in this work.

The material used in the present study was supplied by Prof. T. Nakaoki of the Faculty of Pharmacy, Toyama University, to whom his cordial thanks are due.

References


Abnormal Eggs from *Coccophora*, with Special Interests in the Origin of Half Embryos.

by Singo NAKAZAWA*

* Department of Biology, Yamagata University, Yamagata, Japan.
by Getman\(^3\) on *Hormosira*, a certain species does not always absolutely stick to a certain type of ovogenesis, but sometimes completely or intermediately appears with another type. The present paper is a report on such a phenomenon observed on *Coccophora*.

During his stay at Asamushi in 1953, the writer observed some abnormal *Coccophora* eggs containing eight nuclei discharged together with normal eggs out of the same receptacle. The phenomenon was repeatedly noticed. The material plant, *Coccophora Langsdorffii* (Turn.) Grev. was collected in the vicinity of the Marine Biological Station at Asamushi, Aomori Ken, on the 12th of April, 1955. It was washed repeatedly with filtered sea-water and then kept in glass vessels over a night, where eggs were liberated on the following dry. It is almost impossible that some eggs from another alga such like *Sargassum* have mixed into the present material. In this district, moreover, no another alga of the same family is known to discharge eggs of the same kind in this season. In these respects, the present material is affirmed to be born all from *Coccophora*.

Receptacles were picked from branch and the eggs attached on the surface were scraped of with a glass needle into a Petri dish containing sea water. Among those, one or two out of a hundred were recognized to be eight-nucleate. The ratio of occurrence, however, much varied according to the receptacle. In some cases, over 10 per cent of the whole eggs from a receptacle were eight-nucleate. The abnormal eggs (Fig. 1a, b) so much resemble these of *Sargassum* that they could not be distinguished from the latter. Their course of cleavage was observed after being artificially fertilized together with normal eggs in the same vessel.

The abnormal eggs as well as the normal, whether they are round (Fig. 1a) or a little ovate (Fig. 1b) at the beginning, gradually transformed into more or less ovate form after fertilization. In these abnormal eggs, the first segmentation usually occurs without being accompanied by nuclear division forming a wall at right angles to the major axis, resulting a blunt large cell on one side and a little pointed smaller one on the opposite side (Fig. 1c). The first segmentation is followed by gradual degeneration of seven nuclei which are contained together in the blunt cell. As the seven out of eight nuclei degenerate, the second and the successive cleavages proceed with occurrence of division of the active nucleus, probably fertilized, contained in the basal or pointed cell (Fig. 1c, d). The division therefore is usually restricted only to the basal half of the egg, where rhizoïds are to be formed, and the apical or blunt half remains unicellular containing no nucleus (Fig. 1e, f). This

![Fig. 1](image-url)
tendency that the active nucleus is contained in the basal part seems to verify the
opinion presented by Abe\(^ {2} \) that the basal pole is differentiated at the entrance
point of spermatozoid. The development was traced up to a stage composed of
some thirty cells. As the stage proceeds further and the structure becomes more
complex, they are unable to be distinguished from those originated from the
normal eggs. However, some particular embryos with the apical half remaining
uncloven (Fig. 1 f) are considered to be a later stage of those abnormal eggs.

Judging from the observations mentioned above, it seems that the ovogenesis
and the behavior of nuclei after fertilization of Coccophora and those of Sargassum
etc. are sometimes morphologically continuous. As Inoh\(^ {5} \) points out in his
comprehensive review on Fucaceous algae and now is generally acknowledged, Coccophora
is taxonomically much more of alliance to Sargassum etc. than to Fucus, Pelvetia etc. within the same family. This seems to confirm the present investigations. Besides, the present studies seem to be able for explaining the origin of the half embryos of Sargassum reported by Tahara\(^ {9} \), Hiroe and Inoh.\(^ {4} \) That is to say, considering from the writer’s observations, it is probable that if the first
segmentation independently takes place prior to the occurrence of the nuclear divi-
sion, as it does sometimes, the fertilized nucleus is naturally to be contained only in
one of the daughter cells, the apical or the basal. And as a result, the other cell
without diploid nucleus, is destined to remain uncloven till the later stage, the half
embryo.

**Summary**

*Coccophora Langsdorfit* (Turn.) Grev., a Fucaceous alga, sometimes bears eight-
nucleate abnormal eggs (Fig. 1 a, b) together with normal eggs composed of one
central nucleus. The abnormal eggs so much resemble those of Sargassum as they
could not be distinguished from the latter. After fertilization, just like Sargassum,
seven of the eight nuclei gradually degenerate to disappear with advance of cleavage
remaining one large active nucleus, which takes part in the embryo development.
The active nucleus, however, is accustomed to be distributed to the basal cell (Figlc)
at the time of the first cleavage which takes place without nuclear division. As a
result, the subsequent cleavage is restricted to the basal half, to form a half
embryo with a large vacant apical cell (Fig. 1 f).

**Literature**