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Some Notes on the Genus Lepas Linné, 1767 [1])

(Subphylum *Crustacea*; Classis *Cirripedia*; Ordo *Thoracica*; Fam. *Lepadidae*.)

by

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For the last twenty years several authors have been pointing out, that the species of the genus *Lepas* are very difficult to distinguish. The forms *Lepas anatifera* LINNÉ and *Lepas anserifera* LINNÉ especially cause trouble in identifying. It is often hard and sometimes even impossible to distinguish them by an examination of the shell pieces alone. The only distinguishing mark between the two species is the number of the filamentary appendages, which is two (seldom only one) for *Lepas anatifera* and four to six for *Lepas anserifera*. The other characters of the capitulum used in most of the earlier keys are too variable to be used for accurate identifying.

The number of the filamentary appendages may render good service too if one has to distinguish *Lepas hilli* LEACH from *Lepas anatifera* LINNÉ and *Lepas pectinata* SPENGLER from *Lepas anserifera* specimens with strongly furrowed valves. For this purpose a key based on the number of the filamentary appendages has been included in this paper.

THE VARIABILITY OF *Lepas anatifera* L. AND *Lepas anserifera* L.

The valves of the capitulum of *L. anatifera* and *L. anserifera* are subject to a rather extreme variability.

The diagnosis as given by Darwin (1851) for *L. anatifera* runs as follows with regard to the valves.

Valves smooth or finely striated; internal umbonal tooth only on the right hand scutum, varying in size and form. Occludent margin of the scutum straight, running parallel to the ridge extending from umbo to apex.

All these characters are extremely variable, as may be seen from my observations on the specimens from the collection of the ZOOLOGICAL MUSEUM, AMSTERDAM. The valves are either smooth, finely striated or rather coarsely striated. The internal umbonal tooth on the right hand scutum may be wholly absent or there may be a small tooth on the left hand scutum too. There even may be a left tooth alone or the right hand

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tooth is much smaller than the left one. The occludent margin does not always run straight and parallel to the ridge from apex to umbo. In all these characters, *L. anatifera* can approach *L. anserifera* in external appearance. A comparison with the diagnosis as given by DARWIN (1851) *for Lepas anserifera* can make this clear.

Valves of the capitulum approximate, slightly furrowed, especially the terga. Right hand scutum with a strong internal umbonal tooth, left hand scutum with a small tooth or mere ridge. Occludent margin of the scuta arched, protuberant.

As in the case of *L. anatifera*, these characters are rather variable. Especially the striation of the valves varies considerably. In typical specimens the striation is rather coarse, the valves being furrowed as in *Lepas pectinata*. These furrows, however, may nearly or even wholly disappear so that the valves are as smooth as those of typical *L. anatifera* specimens. The internal umbonal tooth on the left hand scutum may be absent or hardly visible. The right hand tooth may be reduced to a mere ridge too. Sometimes the occludent margin is not at all arched and protuberant but running straight to the ridge from apex to umbo.

After these considerations it must be clear that in many cases only the number of the filamentary appendages can render a safe identification possible.

The intermediate forms between *Lepas anatifera* and *L. anserifera* seem to be largely confined to the tropical and subtropical seas and are seldom found in the seas of the temperate and arctic regions. An explanation of this fact has not yet been given as far as I know. It is tempting to suppose that the centre of evolution has lain in the tropical regions but this supposition can not yet be based on any sound arguments.

THE VARIATIES OF *Lepas anatifera* L.

Up to now the following varieties and subspecies of *L. anatifera* were recognised.

a. *L. anatifera var. a* DARWIN, 1851 ; syn. *L. anatifera var. punctata* GRUVEL, 1905.

b. *L. anatifera var. b* DARWIN, 1851 ; syn. *Anatifa dentata* BRUIGUIÈRE, 1789, *L. anatifera var. dentata* GRUVEL. 1905.

c. *L. anatifera var. testudinata* NILSSON-CANTELL, 1928.

d. *L. anatifera subspec. indica* ANNANDALE, 1909.

The fifth variety, *L. anatifera var. nonfurcata* NILSSON-CANTELL, 1927, was raised to the status of a species by TARASOW, 1935. This step will be discussed later on in this paper under *L. hillii*.

It is often impossible to distinguish the varieties a. and b. of DARWIN, because the "characteristic" features of these two varieties are very variable and often common to both.

Variety a., according to DARWIN, (1851), has one or more lines of dark greenish-brown, square, slightly depressed marks on scuta and terga. However, these lines often appear in those forms showing also a dentated carina, which is characteristic for the variety b. In these respects the two varieties can not longer be regarded as two separate varieties but must be put together.

HIRO already proposed to do this in 1937. He also proposed, in regard to the above mentioned smooth and striated valved forms to consider

the striated form as forma typica of *L. anatifera*, including the two varieties of DARWIN, and to call the smooth valved form a variety. I agree with HIRO as to the necessity to unite the two varieties of DARWIN but I can not justify his proposal to call the smooth valved form a variety. LINNÉ in 1767 in naming the species *Lepas anatifera* described the smooth valved form and not the striated one. I quote here LINNÉ's description as given in editio 10 of the Systema Naturae, genus 267, pag. 668.

Lepas anatifera. Lepadum testa compressa quinquevalvi *laevi*, intestino insidente.

In this edition LINNÉ also mentions that there are two varieties of *Lepas anatifera*. The text runs as follows:

Duplex varietas: laevis quae frequentior; striata quae saepius fossilis observatur.

In his editio 12 this duplex varietas has been omitted but now the *Lepas anserifera* has been described, which was not the case in editio 10. According to the description of *L. anserifera* it seems very likely that LINNÉ has raised his earlier striated variety of *L. anatifera* to species status.

Editio 12. genus 301, Pag. 1109.

Lepas anserifera. Lepadum testa compressa quinquevalvi *striata*, intestino insidente.

Moreover: structura omnino *L. anatifera*, sed valvulis fulcatis.

The striated variety of *Lepas anatifera* of editio 10 and the *L. anserifera* of editio 12 even have the same habitat.

Editio 10. *Lepas anatifera „var. striata"*; striata quae saepius fossilis observatur.

Editio 12. *Lepas anserifera*: habitat in pelago americano; in fossilibus magna.

I am convinced that the striated variety of editio 10 is identical with *L. anserifera* of editio 12.

Apart from these nomenclatural considerations, it is not logical to name the striated valved form *L. anatifera forma typica* because this form is intermediate between the typical, striated valved, form of *Lepas anserifera* and the typical, smooth valved, form of *L. anatifera*.

So I propose to regard the striated valved form as a variety of *L. anatifera* and to call it *Lepas anatifera var. striata*. Darwin's varieties a. and b. must on the whole be included in this new variety.

Lepas anatifera var. striata nov. var.

Synonyms:

Anatifa dentata BRUIGUIÈRE, 1789.
Lepas anatifera var. dentata GRUVEL, 1905.
Lepas anatifera var. b. DARWIN, 1851.
Lepas anatifera var. punctata GUVEL, 1905.
Lepas anatifera var. a. DARWIN, 1851.

Diagnosis:

Terga and scuta smaller than in the forma typica, more or less striated, especially the scuta. Scuta sometimes with a diagonal row of depressed

quadrilateral marks of a brownish-green colour. Carina often more or less strongly dentated. Peduncle shorter than in the forma typica. Animals on the whole approaching Lepas anserifera in external appearance. Filamentary appendages two on each side as in the forma typica.

Subspecies indica ANNANDALE seems to be a distinct variety as the ridges on the peduncle prove to be constant and characteristic. The features of the capitulum are those of the variety *striata*. Only the ridges on the peduncle distinguish this subspecies from the variety *striata*.

HOEK (1907), in summing up the species of the genus *Lepas* of the Siboga-expedition, remarks on the individuals of *Lepas anserifera* found at Station 19 :

"The species collected in the bay of Labuan Tring (Lombok) caused me some trouble as they differed from the usual appearance of *L. anserifera* in one of its most distinctive characters, viz. in the occludent margin not being arched or protuberant. Further the internal umbonal tooth of the right hand scutum is hardly stronger than that of the left hand scutum. But as these characters vary even within the specimens of this locality, the form of the scutum in some of them approching more the typical form than is the case in others ; there existing, moreover, a close resemblance in other regards between this and the typical form no doubt was left as to the importance of this difference.

Several specimens from this locality show the straight line of small quadrilateral depressions of a dirty-brownish colour in the scutum, running diagonally across the capitulum, which are very common in *L. anatifera*. DARWIN observed a trace of a diagonal line in a single specimen of *L. hillii* but they have not been observed in *Lepas anserifera*, so far as I know".

Fig. 1. Sideview of the carina of *Lepas hillii* LEACH

Fig. 2. Carina of *Lepas hillii* LEACH as seen from above.

2.

In reexamining these specimens from station 19, I discovered that they do not belong to *L. anserifera* at all but to *L. anatifera var. striata*. The number of filamentary appendages is two in all these specimens. HOEK did not know the specific value of the filamentary appendages and identified his specimens by external appearance only. Because so far HOEK's remark about a *L. anserifera* with a diagonal line of quadrilateral depressions has been the only one ever made, it seems worthwhile to point to the fact that his remark was founded on a wrong identification.

AN ATYPICAL FORM OF *Lepas hillii* LEACH, 1818.

Among the species of the collection of the Zoological Museum, Amsterdam, I came across a rather unusual form of *L. hillii* LEACH. The carina of this specimen was nearly non-furcated. The carina is only slightly curved inwards at the end and the two prongs are not visible. A small rising on either side at the end of the carina marks the place where they should have been. (Fig. 1 and fig. 2).

The other characters were those of typical specimens. The number of the filamentary appendages is three on either side, two on the swelling at the basal articulation of the first pair of cirri, one on the flank of the prosoma. There are no internal umbonal teeth. Valves thick and smooth, with clear growth lines. Pellicula thick and of a purplish colour. There is a wide interspace between the carina and the other valves.

Measurements: peduncle : 28 mm. in length.
peduncle : 24 mm. „
carina : 17 mm. „

The carina approaches in appearance between the carina of *Lepas nonfurcata* (NILSSON-CANTELL) TARASOW. And in this light it seems questionable if *L. nonfurcata* deserves the status of a species. The non-furcation of the carina appears to be a normal, though rare, variation of the carina as is the case with the dentation of this valve. *Lepas anatifera*, *L. anserifera* and *L. pectinata* all may show a dentated carina. If further observation might show that non-furcation is a rather norma. variation. *L. nonfurcata* will have to be reduced to variety status again.

This atypical form of *Lepas hillii* was found in Japan in 1883; there are no further particulars about the place where the specimens has been caught.

Key to the species of the genus Lepas.

1a. Carina ending in a flat oblong disc. Umbo of the carina about halfway projecting with a sharp angle. Five filaments on each side ..... 1. *Lepas fascicularis* ELLIS and SOLLANDER
b. Carina ending flat in a small disc as broad as the rest of the carina. Carina not projecting. Two filaments on each side ..... 2. *Lepas non-furcata* (NILSSON-CANTELL) TARASOW
c. Carina ending in a fork ..... 2.
2a. Four to six, usually five, filaments on each side. Scuta and terga radially striated, or furrowed. Occludent margin usually arched, protuberant ..... 3. *Lepas anserifera* LINNÉ.
b. Less than four filaments on each side ..... 3.
3a. Three filaments on each side. Valves smooth and thick. Apex of carina reaches hardly halfway between the terga ..... 4. *Lepas hillii* LEACH.
b. None to two filaments on both sides ..... 4.
4a. None to one filament on each side. Valves strongly furrowed, thin and bristle. Scuta with a prominent ridge, from apex to umbo, close to the occludent margin which is straight ..... 5. *Lepas pectinata* SPENGLER.
b. Two filaments on both sides, Valves smooth or finely striated, ... 5.
5a. Two filaments on each side. Valves thick and strong. Usually internal umbonal tooth on right-hand scutum only ..... 6. *Lepas anatifera* LINNÉ.
b. Two filaments on both sides. Valves thin and bristle. Internal umbonal tooth on both scuta ..... 7. *Lepas australis* DARWIN.

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