

STUDIES ON MOROCCAN CIRRIPEDS (Atlantic Coast)

(With plates I-IV and 10 figures in the text) (1)

by Hjalmar BROCH (Oslo)

A glance at the list of Cirripeds hitherto recorded from the occidental coasts of Africa (Broch 1924) shows us that up to now only two species — *Mitella pollicipes* (Gmelin) and *Poecilasma Kempferi* (Darwin) — are noted from Moroccan waters. I was, therefore, delighted when Dr Robert Ph. Dollfus asked me to examine some collections of Moroccan Cirripeds gathered for the most part by Dr Jacques Liouville and himself, and I wish here to express my sincere thanks for the opportunity thus provided to give exact dates filling up some gaps in our faunistic knowledge.

The collections contain 17 species, two of which seem to be new to science, and among the species known of old, one has developed a form which does not seem to have been met with earlier. As one of the two above mentioned species again turned up in the collections, we can now note 18 species from Moroccan coastal waters—the number is by no means great; it nevertheless means a great advance. Of course, our knowledge is far from exhaustive. It is on the contrary certain that more species live along the Moroccan coasts, and I have, after treatment of the species found in the collections, added a review of those species which have been found hitherto, and which are likely to be found in Moroccan waters owing to their occurring in neighbouring seas, or, generally, both in Mediterranean and West African localities.

The Moroccan collections at hand not only contribute to the systematic details concerning adult specimens previously not exhaustively dealt with. They exhibit more than usual interest, heed having been paid to gather also very small specimens, thus furnishing a good base for study also of juvenile individuals. This was especially the case with some species of *Balanus*, and I succeeded in stating that three of the Moroccan species go through a tetramerous stage before going over into the hexamerous stage through proliferation of carinolateralialia from the lateralialia, a phenomenon just elucidated in detail on *Balanus balanoides* (Linné) by Sven Runnström (1924).

We can, therefore, now with certainty state, concerning the development of *Balanus*, that the wall crown is at first formed as a pentamerous ring composed of a carina, two lateralialia and two rostralateralialia; through coalescence of the rostro-lateralialia the pentamerous crown is converted into a tetramerous wall crown, and during the following growth

(1) Résumé en français rédigé par le Dr Théodore MONOD.

the carinal part of the lateralia is detached as carino-lateralialia, the tetramerous stage thus metamorphosing into a hexamerous stage, the definite crown of the adult *Balanus*. It is still a question to be answered whether the tetramerous stage corresponds with the crown of *Tetraclita*.

Now we have to recall the deductions given by *Pilsbry* (1916). He maintains that the « rostrum » of the *Chthamalidae* is a rostrum proper, being furnished with alae, whereas he assumes the « rōstrum » of the *Balanidae* to be composed of the coalesced rostrum and rostro-lateralialia. Although the latter statement, according to the postlarval development, only partly holds good, we must in so far agree with him : in *Balanus* no proper rostrum is present.

Although the definite answer as to the *Chthamalidae* cannot be given till their skeletal development has been worked out in detail, yet the collections at hand give us a good hint owing to a quite small specimen of *Chthamalus stellatus* (Poli) which, judging after the size, the wanting calcification and the development of the eyes, must coincide with the early tetramerous stage of *Balanus*. This early stage of *Chthamalus* already has a hexamerous crown. In this case the plates of the wall crown must — analogous with the *Balanus* plates — be designed as a carina, two lateralialia, two rostro-lateralialia, and a rostrum proper, the latter furnished with distinct alae. This indicates that the interpretation given by *Pilsbry* (1916) holds good for this genus.

The details given by *Sven Runnström* (1924) supplied with the present material afford the first safe basis for a discrimination of plate homologies among the *Balanomorphae*. To a certain degree they corroborate the statements of *Pilsbry* (1916), and they show the correctness of his assumption that the number of plates alone cannot serve as a basis for the classification of the barnacles. Although the numbers of plates coincide in *Balanus* and *Chthamalus*, yet the ontogenetic data reveal that the plates are by no means homologous, and that the genera thus phylogenetically are very distantly related. It is, moreover, obvious that a study of outgrown barnacles does not suffice, if we wish to discriminate the homologies of the plates and the affinities of species and genera — we have yet a vast field for ontogenetic research before us, the only safe basis for a natural classification of the barnacles.

Once more I wish to emphasize the value and importance of collections like the present ones. The careful and time-spending work demanded by gathering such small creatures is, I am sorry to say, only seldom afforded by collectors. Nevertheless it is absolutely necessary if the expeditions are to give more than coarse faunistic data. We are indeed greatly indebted to collectors who spend work and time to further our knowledge also in groups they do not deal with themselves.

Scalpellum scalpellum (Linné)

- « Vanneau » St. XXXVIII, 9-6-1924. Long. W. 7°15'. Lat. N. 34°08.
Depth 150 m. One small specimen.
- St. XLIV, 14-6-1924. Long. W. 7°54'16". Lat. N. 33°54'30".
Depth 145 m. One medium sized specimen.
- St. XLVI, 17-6-1924. Long. W. 7°59'. Lat. N. 33°54'.
Depth 158 m. One juvenile specimen.
- St. XLVIII, 18-6-1924. Long. W. 7°56'16". Lat. N. 33°47'.
Depth 122 m. Three juvenile specimens on Hydroids.
- St. LXVI, 19-8-1925 Long. W. 9°52'20"-9°52'. Lat. N. 30°33'30"-30°33'20". Depth 75 m. on Hydroids.
- St. LXX, 27-8-1925. Long. W. 9°50'40". Lat. N. 30°25'30".
Depth 85 m., on Hydroids.
- St. LXXV, 27-8-1925. Long. W. 9°51'10". Lat. N. 30°24'10".
Depth 105 m., on Hydroids.
- St. LXXVI, 29-8-1925. Long. W. 9°56'30". Lat. N. 30°34'30".
Depth 95 m., on Hydroids.
- St. LXXVIII, 30-8-1925. Long. W. 9°54'20"-9°53'40".
Lat. N. 30°28'-30°26'50". Depth 105 m., on Hydroids.
- St. LXXXIII, 2-9-1925. Long. W. 9°56'10". Lat. N. 30°27'.
Depth 125 m. on Hydroids. And on a Gorgonarian
together with *Heteralepas cornuta* and *Balanus fallax*.
- St. LXXXVIII, 3-9-1925. G. 9°58'40" W, L. 30°38'10" N,
depth 80 m. on Hydroids together with *Balanus fallax*.

According to the present data, we are probably near the southern limit of *Scalpellum scalpellum* in the waters investigated. No difference could be detected as compared with specimens from Northern waters; quite on the contrary, the species seems only feebly inclined to variations. Also a fine specimen from the Balearic Islands in detail agrees with individuals from the Norwegian coast.

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Mitella pollicipes (Gmelin)

(*Pollicipes cornucopia* Leach)

Rabat et Mogador, Alluaud leg. 1922. *Fedhala*, Liouville, leg. août 1923; 1924.

Mogador, marée basse (« Vanneau », 6-9-1925); with *Balanus perforatus* on the capitulum.

The mouth parts of this species obviously agree with those of *Mitella polymerus* (Sowerby). The *mandible* (fig. 1) has three strong, almost equidistant teeth, and its lower and rather pointed angle is strongly

pectinated. The *maxilla* has three prominent tufts of hairy bristles, one below the strong upper spine, one in the middle of the cutting edge, and the third at the lower angle; between the tufts five paired strong spines are seated above and below the median tuft.

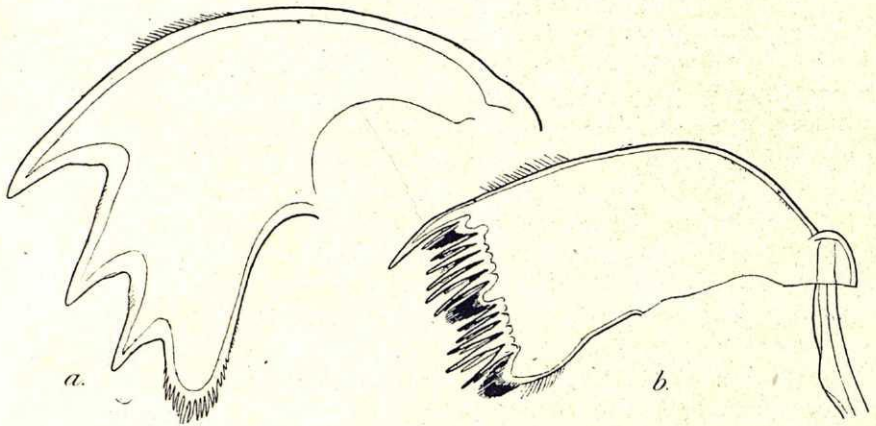


Fig. I. — *Mitella pollicipes* Gmelin, adult specimen from Fedhala, 1924
a, mandible; b, maxilla ($\times 20$)

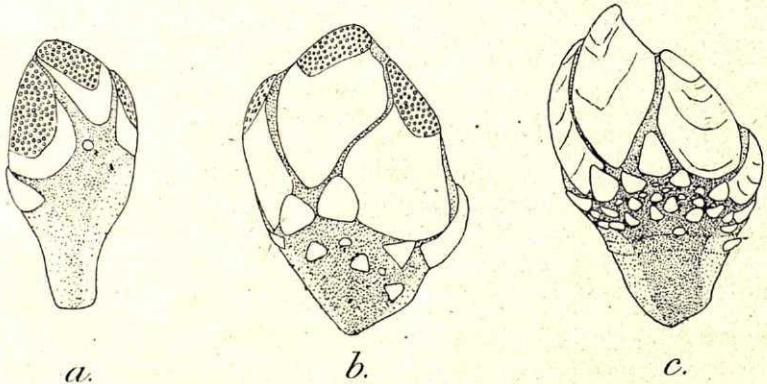


Fig. II. — *Mitella pollicipes* Gmelin, from Fedhala, 1924
a, juvenile specimen with well developed rostrum, to the left, and the first of upper latera only just indicated. — b, more advanced stage in which five pairs of peduncle scales are visible; a subcarina is developed to the left. — c, a young specimen with several latera of the second row developing.

(a and b, $\times 33$; c, $\times 20$)

Seated on the large specimens all developing stages are found from the pupa and upwards. The development of the skeleton (fig. II) in detail agrees with *Mitella polymerus* (comp. Broch 1922). The first latus does not appear till the rostrum has attained a comparatively rather large

size, and the scales of the peduncle commence to appear when a subcarina is developing. New accessory capitulum plates (latera) and peduncle scales, are only formed at the transition from capitulum to peduncle, and the peduncle scales stop growing soon after their having been removed from the zone of origin by new scales.

It is of great interest to notice that the Cypris larva was found crawling about on the capitulum of the large specimens and that every developing stage from the pupa and upwards is observed on the peduncle of large specimens, as was also the case in *Mitella polymerus* (comp. Broch 1922), the peduncle of large *Mitella pollicipes* frequently also serves as base of attachment for Algae, Bryozoans, Lamellibranchiates, etc. This seems to indicate that the larval development in *Mitella*, at all events in several cases, is carried on to the cypris stage within the mantle cavity of the mother animal. This is a case which, nevertheless, deserves closer investigations; my material did not suffice for a nearer study of the problem.

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Lepas anatifera Linné

Mazagan, 27-6-1924. Lièges flottants; several, mostly small specimens. *Casablanca*, 14-6-1923. Liège flottants; several specimens together with *Lepas pectinata* Spengler. *Plage de Casablanca*, R. Ph. Dollfus leg. Août 1923; several small specimens on a piece of cork. *Fedhala*, R. Ph. Dollfus leg. août 1923; some large specimens and several small ones, partly fixed on cinders together with small *Balanus perforatus* Bruguière, or on a piece of cork together with *Lepas pectinata* Spengler.

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Lepas pectinata Spengler

forma squamosa Fischer

Casablanca, 14-6-1923, lièges flottants; several small specimens together with *Lepas anatifera* Linné. *Fedhala*, Liouville et R. Ph. Dollfus leg. août 1923; several small specimens, some on small cinders, others on a piece of cork, together with *Lepas fascicularis* Ellis et Solander and *Lepas anatifera* Linné.

« Vanneau », St. LVI, 24-6-1924. Long. W. 8°24'30". Lat. N. 33°30'20", surface. Small specimens on *Zostera*.

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Lepas fascicularis Ellis et Solander

Fedhala. Liouville leg. août 1923. Some specimens together with *Lepas pectinata* Spengler.

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Heteralepas (Heteralepas) cornuta (Darwin) Pilsbry

Pl. IV. Fig. 26-29

« Vanneau » St. LXXXIII, 29-9-1925, 9°56'10" W., 30°27' N., 125 m. On living and dead Gorgonarians together with *Scalpellum scalpellum* and *Balanus fallax*.

The identity of this characteristic species is easily settled owing to the remarkable constancy of the carinal tubercles, seated one at the upper side of the aperture, two along the carinal crest of the capitulum, and at last, often more or less rudimentary one at the dorso-carinal transition from capitulum to peduncle (comp. Plate IV, fig. 29).

The description given by Darwin (1851) indicates that the species must be placed in the subgenus *Heteralepas* of Pilsbry's (1907) genus *Heteralepas*, the inner ramus both in fifth and sixth cirrus being greatly reduced in size and numbers of segments. The data of the literature being somewhat scanty. I shall here give the details of a medium sized adult specimen from the « Vanneau ».

The numbers of segments counted in the *cirri* are shown in the following table, in which also the numbers of coalesced basal segments of each ramus are given (if the numbers of non coalesced segments are wished, the numbers of the upper row must be reduced proportionally):

CIRRUS	I	II	III	IV	V	VI
Numbers of segments in the rami	12-23	44-56	61-64	65-67	68-17	59-14
Coalesced basal segments.....	4-4	6-5	8-7	8-9	9-0	11-0

In the first cirrus, the shorter ramus attains a length about $\frac{4}{5}$ of the longer one; the segments are only feebly swollen. The *caudal appendages* are as long as the basipodite of the sixth cirrus and have seven segments. The *penis* is irregularly annulated and scantily furnished with hairs.

Also the *mouth parts* show the typical features of the subgenus *Heteralepas*. The *labrum* (Fig. III, a) is prominent, although not bullate, it is hairy and has along its inner side a row of strong, wharty denticles; the palpi are small and slender. The *mandible* (Fig. III, b) has four large teeth, the lower one (the fourth) coinciding with the lower extremity of the cutting edge; the second tooth is situated in the middle of the entire cutting edge, and has pectinated basal contours. The maxilla (fig. III, c) has a large and stout upper tooth at the lower sides of which a pair of strong, somewhat shorter spines are present; below this group a large and deep excavation follows comprising one fourth to one third of the entire cutting edge; the lower half of the maxilla is straight and armed with 7 to 9 pairs of strong but slender bristles.

The collection of *Heteralepas cornuta* brought home by the « Vanneau »

is very interesting containing every stage of development from the newly fixed pupa to adult specimens.

In the youngest specimen found (Plate IV, fig. 26) the pupa cover is present although a peduncle is well visible, already attaining a length of one fourth of the length of the pupa shell. The pupa evidently exhibits some small characters which have not been apparent in other species hitherto investigated: the hind extremity is developed into two very short teeth and the ventral margin has a shallow, although distinct notch just before the large eye of the cypris-larva.

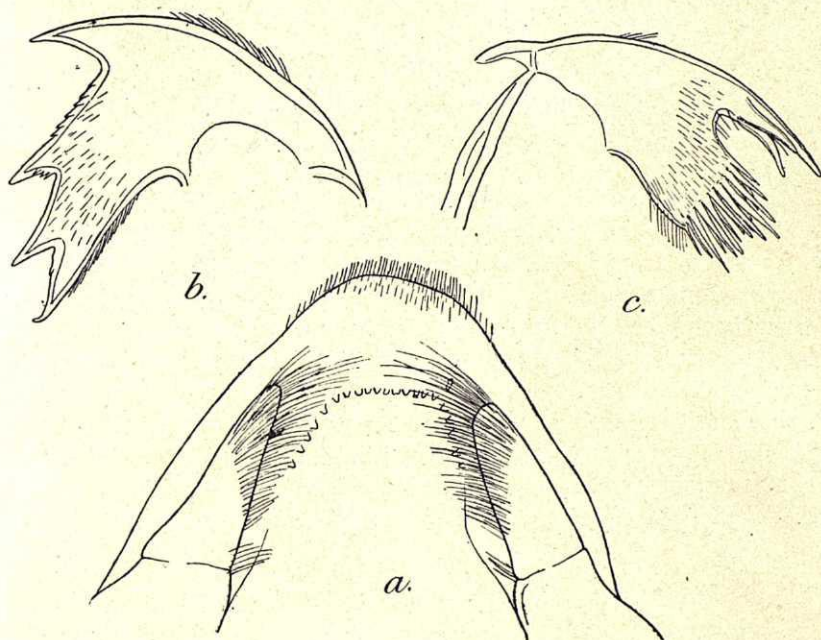


Fig. III. — *Heteralepas (Heteralepas) cornuta*
Mouth parts of a specimen from « Vanneau » St. LXXXIII.
a, labrum with palpe seen from below; b, mandible; c, maxilla.
($\times 40$)

The paired eyes are typically different from those of *Heteralepas (Paralepas) minuta* in the corresponding stage, lacking every trace of vitreous bodies; such may possibly be found in young cypris-larvae, although it does not seem probable in the present case. Even if the features of the eyes mentioned are not taken into consideration; a comparison of the drawings given in Plate I fig. 1 and Plate IV, fig. 26 reveals characteristic differences in shape and appearance between *Heteralepas (Paralepas) minuta* and the present species.

Soon after the pupa cover having been thrown off, the specific fea-

tures of the adult *Heteralepas cornuta* commence to appear (Plate IV, fig. 27). The thick, but rather pellucid mantle develops an acute point at its upper extremity above the aperture, and two carinal wharts are developing along the dorsal crest of the animal. The third wharty dorsal protuberance which is found in most outgrown specimens at the transition from capitulum to peduncle, does not develop till a little later, but already with a total length of about 3 mm. the specimens (Plate IV, fig. 28) so distinctly show the typical features of the species that the identification is easily performed. The outgrown specimens (Plate IV, fig. 29) fully agree with Darwin's description (1851) although the drawing given by Sowerby is a little schematized.

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Heteralepas (Paralepas) minuta (Philippi)

(Plate I, fig. 1-2)

Although this species has not been found in material from Moroccan waters, it must belong to the fauna, being recorded from the Mediterranean as well as from Madeira. Through the kindness of Dr Th. MONOD, I have had opportunity to study a great series of specimens from the Balearic Islands (Cabrera, 3-8-1903, on spines of *Dorocidaris papillata* (Linné) together with *Scalpellum scalpellum* (Linné), and I seize the opportunity here to give some additional remarks concerning the species, the details having hitherto been insufficiently precised.

The investigation of a specimen of total length $\frac{1}{4}$ mm. (capitulum 3, the contracted peduncle 1 mm.) showed the following numbers of segments in the *cirri* : I-6,7; II-9,9; III-10,10; IV-8,10; V-8,10 and VI-9,11.

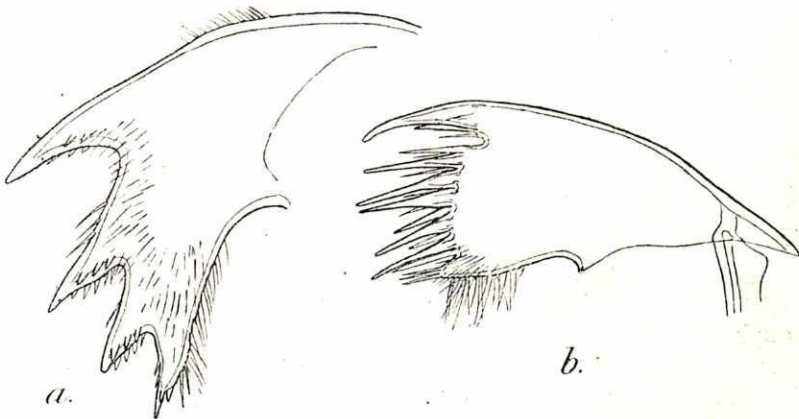
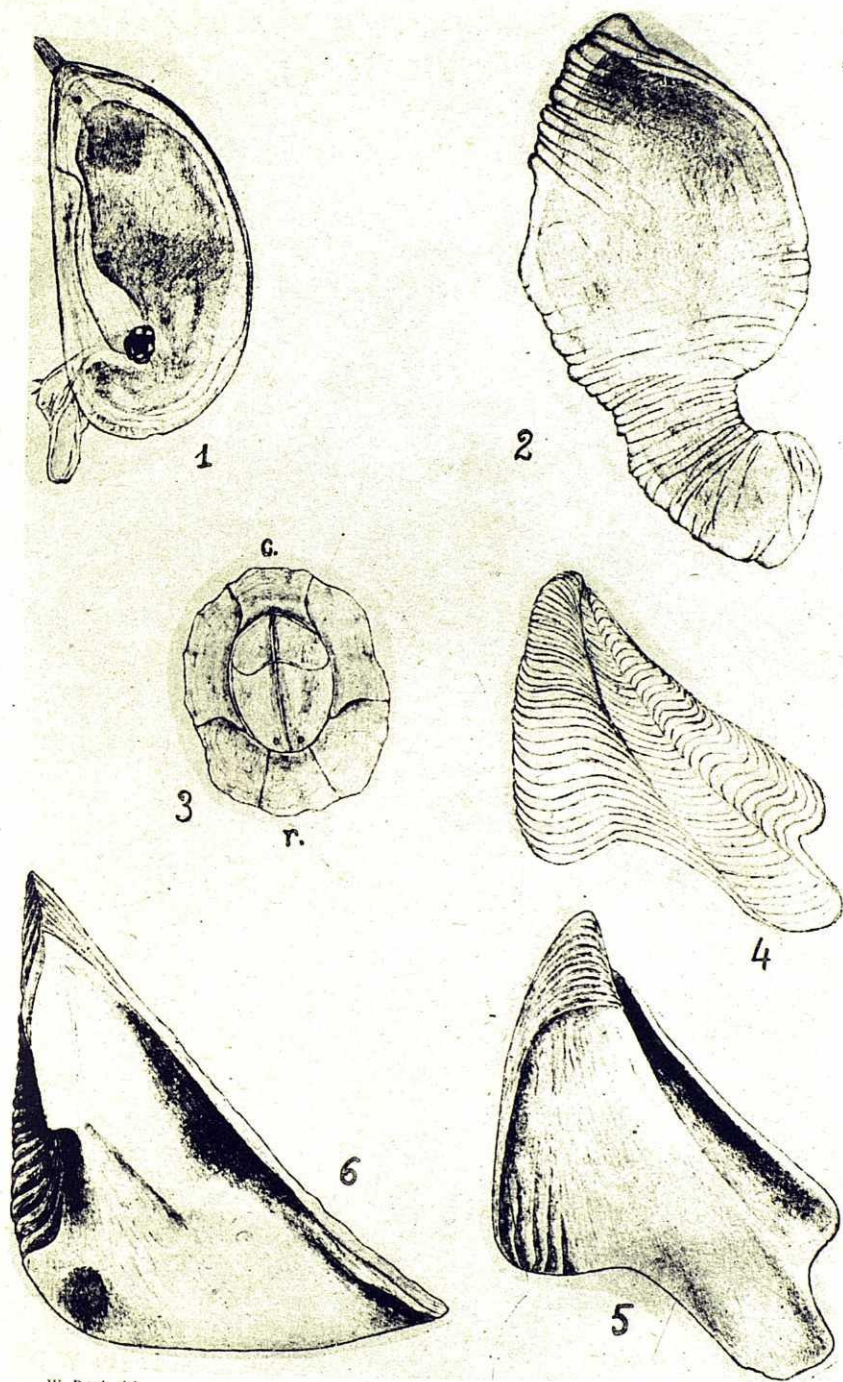


Fig. IV. — *Heteralepas (Paralepas) minuta* (Poli) from the Balearic Islands (Cabrera: on spines of a *Dorocidaris* 1903); adult specimen
a, mandible; b, maxilla ($\times 99$)



Hj. Broch, del.

Chardon, imp.

Heteralepas (Paralepas) minuta
Chtamalus stellatus
Balanus tintinnabulum

The *caudal appendages* do not quite reach the length of the basipodite of cirrus VI; they have 3 large segments, and a rudimentary, almost globose terminal segment, and are armed with some few hairs. — The mouth parts show the typical features of a *Paralepas*: the *mandible* (fig. IV) has four pectinated teeth, the second of which is placed in the middle of the cutting edge; the *maxilla* has a deep although narrow notch below the strong, upper spine; but the large spines of the cutting edge are more uniform in *Heteralepas minuta* than in other species of the *Paralepas* group, where generally two of the spines on the lower two thirds of the cutting edge dominate in size.

The large collection from Cabrera also contains some quite small specimens, and among these even a pupa was found (Pl. I, fig. 1) which is of very great interest. The pupa contains a fully developed young *Heteralepas*, showing no traces whatever of skeletal formations; thus even the primordial plates have disappeared in this genus, or at all events in the species investigated. On the other hand the young cirriped enclosed in the pupa-cover has extraordinarily highly developed composite eyes, seated where we would draw the limit between the capitulum and the peduncle. This recalls the cypris of *Ibla segmentata* (Studer), the only species where so highly developed eyes have been demonstrated (comp. Broch, 1922). In the next stage represented in the material (Pl. I, fig. 2), every trace of composite eyes has disappeared, and the specimen exhibits here the typical appearance of the adult form, although the entire length only amounts to 1,5 mm. The length of the pupa is 1 mm.

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Chthamalus stellatus (Poli)

forma stellata (Poli)

(Pl. I, fig. 3)

Fedhala, Liouville leg. août 1923, several specimens, on *Mytilus africanus*, and on *Mitella pollicipes* (Gmelin); — 1924, on *Mitella pollicipes* (Gmelin).

Agadir, anse de Ouaouzedelt (« Vanneau »), 18-8-1925; grève du fortin Irrelisli, 23-8-1925.

forma fragilis Darwin

Tanger (Oued Youd), Henri Charrier leg. juillet 1922, several small specimens.

Among the specimens of the *forma stellata* from Fedhala 1924, one specimen was found which is probably the youngest *Chthamalus* hitherto described (Pl. I, fig. 3). The greater rostro-carinal diameter only amounts to 0,64 mm. and the plates show no trace whatever of calcification. Nevertheless the wall is already hexamerous, a fact which displays a

principal difference in comparison with *Balanus*. Although the definite proof cannot be given till the postlarval development has been demonstrated in detail, it seems justified to say that in *Chthamalus stellatus* probably no tetramerous developing stage will be found, and that the hexamerous crown of plates here is primary. The crown in *Chthamalus* is, therefore, composed of the following primary plates: carina, paired lateralia, paired rostro-lateralia, and rostrum. This principally contrasts with the crown in *Balanus* which shows the following plates: primary carina, secondary carino-lateralia, primary lateralia and secondarily coalesced rostro-lateralia replacing the totally absent rostrum. This again demonstrates how little weight can be added to the numbers of plates alone as a basis for systematics among the Balanomorpha; although the crown is hexamerous both in *Chthamalus* and *Balanus*, homologies of the plates make it necessary to place the genera in different families.

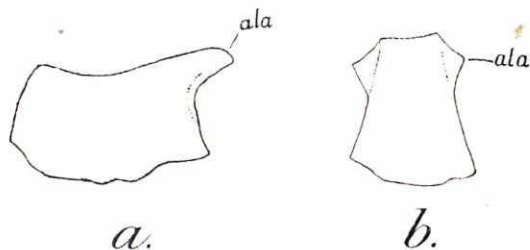


Fig. 5. — *Chthamalus stellatus* (Poli)
forma *stellata* (Poli) juv. from Fedhala (1914)
a, carino-lateral compartment; b, rostrum ($\times 50$)

The small specimen of *Chthamalus stellatus* investigated does not show any radii along the plates, but the alae are distinctly seen as « ears ». Both carina and rostrum (fig. V) have alae on both sides, laterale (fig. V, a) has only ala on the rostral side and in rostro-laterale no ala is developed at all.

In the specimen mentioned the paired eyes are very obvious and situated near rostrum under the scuta. A study of the drawings given by *Sven Runnström* (1924) seems to indicate that the eyes in *Balanus*, as seen from the outer side of the animal, disappear in the tetramerous stage during the calcification of the plates. Also this strengthens the supposition that the present young *Chthamalus* corresponds to the early tetramerous stage of *Balanus*.

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Balanus tintinnabulum (Linné)

a) forma *communis* (Darwin)

Fedhala, août 1923, several rather dark coloured specimens on a piece of cork.

« Vanneau » St. I, 24-6-1923. Long W. 9°21'. Lat. N. 34°55'. One dead specimen.

— St. XI, 8-7-1923. Long. W. 9°33'. Lat. N. 32°32'. Prof. 110 m. One specimen, on a lamellibranchiate.

b) *forma maroccana* nov.

P. I, fig. 4-6. Pl. II, fig. 7-8)

Fedhala, 1923; three specimens on *Cassis saburon* (Adanson) Bruguère.— Méhédyà; several specimens on *Yetus (Cymbium) olla* Linné.

« Vanneau » St. XXIII, 23-7-1923, 6°46'. Long. W., 34°17' Lat. N. 50-60 m. on *Yetus olla* Linné.

c) *forma* indeterminata, specimens without opercular plates, or dead and corroded.

« Vanneau » St. LXV, 18-8-1925, 9°49'20" Long. W., 30°30'50" Lat. N. 75 m.

— St. LXXII, 25-8-1925, 9°43'30" Long. W., 30°30'25" Lat. N. 40 m.

According to their colours, all present specimens of *Balanus tintinnabulum* belong to the *forma communis* of Darwin (subsp. *tintinnabulum*, Pilsbry, 1916). Some of the individuals, however, in their opercular plates so markedly differ from typical *communis*-specimens that they, at all events at present, must be looked upon as representatives of a different, possibly local variety which is here named *forma maroccana*. The characteristic opercular plates are figured on Pl. I, fig. 4-6. The most obvious feature is furnished by the spur of the tergum which at the base has a width of one third to one half of the greatest diameter of the plate, whereas this dimension in other varieties never exceeds one fourth of the diameter mentioned. To this it must be added that the spur fasciole is broad and shallow, and never closed as it is in most other forms of *Balanus tintinnabulum*. The greatest specimens found of the *forma maroccana* only attain a rostro-carinal diameter of 13 mm., and it is possible that the specimens, when larger, will develop into some form or other of the many previously described ones of the species. It must, however, in this connection, be kept in mind that the spur fasciole in almost all other known forms of *Balanus tintinnabulum* is already closed, when the individuals attain a rostro-carinal diameter of 13 mm.

The population from Méhédyà comprises specimens of all sizes, from 13 mm. down to quite small specimens with carino-rostral diameters of only 0,75 mm. at the base. An individual of the last named size is figured on Pl. II, fig. 7; it is obvious that we here face a juvenile specimen in the tetramerous stage, and it does not show any trace of an incipient carino-lateral compartment. The carino-lateral plate, however, soon afterwards turns up (Pl. II, fig. 8); already the specimen figured has fairly well developed carino-lateralialia, although the carino-rostral basal diameter has only increased to 0,8 mm. The carino-lateral compartment arises by proliferation of a carinal part of the lateralialia in the

tetramerous specimen, i. e. in the same way as in *Balanus balanoides* (Linné) according to Sven Runnström (1925).

In most cases it is very difficult to identify small *Balanus*-individuals of 1 mm. diameter or less, and it is quite impossible to refer singly occurring, tetramerous juveniles, to their proper species. In the present case, however, more than a hundred specimens of *Balanus tintinnabulum* f. *maroccana* of all sizes, from 13 mm. diameter and downwards are seated on the shell of one *Yetus*; no other cirriped species being present, every probability points to the tetramerous young also belonging to the same form. It is very interesting to notice that *Balanus tintinnabulum*, judging after the juvenile specimens from Mèhédyà, are smaller than the corresponding developing stages of both *Balanus perforatus* Bruguière and *Balanus jallax* n. sp., although the two latter species are rather small and do not by far attain such dimensions as a fullgrown *Balanus tintinnabulum*.

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Balanus perforatus (Bruguière)

a) forma *angusta* (Gmelin)

(Pl. II, fig. 9)

Fedhala, Liouville leg. août 1923 et septembre 1924. Many specimens on different supports, often on other animals as f. inst. *Mitella pollicipes* (Gmelin), on Decapods (*Eriphia spinifrons* Herbst), Molluscs (Patellids, *Purpura haemastoma* Linné, *Anomia* sp, *Mytilus africanus* Favart d'Herbigny, *Mytilus pictus* Born, etc.) partly also on dead Molluscshells, stones, pieces of cork, etc. — *Casablanca*, 25-6-1923, sur l'échelle du « Vanneau »; probably a small specimen from a floating buoy at Casablanca 14-6-1923 also must be referred to this species. *Casablanca*: sur corps flottant 19-6-1923; sur langouste, juin 1924. Anse de Ouau-gedelt au nord d'Agadir (« Vanneau ») 18-6-1925, together with *Chthamalus stellatus*.

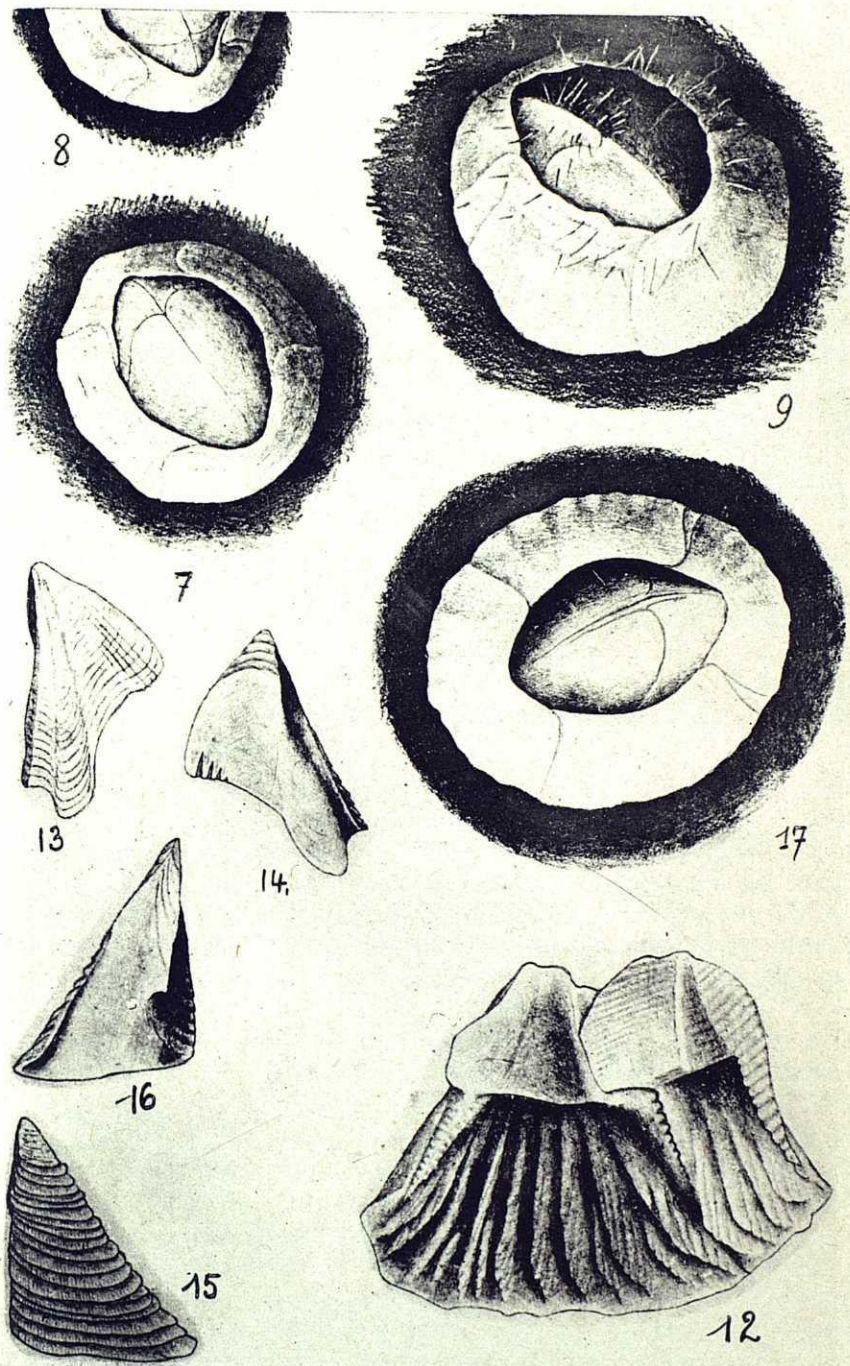
Plage de Fedhala.

Mogador (« Vanneau »), 6-9-1925, zone des moules, and marée basse sur *Mitella pollicipes*.

« Vanneau » St. C. Casablanca.

« Vanneau » St. A. 26-6-1923, *Moulay bou Selham*, basse mer. Some dead somewhat corroded specimens.

From Fedhala two large pieces of cork plates are present carrying great numbers of *Balanus perforatus*; the populations contain individuals of all sizes from 7 mm. and down to 0,75 mm., but no other species of the genus is represented among them. The smallest specimens have tetramerous wall crowns, but in individuals of 0,9 mm. diameter, the formation of carino-lateralis is distinctly observed (Pl. II, fig 9). A comparison with *Balanus tintinnabulum* (Linné) and *Balanus jallax*



Hj. Broch, del.

Chardon, imp.

Balanus tintinnabulum
Balanus perforatus
Balanus (Hesperibalanus) fallax

n. sp. displays a feature which might seem to be characteristic of *Balanus perforatus*, at all events in juvenile specimens, viz. the large hairs all over the shell. It seems to have escaped the attention of previous investigators that young specimens of *Balanus perforatus*, at least up to a diameter of about 7 mm. have their parieties covered with a fine chitinous cuticle richly furnished with hairs. The hairs are more obvious in quite small specimens, so that these strikingly contrast with the other species mentioned. We must, however, remember that many other *Balanus* species than those here mentioned have hairy cuticle and that this character alone probably does not suffice for an identification of young *Balanus perforatus* in the tetramerous stage.

b) *forma fistulosa* (Poli)

Plage de Rabat, 25-10-1925.

* *

Balanus (Eubalanus) Dollfusi n. sp.

(Pl. III, fig. 20-24)

« Vanneau » St. XLV, 14-6-1924. Long. W. 7°54'6". Lat. N. 33°37'15".

Prof. 55 m. One small specimen embedded in an association of Sponges and Zoantharians.

— St. LVII, 24-6-1924. Long. W. 8°24'46". Lat. N. 33°24'.

Prof. 25 m. One large specimen (type!) embedded in a sponge.

The barnacle is feebly conical or almost quite tubular. The carinal part is pink, with somewhat lighter coloured radiating and horizontal stripes; in the rostral part, the shell is almost quite white with a yellowish hue. In the small specimen, the pink colour is almost entirely restricted to the carina, the carino-lateral compartments and the basicarinal part of the broad lateralia. The walls are smooth or somewhat irregularly folded. Owing to the oblique edges of the well developed radii and alae the orifice is strongly toothed.

Basis and parieties are canaliculated; in the compartments, the canals are divided up by several delicate, transverse septa. Below the sheath the inner wall of the compartments show longitudinal ridges corresponding to the septa between the canals; but *there are no secondary ridges between them at the base of the compartments* or elsewhere. The radii are transversely striated, but not canaliculated; both they and the alae are rather broad with very oblique upper edges.

The opercular plates are darker pink coloured, and this, taken together with a rather prominent and peaked tergum causes a treacherous likeness to *Balanus balanus* (Linné) with which the present species obviously is closely related. The *tergum* (Pl. III, fig. 21-22) has a broad

spur not distinctly limited off from the oblique basal margin of the plate ; it is separated from the basi-scutal angle by about half of its own width. The external surface displays a broad fasciole area which is in level with the other parts of the surface. The inner side of the tergum is only very feebly sculptured, and some few crests for the depressor are only just indicated ; the articular furrow is broad and deep. The *scuta* are on the contrary very strongly sculptured (Pl. III, fig. 23-24) ; on the external surface deep growth ridges are traversed by fine, but distinct, radiating stripes. The inner side exhibits a deep pit for the adductor and a short

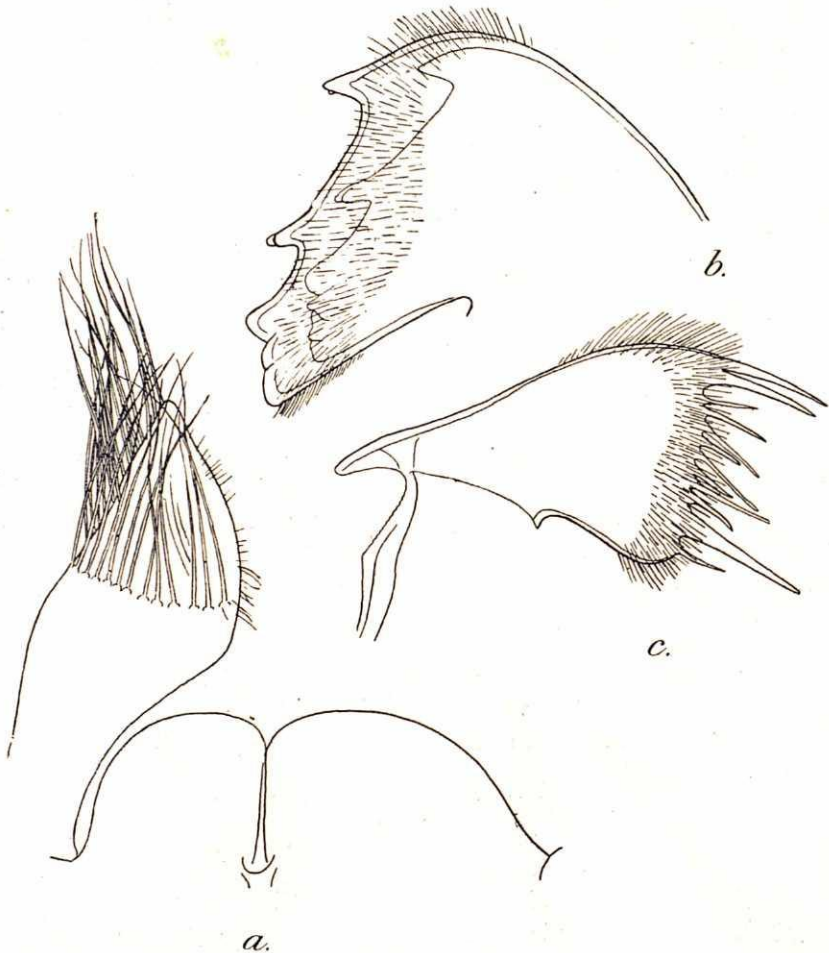
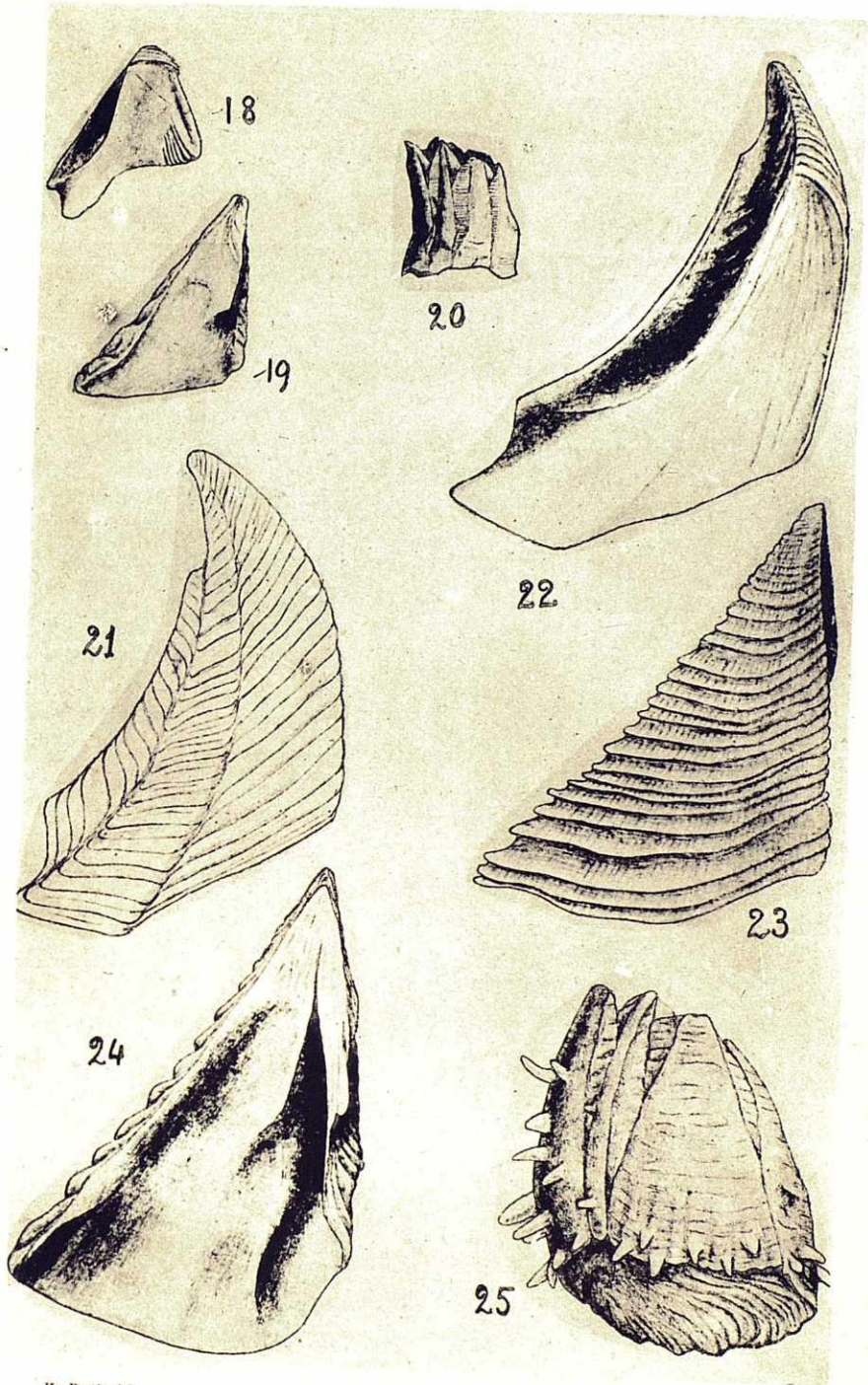


Fig. VI. — *Balanus (Eubalanus) Dollfusi* n. sp. from « Vanneau »
St. LVII, 24. 6. 24. Long. W. 8° 24' 46'' ; lat. N. 33°, 24'. Depth 25 m.
a, labrum with palpa ; b, mandible ; c, maxilla (× 33)



Hj. Broch, del.

Chardon, imp.

Balanus (Hesperibalanus) fallax
Balanus (Eubalanus) dollfusi
Acasta cyathus

although sharp and prominent adductor ridge extending only half way down the plate; also the articular ridge is short, only half as long as the tergal side of the plate, but strongly prominent, and separated from the adductor ridge by a very deep excavation. The articular furrow is broad, but not very deep. There is a great and deep pit for the depressor.

The *labrum* (Fig. VI) has no teeth nor hairs along its finely arched edges; the median notch is deep. The *mandible* strongly recalls that of *Balanus balanus* (Linné), and the second tooth has also here a bifid tip; it is situated in the middle of the entire cutting edge. The third tooth and the irregular and blunt lower teeth are only indistinctly separated. The *maxilla* has one pair of rather strong spines at the upper angle, and below them a feebly pronounced small notch; below the latter four pairs of somewhat slenderer and shorter spines are found, thereupon one large stout spine near the lower angle which is occupied by one or two smaller spines.

The first *cirrus* has swollen and somewhat protuberant segments; the shorter ramus with its 10 segments does not quite reach half the length of the longer ramus which has 18 segments. The second cirri have subequal rami with 14 and 12 protuberant segments; in the third cirri the segments are almost tubular, and the rami have 15 and 14 segments. The segments of cirri IV till VI have three pairs of ventral bristles, or, in some cases, also a basal fourth pair of small bristles may be developed; between the bases of each of the large bristle pairs we find one pair of fine hairs; the latter are at the distal pair of bristles removed a little to the proximal side. — The long *penis* is annulated all over and scantily hairy with the exception of the terminal part which carries a strong tuft of hairs.

This fine barnacle species is closely related to *Balanus balanus* (Linné) and may easily be confused with the latter owing to the colors and the peaked appearance of the operculum. *Balanus Dollfusi* nevertheless lacks the secondary septa on the inner lamina of the compartments, and also the heavy sculpturation of the scuta strikingly differs from all other species of the group.

I have taken the liberty to name the species in honour of Dr Robert Ph. DOLLFUS who has been the first to collect it during his investigations in Moroccan waters, in collaboration with Dr Jacques LIOUVILLE.

* * *

Balanus improvisus Darwin

« Vanneau » St. XIX, 22-7-1923, Long. W. 6°56'. Lat. N. 34°03'. Prof. 80 m. One dead specimen without opercular plates.

* * *

Balanus amphitrite Darwin*forma* **Stutsburi** Darwin

Fedhala 1923; two clusters of specimens, and a single specimen attached to a large *Balanus tintinnabulum* (Linné), all without opercular plates, empty and corroded.

* * *

Balanus (Hesperibalanus) fallax n. sp.

(Pl. II, fig. 12-17. Pl. III, fig. 18-19)

Text figures VII, VIII, 9

Fedhala, 19-7-1923, several strongly coloured specimens; the larger specimens with rostro-carinal broad diameter 6 mm. have ripe ova in their mantle cavities. — Same place, Liouville leg. Sept. 1924, several dried specimens on a stone; id. Sept. 1925.

- « Vanneau » St. V, 30-6-1923. Long. W. 9°2'30". Lat. N. 32°44'30".
Prof. 15 m. Four specimens on Algae.
- St. VII, 2-7-1923. Long. W. 9°58'0". Lat. N. 30°37'30".
Prof. 85 m. Some specimens on a worm tube.
- St. XI, 8-7-1923. Long. W. 9°33'. Lat. N. 32°32'. Prof. 110 m.
Numerous on Gorgonian axes (of dead and living colonies), on Hydroids, Bryozoans and shells of dead Lamellibranchiates.
- St. XXI, 23-7-1923. Long. W. 7°7'. Lat. N. 34°12'. Prof. 140-150 m. One small specimen.
- St. XXXI, 30-5-1924. Long. W. 7°34'. Lat. N. 33°54'30".
Prof. 125 m. One specimen on *Dendrophyllia*; numerous on living Lamellibranchiates.
- St. XXXIII, 2-6-1924. Long. W. 7°35'51". Lat. N. 33°41'15".
Prof. 50 m. Several specimens on *Septa nodifera* Lmck and on *Anomia*.
- St. XXXV bis, 5-6-1924. Long. W. 7°36'. Lat. N. 33°42'30".
Prof. 50 m. A great population on the shell of a *Septa nodifera* inhabited by a *Pagurus arrosor* (Herbst 1796).
- St. XLV, 14-6-1924. Long. W. 7°54'6". Lat. N. 33°37'15".
Prof. 55 m. Some dark coloured specimens on calcareous worm tubes.
- St. LXVI, 19-8-1925. G. = 9°52'20" - 9°52' W., L. 30°33'30" - 30°33'20" N. Prof. 75 m., together with *Scalpellum scalpellum*.
- St. LXIX, 22-8-1925. G. = 9°51' W., L. 30°32'20" N., Prof. 73 m. On tubes of *Phyllochaetopterus*.

- « Vanneau » St. LXX, 24-8-1925. G. 9°50'40" - 9°51'10" W., L. 30°25'30" - 30°28'10" N. Prof. 85-87 m. On tubes of *Phyllochaetopterus*.
- St. LXXI, 25-8-1925. G. 10°3'20" W., L. 30°26'20" N., Prof. 220 m. On tubes of *Phyllochaetopterus*.
- St. LXXII, 25-8-1925. G. 9°43'30" - 9°42'30" W., L. 30°30'25" - 30°30'. Prof. 40 m.
- St. LXXXII, 31-8-1925. G. 9°41'40" W., L. 30°21'40" N., Prof. 30 m. On tubes of Polychaetæ.
- St. LXXXIII, 2-9-1925. G. 9°56'10" W., L. 30°27' N., Prof. 125 m. on Molluscs and Gorgonarians.
- St. LXXXVIII, 3-9-1925. G. 9°58'40" W., L. 30°38'10" N., Prof. 80 m. on Hydroids and tubes of *Phyllochaetopterus* with *Scalpellum scalpellum*.
- St. XCI, 5-9-1925. G. 10°8'50" W., L. 30°32'50" N., one dead, abnormal specimen in a sponge.
- St. XCVII, 8-9-1925. G. 9°47' W., L. 30°30'30" N. 52 m.



Fig. VII.
Balanus (Hesperibalanus)
fallax. Darker coloured
specimen from Fedhala
(× 2)

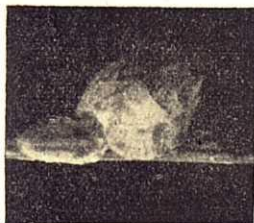


Fig. VIII.
Balanus (Hesperibalanus)
fallax. Specimen from
« Vanneau »
St. XI, 1923 (× 2)

This small species has at most a rostracarinal basal diameter of 6 mm. with a height of 3 to 4 mm.; some specimens of this size have their mantle cavities full of ova (fig. VII et VIII).

The orifice is large and toothed owing to the oblique summits of the broad radii and alae. The opercular plates are lodged high and project above the lateral compartments. — Generally the parieties are white with radiating vividly pink coloured stripes; the latter are often divided up into spots or stains; in some darker specimens the colour must be characterised as dark pink with lighter radiating lines and whitish spots. The radii are transversely striated and generally whitish and spotted with pink, sometimes a little darker.

The *compartments* (Pl. II, fig. 12) are solid, not canaliculated, and rather compact; their inner side is furnished with prominent radiating ribs, the lower ends of which are crenulated owing to longitudinal thickenings of the ribs. The *basis* is solid although radially grooved. The *radii* are broad, their summits making angles of about 45° with the base; they are obviously

transversely striped with crenulated edges. Also the *alae* are broad, their summits as oblique as those of the radii, and their inner side transversely striated. The sheath occupies the upper third of the parieties.

Tergum (Pl. II, fig. 13-14 et Pl. III, fig. 18) has a rather short carinal margin ; the articular ridge is short, although well developed, and overhanging the upper third of the not very deep articular furrow. Some few, short but distinct ribs for the depressor are present. The spur is short, about one third as broad as the valve, and separated from the basiscutal angle of the valve by about the half of its width. The external surface is only feebly sculptured, with a very slight depression running to the spur ; the growth ridges are delicate. Near the carinal margin some weak radiating striae can be distinguished. — The *scutum* (Pl. II, fig. 15-16, Pl. III, fig. 19) is delicately built, with somewhat coarser growth ridges and with a fine but distinct longitudinal striation. The articular ridge is high, about two thirds the length of the tergal margin, the articular furrow deep. *Generally the inner surface of the scutum is all but sculptureless* ; in some cases we find a slight indication of an adductor ridge, no pit is present for the adductor, but a small and distinct pit is found for the lateral depressor muscle.

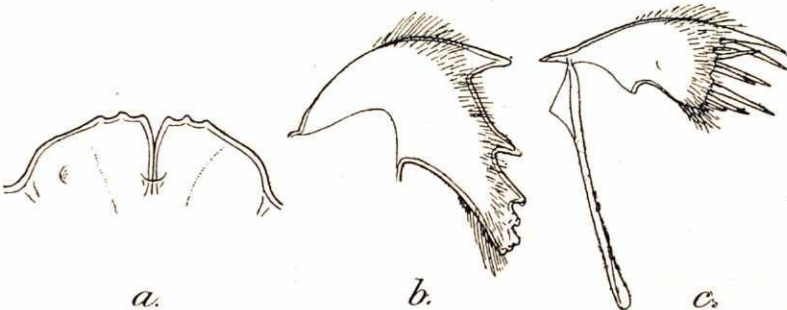


Fig. IX. — *Balanus (Hesperibalanus) fallax* n. sp. from « Vanneau »
St. XI. 8. 9. 1923. Long. W. 9° 33' ; lat. N. 32° 32'. Depth 410 m.
a, labrum ; b, mandible ; c, maxilla (× 33)

The *labrum* (fig. IX) has three blunt and strong teeth on each side of the deep notch, but is otherwise naked ; the palpa agree with those of *Balanus hesperius* Pilsbry. Also the *mandible* in its general features corresponds with that of the latter species : the second tooth is seated in the middle of the cutting edge, the third has a slightly bifid top, and the two lower teeth are composite and only little prominent. The *maxilla* has two upper strong spines above a very slight notch ; basally at the side of the lower of them a very small spine is placed. The median three or four spines are smaller than the upper two, and below them, and often separated from them by a little space, a somewhat stronger spine is

present; the lower part of the cutting edge is occupied by some few shorter spines.

In the first *cirrus* the longer ramus with 15 segments is twice as long as the shorter which has only 6 segments. The subequal rami of the second *cirrus* have 7 and 8 segments; the segments of the two first pairs of *cirri* are moderately swollen. The third *cirrus* has equal rami, both with 8 segments. *Spinules and teeth are wanting in third and fourth pairs of cirri.* The segments of the posterior *cirri* carry three or four pairs of ventral bristles, the lower pair minute. Distally each segment of the fourth and fifth *cirri* have a dorsal group of spines at least as long as the segment; in the sixth *cirrus*, on the other hand, these dorsal spines are short and delicate, and in several cases they even seem to be entirely wanting. Both rami of the sixth *cirrus* have 22 segments. The *penis* is long, annulated throughout, and almost quite destitute of hairs; there is no point at its base.

Also quite young developing stages were found in the greater populations, from the tetramerous stage and upwards. It is noteworthy that the tetramerous stage is here larger than in *Balanus tintinnabulum* (Linné) from Moroccan waters, and that the carino-lateralialia do not appear till the barnacle has attained a carino-rostral basal diameter of almost 1 mm. (Pl. II, fig. 17). This is the more interesting, as *Balanus fallax* only attains rather small dimensions in its adult stages.

The external aspect of *Balanus fallax* treacherously recalls that of small races of *Balanus amphitrite* Darwin, so strongly indeed that they are easily confused at first sight. But an examination of the compartments soon reveals that the species belongs to quite another group of the genus, and indeed, it has its next relate in *Balanus hesperius* Pilsbry (1916) from the Pacific.

It is surprising, in the waters investigated, to find so numerously occurring and relatively widely distributed a hitherto undescribed shallow water species of *Balanus*, and I cannot but think this being due to *Balanus fallax* having hitherto been confused with other species. Its frequent occurrence along the Moroccan coast seems to indicate that it also has a much wider habitat, and I am inclined to assume that, on further study, it will turn out to be a rather common species also in adjacent parts of the coastal waters. It shall be the tempting task of coming investigators in African waters to study the distribution of this small barnacle.

*
* *

***Balanus calceolus* (Ellis)**

Plage de *Rabat*, 25-10-1925 (The identity of the specimen is not quite sure, the opercular plates being absent).

*
* *

Acasta cyathus Darwin (?)

(Pl. III, fig. 25)

« Vanneau » St. I, 25-6-1923. Long. W. 6°21'. Lat. N. 34°53'30".
Prof. 21 m.

The collections only contain one small specimen (Pl. III, fig. 25) probably belonging to this species. There are, however, some difference as compared with specimens described earlier, so that at present it is more correct to put a query to the name. According to previous descriptions, the carinolateral parieties have about one fourth the width of the lateral parieties in *Acasta cyathus*; in the specimen at hand the carinolateral compartments are much narrower, only about half as broad as they ought to be. In other respects the external appearance of the specimen coincides with the descriptions given of the typical *Acasta cyathus*. To settle the identity with absolute certainty a dissection should have been necessary; as, however, only an unique small specimen was present in the collections, I thought it correct not to mutilate it and so await further specimens to settle the identity of the Moroccan *Acasta* species definitely.

* *

Platylepas hexastylus (O. Fabricius)

Rabat, 16-6-1925. Five specimens from *Thalassochelys corticata* (Rondelet).

* *

Pyrgoma anglicum Sowerby

- « Vanneau » St XXXI, 30-5-1924. Long. W. 7°34'. Lat. N. 33°54'30".
Prof. 125 m. Some living specimens in *Dendrophyllia cornigera* Lamarck (together with *Balanus jallax* n. sp.).
- St. XXXVII, 7-6-1924. Long. W. 7°50'. Lat. N. 33°59'.
Prof. 155 m. Several dead specimens on *Dendrophyllia cornigera* Lamarck.
- St. XLIII, 13-6-1924. G. 7°47'26" W., L. 33°51'30" N.;
Prof. 133 m.
- St. LXV, 18-8-1925. G. 9°49'20" W., L. 30°30'50" N.
Prof. 75 m.

No details being at hand as to the animal of *Pyrgoma anglicum* Sowerby, a specimen from « Vanneau » St. XXXI was dissected.

In the mouth parts (fig. X) the slender and rather conical shape of the *labrum* seems rather different from other species; there is only one small tooth present on each side of the very deep notch; the palpa are rounded. The *mandible* has little prominent teeth; the second is

slightly bifid, and placed in the middle of the entire cutting edge, the third is by a distinct excavation separated from the two or three blunt and indistinct, coalesced teeth of the lower angle. The *maxilla* has a

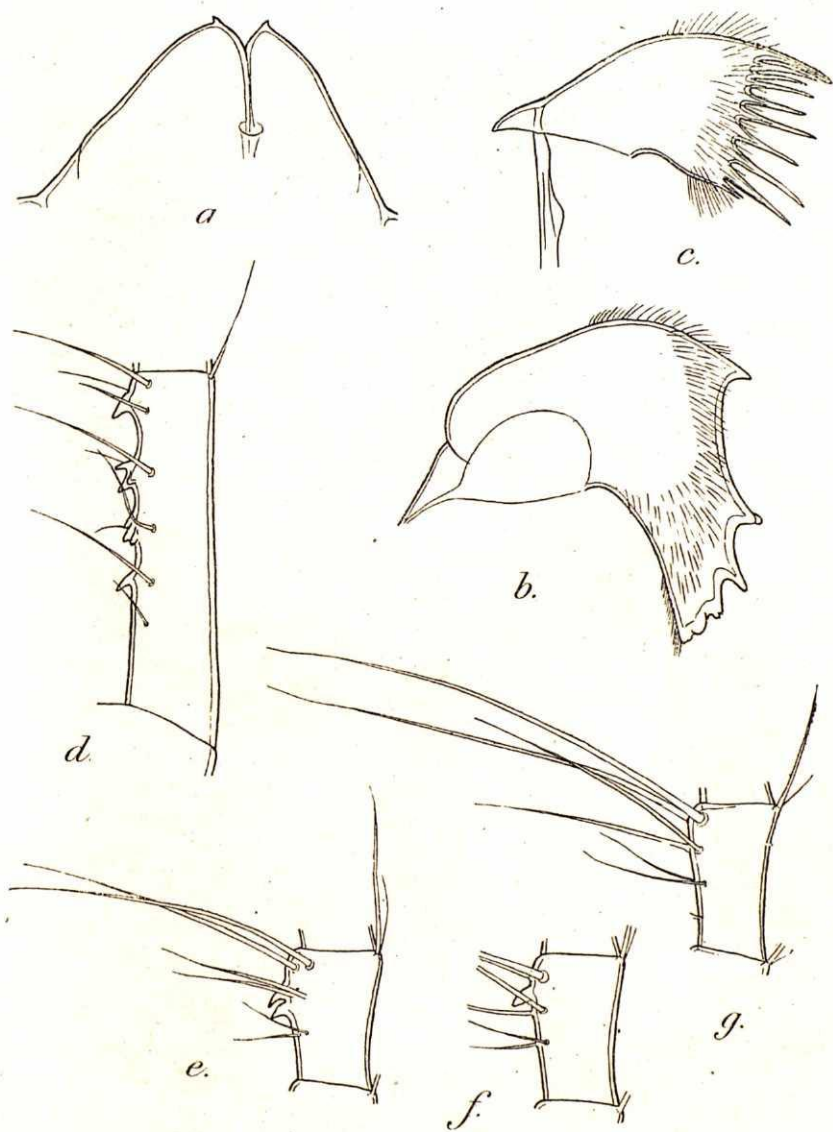


Fig. X. — *Pyrgoma anglicum* Sowerby, from « Vanneau »
St. XXXI, 30. 5. 1924. Long. W. $7^{\circ} 34'$; lat. N. $33^{\circ} 54' 30''$. Depth 125 m.
a, labrum. — b, mandible. — c, maxilla. — d, basal segment of inner ramus
of cirrus IV. — e, fourth. — f, sixth, and, g, eighth segment of the same ramus.
(a-c; $\times 59$; — d-g, $\times 99$)

straight cutting edge with no notch, the upper spine being stouter and more prominent than the others; below it about eight strong spines are found, increasing somewhat in size towards the lower angle which is occupied by two quite small and delicate bristles.

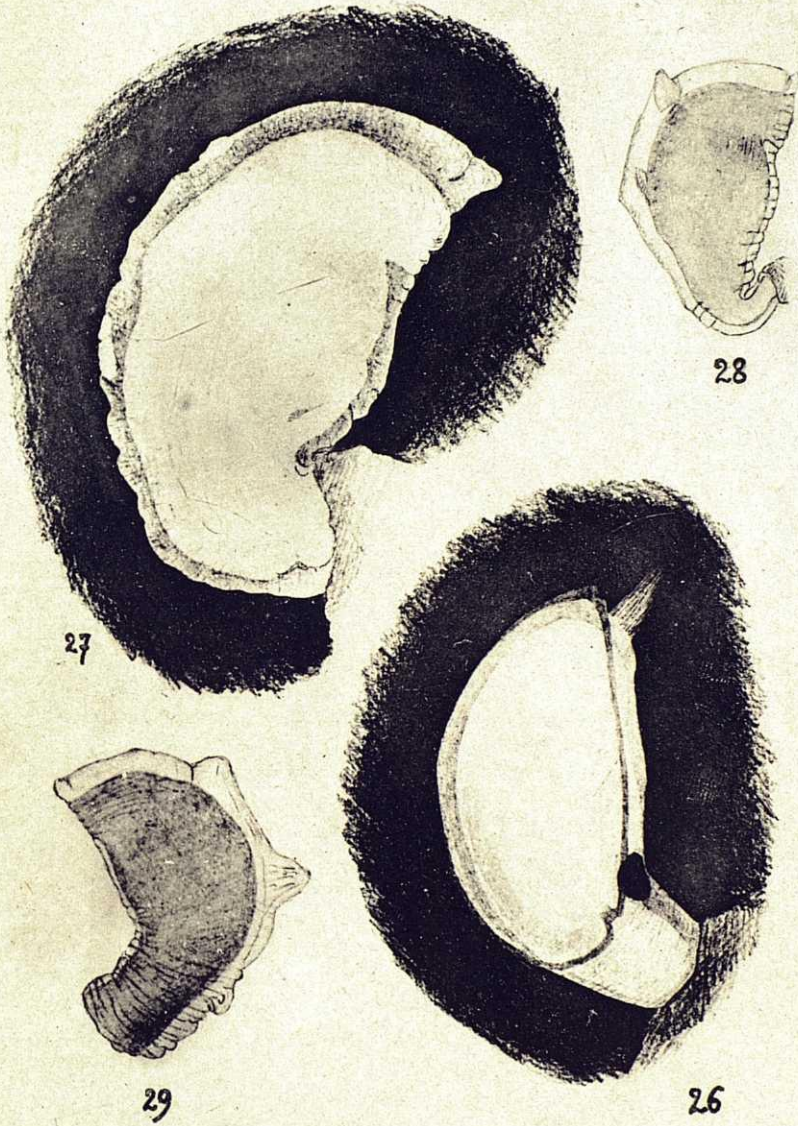
Among the *cirri* the second pair at once catch our attention owing to their small size. The segments of the three first pairs of cirri are swollen. In the first cirrus the rami are very unequal, the shorter ramus with 8 segments only attaining two fifth the length of the longer one which has 17 segments. In the second, the third and the fourth cirri the rami are subequal, the numbers of segments in the rami being respectively 7-9, 8-10 and 17-19. In the fifth cirrus the rami are again more unequal, showing a proportion 4:5; they have 18 and 22 segments. In the sixth cirrus they are, however, again more subequal with 20 and 23 segments. *In the fourth cirrus the basal 7 segments of the inner ramus are furnished with strong, ventral hooks in addition to their long bristles (fig. VIII).*

The basal segment is evidently composed of four coalesced segments according to its armament with hooks; the following four segments have two hooks each, the next only one, the seventh has but a rudimentary one, and all other segments are devoid of hooks, carrying three or four pairs of ventral bristles, like the segments of the posterior three pairs of cirri. The *Penis* is annulated all over and has a stout dorsal point at its base.

The armament of the fourth cirrus is very interesting, recalling the features of *Acasta* and the subgenus *Conopea* of *Balanus*, i. e. such other *Balanidae* which live embedded in corals and sponges. It does not, however, seem to be a universal feature of *Pyrgoma*, or it should have been observed in other species investigated by *Ni sson-Cantel!* (1922) which otherwise in their characters fairly well agree with *Pyrgoma anglicum*.

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* *

It seems suitable here, in addition to the report of the Moroccan collections, to give a review not only of the species at present known to occur in these waters, but also of those which, according to their known distribution in adjacent seas, are likely to be found here on closer study. In the following list, the species hitherto recorded are printed in fat, the other in ordinary types, those marked with an asterisk being included in the Moroccan collections of Dr Robert Ph. Dollfus. To give a basis for the judgment the occurrence in the Mediterranean, at the Azores and Madeira, and on the West African Coast is also indicated.



Hj. Broch, del.

Chardon, imp.

Heteralepas (Heteralepas) cornuta

	MEDITER- RANEAN	MOROCCO	MADEIRA M AZORES A	WEST AFRICA
	—	—	—	—
* SCALPELLUM SCALPELLUM (Linné) ...	+	+		
* MITELLA POLLICIPES (Gmelin).....		+		+
* LEPAS ANATIFERA (Linné)		+		+
— <i>Hilli</i> Leach.....				
— <i>anserifera</i> Linné	+			
— PECTINATA Spengler	+		A	+
* <i>forma</i> SQUAMOSA Fischer		+		
* — FASCICULARIS Ellis & Solander...		+		+
<i>Conchoderma auritum</i> Linné				+
— <i>virgatum</i> Spengler	+			+
POECILASMA KEMPFERI Darwin		+	M	
<i>Octolasmis Lowei</i> Darwin	+		M	+
<i>Heteralepas minuta</i> (Poli)	+		M	+
* HETERALEPAS CORNUTA (Darwin)...		+		
CHTHAMALUS STELLATUS (Poli)			M	
— * <i>forma</i> STELLATA (Poli)...	+	+	A M	+
— * — FRAGILIS Darwin	+	+		
BALANUS TINTINNABULUM Linné				
* <i>forma</i> COMMUNIS Darwin..		+		+
* <i>forma</i> MAROCCANA NOV. ...		+		
— <i>trigonus</i> Darwin			A M	+
— PERFORATUS (Bruguère)	+			+
<i>forma</i> ANGUSTA Gmelin		+		+
— * DOLLFUSI n. sp.		+		
— * IMPROVISUS Darwin		+		
<i>forma communis</i> Darwin ...				+
— <i>assimilis</i> Darwin				+
— AMPHITRITE Darwin				
* <i>forma communis</i> Darwin...	+			+
— — STUTSBURI Darwin..		+		+
— * FALLAX n. sp.		+		
— * <i>calceolus</i> Darwin	+	?		+
* ACASTA CYATHUS Darwin		?	M	
* PYRGOMA ANGLICUM Sowerby	+	+	M	+
<i>Chelonibia testudinaria</i> (Ellis)	+			+
— <i>patula</i> Ranzani	+			+
* PLATYLEPAS HEXASTYLOS (O.Fabریcius)	+	+		+

Although this list is certainly not exhaustive, it nevertheless gives us some few hints as to the geographic character of the waters investigated, which are of some interest.

First we may point out the frequency of the boreo-lusitanic *Scalpellum scalpellum* Linné which seems in the neighbourhood of its extreme sou-

thern limit in the regions studied ; the species is otherwise bound to cooler strata and its occurrence may be taken as further evidence that we cannot apply the term « tropical » to Moroccan waters ; they are subtropical or better, to a certain degree, they tend to temperate conditions.

This impression is also strengthened by the composition of the Moroccan cirriped fauna. It consists of tropical, subtropical, and temperate species, whereas more distinctly tropical forms are scarce (1), or to the greater extent even wanting. Of course, as I have said before in a review of the West African cirriped fauna (1924) : it would indeed be premature to go into details, so scanty is our knowledge concerning the stricter tropical parts of the African coast. But the absence of a form as for instance *Tetraclita squamosa* (Bruguère) may be taken as evidence that some typical tropical forms cannot penetrate so far to the north as to Morocco ; we shall evidently here also have to look for the northern limit of *Balanus trigonus* Darwin which in the Atlantic seems to be bound to the tropical parts.

Although we cannot at present say more, the hints given by the collections reveal the great interest in biogeographical respect connected with a thorough study of the Moroccan waters.

* * *

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(1) Very interesting is the appearance of *Heteralepas cornuta* Darwin in Moroccan waters. The species had till now only been found in the West Indies, but the new finding place makes it probable that we here face a more widely distributed Atlantic species which, after all, has a tropical-subtropical character. According to the occurrence of its stages in the material at hand, the species probably makes through most of its larval development in the mantle cavity of the mother animal ; this would explain a more local occurrence within its great area of distribution

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EXPLANATION OF THE PLATES

PLATE I

Heteralepas (Paralepas) minuta (Poli)

- Fig. 1. — Pupa from *Cabrera* 3 août 1903. Within the shell of the pupa the contours of the cirriped are plainly visible, and at the transition from stalk to capitulum the large composite eye is obvious (x 50).
- Fig. 2. — A young specimen shortly after having thrown off its pupa cover. Same locality. (x. 50).

Chthamalus stellatus (Poli)

- Fig. 3. — A very small specimen from *Fedhala* 1924, not yet calcified; (c), carina; (r) rostrum; the eyes are seen near the rostral end of the scuta. (x 50).

Balanus tintinnabulum (Linné) *forma maroccana* nov.

- Fig. 4. — Tergum of a specimen from *Méhédy*, external view. (x 12).
- Fig. 5. — Tergum of another specimen from the same locality; inside view (x 12).
- Fig. 6. — Scutum of the latter specimen; inside view. (x 12).

PLATE II

Balanus tintinnabulum (Linné) *forma maroccana* nov.

- Fig. 7. — Tetramerous stage from *Méhédy*. (x 50).
- Fig. 8. — Carinal part of a somewhat older specimen showing newly formed carino-lateralialia. Same locality. (x 50).

Balanus perforatus Bruguière *forma angusta* (Gmelin)

- Fig. 9. — Young specimen from *Fedhala*, showing transition from tetramerous into hexamerous stage, (x 50).

Balanus (Hesperibalanus) fallax nov. sp. (1)

- Fig. 10. — Specimen from « *Vanneau* » *St. XI* 1923. (x 2). (Text. fig. VIII).

(1) Les figures 10 et 11 sont intercalées dans le texte sous les numéros VII et VIII.

- Fig. 11. — Darker coloured specimen from *Fedhala*. (x 2). (Text. fig. VII).
 Fig. 12. — Inside view of « rostrum » and laterale showing the prominent, basally crenulated ridges of the parieties; specimen from « Vanneau » St. XI 1923. (x 10).
 Fig. 13. — Tergum of the same specimen, external view. (x 10).
 Fig. 14. — Tergum, inside view. (x.10).
 Fig. 15. — Scutum of same, external view (x 10).
 Fig. 16. — cutum, inside view. (x 10).
 Fig. 17. — Young specimen from the same locality showing transition from tetramerous into hexamerous stage. (x 50).

PLATE III

Balanus (Hesperibalanus) fallax n. sp.

- Fig. 18. — Inside view of tergum in a stronger sculptured specimen from *Fedhala*. (x 10).
 Fig. 19. — Inside view of scutum of the same specimen. (x 10).

Balanus (Eubalanus) Dollfusi n. sp.

- Fig. 20. — Type specimen from « Vanneau » St. LVII 1924. Natural size.
 Fig. 21. — Tergum, external view. (x 8).
 Fig. 22. — Tergum, inside view. (x 8).
 Fig. 23. — Scutum, external view. (x 8).
 Fig. 24. — Scutum, inside view. (x 8).

Acasta cyathus Darwin (?)

- Fig. 25. — The specimen from « Vanneau » St. I, 1923 (x 24).

PLATE IV

Heteralepas (Heteralepas) cornuta (Darwin)

- Fig. 26. — Quite young specimen within its pupa cover. The shell has two small teeth at its posterior (upper) end, and an evident notch just below (before) the large, paired eye (x 60).
 Fig. 27. — Somewhat older specimen. The pupa cover has been thrown away. The apex has attained the characteristic pointed shape, and along the carinal crest two wharty tubercles are developing, in the figure seen as more whitish (less pellucid) parts. (x 60).
 Fig. 28. — About 3 mm. long specimen showing all specific features of outgrown animals already; also the dorsal tubercle at the transition from capitulum to peduncle is indicated (x 14).
 Fig. 29. — Outgrown specimen (x 6).

RÉSUMÉ (1)

La liste des Cirripèdes de la côte atlantique du Maroc qui ne comptait encore, en 1924, que deux genres et deux espèces, comprend, aujourd'hui, grâce à la patiente et laborieuse activité du Dr R.-Ph. DOLLFUS, dix genres, représentés par dix-huit espèces, dont deux : *Balanus fallax* et *Balanus Dollfusi*, sont nouvelles pour la science.

Le présent résumé du mémoire contiendra une liste des formes présentes dans la collection, avec quelques remarques sur les plus intéressantes d'entre elles.

Scalpellum scalpellum (Linné). — L'espèce est probablement ici aux environs de sa limite méridionale.

Mitella pollicipes (Gmelin). — Le fait que des larves cypris ont été observées rampant sur le capitulum de spécimens adultes et que tous les stades de développement se rencontrent fixés au pédoncule des mêmes adultes, paraît indiquer que le développement, jusqu'au stade cypris, a lieu dans la cavité du manteau du progéniteur.

Lepas anatifera Linné.

Lepas pectinata Spengler forma *squamosa* Fischer.

Lepas fascicularis Ellis et Solander.

Heteralepas (Heteralepas) cornuta (Darwin) Pilsbry. — Le matériel marocain a permis l'étude des stades juvéniles de cette espèce, supposée jusqu'à présent particulière à la faune des Antilles.

Chthamalus stellatus (Poli) forma *stellata* (Poli).

Un individu très jeune — d'un âge correspondant à celui des stades tétramères de *Balanus* — offre un exceptionnel intérêt en ce sens qu'il possède une disposition hexamère de sa couronne de plaques. La couronne hexamère du *Balanus* adulte (carina primaire, carina lateralia secondaires, lateralia primaires, rostro-lateralia secondairement soudées et remplaçant le rostrum absent) ne serait donc nullement homologue de celle du *Chthamalus* adulte (carina, lateralia, rostro-lateralia, rostrum), bien que le même nombre de plaques soit représenté. Cette découverte rend plus évidente encore qu'on ne l'avait cru le danger de fonder la systématique des *Balanomorpha* sur le seul nombre des plaques, deux genres ayant un même nombre de plaques devant parfois — une fois connues les homologues vraies des plaques — être placés dans deux familles différentes.

(1) Ce résumé a été rédigé par M. le Dr Théodore MONON.

Balanus tintinnabulum (Linné)a) Forma *communis* Darwin.b) Forma *maroccana* nov.

Les stades juvéniles de *Balanus tintinnabulum* sont — fait très intéressant — plus petits que les stades correspondants de *Balanus perforatus* Bruguière et *Balanus fallax* nov. sp. qui, ni l'un ni l'autre, n'atteignent, adultes, la taille de *Balanus tintinnabulum*.

Balanus perforatus (Bruguière).a) Forma *angusta* (Gmelin).b) Forma *fislulosa* (Poli).*Balanus* (*Eubalanus*) *Dollfusi* nov. sp.*Balanus improvisus* Darwin.*Balanus amphitrite* Darwin forma *Stutsburi* Darwin.*Balanus* (*Hesperibalanus*) *fallax* nov. sp.

Il est curieux de découvrir une espèce encore inconnue si largement distribuée dans les eaux étudiées : sans doute a-t-elle dû être confondue avec d'autres.

? *Balantus calceolus* Ellis. — Un exemplaire incomplet.

Acasta cyathus Darwin? — Peut-être la forme marocaine est-elle spécifiquement distincte du vrai *A. cyathus*.

Platylepas hexastylus (O. Fabricius).

Pyrgoma anglicum Sowerby. — Une description de la morphologie de l'animal est donnée pour la première fois.

Le mémoire est terminé par quelques remarques bio-géographiques sur la faune des Cirripèdes du Maroc et un tableau de répartition comparée des espèces connues du Maroc, de la Méditerranée, de Madère et des Açores, enfin de l'Afrique Occidentale (Mauritanie comprise).