

XXVII

SOME REMARKS ON THE EGGS AND EGG-DEPOSITION
OF *HALOBATES*

BY

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JAPETUS STEENSTRUP's interest, as is well known, extended to almost all groups within Zoology. Among the Arthropods he has given us works on Crustacea, partly alone, partly together with LÜTKEN; further he published in 1857 a note about the species of *Phytoptus* living on the Scandinavian trees and other plants. On the other hand there exists no work by STEENSTRUP on Insects; it is known however, that also that class had caught his interest. Most frequently it was forms with specially interesting biology or in other ways peculiar, which attracted STEENSTRUP's attention, and roused his desire to make a closer study. So also concerning the Insects; he had here fixed his attention on the pelagic Hemipteres, a group which on account of its marine occurrence stands out so characteristic and isolated. For a time he thought of writing a monograph of these animals together with MEINERT, but this plan was never realized.

No wonder that STEENSTRUP had thought of such a monograph, for he was in possession of an exceedingly large material of those animals, belonging to the study collection of the University of Copenhagen. As is well known STEENSTRUP had a whole staff of collectors, especially sea-captains, whom he had managed to interest in a very high degree in collecting work, and from whom he therefore received abundant material from many different parts of the world. In reality STEENSTRUP in this manner succeeded in procuring a material, especially of Plankton-forms, far surpassing that of any other museum at that time. STEENSTRUP also in his works names several of the collectors with acknowledgments. It is again the same names we meet associated with the material of Halobatids, especially A. F. ANDRÉA and V. HYGOM.

After the death of STEENSTRUP his material of *Halobates* came to the Department of Arthropods of the Museum. Besides imagines and larvæ it contained also a large collection of eggs of those animals; this collection is of great interest, as only very little is known of the eggs of *Halobates*. It is also to be seen that STEENSTRUP had strongly fixed his attention upon the eggs; for together with his material

there also were some coloured drawings of egg-masses and eggs, which had been executed by the late CHR. THORNAM; besides there were some Pro Memoria notes, written by STEENSTRUP, which for a great part dealt with the eggs, and with such questions concerning them as STEENSTRUP thought had especially to be answered. It therefore seems to me that when a memorial volume of STEENSTRUP is published, no more fitting opportunity of bringing forward the drawings left by him may be found, and on account of the interest attached to the figures it also gives me great satisfaction to see them published. For completeness I have added some figures on the plate (figs. 5—7). I shall then in connection therewith give an account of the whole material of *Halobates*-eggs, which, besides the original Steenstrup material, consists of a few collections added afterwards.

As mentioned not much has hitherto been known of the eggs of *Halobates*. LÉON FAIRMAIRE communicates (Bull. de la Soc. Ent. de Fr. 1848, II, XXVI) that he had got a number of specimens of *Halobates flaviventris* Esch. and *sericeus* Esch., among which there were some females with strongly swollen abdomen, and by dissection 15—20 eggs were found, which are described as oblong, rather large and of pale yellow colour. BUCHNAN WHITE (Voy. of Chall. XIX, 1883, 71, Pl. III, fig. 30) describes and figures the egg of *H. Wüllerstorffi* Frauenf., also an ovarial egg; it is stated to be of a length of 1,2 mm and a diameter of 0,8 mm, and the shell is without any special structure; the number of eggs in a female was about 25. In 1879 MOSELEY (Notes by a Naturalist on the Chall. London 1879, 572) had communicated that *Halobates* carries the eggs fixed to the abdomen, but without any further particulars, and BUCHNAN WHITE states in his work that MOSELEY had communicated to him, that the mentioned statement was an error. It seems, however, to be as originally stated by MOSELEY, for WALKER communicates (Entom. Month. Mag. 2, IV, 1893, 231) that among specimens of *H. Wüllerstorffi* from the Marquesas Islands he found two females, one of which had three, the other one egg fixed to the end of abdomen, and SHARP figures a female (of *H. sobrinus*) procured by WALKER, and carrying three eggs (Cambridge Nat. Hist. VI, 1899, 511, fig. 265). WALKER describes the eggs as cylindric, with rounded ends, deep ochreous-yellow, and of a length of fully 1 mm. Finally HEIDEMANN (Proc. Wash. Academ. of Sc. III, 1901) mentions a female of *H. Wüllerstorffi*, taken west of Mexico, with eggs attached to the end of the abdomen.

The eggs mentioned here were thus either ovarial eggs, or eggs found fastened to the end of the abdomen of the female, and in the latter case it probably only will apply to the females bearing the eggs for a short time, till a suitable place for deposition is found; but where to seek this place, thereof the records mentioned did not give any information. UHLER supposed (Standard Nat. Hist. II, Boston, 1884,

269) that the eggs are laid on Sargassum or other floating sea-weed, a supposition which was rather natural.

As far as I have been able to find, only two cases of deposited *Halobates*-eggs have been published. The first publication is from 1886. WITLACZIL, who treated the collections of *Halobates* from "Vettor Pisani's" circumnavigation 1882—85, communicates (Wien. ent. Zeitg. V, 1886, 233 and Zool. Anz. X, 1887, 338) that the expedition south west of the Galapagos Islands found a bird's feather, the vane of which, being of a length of 6 centim, was covered on both sides "mit einer Unmasse von ziegelrothen Eiern". The eggs had a length of 1 mm; they were supposed to belong to *H. splendens* Witl., which was found in the vicinity. The next publication is a short note by STAMM (Vidensk. Meddel. fra Dansk Nat. For. København, 64, 1913 p. VIII); it mentions quite briefly that in the Zoological Museum of Copenhagen there is a collection of *Halobates*-eggs, deposited on different objects floating in the sea; it is just the material before me, which will be treated more particularly below; further on it gives the highly interesting information, that *Halobates*-eggs were found deposited on a living Noddy (tern-like bird), which was captured in the Red Sea; this also will be mentioned below.

The material now before me is the following.

From the Atlantic.

- No. 1. A Spirula-shell, almost entirely covered with several hundreds of eggs, among which there is a good deal of Lepas-brood, partly in the Cypris-stage, partly older. 20° Lat. N., 81° Long W. Hygom.
- 2. Three pieces of sea-weed with eggs; these contain more or less developed embryos, and there are also a number of empty shells. 20° Lat. N., 81° Long. W. (Pl. I, fig. 3).
- 3. A Spirula-shell with eggs. 23° 2' Lat. N., 31° 48' Long W. ¹⁸/₁₀ 1848. Mathiesen.
- 4. A fragment of a Spirula-shell with about a hundred eggs. 24° 30' Lat. S., 28° 30' Long W. 1869. Andréa. (Pl. I, fig. 2).
- 5. A large, roundish egg-mass, consisting of thousands of eggs, laid on a cork; this latter is entirely hidden by the eggs, which are laid above each other in many layers. The largest diameter of the egg-mass is about 45, and the smallest 35 centim. All the eggs are alike and without embryos. 14° Lat. N., 27° Long W. ¹⁰/₁₀ 1858. Hygom. (Pl. I, fig. 4).
- 6. A longish, somewhat band-shaped egg-mass, consisting of several hundred eggs; no object is to be seen whereupon the eggs are laid. 6° Lat. N., 26° Long. W. ⁵/₁₁ 1857. Hygom.
- 7. Two bird's feathers with a very great number of eggs placed on both sides of the vane, and along the rhachis. 2° Lat. N., 21° Long. W. Hygom.



R. H. Stamm phot.
Fig. I. Tail of a Noddy (*Anous stolidus*) with a multitude of *Halobates*-eggs on the feathers. $\frac{1}{1}$.

- No. 8. Five *Spirula*-shells with eggs. 29° Lat. N., 20° Long. W. Hygom.
- 9. A small coal slag with about 30 eggs. $28^{\circ} 20'$ Lat. N., 18° Long W. $\frac{20}{14}$ 1842. Andréa.

From the Pacific and the Indian Sea.

- No. 10. A Noddy (*Anous stolidus*) with many hundreds of eggs placed on the tail feathers. The bird was captured with the eggs on it, and had thus been living, when they were laid. The collector stated, however, that it was somewhat feeble. The Red Sea 11. 1911. Chief-officer O. Christiani. (Fig. 1).
- 11. A small piece of sea-weed with about half a hundred eggs, some with embryos. The Mozambique Channel, $\frac{18}{11}$ 1863. Hansen and Thalbitzer.
- 12. A *Spirula*-shell, almost wholly covered with eggs, in many of the eggs are embryos. $3^{\circ} 10'$ Lat. S., $89^{\circ} 51'$ Long. E. $\frac{29}{4}$ 1863. Hansen and Thalbitzer.
- 13. A *Lepas* and a small piece of sea-weed with eggs. Siam Bay, $\frac{15}{3}$ 1900. Th. Mortensen.

- No. 14. A Sepia-shell with a little more than a hundred eggs. $4^{\circ} 56'$ Lat. N., $106^{\circ} 6'$ Long. E. $\frac{22}{5}$ 1881. Hartmann. (Pl. I, fig. 5).
- 15. A small piece of sea-weed with eggs. 1° Lat. N., $106^{\circ} 40'$ Long E. 1869. Andréa.
 - 16. A Sepia-shell with half a hundred eggs. $3^{\circ} 20'$ Lat. S., $106^{\circ} 50'$ Long. E. 1869. Andréa.
 - 17. A Sepia-shell with several hundreds of eggs, most of them either containing embryos or open and empty. Chinese Sea between 4° and 8° Lat. N. 1866. Caspersen.
 - 18. A small piece of floating timber with eggs and larval skins. $4^{\circ} 30'$ Lat. N., 137° Long. E. $\frac{8}{1}$ 1875. Caspersen.
 - 19. A small piece of vegetable substance with about half a hundred eggs, some with embryos. ca. 10° Lat. S., 142° Long. E. 1881. Corneliusen.
 - 20. A piece of a feather with eggs, all with embryos. The Galapagos Islands. Received from Dohrn.

Of the 20 specimens named here, four are missing, namely No. 3, 8, 15 and 18; these are noted in the above list according to a card-catalogue, written by STEENSTRUP; as STEENSTRUP was thoroughly acquainted with *Halobates*-eggs, there is no doubt about the mentioned specimens being correctly referred by him.

In the existing material we can distinguish between five different sorts of eggs, which thus must belong to at least five different species of *Halobates*; (perhaps to more, as several species may have quite similar eggs). In all the specimens, whether they show few or many eggs, all the eggs are similar, and there is nothing which indicates that the females of different species have laid their eggs together. All the eggs from the Atlantic localities as well as No. 10, Red Sea, No. 12, $3^{\circ} 10'$ Lat. S., $89^{\circ} 51'$ Long. E., and No. 20, Galapagos Islands agree, and may thus belong to one species (Pl. I, fig. 6). They have a length of about 1 mm and a diameter of about 0,4 mm, are of an elongated oval shape and as usual with the ventral side more arched than the dorsal one, and with the front end a little broader than the posterior. The egg-shell is not thick, and shows no special structure. In the Atlantic five species of *Halobates* occur, but only one of them is common, viz. *H. Wüllerstorffi* Frauenf., which according to WITLACZIL (l. c.) and DAHL (Ergebnisse d. Plankton-Exp. II, 9 a, α , 6) is identical with *H. micans* Esch., and this species also appears in the Indian Sea and the northern Pacific; there is thus some reason for believing, that the eggs in question belong to this common species. Its eggs are, as mentioned, described and figured by BUCHNAN WHITE, who describes the shell without structure, and states the length to be 1,2 mm and the breadth 0,8 mm; this breadth is, as

seen, considerably larger, and the egg therefore of a relatively shorter and broader shape than those before me; it is, however, to be remembered that the egg figured by BUCHNAN WHITE was an ovarian egg, and besides the text proves, that it was treated as a microscopical preparation, and the comparatively large breadth is certainly due to pressure. The eggs from the Mozambique Channel (No. 11) are very characteristic; they have a thick shell, which is beautifully sculptured (Fig. 2). The sculpture consists of thickened, isolated parts, which are elongated in the longitudinal direction of the egg, and the edges of which rise in thorn-like, but blunt and often a little branched processes; the thickened parts are lying close together, and separated by interjacent, more narrow, deeper lying parts or furrows. The sculpture is not the same all over the surface; it is strongest on the arched, upwards turned side, towards the downwards turned side it gradually decreases, and passes into a more simple and somewhat spined sculpture, which almost wholly disappears on the side turned downwards.

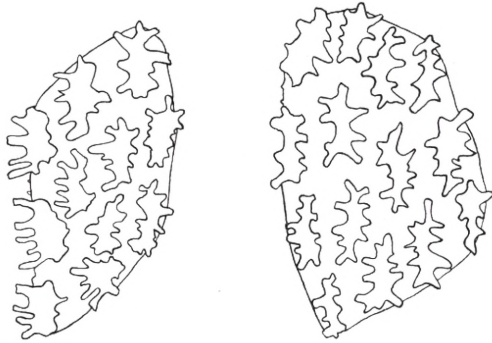


Fig. 2. Two pieces of the shell of the eggs from the Mozambique Channel (No. 11), showing the sculpture. $\times 200$.

passes into a more simple and somewhat spined sculpture, which almost wholly disappears on the side turned downwards. The egg has a length of fully 1 mm, and a breadth of about 0,4 mm. Of *Halobates*-species taken in the neighbourhood of that locality I find only *sericeus* Esch. and *flaviventris* Esch., both taken at Madagascar, the former, however, uncertain, while *H. Alluaudi* Bergr. is taken at the Seychelles. — From No. 13, Siam Bay, No. 16 $3^{\circ} 20'$ Lat. N., $106^{\circ} 50'$ Long. E., and No. 17, Chinese Sea between 4° and 8° Lat. N. there are eggs with another sculp-

ture (Pl. I, fig. 7). They have a thick shell, which is thickest on the ventral side; the shell is very densely covered with short spines or finger-like emergences, often more or less fused into somewhat sinuous and ramified crests. Also this sculpture is strongest on the upwards turned ventral side and at the front end, and it decreases gradually towards the downwards turned, attached surface. The size and shape of the eggs is for the rest as with the foregoing ones. From the parts where the named localities are situated several *Halobates*-species are known, besides *Wüllerstorffi*, *sericeus* Esch., *frauenfeldanus* B. White, *proavus* B. White, *princeps* B. White, *germanus* B. Wite and *sexualis* Dist. — From No. 14, $4^{\circ} 56'$ Lat. N., $106^{\circ} 6'$ Long. E. there is a *Sepia*-shell with eggs; these have a very thick shell, likewise thickest on the upwards turned ventral side. The shell shows a sculpture consisting of a slight crenulation, which is strongest on the ventral side; the faint emergences are also here somewhat fused together to low, sinuous walls. The length is 1,2 mm, the

breadth 0,4 mm. The locality for these eggs is in the same parts as for the last mentioned. — Finally we have from No. 19, Torres Street a small piece of sea-weed with eggs, which show a sculpture almost as in the eggs from No. 13, 16 and 17, and which perhaps is not specifically different from them; the shell is thick, but the spines or emergences are fine and more distant; the length is 1,1 mm and the breadth 0,4 mm; *Halobates sericeus* Esch. and *regalis* Carp. are taken near to that locality.

The eggs of *Halobates* are comparatively large; the length is from a little below 1 mm to 1,2 mm, which is a considerable size, as the imagines do not reach a greater length than 5,5 mm. The eggs are of a longish oval shape, sometimes a little more elongated, and then almost cylindric with rounded ends. The dorsal side of the egg is flat or only slightly arched, the ventral side somewhat more arched. Also the two ends are different, the head end being somewhat broader than the posterior. It is thus in general not difficult to orientate the egg only after its shape. The shell, the so-called chorion, is solid, but varies somewhat in thickness in the different species; when it is thicker it always seems to be thickest on the ventral side and at the anterior end; when the shell is thin this difference is less strongly marked or disappearing. The shell may, as mentioned above, be somewhat different in the different species as to sculpture. It is sometimes simple and plain, and it can have a stronger or slighter sculpture; in the simplest cases the surface then is very finely spined with short, close standing, spine-like, more or less fused projections, which at some places pass into a fine crenulation; or the shell is all over more or less slightly crenulated, likewise with the low emergences somewhat fused together; further it can also be more strongly spined with relatively short, close standing, generally blunt spines or emergences, which are more or less fused into sinuous crests. Finally it can show a more strongly marked sculpture, with isolated thickenings, the margins of which run into prominent elongations, as described above. In all the cases where a sculpture is present, the same is strongest on the ventral side and at the anterior end, and it decreases evenly towards the dorsal side, where it tends to disappear, or the shell is here quite smooth. The eggs sculptured have always a comparatively thick shell, and it is, as mentioned, thickest on the ventral side.

There is only one micropyle, which has its place in the front pole of the egg, or at any rate very near to it. The shape of the micropyle is rather characteristic (Fig. 3); it begins on the surface of the shell as a very low, funnel-shaped deepening;

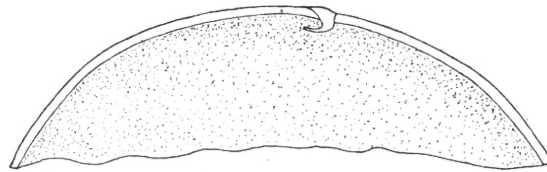


Fig. 3. Front end of an egg-shell (from No. 5) showing the micropyle $\times 200$.

from the bottom of this issues a canal, which becomes narrower towards the inner opening, and which during the course inwards is about rectangularly bent. The canal is comparatively long, not going the shortest way through the chorion, but running somewhat tangentially in the same. That form of the micropyle quite agrees with the one in *Gerris lacustris*, described and figured by LEUCKART (Müller: Arch. f. Anat. Physiol. und Wissenschaftl. Med. 1855, 158, Taf VIII, fig. 26) as well as the *Halobates*-egg upon the whole shows great accordance with the *Gerris*-egg.

In colour the eggs vary from yellowish white to red or reddish brown; it is, however, not the eggs of the different species that have a different colour, but the eggs of the single species run through the scale. The fact is that the colour is chiefly dependent on the contents, as the chorion is transparent, and only slightly yellowish; the eggs in which the development has not begun are yellowish white, and gradually as the embryo is developed, the egg grows darker and becomes at last red or reddish brown. The eggs mentioned by WITLACZIL (l. c.) are also called brick coloured, and they had fully developed embryos. In the eggs with a very thick chorion this can be a little more yellow than in the thin shelled ones.

From the above list of the material it is evident that the *Halobates*-species deposit their eggs on floating objects of the most different sorts. It is, however, worth remarking that they almost always are of animal or vegetable origin, of course, because such objects most frequently are present. The material contains only two exceptions herefrom, No. 5 and 9, in the former case the eggs are laid on a cork stopper, and in the latter on a small coal-slag. The number of the eggs varies from about 30 to many thousands. It seems as if the females also can lay their eggs without their being fixed to any object. The specimen No. 6 is a longish, nearly band-shaped mass of eggs glued together; only some quite thin threads are to be seen in it, which probably form the original substratum for the eggs, but that object is so extremely small, that it cannot have been of any importance for the floating power of the eggs; it must only have been the floating power of the eggs themselves that in this case has supported them. As it seems to be rare for the eggs to be laid in that manner, it probably only happens when the females have found no floating objects. As mentioned before females in some cases have been found bearing 1—3 eggs at the end of the abdomen; it may be supposed, I think, that the females bear them only for a short time, till they find a suitable place for deposition; if such a one is not found, they may thus possibly also lay them without it.

The deposited eggs are attached with a glue-like substance which in my specimens is more or less abundant, but it is always distinctly present, and the eggs are solidly fastened. Most frequently the glue-like mass is abundant and surrounds the eggs entirely, and when an egg is isolated, it is seen to be more or less com-

pletely surrounded by the mass (Pl. I, fig. 6). In one specimen (No. 20) the glue-like mass is especially abundant, and the eggs are wholly imbedded in it. For the rest the eggs are laid without any apparent order, or at most a few are found beside each other more or less parallel as shown in Pl. I, fig. 1—3. The single eggs are, on the other hand, always fastened in a certain manner, always sitting with the flat dorsal side downwards, towards the substratum, and the more arched ventral side turning upwards. When several eggs are found side by side they all point with their head-ends in the same direction; the apparent want of order of the eggs is, probably, also for a great part due to several females having laid their eggs together, and most likely after each other. In several of the specimens also groups of about twenty odd eggs are to be seen, all with their front ends in the same direction; such a group is no doubt laid by one female, and some order may then be traced of rows following each other, each consisting of a few eggs ranged parallel side by side. The shape of the substratum, for the rest, certainly to some degree influences the deposition, and in the few specimens which show so small a number of eggs, that these may possibly originate from one single female, and where therefore the eggs might be expected to show some order, the underlayer is just of so small an extent that it has not been possible to place the eggs on one surface, but they are placed over the whole object, whereby the order is effaced. When the underlayer gets strongly covered with eggs so that they lie in layers above each other, every order disappears.

As mentioned above FAIRMAIRE found 15—20 eggs in one female, and BUCHNAN WHITE about 25. The number one female lays must therefore be supposed to be near those numbers. Most of the specimens before me show a great or very great number of eggs, and must therefore originate from several or many females; only one specimen, No. 9, shows comparatively few, about 30 eggs, which thus may possibly proceed from one female, and of three other specimens, each with about 50 eggs, the same may perhaps be the case. That as a rule several or many females deposit their eggs together evidently is in accordance with the fact that the *Halobates*-species are gregarious, and it ought to be remarked, that when the objects on which the eggs are laid have some extent, the eggs always are found more or less numerous. Eggs which according to their number might possibly be laid by one female are only found on very small objects. No. 5 is the specimen which contains the greatest number of eggs, many thousands lying in many layers above each other (Pl. I, fig. 4); here a great swarm of females must have laid their eggs together, and it looks as if they were laid in a comparatively short time, as there are no embryos in any of the eggs. In other cases the degree of development of the eggs shows

that they must have been laid at different times, as not developed eggs, eggs with embryos and empty shells are to be found among each other.

The opening of the egg occurs in the manner that the shell splits in the front part in a fissure which runs down the middle of the dorsal and ventral side to a little beyond the middle (Pl. I, fig. 7); two lateral valves are thus formed. I have not been able to observe that the fissure is preformed in the egg-shell.

It is mentioned above that the eggs are attached with, or generally more or less imbedded in a glue-like substance. In the specimens, which are all preserved in spirit, that mass is hard. The question then arises how the larvæ come out; the hard mass must prevent the opening of the egg, and even if the egg was opened, it would be difficult or impossible for the larvæ to get out, and especially in the cases where the eggs are lying in many layers above each other, and those at the bottom thus are quite enveloped; here the eggs lying farther down in the egg-mass certainly must be destroyed. I suppose therefore, that the glue-like substance mentioned, in its natural state, when the egg-mass is floating in the sea, is gelatinous, so that it permits the egg to open itself and the larvæ to get out. There also exists a communication which confirms this. WITLACZIL says (l. c. 233) of the eggs taken on the expedition of "Vettor Pisani" ". . . die von einer wahrscheinlich ursprünglich gallertigen Masse umgeben waren. Diese Masse quoll im Wasser wieder auf —" It is not said how the eggs had been treated before they were put into water, probably they had been dried. One of my specimens also shows open egg-shells sitting quite surrounded by the glue-like mass, which thus certainly must have been soft.

When the larvæ have escaped they probably very soon undergo the first moult; the specimen No. 18, which unfortunately has been destroyed, was a piece of drift timber, on which eggs and cast larval skins were sitting. The first moult has then occurred at the place where the larvæ had been bred, and certainly shortly after the creeping out. WITLACZIL states (l. c.) the same, founding his opinion on the fact found in other Hemipteres.

As to the mature embryos I can only confirm WITLACZIL's communication, that they do not quite fill the whole shell, and that the long middle and hind legs bend down round the end of abdomen, and then along the dorsal side up towards the head.

According to what has been stated above the following may in general be said:

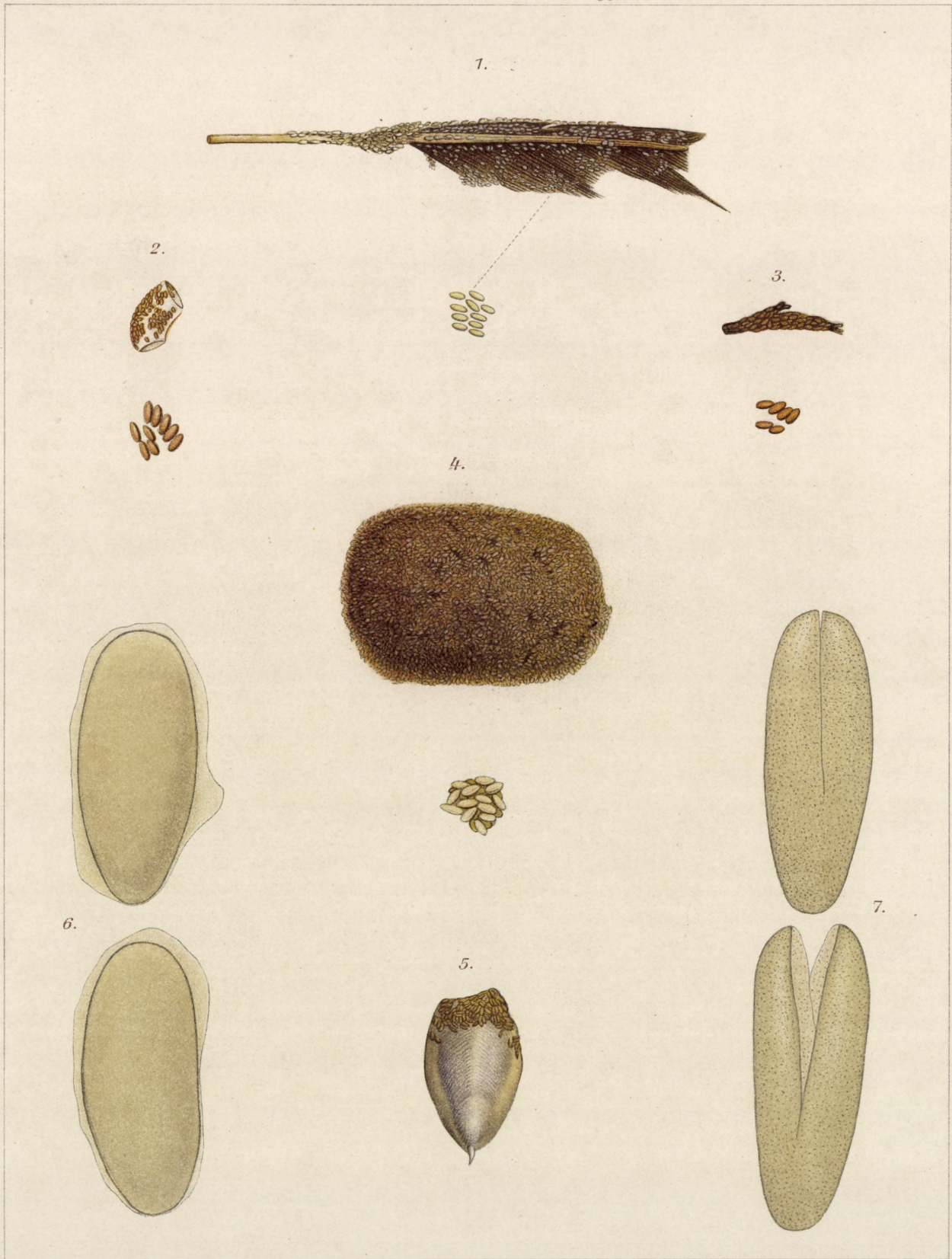
The eggs of the *Halobates* are comparatively large, about 1 mm long, elongated oval or cylindrical with rounded ends. The ventral side is arched, the dorsal side flat or slightly arched; the front end somewhat broader than the posterior end. The colour varies gradually from yellowish white to red, as the development advances. Chorion is solid, thicker or thinner; it is simple, without sculpture, or with a more

or less strongly marked sculpture after the species. The sculpture is most strongly marked on the ventral side and at the anterior end, and decreases towards the dorsal side, where it almost or wholly disappears. Only one micropyle, situated in or very near to the front pole; it forms a canal, issuing from a funnel-shaped deepening in the surface; the canal runs somewhat tangentially in the chorion, and is rectangularly bent. The females can bear a few eggs at the end of abdomen, but probably only for a rather short time. The egg-laying takes place on all objects possible floating on the surface of the sea. One female produces about 25 eggs. In general several or many females lay their eggs on the same object. It seems as if the eggs can also be laid without being attached to any underlayer, so that they form a floating heap. The eggs are apparently laid without any definite order, or this is at any rate only very insignificant; this seems, however, partly caused by the circumstance that many females lay their eggs together; when groups of eggs that may be supposed to proceed from one female are examined, there often appears some arrangement in a few transverse rows, following each other, and consisting of parallel eggs, all with their front ends in the same direction. The eggs are always deposited with the dorsal side against the substratum, the ventral side upwards; they are fastened with a mass which in general entirely envelops them, and which no doubt is gelatinous. The opening of the egg-shell occurs through its splitting in the front end, down the middle of the dorsal and ventral side, to a little beyond the middle, so that two lateral valves are formed. The larvæ probably moult very soon after their escape from the shell.

EXPLANATION OF PLATE

Plate I.

- Fig. 1. A bird's feather with a great number of *Halobates*-eggs (Specimen No. 7). $\frac{1}{11}$.
- 2. A piece of a Spirula-shell with *Halobates*-eggs (Specimen No. 4). $\frac{1}{11}$.
 - 3. A piece of sea-weed with *Halobates*-eggs (Specimen No. 2). $\frac{1}{11}$.
 - 4. A cork stopper quite covered with thousands of *Halobates*-eggs (Specimen No. 5). $\frac{1}{11}$.
Below each of the figures some few eggs, a little enlarged, to show arrangement.
 - 5. A Sepia-shell with *Halobates*-eggs (Specimen No. 14). $\frac{1}{11}$.
 - 6. Two *Halobates*-eggs, one viewed from above, the other from the side, both surrounded by the glue-like substance. (From specimen No. 5). $\times 45$.
 - 7. Two empty shells of *Halobates*-eggs, viewed from above, showing the way of opening. (From specimen No. 17). $\times 45$.
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Chr. Thorman (1-4), H. Westergaard (5) W. Lundbeck (6-7) del.

Lith. Anst. v. E. A. Funke Leipzig