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The Ripeness of Eggs of Induced European Eel (*Anguilla anguilla*), with notes on the changes of oil globules

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ABSTRACT. Results of this work were obtained from the comprehensive studies carried out on the European eel (Anguilla anguilla L.) inhabiting the Egyptian delta lakes between 1974 and to day. The used material was collected from lake Edku during the spawning migration in 1988-1989. Females of migrating silver eel were injected by carp pituitary (CP) and HCG. On reaching stage IV of maturation, the ovaries occupied the entire body cavity, oocytes enlarged in size (0.60 mm), nucleus was centrally positioned, nucleoli adherent to the nuclear membrane, and dense deposition of yolk granules.

Fig. 1

Fig. 2

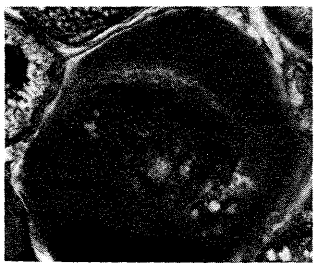

Fig. 3

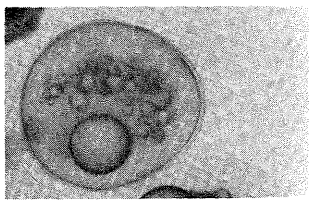

Fig. 4

After completion of trophoplasmic growth (stage IV of maturation), the directly following process of ripening occured in 2-4 days, this period was classified into four distinguished phases. Each phase developed within a period of time from 15 to 24 hours. **First phase**: Egg diameter about 0.69 mm, nucleus started its migration toward the animal pole and began to lose its circularity. Yolk granules appeared in groups and began to diffuse thence homogenize in the periphery of oocyte (Fig. 1). **Second phase**: egg diameter about 0.80 mm, nucleus with disintegrated membrane appeared near the egg cover. Homogeneity of yolk granules increased, small granules appeared in red-orange stained (Fig. 2). **Third phase**: a characteristic increase in number and size of oil globules (more than 10), oocytes were more transparent, karyoplasm in the state of prophase and about full homogeneity of yolk (Fig. 3). **Fourth phase**: Ripening condition, variable numbers of oil globules, mostly less than ten, and counted from four to six in some oocytes. Other oocytes appeared with one prominant oil globule (Fig. 4).

Such artificial maturation brought about by the effect of hypophysial and hormonal injections reveals that CP and HCG could stimulate the gonadotropin secretion in female silver eel to develop its sexual cells in successive developmental stages. This result suggests that the amount of gonadotropin releasing hormone is one of the main factors which regulate the speed of gonadal development.

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Effect of induced gonodal development and starvation on blood contents of *Anguilla anguilla* L.

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Fishes of migrating silver Eel *Anguilla anguilla* were kept in special tanks under certain environmental conditions. Hormonal induction was carried out for gonadal development, experiments extented to 40-70 days without any food supply. Other fishes were starved for 330 days. Hemoglobin content, hematocrit value, red blood cell count and leukocytes contents were examined. Hematological studies were done to determine the alterations which occured in the blood during induced gonadal development and starvation.

Blood was obtained by transection of the caudal area for all the previous examinations. A drop of blood was used to make the smear and stained with a May-GreenWeld (M-G) giemsa.

In female silver Eel treated with a combination of carp pituitary (CP) and human chorionic gonadotropin (HCG) to ovulation hemoglobin, hematocrit and red blood cells count were sharply decreased in samples taken from injected fishes (ripe stage). In male silver Eel treated with (HCG), hemoglobin and hematocrit continuously decreased with gonadal development from immature (control) to ripe conditions (spermiation), but there was no change in erythrocyte count (Table 1).

Leukocytes counts (white blood cells) did not vary during consecutive gonadal development in both sexes, this virtually reflected that there was no pathological state of the blood.

During starvation, the loss of body weight of males from 150g to 60g and females 700g to 250g was more severe followed by a marked decrease of lipid and protein contents in the whole body (Amin, 1988). Such reductions in body weight, lipid and protein contents were accompanied by significant decrease in all hematological contents of male and more significant in female silver Eels (Table 1).

Table 1 : Hematological changes on fish

	sex	control	ripe fish	starved fish
Hemoglobin concentration (g/100ml)	♂	11.9±0.51* (30)**	9.9±0.92 (20)	6.9 ±0.41 (10)
	♀	10.1±0.91 (30)	4.2±0.19 (6)	2.0±0.21 (4)
Hematocrit (%)	♂	34.1±2.9 (30)	27.1±1.91 (20)	21.9±1.53 (10)
	♀	30.1±2.9 (30)	24.6±2.01 (6)	20.1±1.67 (4)
Red blood cell count erythrocytes (mm^3)x10^6	♂	2.61±0.19 (30)	2.63±0.29 (20)	0.88±0.28 (10)
	♀	2.47±0.15 (30)	0.90±0.12 (6)	0.67±0.25 (4)

* = mean ± standard deviation
** = number of fish

In conclusion, the experimented silver Eels during their gonadal development and complete starvation were anemic. The abnormality in the formation of hemoglobin which depend mainly on the amino acid and iron percentages lead to the formation of cell anemia. Such condition may further expressed by the extremely low values of hemoglobin, hematocrit and loss in red blood cells.