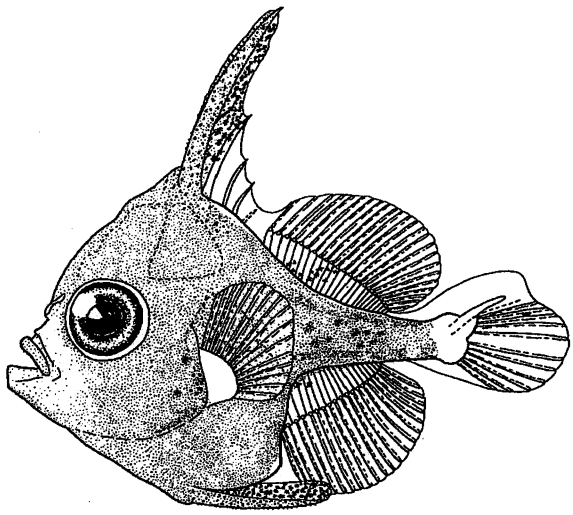


Chapter 18

Tetraodontiformes

Order: Tetraodontiformes (Plectognathi)

Number of suborders	2 (Triacanthoidei, Tetraodontoidei; monophyly of the order is accepted but relationships within the order are not settled; currently the triggerfishes and filefishes are separated from the Tetraodontoidei as a third suborder, Balistoidei; e.g., Santini and Tyler 2003, Nelson 2006).
Number of families	9
Number of genera	101
Number of species	approx. 357

GENERAL LIFE HISTORY

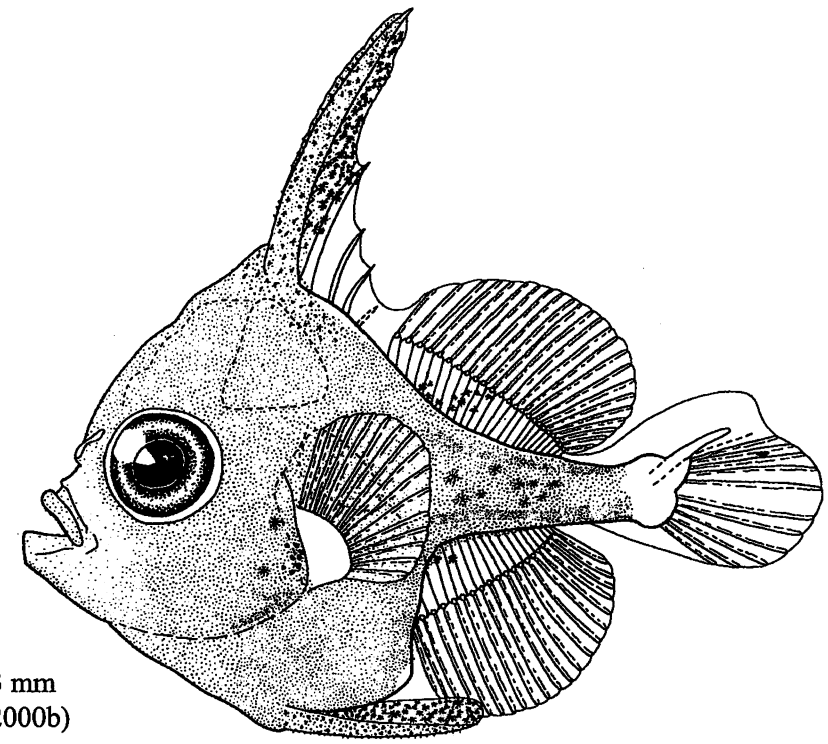
Distribution	World-wide in temperate to tropical seas, some species in freshwater.
Relative abundance	Relatively common; some species utilized in subsistence and small commercial fisheries, including the aquarium trade.
Adult habitat	Benthic to epipelagic; most are tropical to warm temperate shorefishes, commonly associated with benthic habitats.

EARLY LIFE HISTORY

Mode of reproduction	Oviparous (oviparity assumed for species with unknown mode), with planktonic or demersal eggs and planktonic larvae.
Knowledge of ELH	Eggs and larvae known for many species representing all families.
ELH Characters:	**Eggs:** both planktonic and demersal eggs spherical, ca. 0.5–2.3 mm in diameter, with one to several oil globules (commonly > 1); demersal eggs adhesive. **Larvae:** hatch at approx. 1–3 mm in relatively undeveloped (large yolk sac, unpigmented eyes, unformed mouth) to well developed state (little yolk, pigmented eyes, functional mouth); notochord flexes at approx. 2.5–6.5 mm, transformation at approx. 5–30 mm (commonly ≤ 10 mm); initially moderately slender and compressed becoming deeper-bodied with growth, to deep-bodied and broad throughout development; preanal length initially approx. 35–65% BL increasing to approx. 40–90%; eyes typically large; epidermis typically slightly to strongly inflated (the dermal sac); spines lacking on bones of head and pectoral girdle, but dermal spinules or bony plates form in some; 16–26 myomeres (commonly 18–22); pigmentation ranges from nearly absent to nearly complete, commonly present on head, gut, and dorsum of trunk.
Example species:	TRIACANTHOIDEI: *Triacanthus biaculeatus* (Triacanthidae). TETRAODONTOIDEI (Balistoidei): *Aluterus scriptus* (Monacanthidae). TETRAODONTOIDEI (Tetraodontoidei): *Sphoeroides lobatus* (Tetraodontidae).
REFERENCES	Aboussouan and Leis 1984, Fahay 2007b, Fujita 1988, Johnson and

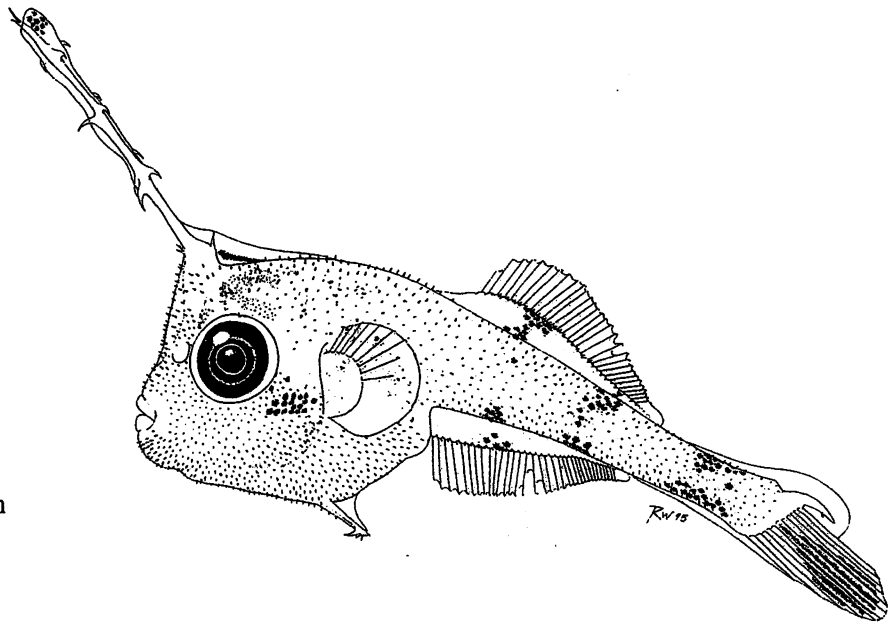
Britz 2005, Leis 1984a, b, Leis and Rennis 2000o–s, Lyczkowski-Shultz 2006a–d, Lyczkowski-Shultz and Ingram 2006, Lyzkowski-Shultz et al. 2006a, b, Trnski and Leis 2000b, Watson 1996y, z, aa, Zapfe and Lyzkowski-Shultz 2006, also see references in the suborder chapters.

Tetraodontiformes/Triacanthoidei/Triacanthidae



Triacanthus
T. biaculeatus 4.3 mm
(Trnski and Leis 2000b)

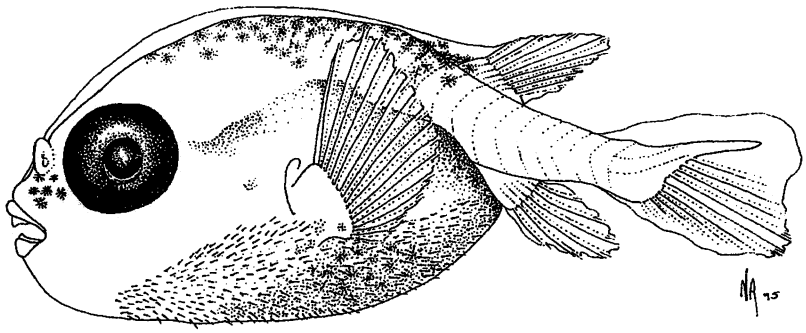
Tetraodontiformes/Tetraodontoidei (Balistoidei)/Monacanthidae



Aluterus
A. scriptus 5.7 mm
(Watson 1996z)

Tetraodontiformes/Tetraodontoidei (Tetraodontoidei)/Tetraodontidae

Sphoeroides
S. lobatus 5.2 mm
(Watson 1996aa)



Order Tetraodontiformes (Plectognathi)

Suborder	Tetraodontoidei (Superfamily Balistoidea)
Family	**Balistidae (Triggerfishes)** Nb: some authors include Monacanthidae in this family.
Number of genera	11
Number of species	about 40

GENERAL LIFE HISTORY

Distribution	Marine, primarily tropical.
Relative abundance	Locally abundant. Of limited artisanal importance.
Adult habitat	Mostly on shallow reefs, but some semi-pelagic or oceanic. Medium-sized carnivores.

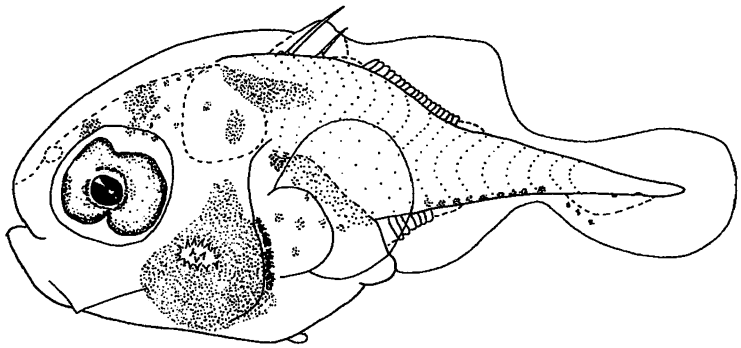
EARLY LIFE HISTORY

Mode of reproduction	Oviparous.
Knowledge of ELH	Eggs and larvae known for few species.
ELH Characters	**Eggs**: demersal and small, 0.5–0.6 mm. **Larvae:** body initially slender and slightly compressed, but quickly becomes deep and robust before flexion. Gut deep and coiled. Preanal length 40–58% BL before flexion, 63–73% BL after flexion. 18–19 myomeres. Head moderate, becomes large with short snout and steep profile but snout lengthens. Mouth small and horizontal; teeth form just before flexion. By flexion, gill opening reduced to small pore at P1 fin base. No head spines, but what appear to be modified spinulose scales form an enlarged tuft on preopercle at about 1.5 mm BL. Tuft disappears at about time of flexion as spinule-like scales appear on head and body. Notochord flexion at 3.5–4.5 mm. First fin elements (D fin spines) form prior to flexion. D sp1 becomes robust, long and barbed by start of flexion. D and A rays begin to form just prior to flexion, and full complement of elements present in all fins by 6–7 mm. No P2 fin. Heavy pigment over head, nape, gut and operculum. Series of fine melanophores on ventral midline of tail, and usually on dorsal notochord tip: these disappear by end of flexion. Become juveniles at a small size (ca. 8–10 mm), but remain pelagic for extended periods.
Example taxon	Balistidae (unidentified).
Meristics (family):	D: III+22–36, A:19–31, P1: 12–16, P2: absent, V: 7+11=18, C: 6+6.

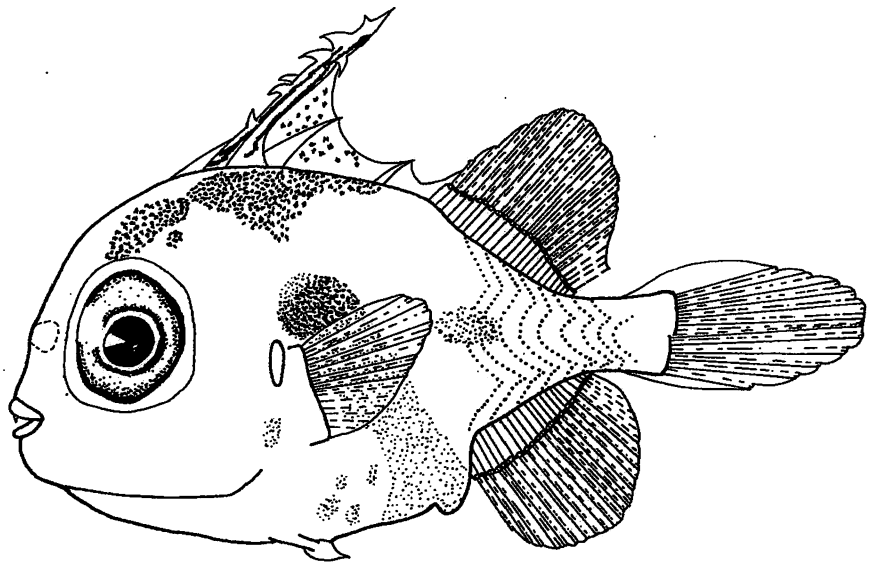
REFERENCES

Aboussouan and Leis 1984, Fujita 1988, Leis and Rennis 2000p, Matsuura 2001, Tyler 1980, Watson 1996y.

Tetraodontiformes/Balistoidei/Balistidae
from: Leis and Rennis 2000p
Balistidae (unidentified)



3.0 mm



4.4 mm

Order Tetraodontiformes (Plectognathi)

Suborder	Tetraodontoidei (Superfamily Tetraodontoidea)
Family	**Tetraodontidae (Puffers)**
Number of genera	about 20
Number of species	about 120

GENERAL LIFE HISTORY

Distribution	Primarily marine, but some freshwater. World-wide tropical to temperate.
Relative abundance	Locally abundant. Of commercial importance in Japan.
Adult habitat	Variety of marine, estuarine and freshwater habitats: some epipelagic. Small to medium-sized carnivores.

EARLY LIFE HISTORY

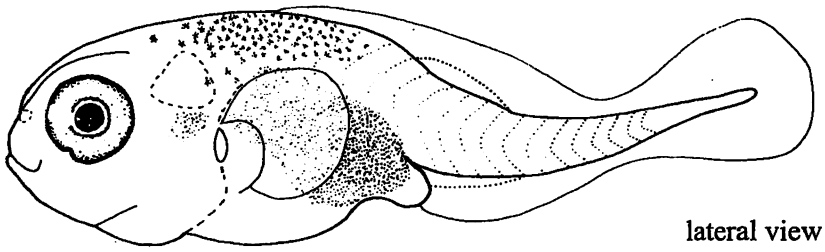
Mode of reproduction	Oviparous.
Knowledge of ELH	Eggs and larvae known for few species.
ELH Characters	**Eggs:** demersal, 0.5–1.3 mm.

Larvae: early preflexion larvae have moderate to deep, ovoid head and trunk and slender, tapered tail. By late preflexion stage, head and trunk more robust and larvae can inflate. Body wide, width remains less than depth. In preflexion larvae, head and trunk with wide subdermal space. The gut broad, deep and coiled. Preanal length 48–83% BL, and >75% BL following flexion. 17–24 myomeres. Head moderate to large, and ovoid to rotund. Mouth small and horizontal, beak-like teeth form prior to flexion. Gill opening a small exhalent pore at P1 fin base. No head spination. Notochord flexion at 3–5 mm. No spines in fins: P2 absent. D, A and P1 rays begin to form just prior to flexion, and full complement of elements present in all fins by 5 mm. Spinule-like scales begin to form usually on belly as early as 3 mm: distribution, shape and persistence of dermal spinules species specific. Heavy pigment present over dorsal and dorsolateral surfaces spreads with development. Tetraodontids become juveniles at very small size (ca. 5–10 mm), but may remain pelagic for an extended period.

Example taxon:	Tetraodontidae (unidentified).
Meristics (family):	D: 8–18, A: 6–16, P1: 12–19, P2: absent, V:7–10+8–14=16–24, C: 5+6=11

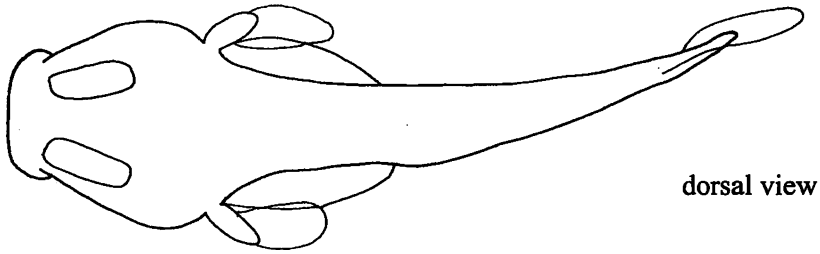
REFERENCES Tyler 1980, Leis 1984, Fujita 1988, Watson 1996aa, Leis and Rennis 2000r, Yamada 2002.

Tetraodontiformes/Tetradontoidei/Tetraodontidae
from: Leis and Rennis 2000r

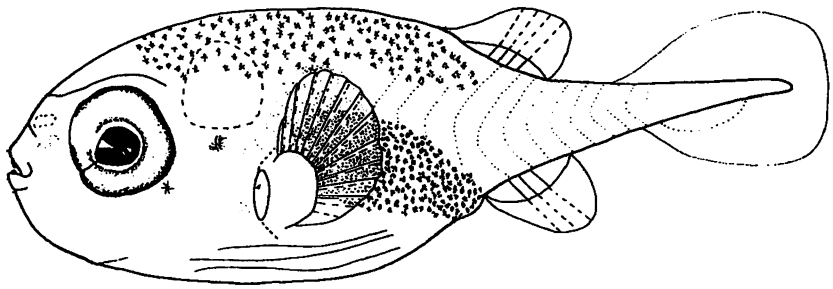


lateral view

2.8 mm



dorsal view



3.8 mm

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