darf nach vorn gerichteter Sprossen ist leichter aus dem Bereich der normalen Vordersprossen zu decken, als aus dem Gebiet der ursprünglichen Hintersprossen, die in sehr weitgehender Weise (über 90° hinaus) hätten gedreht werden müssen.

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2. Note on the Hectocotylized Arm of the Pacific Form of Ommastrephes O. sloanei sloanei Gray.

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(With 4 figures.)

eingeg. 7. Juli 1913.

Pfeffer in his great work on the Oegopsid Cephalopodes[1], writes about the hectocotylized arm of *Ommastrephes pacificus* as follows: "Der Hectocotylus dieser Form ist noch nicht beschrieben, da nach Würker sich im Münchner Museum 3 Männchen befinden, so ist die Beschreibung in absehbarer Zeit zu erwarten".

As however the expected description of the Munich specimens has not appeared after the lapse of three years, and as the new Catalogue of Japanese Cephalopoda by S. Stillman Berry[2], does not mention anything about it, I venture to give a sketch of the hectocotylized arm of this species, leaving a fuller description to my monographic work on the Oegopsid Cephalopoda of Japan which is now in preparation.

The hectocotylization is observed on the right ventral arm as in other species of the genus. In the proximal three-fourths of the arm no difference whatever is to be observed between the right and the left arms, with the exception of the supporting bars of the membrane which on the right are a little longer and somewhat more developed. The distal portion of the arm becomes flattened on the outer side, and forms a broad membrane, and the suckers which are placed along the median dorsal side come to be situated along the inner edge. On the inner row of suckers the transverse bars as well as the membrane supporting them are well developed, while on the outer row the bars and the supporting membrane become rudimentary as we proceed more distally, but the peduncles of the suckers persist to the extreme end of the arm, and become relatively larger and more or less flattened. On the inner row, the peduncles of the suckers become rudimentary in larger specimens.

To take a concrete case, in a specimen from Misaki with the mantle length of 250 mm. marked (S 12) (Fig. 1) in the collection of the College of Agriculture, there are twenty-one rows of suckers on the proximal

[1] G. Pfeffer, Die Cephalopoden der Planktonexpedition; Ergebnisse der Planktonexpedition der Humboldt-Stiftung; Bd. II, F. a., 1912; P. 57.

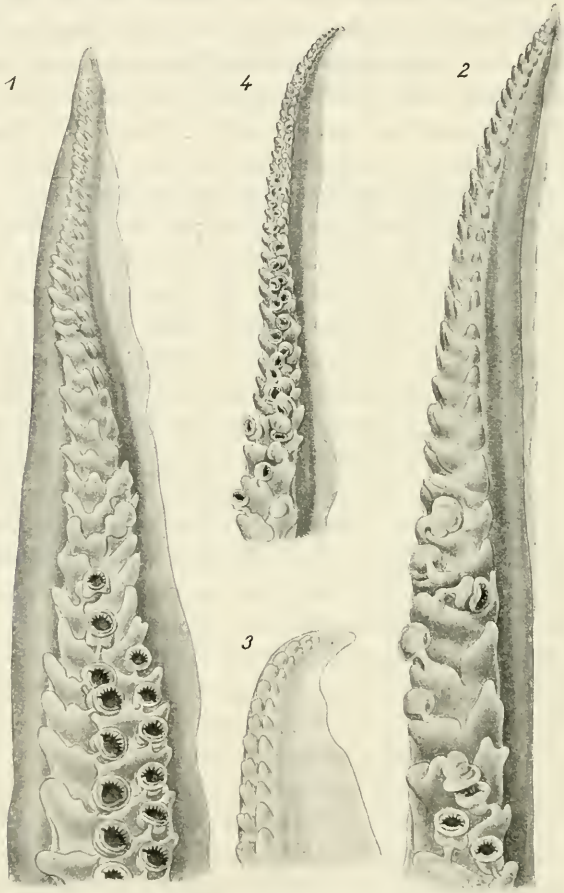
[2] S. Stillman Berry, A Catalogue of Japanese Cephalopoda; Proc. Acad. Nat. Sci., Philadelphia, July 1912.

three-fourths of the arm. Of the four following rows, only the inner suckers are developed, while the outer ones are represented only by the stalks. These four suckers are moreover not placed in a continuous series, but the two proximal ones are of 22nd and 23rd, and the two distal ones belong to the 25th and the 26th, while the 24th is only represented by a stalk. That this sucker has lost its head can be imagined from other specimens described below, which also show that there exist some irregularities in the formation, as well as the number and the arrangement, of the suckers at the distal portion of the arm. The supporting membrane of the transverse bars is nearly equally developed on both sides of it to 21st sucker, which is situated at about two-thirds the length of the suckered portion of the arm from the proximal end. From this point distally the membrane as well as the transverse bars become rudimentary on the outer side, the traces of the bar being seen to the 22nd sucker, on the outer side of which the bar appears only as a small knob, while the membrane can be traced a little more distally, i. e. as far as the 23rd sucker. The peduncles of the suckers persist, however, up to the very tip of the arm, becoming thin and membraneous distally. On the inner side, the transverse bars as well as the membrane persist to the tip of the arm, but the peduncles of the suckers become rudimentary as we proceed more distally to about the 35th row, where they become entirely lost. Thus it will be seen that on the outer side the peduncles of the suckers only persist, while the heads, the tranverse bars together with the supporting membrane become lost, whereas on the inner side the transverse bars and the supporting membrane persist, while the heads and the peduncles of the suckers become rudimentary.

The position of the transverse bars of the inner side, which, as above stated, persist to the tip of the arm, is transverse proximally, but becomes more and more oblique distally, the free ends facing distally inwards. The position of the peduncles of the suckers on the outer side also change their direction from the point where they lose their heads, the free ends becoming directed inward and distally like the bars of the outer row, the two structures are thus placed in the same direction. It will moreover be observed that the peduncles of the suckers on the outer side become greatly enlarged after they have lost their heads, thus give the appearance of being transformed from the transverse bars of the membrane. That this however is not the case, can be seen by tracing their development.

Some variations are to be observed in the formation of the hectocotylized arm between different individuals. Thus in a specimens from Niigata, on the coast of the Japan Sea, labelled as (B 2) (Fig. 2) in our Collection, which has exactly the same mantle length as the Misaki

male, the peduncles of the suckers of the inner row persist to the tip of the arm together with the bars which are larger than the peduncles. It will be remarked that in this specimen there are 42 pairs of suckers, or the peduncles of the suckers, from the base to the tip of the arm, the proximal 13 of which are provided with suckers on both rows. The



Distal portions of the hectocotylized arms of *Omm. sloanei pacificus*.
Fig. 1. From a specimen from Misaki with the mantle length of 250 mm.
Fig. 2. A specimen from Niigata, mantle length 250 mm.
Fig. 3. A specimen from Misaki, mantle length 240 mm.
Fig. 4. A specimen from Iwami, mantle length 160 mm. The lines on the side of the figures represent $^4/_5$ of the natural length.

following five have suckers only on the inner row. The transverse bars of this specimen are developed up to the 15 th, whence distally they become obsolete.

In another specimen from Misaki (S 13) (Fig. 3) with the mantle

length of 240 mm. we have 46 suckers or the transverse bars of the membrane on the inner row and the same number of peduncles of the suckers on the outer. In this specimen the suckers are present up to the 27th on the inner, and 26th on the outer row; the peduncles of the suckers on the inner row are seen up to the 23rd where it is represented by a small knob, whereas the transverse bars of the outer row are seen only up to the 13th.

In a specimen from Miye, the mantle length of which measures 230 mm., we find 50 transverse rows on the inner side, of which the proximal 36 are suckered, the following three are not, while the 40th, the 42nd, the 43rd, and the 44th are again suckered. Thus there are more suckers present in this specimen than in the others above mentioned.

But in a still smaller specimen than the last, i. e. in a specimen from Uodu, Japan Sea, with the mantle length of 240 mm. we count 46 transverse bars on the inner row and the same number of peduncles of the suckers on the outer. In the inner row of this specimen the proximal 22 are suckered, while in the outer, 16 are with suckers. The stalks of the suckers on the inner row are seen to the 31st whence they disappear, while the last trace of the bars of the outer row is seen only up to the 18 th.

In a small specimen with the mantle length of 160 mm., (O 2) (Fig. 4), from Iwami, Japan Sea, 49 pairs of suckers are counted from the base of the arm to the very small ones at the tip. The flattening of the distal portion of the arm, as well as the development of the membrane on the outer side are similar to those of the larger specimens, but both the pairs of the suckers are present as far as the extreme end, those of the outer becoming smaller from about the 17th distally. The transverse bars are prominent on the inner row, but become lost on the outer in the distal portion from about the 26th.

From this it will be seen that the hectocotylization of the Pacific form of *O. sloanei* (*O. sloanei pacificus*), differs greatly from the Atlantic representative, but is very like that of the southern form, the description of which as given by Pfeffer being applicable, with almost no alterations, to the small specimen above given, the male examined by the German author being nearly of the same size as our Iwami specimen (the Goettingen male of *sloanei sloanei* described by Pfeffer is stated to measure 170 mm. mantle length, whereas our specimen measures, as above given, 160 mm). But the suckers as well as the peduncles on the inner row, in the northern form, are, as above stated, subject to great variations, becoming liable to be lost as the animals grow larger. Whether this is the case with the southern form, i. e. with *sloanei sloanei*, is to be left for future investigations.