

## Sex maturation of the young-of-the year anchovy, *Engraulis encrasicolus* (L.) in Varna Bay (Black Sea, Bulgaria) in August 1987

Konstantin R. Mikhailov

*Institute of Fisheries (Varna)*

Published accounts cite attainment of sexual maturity at different size of the anchovy, *Engraulis encrasicolus* (L.) (A m b r o z, 1955; Cort, Cendrero, Iribar, 1976; see D e m i r, 1965 for a review). The reported lengths vary between 80 and 130 mm (TL). According to the authors the age when the anchovy become sexually mature is one year. It means that fish do not mature until summer or spring of the year following their hatch.

Occurrence of maturing young-of-the year anchovy is documented for the first time in 1987.

Anchovy were collected from trap nets in Varna Bay in August 1987. Some of the samples were composed exclusively of individuals in the size range 34-92 mm (TL).

Sex and maturation stage of gonads were assigned after macroscopic examination using the classification of S a k u n and B u t z s k a j a (1963). Histological sections of representative gonads provided verification of maturation stage assignment. Gonadosomatic index (GSI) was used as an indicator of maturation state and maturation rate, as well. It represents the percent contribution of gonads to the total fish weight.

The age was determined from otoliths. When viewing under microscope the otoliths exhibited no annual rings to maximum size of 92 mm, i.e. the fish examined belonged to age-group 0. The sex could be defined macroscopically for the following lengths: males 70-92 mm; females 74-90 mm. Within these size

ranges about 87% of the fish from both sexes were maturing, possessing testes and ovaries in the maturity stages III, III-IV and IV. Around 25% of the total anchovy number sampled (679) had begun to mature.

GSI showed tendency to grow higher with the increase of the length both in male and female anchovy, although the variation of the index was considerable at one and the same size but for different individuals. Testicular indices varied in the range 1,8-3,5% and ovarian ones were in the range 1,6-2,8%.

No anchovy of age-group 0 with gonads in stage IV-V (hydrated) or in stage V (ripe-running) were detected probably because such fish can be met only at certain period of the day (15-21 h) (L i s s o v e n k o, O v e n, A n d r i a n o v, 1988; M i k h a i l o v et al., in press) or maybe because the gonads did not developed enough to be ready for spawning. It was in 1990, when actual spawning of the anchovy fingerlings was proved to occur (L i s s o v e n k o et al., in press). Therefore, it can be concluded, that once the sex maturation is on, it may end with spawning of the anchovy.

As regards the early anchovy maturation a lot of questions have to be unanswered, especially those concerning the ecology of the fish. What arose interest are the causes for the occurrence of this phenomenon. The disturbances in anchovy biomass since 1984 (hence the less competition for food by the adult and probably juvenile anchovy), the

continuous eutrophication of the Black Sea, the high temperatures in summer of the upper water layers inhabited by the species (25–28 °C) (perhaps on this account the accele-

rated somatic growth), all this and possibly some other environmental factors conduced to the anchovy maturation a few months after the hatch.

## References

Ambroz, A. P. 1955 Maturation and fecundity of Black Sea anchovy during 1952 and 1953. — Tr. AzTcherNIRO, 16, 461-467 (In Russian). Cort, J. L., O. Cendero, X. Iribar. 1976. La anchoa, *Engraulis encrasicolus* (L.), del Cantabrico. Resultados de las campanas de 1974, 1975 y 1976. — Bol. Inst. Esp. Oceanogr., 220, 3-34. Demir, D. 1965. Synopsis of biological data on anchovy, *Engraulis encrasicolus* (Linnaeus) 1758. (Mediterranean and adjacent seas). — FAO Fish. synopsis, 26, Rev.1, 48p. Lissovenko, L. A., L. S. Oven, D. P. Andrianov. 1988. Dayly spawning dynamics of the Black Sea anchovy. — In: Fourth All-Union Conference on the Early Life History

of Fish. Part I. (Murmansk, 28-30 September, 1988). Moscow, 171-175. (In Russian). Lissovenko et al. In press. On the maturation of the young-of-the-year anchovy (*Engraulis encrasicolus ponticus* Aleksandrov) in August 1990. — Hidrology. Mikhailov et al. In press. Spawning biomass of the Black Sea anchovy, *Engraulis encrasicolus ponticus* Aleksandrov, in 1989 off Bulgarian Coast, estimated by the method of Parker. — Proc. Res. Inst. Fish. Sakun, O. F., N. A. Butzskaya. 1963. Determination of the maturing stages and studies on sexual cycles in fish. — Rybn. Khoz. 36p. (In Russian).

**Полово съзряване на 0+ годишните индивиди на хамсията (*Engraulis encrasicolus* L.) във Варненския залив през август 1987 г.**

*Константин Р. Михайлов*

(Резюме)

Отразени са резултатите от изследванията върху размножаването на хамсията през българския бряг през 1987 г. Пробите са събирани с крайбрежни риболовни уреди през втората половина на август, т.е. в края на размножителния период. Установено е, че половите жлези на най-ранните генерации, достигнали в края на ав-

густ до 70–92 mm дължина, са в III, III-IV и IV стадий на зрелост. Такова ранно полово съзряване на 0+ годишни риби се констатира за първи път в Черно море. Вероятно това е свързано с условията на околната среда и рязкото понижаване на размножителната биомаса на хамсията.

*Received on January 8, 1992*