

## **Assessment of Testis Development during Induced Spermatogenesis in the European Eel *Anguilla anguilla***

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### **Abstract**

In a study of reproduction in male European eels *Anguilla anguilla*, we induced spermatogenesis through hormone injection and established a spermatogenic maturity index (SMI) as a novel quantification of testis development. Eels in the experiments were sacrificed weekly and testis tissue was sampled for histological analysis of spermatogenesis. Testis development was followed over 18 weeks, during which the males continued to develop spermatocytes and produce spermatozoa. The SMI describes testis development from estimation of the area fractions of various tissue categories characterized by progressive gamete development stages in histological sections of the testes. The index weighs the volume fractions of the different tissues (somatic cells and germ cell stages) and describes development on a scale of 0 to 1. The method improves the existing histological classification, providing a quantitative measure that reflects the spermatogenic process and can be correlated with morphological and physiological parameters. In this study, the SMI reacted immediately to the onset of spermatogenesis and increased linearly over time, tracking the development of spermatocysts and spermatozoa. In week 7, the SMI reached a stable level of around 0.75, where it remained, with limited fluctuations, until the end of the experiment. This reflected the composition of different germ cell stages in the testis tissue with a continuous generation of spermatocysts and production of spermatozoa. In comparison, the gonadosomatic index showed a delayed response to the onset of spermatogenesis and fluctuated substantially during the sperm production period. The properties of the SMI made it a useful index for describing spermatogenesis in male European eels during this experiment and a promising tool for quantifying testis development and describing male reproductive strategy in other fish species.