

Illustrated Keys to the Lanternfishes (Myctophidae: Myctophiformes) from Australian Waters

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Abstract. The lanternfishes (Family Myctophidae), represented by at least 254 extant species, are a diverse family of oceanic fishes which dominate fish biomass in world oceans. Most lanternfish species reside in the mesopelagic zone (the upper water column of open ocean in ~200–1,000 m depths) where many ascend vertically at night to feed. Lanternfishes are small-bodied (~25–280 mm SL) and are key prey for myriad fishes and squids (including numerous commercial species), seabirds and marine mammals. For these reasons, the ecological roles of lanternfishes and their relevance to food security are of increasing global research interest. Despite numerous lanternfish species being known from Australian waters, no comprehensive and regionally specific key is available to aid species-level identification of the Australian fauna. This paper meets that need by providing illustrated keys to 30 lanternfish genera and 141 species: 29 genera and 136 species present within Australia's Economic Zone (EZ), plus one genus and five species recorded close to the EZ boundary. About half the fauna is contained within the three most speciose genera – *Diaphus* (40 species), *Lampanyctus* (16) and the *Myctophum* complex (14) – while nine genera are represented by single species (*Ceratoscopelus*, *Hintonia*, *Idiolychnus*, *Krefflichthys*, *Lampanyctodes*, *Lampichthys*, *Notolychnus*, *Scopelopsis* and *Triphoturus*); four species remain undescribed (three *Dasyscopelus*, one *Lampanyctus*). There are new records from Australian waters of 21 species, and numerous distributional range extensions within Australian waters of previously recorded species. Synopses of the relationships between genera, taxonomic uncertainties, comparisons of morphological and molecular-based taxonomies, and ecological notes are provided for most genera.

Introduction

The lanternfish family Myctophidae, Order Myctophiformes, is the second-most diverse family of fishes (after Stomiidae) in the mesopelagic zone (depths from approximately 200 to 1000 m) in global oceans. Lanternfishes occur in all oceans, from the Antarctic Ocean to the Arctic area, and in most seas with waters exceeding 400 m depth. Presently, at least 254 species in 34 genera are recognised (Fricke *et al.*, 2026).

Lanternfishes are small-bodied fishes, with maximum size ranging from ~25 to ~280 mm SL at sexual maturity. Many species are broadly distributed and abundant. Collectively,

lanternfishes make up most of the biomass of mesopelagic fishes – estimated, variously by net capture, acoustic and modelling methods, to be in the range of 1 to ~16 Gt (10⁹ tonnes) (Gjøsæter & Kawaguchi, 1980; Irigoien *et al.*, 2014; Gascuel *et al.*, 2008; Jennings & Collingridge, 2015; Proud *et al.*, 2019). This extraordinarily high total dominates fish biomass in world oceans and is larger than any commercial fish stock.

Although the distributions of most lanternfish species are in the mesopelagic zone of the high-ocean, some species are pseudoceanic (*sensu* Hulley, 1981), being restricted to ocean margins overlying the continental and insular shelf

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