

Developmental stages of Antarctic myctophid *Electrona antarctica* collected off Lützow-Holm Bay, East Antarctica

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To assess the early life history of the Antarctic myctophid *Electrona antarctica*, which is a key species in oceanic ecosystems in the Southern Ocean, we examined the morphological development of larval and juvenile Antarctic myctophids based on specimens (106 inds; 8.04–36.9 mm body length, BL) collected off Lützow-Holm Bay, East Antarctica. In seven of nine characters examined, such as body depth and preanal length, rapid allometric growth was observed by approximately 10 mm BL and slowed thereafter. Eye diameter and upper jaw length markedly increased over an extremely short range (18.5–19.5 mm BL). Notochord flexion was complete in a 10.6 mm BL specimen, and fin rays were completed at 10–13 mm BL. Melanophores appeared on the snout tip, lateral part of the abdomen, pectoral fin, and ventro-lateral region of the caudal peduncle, with these patterns being stable by 18.0 mm. Abdominal melanophores started to become dense at 18.3 mm, and caudal-peduncle melanophores began to diffuse at 18.5 mm, becoming obscure by 19.5 mm. Furthermore, 19.5 mm specimens had brownish bodies and heads caused by dense melanophore cover. Photophores SAO₁, SAO₃, and VLO appeared at 19.1 mm, and others appeared by 22.3 mm except for those on the head, which were complete by 24 mm. These results show that *E. antarctica* has four developmental stages. 1) planktonic larval period (<8.0–10 mm): fin rays undeveloped, although exhibiting rapid development in most characters; 2) swimming larval stage (10–18.9 mm): fin rays complete, swimming function developed, jaw teeth appearing; 3) transformation phase (18.3–19.4 mm, only five specimens): rapid increase in eye diameter, upper jaw length, and number of jaw teeth, photophores appearing; 4) juvenile (>19.3 mm): photophore formation complete, melanophore formation complete. About 90% of early larvae in stages 1) and 2) and one specimen (18.3 mm) in the transformation phase were collected from depths of 0–200 m, and four transformation fish (18.5–19.4 mm) and all juveniles were collected from 200–1000 m depths. Rapid increase in eye diameter, the appearance of photophores, and darkening body colour are most likely adaptations to the migration from epipelagic to mesopelagic life, with rapid increases in upper jaw length and number of jaw teeth suggesting drastic changes in food habits.

南大洋リュツオ・ホルム湾沖から得られたナンキョクダルマハダカ (ハダカイワシ科) の発育段階

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南大洋の外洋生態系における鍵種であることを明らかにすることを目的とし、リュツオ・ホルム湾沖で採集された本種の仔稚魚（106 個体，8.04-36.9 mm BL）について，外部形態と骨格系の発育を観察した。観察した 9 計量形質のうち体高や肛門前長などの 7 形質において，相対成長は 10 mm 付近まで大きく，その後は小さくなった。さらに，18.5-19.5 mm のきわめて短い体長範囲の間で，眼径と上顎長が急激に増大していた。10.6 mm で脊索末端の上屈は完了し，各鰭条は 10-13 mm で完成した。黒色素胞は，8.0 mm の個体で吻部先端付近，腹部側面，胸鰭，尾鰭および尾柄側面下部にみられ，18.0 mm まで分布様式に大きな変化はなかった。しかし，18.3 mm の個体では腹部の黒色素胞が密になり，18.5 mm で，尾柄部の黒色素胞は拡散し始め，19.5 mm の個体では不明瞭であった。また，19.5 mm でほぼ全身が黒色素胞に覆われ茶褐色となった。発光器は，19.1 mm で SAO ₁，SAO ₃ および VLO が現れ，22.3 mm までに頭部を除くすべての発光器が出現した（頭部は 24 mm で完成）。以上のことから，本種の発育段階は以下の 4 期に分けられた。1) 浮遊仔魚期 (<8.0-ca.10 mm)：各部分は急速な発達をするものの鰭条は未発達；2) 遊泳仔魚期 (10-18.9 mm)：鰭条が完成し遊泳機能は大きく発達，顎歯と咽頭歯の出現；3) 変態期 (18.3-19.4 mm, 5 個体のみ)：眼径および上顎長の急激な増大，顎歯の急速な増加，発光器の出現；4) 稚魚期 (>19.3 mm)：発光器の完成，成魚と同じ黒色素胞の分布。第 1) 期と 2) 期の 89.5% の個体および 3) 期の 18.3 mm の 1 個体は深度 0-200 m から，3) 期の 18.5-19.4 mm の 4 個体と 4) 期のすべての個体は 200-1000 m で採集された。変態期における，眼径の増大や発光器の出現，黒色素胞の分布様式の変化などは，中深層生活への急速な適応と考えられ，上顎長の増大もそれにとまなう食性の大きな変化を示唆している。