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EGG OF *A. PHILIPPINENSIS* LUDL.

BY

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AND

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[4th February, 1939.]

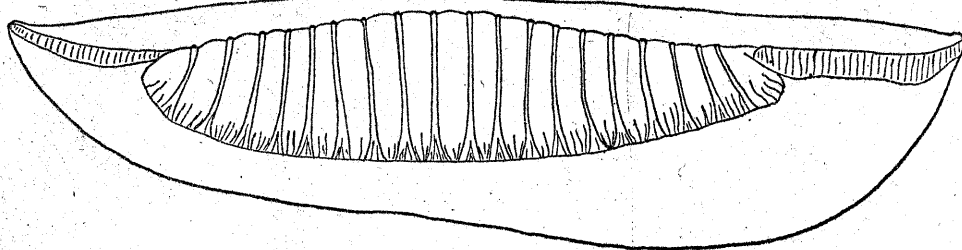
THE only account hitherto published of the egg of *A. philippinensis* is a provisional description by Christophers and Barraud (1931). This was based on eggs from two specimens which the authors thought were *A. philippinensis*, but were unable to examine in detail. One specimen produced eggs resembling those of *A. annularis*, whilst the eggs of the other resembled those of *A. maculatus*. This has led us to make a critical study of the morphology of the eggs of all three species and a brief description of each is given below. The description of the egg of *A. philippinensis* is based on eggs laid by a specimen captured in Contai (Midnapur District, Western Bengal) and by another from Siliguri, that of *A. annularis* on eggs laid by specimens captured in cowsheds near Calcutta, and that of *A. maculatus* on eggs obtained from specimens collected in the Dooars.

EGG OF *A. PHILIPPINENSIS* LUDL.

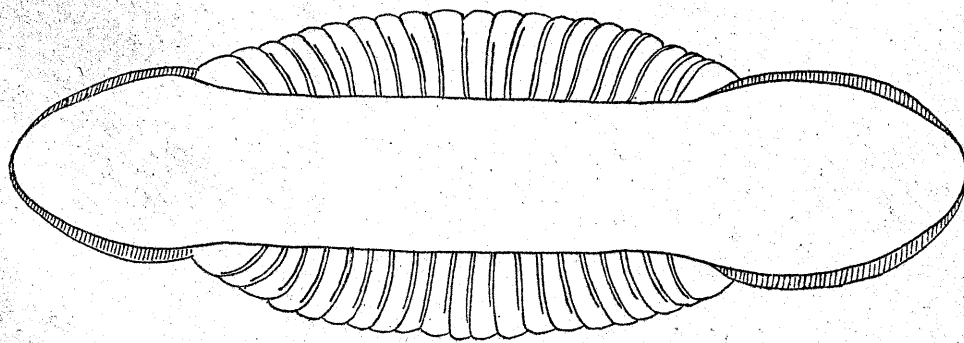
Length, 0.51 mm. : greatest breadth including floats, 0.17 mm. It is of the open boat-shaped type, flat, and shallow. *Upper surface* is as broad as the body of the egg, without distinct demarcated areas, dark and unornamented; middle portion slightly narrowed; the anterior part bordered by the frill is longer and broader than the posterior part. *Lower surface* unornamented but with a pale silvery sheen. *Floats* touch the margin of the upper surface, extending nearer to the posterior than the anterior end; length, two-thirds of the total egg length; breadth from one-fourth to one-fifth of their length and over half

Egg of A. philippinensis Ludl.

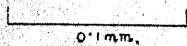
the depth of the egg; float terminations of moderate size. Float ridges 19, smooth and fairly regular. *Frill* moderately broad, laterally extended, about one-sixth to one-eighth the depth of the egg, striated, merging into the floats; two lengths of frill on each side taken together are less than half the egg length.

A. philippinensis.

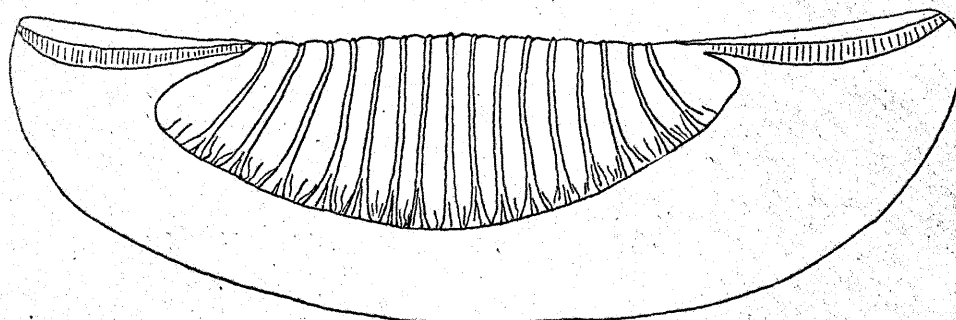
Lateral view.



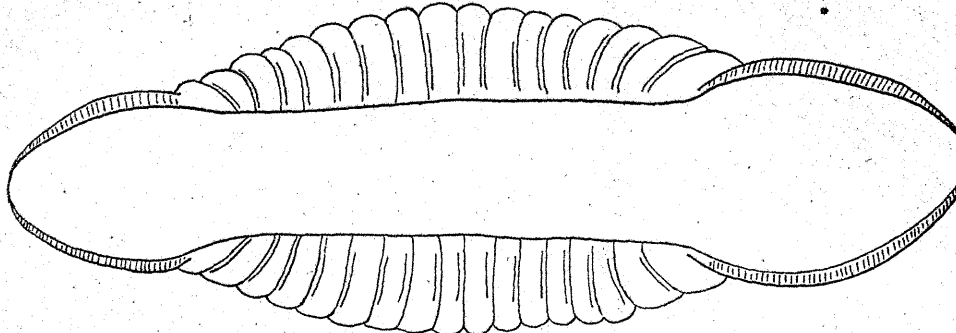
Upper surface.

EGG OF *A. ANNULARIS* VAN DER WULP.

Length 0.45 mm. : greatest breadth including floats 0.16; boat-shaped, flat and shallow. *Upper surface* : dark and unornamented; as broad as the egg body, without distinct demarcated areas; middle portion slightly narrowed; anterior part bordered by the frill, is longer and broader than the posterior part. *Lower surface* : unornamented. *Floats* touching the margin of the upper surface, of moderate length, occupying just more than the middle half (0.55) of the egg and extending nearer the posterior than the anterior extremity of the egg; breadth about one-third of the float length and about one-half of the depth of the egg; float terminations of moderate size. Float ridges 14, smooth and regular. *Frill* moderately broad, laterally extended, about one-sixth to

A. annularis.

Lateral view.



Upper surface.

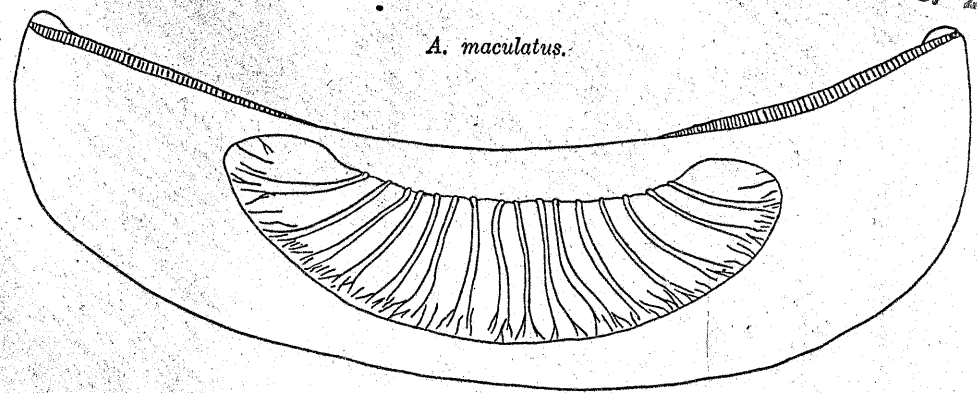
one-eighth of the depth of the egg, striated, merging into the floats; two frill lengths of each side taken together are more than half the egg length.

EGG OF *A. MACULATUS* THEO.

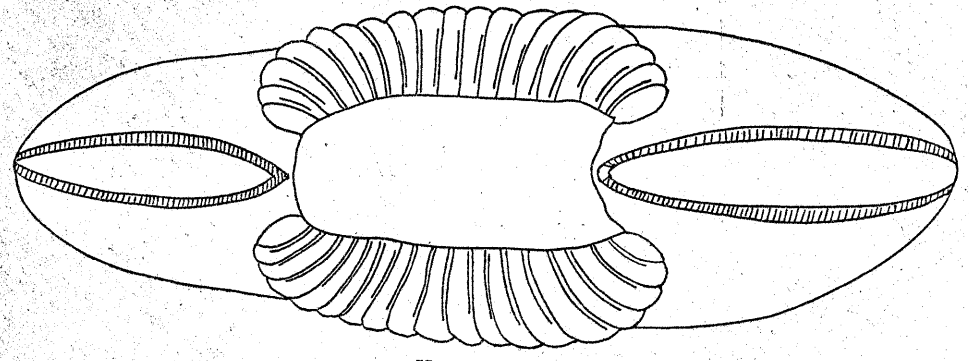
Length 0.41 mm. : greatest breadth including floats 0.14 mm. Galleon-shaped type with concave upper surface. *Upper surface* divided into three areas : narrow anterior and posterior demarcated areas and a broader middle portion bordered by the floats. The demarcated areas are commonly completely surrounded by the frill. The anterior area is somewhat longer and broader than the posterior. The breadth of the demarcated areas varies from about one-third to one-eighth of the greatest breadth of the egg, so that the sides of the egg are visible when viewed from the upper surface which is dark and unornamented. *Lower surface* unornamented, with silvery sheen. *Floats* touch the margin of the middle portion of the upper surface but not those of the demarcated areas. Length 0.55 of the egg length; breadth averages about one-third (0.34) of the float length and over half the depth of the egg. When viewed laterally the upper surface of the float is slightly concave; float terminations of moderate size. Float ridges averaging 16, fairly smooth and slightly sinuous. *Frill* completely surrounding the demarcated areas or ending abruptly in tags; narrow, viewed laterally about one-tenth of the depth of the egg; striated, two halves of frill on each side taken together are more than half the egg length.

From the above descriptions of the eggs of the three species, *A. philippinensis*, *A. annularis* and *A. maculatus*, it is clear that the specimens thought by

Egg of *A. philippinensis* Ludl.



Lateral view.



Upper surface.

Christophers and Barraud to be *philippinensis* were really not so. The general appearance of *maculatus* eggs is distinctly different from those of the first two species, as the following characters will show :—

- (1) High-standing, galleon-shaped with concave upper surface.
- (2) Upper surface with distinct demarcated areas.
- (3) The lower surface is visible when viewed from the upper surface.
- (4) The frill does not merge into the floats, but either completely surrounds the demarcated areas, or ends in tags.

In our study of eggs of *annularis* we found the average number of ridges to be 14, while according to Christophers and Barraud it is 20. As this might indicate a racial variation we were induced to count their number in specimens obtained from a different locality such as Contai (Midnapur). Here too we failed to confirm them as the average number detected by us was 15.

The main points of difference between *philippinensis* and *annularis* eggs lie in the following characters :—

- (1) The eggs of *A. philippinensis* are larger.
- (2) The float is relatively longer.
- (3) The number of float ridges is higher, and
- (4) The frill lengths of each side are relatively shorter.

The differentiating characters between the eggs of *A. philippinensis*, *A. annularis* and *A. maculatus* have been given in the following table :—

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TABLE.
Showing comparative measurements of eggs of *A. philippinensis*, *A. annularis* and *A. maculatus*.

Characters	(1) <i>A. philippinensis</i> .			(2) <i>A. annularis</i> .			(3) <i>A. maculatus</i> .		
	Maximum.	Minimum.	Average.	Maximum.	Minimum.	Average.	Maximum.	Minimum.	Average.
Length	0.54 mm.	0.49 mm.	0.51 mm.	0.50 mm.	0.43 mm.	0.45 mm.	0.45 mm.	0.39 mm.	0.41 mm.
Breadth including floats.	0.18 mm.	0.16 mm.	0.17 mm.	0.18 mm.	0.16 mm.	0.16 mm.	0.16 mm.	0.12 mm.	0.14 mm.
Length of float	0.72	0.57	0.60	0.70	0.48	0.55	0.59	0.44	0.55
Length of egg	0.25	0.18	0.23	0.46	0.20	0.30	0.45	0.30	0.34
Breadth of float									
Length of float									
Number of float ridges.	22	18	19	16	12	14	17	13	16

Based on measurements of (1) 25 eggs from one batch, (2) 25 from three batches, and (3) 25 from two batches.

REFERENCE.

CHRISTOPHERS, S. R., and BARRAUD, *Rec. Mal. Surv. Ind.*, **2**, 1, pp. 161-187.
P. J. (1931).