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Author(s)	KUSA, Mamoru
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Occurrence of a Neutral Mucopolysaccharide in the Cortical Alveoli of Lamprey Eggs[1)]

By

Mamoru Kusa

(Department of Biology, Yamagata University)

(With 2 Text-figures)

In recent years polysaccharide has been shown to be a main constituent of the cortical alveoli in various teleostean eggs (e. g., Kusa, 1953, 1954 and 1956; Aketa, 1954; K. Yamamoto, 1956a and b). Except for the papers on the lamprey eggs by T. Yamamoto (1944, 1945 and 1947), in which some colloidal properties are strongly suggested, there still seems little information available as to the chemistry of the cortical alveoli in the eggs of cyclostomes.

The present paper deals primarily with polysaccharide tests of the content of alveoli in the eggs of two lamprey species, *Lampetra reissneri* and *L. japonica japonica*. Prior to cytochemical examinations, the fresh unfertilized eggs were fixed either with the Bouin or with the Regaud fluid; and routine paraffine sections, cut at 7 to 8 micra, were prepared.

Results

The cortical alveoli, somewhat ellipsoidal in shape, are uniformly arranged in the ooplasm just beneath the egg membrane. These alveoli clearly have a positive reaction to the periodic acid-Schiff (Hotchkiss-McManus) and to the chromic acid-Schiff (Bauer) test, and also show a violet stain to application of the combined technique of 2, 4-dinitrophenylhydrazin-Schiff reagent (Monné and Slautterback, 1950). However, the material is resistant to amylase and unstainable with iodine, so that it seems to be a polysaccharide in nature other than glycogen. But the alveoli manifest no essential protein-reaction: they do not stain at all with the mercuric bromphenol blue reagent (Mazia, Brewer and Alfert, 1953). Contrary to the writer's observation on teleostean eggs (Kusa, 1956), the lamprey alveoli have little affinity for such basic dyes as safranin O and neutral red, and give no indication of metachromasy with toluidine blue.

These findings suggest that the content of the lamprey alveoli may be a "neutral mucopolysaccharide", in so far as this term has been adopted for

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nonglycogen substance, which is reactive to the periodic acid-Schiff reagent, but is not basophilic or metachromatic (cf. Lison. 1953).

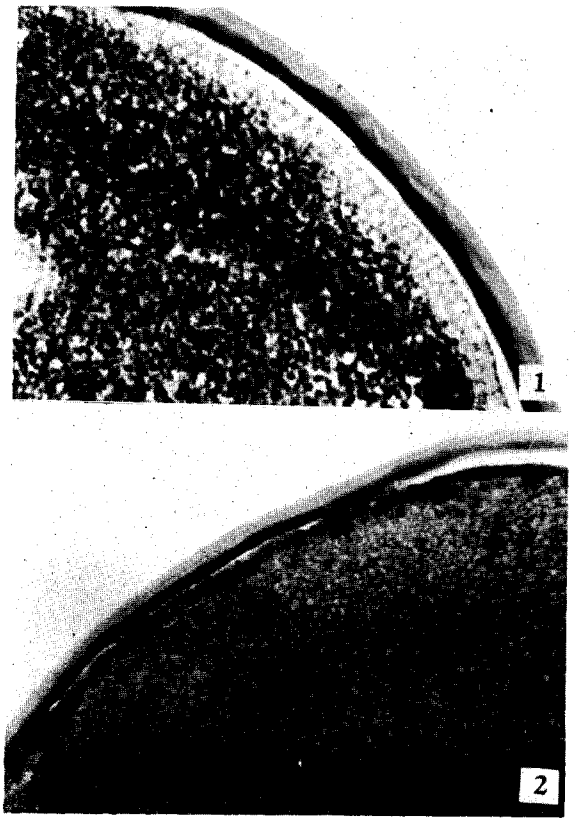

Fig. 1. Periphery of the unfertilized eggs of the lamprey, *Lampetra japonica japonica*, fixed with Regaud's fluid and subsequently stained with Heidenhain's iron hematoxylin and counterstain of light green. ×ca. 320.

Fig. 2. A preparation showing the reactiveness of egg constituents to periodic acid-Schiff reagent. The positive staining of alveoli content appear dark in the photograph. × ca. 320.

Conclusion

As was noted in an earlier paper (Kusa, 1956), the unfertilized eggs of various teleosts appear to be common to one another in respect to their possession of mucopolysaccharide within the alveoli. It is to be noted, however, that this mucopolysaccharide is determined to be an acid one in some fish eggs (Kusa,

1954, 1956: K. Yamamoto, 1956b) and a neutral one in others (K. Yamamoto, 1956a). In consequence, the lamprey eggs show much likeness to fish eggs, particularly to those in which the cortical alveoli are characterized with neutral mucopolysaccharide. In the lamprey eggs, moreover, the alveoli content is discharged, as a results of breakdown of the cortical structure, at the time fertilization and parthenogenetic activation (T. Yamamoto, 1944, 1945 and 1947). In view of this, the present study may favor the writer's previous suggestion that in various animal eggs, the egg activation, at least when it occurs in normal fashion, takes place on a certain general plan with which elimination of some polysaccharide is closely linked (Kusa, 1956).

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