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Biological Characteristics of Skates (Elasmobranchii: Rajidae)

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Skates are one of the most favorite food fishes for Korean people. It is, I think, important to know the biological characteristics of skates for protecting the fishes from the extinction caused by overfishing. Family Rajidae encompasses about 200 species which is one fourth of elasmobranch fishes, and 11 species known from the Korean waters. But, very few biological characteristics of skates have been known Some of them are shown here and discussed comparing with those of other elasmobranch fishes (sharks and rays) and teleost fishes.

Rajid fishes are oviparous to produce egg capsules which include 1-5 juveniles per each. Rajid juveniles just after hatching out are about 10 cm TL in size, and are almost the same shape as adults. Hatching period of *Okamejei kenojei* is abo five months. Egg capsules are seen in some sharks such as Heterodontidae and Scyliorhinidae, and in chimaeroid sharks (Holocephalli, Chimaeridae). And, whale shark, *Rhyncodon types* has egg-capsules in its uterus. Other sharks are viviparo or ovoviviprous; their gestation periods are very long such as eight months-3.5 years.

Okamejei kenojei grows 20 cm TL at age 1, 32 cm TL at age 2, 45 cm TL at 3, alives till age 8.5 (55 cm TL), and matures at 45 cm TL of age 3; this specie produces 120 eggs per year and about 400 eggs throughout its life. *Leucoraj erinacea* (Atlantic species) grows 16-28 cm TL at age 1, 24-35 cm TL at age 2, 2 cm TL at age 3, 40-53 cm TL at age 6, 43-53 cm TL at age 7, 46-51 cm TL at 8. Sharks grow somewhat slower and mature older than skates. For example *Squalus acanthias* matures at ages 14 (male, 70-75 cm TL) & 24 (female, 74-84 TL); *Hemitriakis japonica* matures at age 5 (84-85 cm TL); *Carcharhinus plu* matures at age 13 (130-140 cm TL).

As compared with the above elasmobranch fishes (including skates), teleost fishes produce a large number of small-size eggs, which are 1-7 mm in diameter

into waters. And they grow and mature very fast. *Trichiurus japonicus*, 60 cm (TL) at age 1 (half of them matured), 80 cm (TL) at age 2 (all of them matured), and produces 11,000-92,000 eggs which are 1.5-2.0 mm in diameter. *Plecoglossus altivelis* matures 20 cm SL at age 1 (all of them matured, and die after spawning), and produces 1,400-130,000 eggs which are 0.9-1.1 mm in diameter.

In the history of the vertebrate, internal fertilization with few large eggs shown in sharks and rays is plesiomorphic, and external fertilization with a large number of eggs shown in teleost fishes is apomorphic. But, these two kinds of reproductive characteristics are products of natural selection, and have almost the same meaning to keep their own population. Large-size juveniles of sharks and rays cannot be easily attacked by predators, but small-size juveniles of teleos fishes can be easily eaten by predators. On the contrary, the former has few juveniles, and the latter has a large number of juveniles.

Sharks and rays, however, are quite weak against fishery because of thei reproductive characteristic such as producing a few large eggs and maturing very late. Appropriate amount for catching adult sharks and rays are quite small as compared with that of teleost fishes. If sharks and rays are caught over, their populations are easily destroyed.

In addition to the above elasmobranch characteristics, each species of skates has relatively small geographic distribution. It is mostly restricted to its own region. Therefore, in order to protect skate species from extinction by overfishing, it is needed for you to know their biological characteristics, especially related to reproduction.