

Evolution of Myogenesis: Insights from the Lamprey

円口類ヤツメウナギから考える筋肉の進化

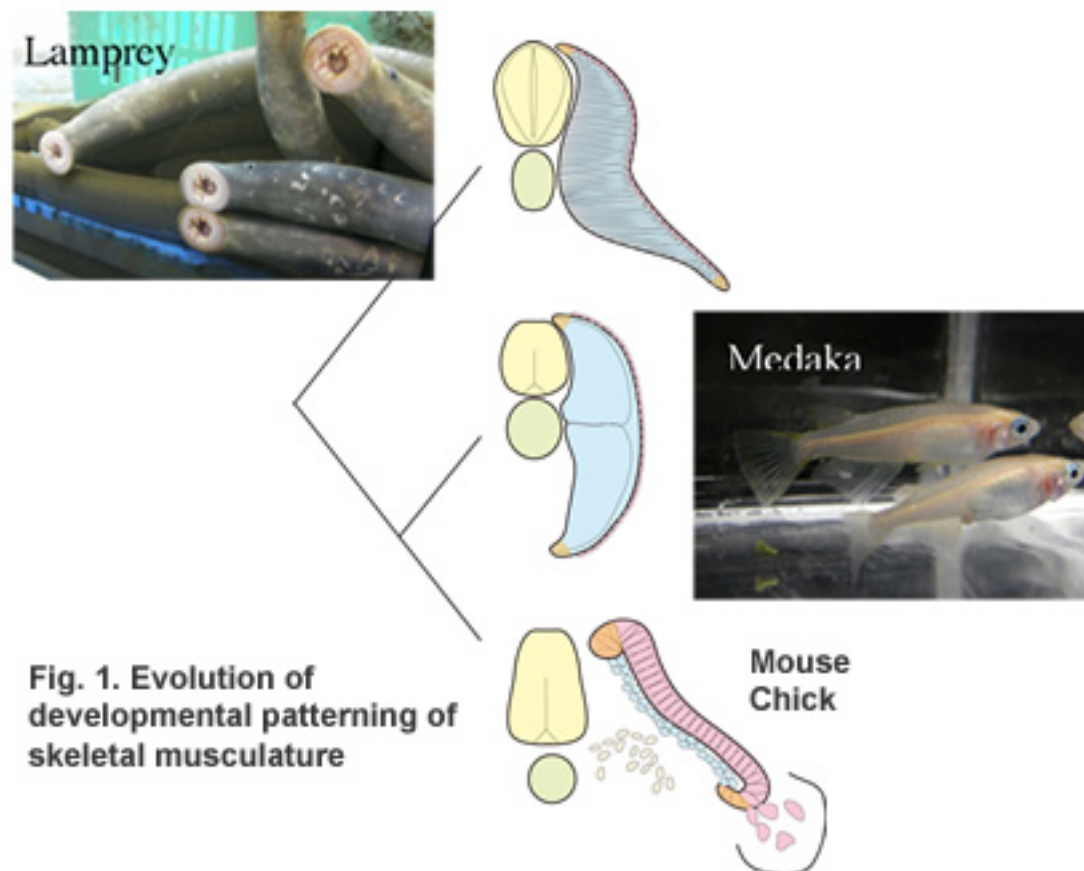
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Trunk skeletal muscles of the jawed vertebrates are categorized into epaxial and hypaxial groups morphologically separated at the level of the notochord. During evolution, the hypaxial part underwent conspicuous elaboration to give rise to the tongue muscles, the trapezius muscles, and the limb muscles, all of which are absent in agnathans and invertebrates. We investigate the molecular basis for evolution of the complicated and diverse morphology of the gnathostomes, using mainly the Japanese lamprey *Lethenteron japonicum*.

Lamprey lacks paired fin structure and appendicular muscles, and thus would represent the ancestral state of vertebrates. We examined the patterns of expression of the lamprey genes encoding the major contractile proteins and the muscle-related transcription factors. The results revealed that the lamprey myotomes consist of multiple regions associated with differential mRNA expression. Expression of the lamprey *Pax3/7* gene implied that a cell layer homologous to the amniote dermomyotome might have been already acquired in agnathans. It was also discovered that the lamprey hypobranchial muscle is developmentally homologous to the gnathostome tongue muscles.

In order to understand the evolutionary mechanism underlying diverse morphology of skeletal muscles, it would also be necessary to investigate the changes occurred in the post-transcriptional regulation. We recently started a new approach to the microRNAs, a major group of short non-coding RNA which negatively regulates mRNAs, using the teleost medaka. We anticipate that combination of these research strategies will provide an evolutionary scenario of the molecular mechanisms of skeletal muscle development.



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