostly in areas with some degree of protection from wave exposure. The colour of these chitons blends perfectly to that of the blackish basalt stones. Only two specimens were of a different colour (orange), these were found in about 10 cm depth on orange coloured stones.

This species was well described by Bergenhayn (1931: 11-13). who erroneously placed the species in the genus *Ischnochiton* s.s. No one paid any attention to this species until Kaas & Van Belle (1981: 32-34, 1985: 97-99) gave a full description of the species and placed it correctly (although as they wrote "with much hesitation") in the genus *Lepidochitona*. The dorsal girdle scales (Fig. 3) are indeed Ischnochitonoid in appearance. On the other hand the ventral girdle scales are not rectangular (typical for *Ischnochiton*) as in their opinion but round at the base, conical and rather sharply pointed at the top (Fig. 5), much more like the original drawing of Bergenhayn. Only near the margin of the girdle the scales are more or less round at the top (Fig. 4). All the studied specimens from Gran Canaria showed an identical ventral girdle scale morphology which pleads in favour of an arrangement in *Lepidochitona* rather than in *Ischnochiton*.

So far nothing was known about the reproduction of *L. stroemfelti*. The population in Galdar showed that this is a brooding species (see also the appendix for a worldwide survey of brooding species), as out of 200 specimens, varying between 5-24 mm in length, 73 36,5%) carried eggs in the pallial grooves (Fig. 6). Of these 73 specimens, 38 had eggs on both left and right sides, although mostly not over the whole length of the grooves. The smallest specimen carrying eggs measured 8.5 mm in length. The total amount of eggs carried by an individual specimen varies considerably. One 14 mm long specimen with eggs covering the entire left groove carried 500 eggs. The eggs are bright yellow in colour, 200-230μm in diameter (not including the appendages) and surrounded by a transparent chorion covered with cone and and cupformed appendages (Fig. 7). These are characteristic for the genus *Lepidochitona*. This clearly confirms the opinion that *L. stroemfelti* should be placed in the genus *Lepidochitona. Ischnochitons* have egg hulls with threadformed papillae as Lyngnes (1924: taf. 2, fig. 25) has shown for *I. albus* (L.), Hull & Risbec (1930: fig. 21) for *I. acomphus* Hull & Risbec, Von Wissel (1904: pl. 22, fig. 10) for *I. maorianus* Iredale and as I was myself able to observe in *I. bergoti* (Velain).

Chiton (Rhyssoplax) canariensis
D'Orbigny, 1839

Of this species 21 specimens were collected in the following localities: Arinaga, Playa del Ojo de la Garza, Las Canteras, La Atalaya and Puerto de las Nieves.



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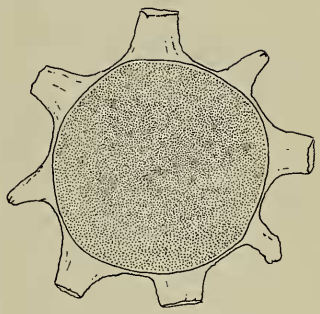

Figs. 6-7.- *Lepidochitona stroemfelti* (Bergenhayn, 1931) Galdar, Gran Canaria. colln. H.L. Strack Fig. 6.- Ventral side of a specimen showing eggs in both pallial grooves. 4,4 x. Fig. 7.- Egg. 190 x.

All specimens were found in depths of at least 30 cm below low water mark, presumably they are more common somewhat deeper in the sublittoral region. They prefer smooth stones buried in sand.

Acanthochitona crinita (Pennant, 1777)

This is a common rockdwelling species in Gran Canaria of which 94 specimens were collected in Las Canteras, Galdar, Sardina, Puerto de las Nieves and Puerto de la Aldea.

It shares its habitat with *L. piceola* but has a larger micro-distribution range. It can be found in rock crevices just under high-tide level to mid-tide level. Juvenile specimens seek shelter in cushens of *Corallina sp.* and can be found together with *Lasaea rubra* (Montagu), *Pisinna glabrata* (Von Mühlfeld), *Fossarus ambiguus* (L.) and *Skenea planorbis* (Fabricius).

This is the first record of this species for Gran Canaria.

Acanthochitona fascicularis (Linnaeus, 1767)

Only six specimens were collected in Las Canteras and Puerto de las Nieves.

Like *C. canariensis* this species occurs only in depths greater than 30 cm below low water mark on stones on sandbottoms.

Figs. 3-5.- *Lepidochitona stroemfelti* (Bergenhayn, 1931) Galdar, Gran Canaria. colln. ITZ. Fig. 3-5.- Girdle. Fig. 3.- Dorsal scales. 286 x. Fig. 4.- Ventral scales and marginal spicules. 214 x. Fig. 5.- Detail of ventral scales. 1088 x.

Bergenhayn (1931: 20-26, pl. fig. 38-42, pl. 3, fig. 67-74) described *Acanthochitona heterochaetus* from La Luz, Gran Canaria, but in my opinion it must be regarded a junior synonym of *A. fascicularis.*

APPENDIX - WORLDWIDE SURVEY OF BROODING SPECIES

The first report on brooding in chitons (although very brief) was made by Kowalevsky (1879: 470). Later, he gave a more detailed report (1883: 6). Smith (1966: 442) listed 12 brooding chiton species in his survey and Pearse (1979: 76-77), in his list, enlarged this number to 18. Now the amount of known brooding species has increased to 32 species, of which 29 can be more or less regarded as confirmed brooders (Tables I-II). In the tables the doubtful records are marked with a note of interrogation. Four important genera (*Leptochiton, Chaetopleura, Plaxiphora* and *Onithochiton*) are added in this report. Still there reamains one major family, the *Acanthochitonidae*, in which no brooding has yet been observed. Except for *Onithociton neglectus* De Rochebrune and *Ischnochiton circumvallatus* (Reeve) all the new cases of brooding species in this report are of small size (maximal adult length 27 mm).

Both Smith and Pearse included *Callistochiton viviparus* Plate (= Calloplax vivipara Plate)) in their lists. This is a ovoviviparous species that does not mother its young in the pallial grooves (branchial caveties). Here it is not regarded as a brooder: only those species that show parental care by retaining young and/or eggs in the pallial grooves are here considered to be genuine brooders.

The following cases of brooding listed in my survey (Tables I-II) need some comment:

Callochiton crocinus (Reeve): I have in my possession Hull's personal copy of Iredale & Hull (1927), with many notes in the margin in his handwriting. One of these notes on page 52, treating of *Levicoplax platessa* (Gould) (= *C. crocinus*), reads "Example not much elevated, taken by Childers at Obelish Bay, 21.4.1929, had clusters of eggs about gill rows, and interiorly".

Lepidochitona corrugata (Reeve): among hundreds of specimens in my private collection only one specimen with clusters of eggs in the pallial grooves could be found (South West coast Mallorca, Spain, IV-1976, H.L. Strack leg.). Furthermore Dr. D.J. Eernisse informed me (in litt.) that he observed several brooding populations of this species in Yugoslavia in September 1986.

Lepidochitona caboverdensis Kaas & Strack: newly received material of this species included one specimen (length 10.5 mm) with eggs in the pallial grooves from the Cape Verde Archipelago, Boavista Island, Praia da Cruz, 28-V-1986,

TABLE I

Species	Maximal adult length (mm.)	References(s)
Callochiton crocinus (Reeve)	50	Turner, 1978 & Hull (unpublished)
Eudoxochiton inornatus (Tenison Woods)?	100	Turner, 1978
Lepidochitona corrugata (Reeve)	23	Kowalevsky, 1878, 1883; Eernisse (unpublished) & This report
Lepidochitona caverna Eernisse	14	Heath, 1905; Pearse & Lindberg in Pearse, 1979 & Eernisse, 1984
Lepidochitona stroemfelti (Bergenhayn)	25	This report
Lepidochitona caboverdensis Kaas & Strack	12	Kaas & Strack, 1986 & This report
Chiton barnesi Gray	38	Plate, 1901
Chiton (Rhyssoplax) perviridis Carpenter	21	Burghardt, 1973 & This report

Species in which the females deposit their eggs in the pallial grooves and retain them there at least to the trochophore larval stage.

TABLE II

Species	Maximal adult length (mm.)	Reference(s)
Leptochiton algesirensis (Capellini)	20	This report
Hanleyella asiatica Sirenko	11	Sirenko, 1973
Hemiarthrum setulosum Dall	15	Martens & Pfeffer, 1886; Leloup, 1956 & Simpson, 1977
Schizoplax brandti (Middendorff)	25	Kussakin, 1960 & Smith, 1966
Lepidochitona thomasi (Pilsbry)	18	Heath, 1905; Thorpe in Smith, 1966 & Eernisse, 1984
Lepidochitona fernaldi Eernisse	17	Eernisse, 1984
Lepidochitona cinerea (Linnaeus)?	25	Knorre, 1925
Chaetopleura pomarium Barnard	21	This report
Ischnochiton inca (D'Orbigny)	20	Plate, 1898 & Leloup, 1956
Ischnochiton subviridis (Iredale & May)	50	Iredale & Hull, 1923 & Turner, 1978
Ischnochiton bergoti (Velain)	20	Dell, 1962; Taylor in Pearse, 1979 & This report
Ischnochiton circumvallatus (Reeve)	40	Creese, 1986 & Creese (unpublished)
Ischnochiton cf. paessleri Thiele	8	This report
Ischnochiton (Haploplax) mayi Pilsbry	22	Turner, 1978
Ischnochiton (Haploplax) lentiginosus (Sow.)	27	Penprase, 1981
Callistochiton asthenes (Berry)	10	Smith, 1966; Ferreira, 1979 & Lindberg in Pearse, 1979
Callistochiton leei Ferreira	9	Ferreira, 1979
Callistochiton mawlei Iredale & May?	24	Turner, 1978
Plaxiphora australis (Suter)	11	Dell, 1963 & Creese (unpublished)
Chiton nigrovirescens De Blainville	25	Thiele, 1910; Barnard in Ashby, 1931; Dell, 1962; Smith, 1966 & This report
Chiton torri Suter	10	Bullock in Pearse, 1979
Chiton aorangi Creese & O'Neill	15	Creese, 1986 & Creese & O'Neill, 1987
Onithochiton neglectus De Rochebrune	45	Creese, 1983, 1986 & O'Neill, 1984
Polyplacophora sp.	4	Creese, 1986 & Creese (unpublished)

Species that mother their young in the pallial grooves through the final stage of metamorphosis, including the development of fully-formed shell plates.

E. Rolán leg.

Chiton (Rhyssoplax) perviridis Carpenter: in 1973 Burghardt described *Rhyssoplax linsleyi* from material collected in Hawai. He also recorded the fact that this is a brooding species. I possess two specimens of *Chiton (Rhyssoplax) perviridis* from Tahiti (Papeete, Aue Beach, VII-1971, G.A. Hanselman leg.) of which one (length 12.5 mm) carries eggs. Comparing these specimens with a specimen of *R. linsleyi* from Hawai I must conclude that they are conspecific and therefore *Rhyssoplax linsleyi*

Burghardt, 1973 must be regarded a junior synonym of *Chiton (Rhyssoplax) perviridis* Carpenter, 1865. The only major discrepancy between the two original descriptions is that *R. linsleyi* should have smooth dorsal girdle scales whereas *C. perviridis* should have striated scales. The studied specimen proved that the dorsal girdle scales of *R. linsleyi* are in fact finely striated, and equal in size to those of *C. perviridis*.

Leptochiton algesirensis (Capellini): Mr. H. Huneker (Bennebroek, The Netherlands) drew my attention to the fact that this is also a brooding species. In his private collection there are two specimens with metamorphosed young in the pallial grooves from La Caleta, Lanzarote, Canary Islands, XII-1983, H. Huneker leg.. In addition I have in my collection one specimen (length 12.5 mm) with 8-valved young (ca. 600 μm in length) from Playa de las Americas, Tenerife, Canary Islands, VII-1975, H. Huneker leg. and two specimens from Tarifa, Spain, 24-VIII-1984, H.L. Strack leg. with eggs in the pallial grooves.

Lepidochitona cinerea (Linnaeus): Von Knorre (1925: 551) reported several brooding specimens from Helgoland. After the publication of Von Knorre no new case of brooding *L. cinerea* was reported although it is one of the most common and most studied species of *Polyplacophora*. Furthermore, hundreds of specimens from my private collection (from many different localities and collected in different periods of the year) were studied but no brooding specimens were found. *L. cinerea* is generally known to be a broadcast fertiliser, a deviation of this mode of reproduction towards brooding behaviour seems very doubtful at the least.

Chaetopleura pomarium Barnard: Michael Meyer collected for me three specimens of this species, one of which (length 14 mm) carries eggs and another (length 18.5 mm) carries 8-valved young (ca. 200-250 μm in length) in the pallial grooves. They were collected at Sea Point, Cape Town, Cape, South Africa, V-1985.

Ischnochiton bergoti (Velain): several specimens in my collection exhibit brooding behaviour. Out of 11 specimens from Sea Point, Cape Town, Cape, South Africa, X-1985, MM leg., two have eggs and three have young. Out of 16 specimens from Kommetjie, Cape, South Africa, XI-1984, MM leg., one specimen has eggs. Out of 8 specimens from Kommetjie, Cape, South Africa, V-1983, MM leg., one specimen carries young. Out of 10 specimens from Gonubie, Cape, South Africa, V-1983, MM leg., there are two specimens with eggs and two with young.

Ischnochiton cf. *paessleri* Thiele: one specimen (Palmeira, Mordeira or Calhetinha, Sal Island, Cape Verde Archipelago, VIII-1978, E. Roldán leg.) about 5 mm in length, carries 15 (8-valved) metamorphosed young (lengt ca. 300μm) in his pallial grooves. Another small specimen from the Cape Verde Archipelago with metamorphosed young is stored in the Rijksmuseum van Natuurlijke Historie, Leiden, The Netherlands. I have some doubt about the true identity of these specimens. There is a great resemblance to the common West African species *I. cessaci* (De Rochebrune) of which they could be juvenile specimens. But if these are juvenile specimens they are not likely to be sexual mature and as no brooding could be observed in several hundred adult (maximal length 18 mm) specimens of true *I. cessaci* ecamined by me, I prefer to consider these specimens as a small, distinct, brooding *Ischnochiton* species which, on a tentative basis, I will give the name of *Ischnochiton paessleri* Thiele, 1910.

Chiton nigrovirescens De Blainville: out of 82 specimens from Kommetjie, Cape, South Africa, XI-1984, MM leg., four specimens were found with young. Out of 30 specimens from Kommetjie, Cape, South Africa, V-1983, MM leg., one specimen with eggs and six with young were observed.

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REFERENCES

ASHBY, E., 1931.- Monograph of the South African Polyplacophora (Chitons). *Ann. S. Afr. Mus.* 30: 1-59, pls 1-7.

BERGENHAYN, J.R.M., 1931.- Beiträge zur Malakozoologie der Kanarischen Inseln. Die Loricaten. *Ark. Zool.* 23A (13): 1-38, pls 1-3.

BURGHARDT, G.E., 1973.- A new Hawaiian chiton, *Rhyssoplax linsleyi* (Mollusca: Amphineura: Chitonidae). *Proc. Calif. Acad. Sci.* (4)39(21): 501-506.

CREESE, R.A., 1983.- Brooding in Chitons. *N.Z. mar. Sci. Newsl.* 26: 16.

CREESE, R.A., 1986.- Brooding behaviour and larval development in the New Zealand chiton, *Onithochiton neglectus* de Rochebrune (Mollusca: Polyplacophora). *N.Z. Jl Zool.* 13: 83-91.

CREESE, R.A. & O'NEILL, M.H.B., 1987.- *Chiton aorangi* n.sp., a brooding chiton (Mollusca: Polyplacophora) from Northern New Zealand. *N.Z.Jl. Zool.* 14: 89-93.

DELL, R.K., 1962.- Stages in the development of viviparity in the Amphineura. *Nature* 195(4840): 512-513.

DELL, R.K., 1963.- The littoral marine mollusca of the Snares Islands. *Rec. Dom. Mus.* 4(15): 221-229.

EERNISSE, D.J., 1984.- *Lepidochitona* Gray, 1821 (Mollusca: Polyplacophora) from the Pacific coast of the United States: Systematics and reproduction. Ph.D. Dissertation. *University of California*. Santa Cruz: 1-358, pls 1-38.

FERREIRA, A.J., 1979.- The Genus *Callistochiton* Dall, 1879 (Mollusca: Polyplacophora) in the Eastern Pacific, with the Description of a New Species. *The Veliger* 21(4): 444-466.

HEATH, H., 1905.- The Breeding habits of Chitons of the Californian coast. *Zool. Anz.* 29(12): 390-393.

HULL, A.F.B. & J. RISBEC, 1930.- The Loricates of the New Caledonian region. (Class Mollusca - Order Loricata). *Aust. Zool.* 6(3): 277-286, pl. 20.

IREDALE, T. & A.F.B. HULL, 1923.- A monograph of the Australian loricates (Phylum Mollusca - Order Loricata). *Aust. Zool.* 3(5): 186-194, pls 26-27.

KAAS, P. & H.L. STRACK, 1986.- Two new species of *lepidochitona* Gray, 1821 (Polyplacophora: Ischnochitonidae) from Senegal and the Cabo Verde Archipelago. *Basteria* 50(4-6): 79-86.

KAAS, P. & R.A. VAN BELLE, 1981.- The genus *Lepidochitona* Gray, 1821 (Mollusca: Polyplacophora) in the northeastern Atlantic Ocean, the Mediterranean Sea and the Black Sea. *Zool. Verh. Leiden* 185: 1-43.

KAAS, P. & R.A. VAN BELLE, 1981.- *Monograph of Living Chitons (Mollusca: Polyplacophora).* Vol. 2. E.J. Brill/Dr. W. Backhuys, Leiden: 1-198.

KNORRE, H. VON, 1925.- Die Schale und die Ruckensinneorgane von *Trachidermon (Chiton) cinereus* L. und die ceylonischen Chitonen der Sammlung Plate. (Fauna et Anatomia ceylanica, III, nr. 3) *Jena. Z. Naturw.* 61, neue folge, 54: 469-632, pls 18-35.

KOWALEVSKY, A., 1879.- Ueber die Entwickelung der Chitonen. Zool. Anz. 2 (3): 469-473.

KOWALEVSKY, A., 1883.- Embryogenie du *Chiton polii* (Philippi) avec quelques remarques sur le développment des autres Chitons. *Annls Mus. Hist. nat. Marseille, Zoologie* 1(5): 1-46, pls 1-8.

KUSSAKIN, O.G., 1960.- Biological peculiarities of the Far Eastern mollusc *Schizoplax brandtii* (Middendorff). *Zool. Zh.* 39(8): 1145-1150. (in Russian).

LELOUP, E., 1956.- Reports of the Lund University Chile Expedition 1948-49, 27. Polyplacophora. *Lunds Univ. Arsskr.* (2)52(15): 1-94.

LYNGNES, R., 1924.- Zur Kenntnis der Eihüllen der Chitoniden. Vid. Selsk. Skrift. *I Matem. naturvid.* Kl. 20: 1-12, pls 1-4.

MARTENS, E. VON & G. PFEFFER, 1886.- Die Mollusken von Süd-georgien nach der Ausbeute der Deutschen Station 1882-83. *Jb. wiss. Anst. Hamburg* 3: 65-135, pls 1-4.

O'NEILL, M.H.B., 1984. Morphological changes in *Onithochiton neglectus* Rochebrune, 1881 (Mollusca: Chitonidae), and their taxonomic significance. *N.Z. Jl Zool.* 11: 43-48.

PEARSE, J.S., 1979.- Polyplacophora. *In: Reproduction of marine Invertebrates* (Giese & Pearse, Eds.) vol. 5, New York, Academic Press: 27-85.

PENPRASE, J.R., 1981.- Brooding of *Ischnochiton (Haploplax) lentiginosa* (Sowerby, 1840) in New South Wales. *J. Malac. Soc. Aust.* 5(1-2): 65-66.

PLATE, L.H., 1898.- Uber primitiv Organisations verhältnisse, Viviparie und Brutflege bei Chitonen. Sber. K. Preuss. Akad. Wiss. 14: 213-217.

PLATE, L.H., 1901.- Die Anatomie und Phylogenie der Chitonen. Fauna Chilensis. Zool. Jb. Syst. Suppl. 5: 281-600, pls 12-16.

SIMPSON, R.D., 1977. The Reproduction of Some Littoral Molluscs from Macquarie Island (Sub-Antarctic). *Mar. Biol.* 44: 125-142.

SIRENKO, B.I., 1973.- A new genus of the family Lepidopleuridae (Neoloricata). *Zool. Zh.* 52(10): 1569-1571 (In Russian).

SMITH, A.G., 1966. The larval development of chitons (Amphineura). *Proc. Calif. Acad. Sci.* 32: 433-466.

THIELE, J., 1910.- Polyplacophora, Gastropoda marina, Bivalvia. In: Schultze, L. *Zoologische und anthropologische Ergebnisse einer Forschungreise im westlichen und zentralen Südafrika ausgeführt in dem Jahren 1903-1905.* Denkschr. med. - naturw. Ges. Jena 4(1-2): 1-370, 14 taf.; 4(3): 371-522, 9 taf. (not seen).

TURNER, E., 1978.- Brooding of chitons in Tasmania. *J. Malac. Soc. Aust.* 4(1-2): 43-47.

VAN BELLE, R.A., 1984.- De Polyplacophora van de Canarische Eilanden. *Gloria Maris* 23(4): 69-76, pl. 1.

WISSEL, C. VON, 1904.- Pacifische Chitonen der Sammlungen Schauinsland und Thilenius nebst einem Anhang über drei neuseeländische Species der Gattung Oncidiella. *Zool. Jb. Syst.* 20(6): 591-676, pls 21-25.

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