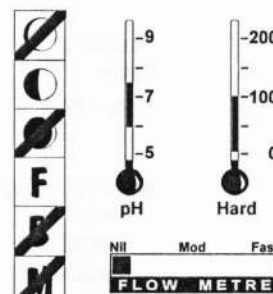
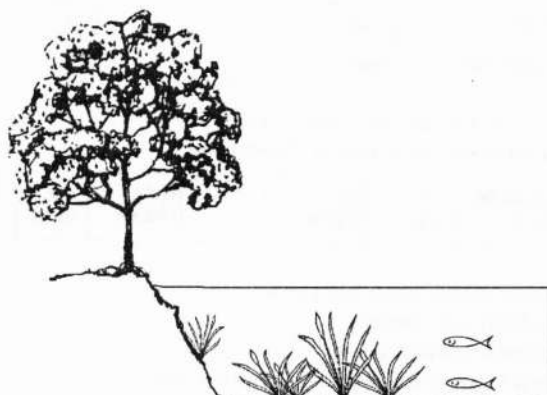


Olive Perchlet *Ambassis agassizii*

- Meaning of names:** *Ambassis* - small value, referring to low worth as human food.
agassizii - after the ichthyologist
- Synonyms:** *Pseudoambassis castelnaui*; *Pseudambassis pallidus*; *Pseudambassis nigripinnis*; *Priopis olivaceous*
- Other species in genus:** 22 species in 4 genera from Australia and PNG
- Description:** **Historical:** Steindachner, 1867, Fitzroy R - Qld
Features: Medium sized glass perch; dull olive body; fins - medium sized, variable black in dorsal, anal and pelvic fins
Size: Nature: to 65mm (TL); Aquarium: to 65mm (TL)
Sex differences: similar. ♂ proportionally larger fins. Gravid ♀ obviously plumper
Colour forms: "nigripinnus" form from SE Qld has substantial black edges to fins especially in juveniles



Distribution: Murray-Darling system; coastal streams of NSW and QLD to Mowbray R.

Stream: **Type:** rivers, creeks and swamps
Depth: usually less than 1m
Substrate: in or near aquatic vegetation; especially in backwaters
Flow: low or none
Riparian: likes shadows from overhanging vegetation

Shared with: **Fish:** various groups because of wide spread distribution; eg., *melanotaeniids*, *pseudomugils*, *hypseleotris* etc.
Invertebrates: *Macrobrachium*, *Cherax* and *Atyid* shrimps
Plants: Include *Nymphaea*, *Nymphoides*, *Ottelia*, *Aponogeton*, *Vallisneria*, *Hydrilla*.

Water:	Temp	15 - 25°C	Light	some shadow
	pH range	6.0 - 7.5	Colour	mild tannin
	Hardness	5 - 100ppm	Turbidity	minimal
	TDS	variable	SG	FW
	Salinity		Conductivity	

Collecting: **Methods:** Traps and frame nets in "weed" beds - use fine netting to avoid meshing damage
Transport: Hardy, add a little salt to avoid capture shock - may need double bagging

AQUARIOLOGY

Aquarium:	Volume	600 x 300	Temp	15 - 27°C
	Salts	none needed	pH	7
	Equipment	light filtration	Hardness	50ppm

Feeding: all live, frozen and dried foods

Compatibility: Own species: peaceful, prefers small schools of varying maturity
Other species: peaceful community fish
Aquarium plants: does not damage plants, enjoys the security of plants
Substrate: not disturbed
Equipment: not disturbed

Hardiness: Lifespan: 3 - 4 years
Jump ability: don't jump much
Diseases: generally healthy
Toxins: resists some degree of pollution
Special problems: recently caught fish sometimes prone to fungus

BREEDING In nature: apparently triggered by rains and increased temperatures; spawns in plants

Conditioning: Separate: separation not necessary
Feeding: increase live foods
Water: small water changes frequently
Duration: 2 - 4 weeks
Assessment: watch for fullness in ♀, increased colour in males

Spawning:	Aquarium:	Volume	600 - 750 x 450	Temp	25°C
		Salts	none needed	pH	6.5
		Equipment	none		

Furnishings: well planted - especially back and ends
Ratios: small group - sexes equal or slightly more ♀

Trigger factors:

Day/Night Ratio	↑ day	Temp Change	↑	Water Change	↑ softer	Water Levels	↑	Feeding	↑ live foods
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Act of spawning

Behaviour: flaring of fins, spawn over plants
Time of day: probably early morning
Duration: probably less than an hour
Frequency: each ♀ spawns daily for several days then rests
Other: -

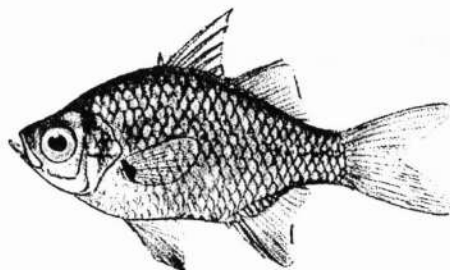
Eggs: Physical: small, spherical and adhesive
Numbers: 30 - 50 per ♀ per day
Hatching: 24 - 36hrs
Fertility: -
Management: remove parents when fry are seen

Fry: Free swimming: by 4 days
Feeding: egg yolk, infusoria, APR, graduated small live foods
Growth rates: rather slow - to 12mm by 60 days
Management: add gentle aeration when fry are free swimming
Special problems: supplying enough live food for fry

REFERENCES Books: 3, 6, 7, 9, 10
Lake JS: Freshwater fish of the Murray Darling system
Journals: A - Vol 1/3: Leggett R.
B - supp No. 34: Allen GR; Burgess WE: Review of glassfishes of Australia and New Guinea

COMMENTS

- Attractive in small schools, especially "nigripinnis" form, adds a nice contrast with other genera in communities
- Doesn't need much heating if local forms are used
- Only occasionally available from commercial outlets



Reticulated Perchlet, Macleay's Glassfish

Ambassis macleayi

Meaning of names:

Ambassis - small value, referring to low worth as human food.
macleayi - after naturalist W. Macleay

Synonyms:

Pseudoambassis macleayi

Other species in genus:

A. agrammus, *A. mulleri*, *A. agassizi*, *A. elongatus*, *A. marianus*

Description:

Historical:

Castelnau, 1878, Norman R - Qld

Features:

broad glass perch with shiny mirror scales and dark edges. Fins tall and erect- may become burgundy red under ideal conditions, dark spot on pectoral base usually.

Size:

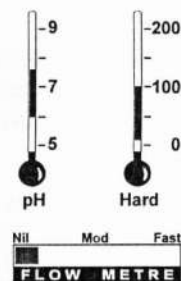
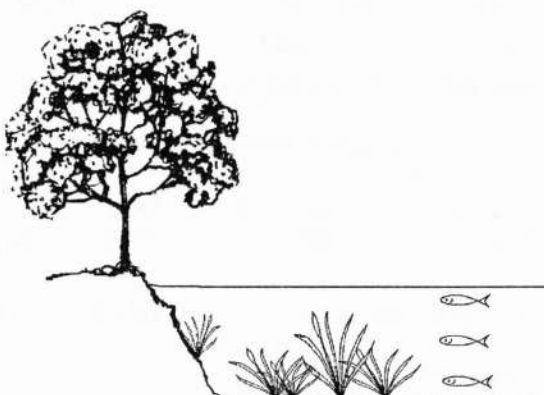
Nature: ♂ to 100mm (TL); Aquarium: ♂ to 100mm (TL)

Sex differences:

generally similar. ♂ larger and with larger fins.

Colour forms:

burgundy colour in fins seems to depend on conditions rather than representing a geographical variation.



Distribution: From Cape York, Southern PNG and across Gulf country and NT to northern WA.

Stream:

Type:

Streams, ponds and swamps

Depth:

usually less than 2m

Substrate:

variable but usually near aquatic vegetation

Flow:

low or none

Riparian:

overhanging vegetation

Shared with:

Fish:

other ambassids, gudgeons, hardiheads, rainbowfish etc.

Invertebrates:

species of *Macrobrachium*, *Cherax* and *Atyds*

Plants:

Nymphaeas, *Vallisneria*, *Najas*.

Water:

Temp

25 - 30°C

pH range

6 - 7.6

Hardness

5 - 100ppm

TDS

variable

Salinity

tolerates small amount

Light

prefers some shade

Colour

variable

Turbidity

low

SG

Conductivity

Collecting:

Methods:

Fine mesh used to avoid damage from meshing, try traps and frame nets near plants.

Transport:

Add a little salt to avoid capture shock. Don't overcrowd especially mature fish. Double bag because of fin spines.

AQUARIOLOGY

Aquarium:	Volume	900 x 450	Temp	28 - 30°C
	Salts	none needed	pH	6.5
	Equipment	Heater, light filtration	Hardness	50ppm

Feeding: Live and frozen foods, some flake; taken at all levels

Compatibility: Own species: peaceful; schools preferred; sizes can vary
Other species: community as long as large enough not to be swallowed
Aquarium plants: plants are safe and needed for security
Substrate: not disturbed
Equipment: not disturbed

Hardiness: Lifespan: approx 3 years
Jump ability: not notorious
Diseases: not particularly susceptible
Toxins: easily succumbs
Special problems: capture shock and damage fungus especially in mature fish

BREEDING In nature: All year especially early "wet"; spawns on plants just after dawn

Conditioning: Separate: separation not necessary
Feeding: increase live foods
Water: no big water changes, temp about 25°C
Duration: 2 - 4 weeks
Assessment: watch for fullness in ♀, red in fins

Spawning:	Aquarium:	Volume	900 x 450	Temp	28 - 30°C
		Salts	none needed	pH	6.5
		Equipment	Heater, light filtration		

Furnishings: copious plants along back and ends, not full height
Ratios: equal or 2 ♂ to 3 ♀

Trigger factors:

Day/Night Ratio	equal	Temp Change	↑	Water Change	↑ softer	Water Levels	↑	Feeding	↑ live foods
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Act of spawning

Behaviour: ♂ nudges ♀ underneath; receptive ♀ faces and grabs mouth, then spawns over plants.
Time of day: dawn
Duration: few minutes
Frequency: each ♀ several consecutive days (2 - 4)
Other: no parental care

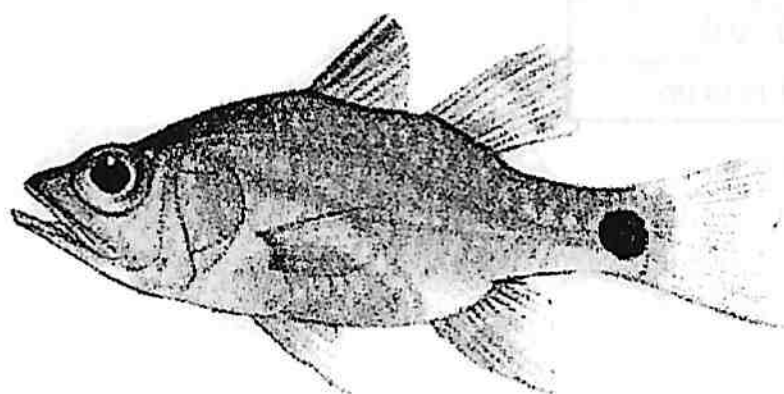
Eggs: Physical: adhesive; 0.5 - 0.55mm; spherical
Numbers: 30 - 250 per ♀
Hatching: approx 24hrs
Fertility: -
Management: remove parents to avoid predation or conversely could replace plants.

Fry: Free swimming: actively feeding by day 3
Feeding: copious infusoria initially then small crustaceans
Growth rates: should be 34mm and breeding by 3 months
Management: regular water changes
Special problems: supplying enough live food for fry

REFERENCES Books: 2, 3, 4, 5, 6, 7
Journals: Fishes of Sahul, 1985 p90, Semple G; A review of the Glassfishes of Australia and New Guinea, 1990, Allen GR and Burgers WE

COMMENTS

• Very attractive schooling community fish that should breed well in ponds in tropical Australia. Has commercial potential.



Mangrove Cardinalfish, Translucent Cardinalfish, Hump-backed Cardinalfish *Apogon hyalosoma*

Meaning of Names:

Apogon - no beard
hyal - transparent *soma* - body

Synonyms:

Apogon thermalis, *Amia hyalosoma*

Other Species in Genus:

> 100 species in genus - mainly marine, tropical and sub-tropical; only 2 species enter freshwater.

Description:

Historical:

first described by Bleeker in 1852

Features:

High-bodied cardinalfish, concave nape in adults; body colour varies from pale golden to translucent olive with purplish sheen; large black spot at base of tail and black strip in first dorsal between rays 2&3

Size:

maximum 15cm SL

Sex differences:

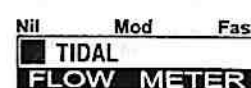
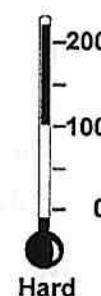
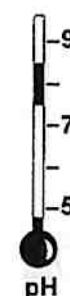
♂ has more bulbous head; longer and more reddish dorsal; also mouth deeper split

Colour forms:

minor variation only

Cons. status:

secure and widespread



Distribution: Brackish estuaries from east Africa to the Indo-Australian Archipelago

Stream:

Type:

estuaries and lower reaches of freshwater streams - near mangroves

Depth:

60 cm and deeper

Substrate:

mangroves, rocks, pilings

Flow:

tidal

Riparian:

mangroves - likes to be near cover

Shared with:

Fish:

various marine and estuarine fishes over such a wide range e.g. Scats, Monos, Ambassids, gudgeons etc

Invertebrates:

shrimps, prawns, mud crabs etc

Plants:

algae, mangroves

Other:

In tropical areas beware of Estuarine Crocodiles in these haunts

Water:

Temp	20 - 30 C
pH range	7.5-8.5
Hardness	
TDS	
Salinity	

Light	subdued
Colour	clear
Turbidity	variable
SG	35ppt
Conductivity	

Collecting:

Methods:

Spotlighting at night with a dip-net

Transport:

Transports easily in habitat water.

AQUARIOLOGY

Aquarium:

Volume	750x300
Salts	500ppm up
Equipment	aeration, filtration

Temp	15 - 30 C
pH	7.5 - 9.0
Hardness	300ppm up

Feeding:

only eats small live fish e.g. blue-eyes

Compatibility:

Own species: may be aggressive towards others of the same species
Other species: peaceful with any other fish too large to be prey.
Aquarium plants: likes to use plants as cover
Substrate: not disturbed
Equipment: not damaged

Hardiness:

Lifespan: unknown
Jump ability: strong jumpers, needs a cover
Diseases: prone to fungal diseases if salinity too low
Toxins:- can tolerate some pollution; must be tough to live where they do.
Special problems: will not take any dead food

BREEDING

In nature: Mouth -brooder like all Cardinalfishes.

Conditioning:

Separate: -
Feeding: -
Water: -
Duration: -
Assessment: -

Spawning:

Aquarium:

Volume	-
Salts	-
Equipment	-

Temp	-
pH	-
Hardness	-

Furnishings: -
Ratios: -
Trigger factors:

Day/Night Ratio	?	Temp Change	?	Water Change	?	Water Levels	?	Feeding	?
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Act of spawning:

Behaviour: -
Time of day: -
Duration: -
Frequency: -

Eggs:

Physical: approx 4mm in diameter
Numbers: 30-40 per brood
Hatching: -
Fertility: -

Fry:

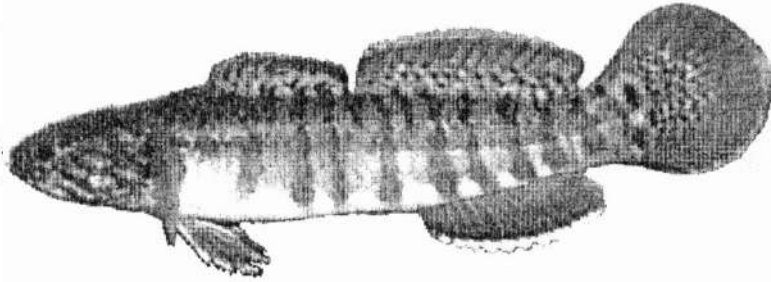
Free swimming: -
Feeding: -
Growth rates: -
Management: -
Special problems: -

REFERENCES

Books: 3, 4, 8, Munro ISR: The Fishes of New Guinea; Munro ISR: The Marine and Fresh Water Fishes of Ceylon; Kottelat M et al: Freshwater Fishes of Western Indonesia and Sulawesi
Journals: Fishes of Sahul p 332, 382

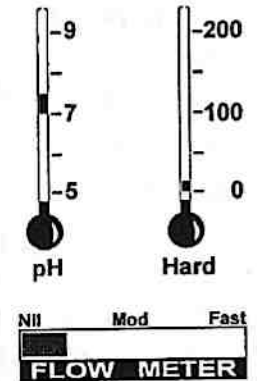
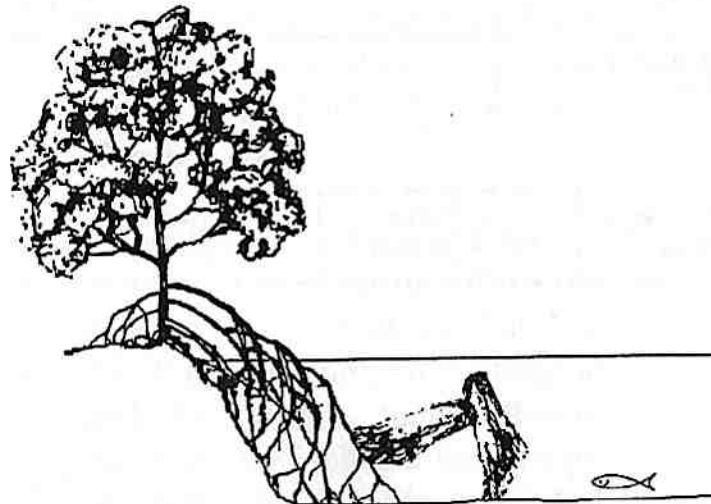
COMMENTS:

- An interesting and attractive "odd-bod" species
- Makes a good contrast to other estuarine species but can be a "picky" feeder.



Barred Gudgeon *Bostrichthys zonatus*

- Meaning of names:** *Bostrichthys* - bull headed fish (refers to males)
zonatus - bars on body
- Synonyms:** *Bostrychus zonatus*
- Other species in genus:** also *B. arvensis*, *B. sinensis*, *B. strigogenus*
- Description:** **Historical:** *Bostrichthys* - Dumerid, 1806; *B. zonatus* - Weber, 1908
- Features:** **Head** - scaled and depressed, teeth on vomer, each cheek carries a small forward projecting sensory papilla
Body - cylindrical but compressed at rear, numerous small cycloid scales, yellow belly, 8-0 dark cross-bars and narrow transverse stripe
Fins - tail is round with ocellus on upper 1/2 of base, anal and 2nd dorsal larger than 1st, grey with many small spots
- Size:** to 150mm
- Sex differences:** ♂ - develops bigger head and brighter colours; ♀ - more slender
- Colour forms:** none recorded
- Cons. status:** conservation status is uncertain, possibly restricted



Distribution: Central southern PNG; Northern Australia - Glyde R and Darwin, NT

Stream: **Type:** monsoonal estuaries and freshwater runoff drains
Depth: 10cm
Substrate: rock and clay
Flow: tidal in dry season, moves into stormwater drains in the "wet"
Riparian: mangrove trees and marginal grasses

Shared with: **Fish:** Gudgeons, single-gilled eels, ox-eye herring, *Ambassids*, adults and juveniles together (3 - 15cm)
Invertebrates: not recorded
Plants: grasses and algae, mangroves further downstream
Other: mangrove snakes

Water:

Temp	26°C
pH range	approx 7.0
Hardness	<10ppm
TDS	low
Salinity	minimal

Light	well shaded
Colour	crystal clear
Turbidity	low
SG	-
Conductivity	-

Collecting: **Methods:** caught amongst grass at night with torch and scoop net
Transport: cover to prevent jumping, bag large specimens separately to prevent cannibalism

AQUARIOLOGY

Aquarium:

Volume	50 litres per pair
Salts	10% seawater
Equipment	box filter

Temp	24 - 30°C
pH	7 - 8
Hardness	shell grit substrate

Feeding:

frozen or live "meaty" foods, eg., prawn and pea mix, live fish or shrimps

Compatibility:

Own species: quarrelsome and territorial especially when adult
Other species: likely to be either eaten or damaged
Aquarium plants: likely to be uprooted
Substrate: regularly moved around, (as with cichlids)
Equipment: avoid u-g filters, provide cover eg., driftwood, poly piping (slightly larger diameter)

Hardiness:

Lifespan: unknown, probably several years
Jump ability: excellent jumpers so cover well
Diseases & Toxins: seem hardy
Special problems: fighting and cannibalism, may need additional salt at times if kept in freshwater long term

BREEDING

In nature: unrecorded in nature or aquaria. Possibly breed in the "wet" in the freshwater with some initial parental care by the male before the larvae dispers downstream

Conditioning:

Separate:
Feeding:
Water:
Duration:
Assessment:

Spawning:

Aquarium:

Volume	
Salts	
Equipment	

Temp	
pH	

Furnishings:

Ratios:

Trigger factors

Day/Night Ratio	
-----------------	--

Temp Change	
-------------	--

Water Change	
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Water Levels	
--------------	--

Feeding	
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Act of spawning

Behaviour:

Time of day:

Duration:

Frequency:

Eggs:

Physical:
Numbers:
Hatching:
Fertility:
Management:

Fry:

Free swimming:
Feeding:
Growth rates:
Management:

REFERENCES

Books:

4

Munro: The Fishes of New Guinea, 1967

Kottelat/Whitten/Kartikasari/Wirjoatmodjo: Freshwater Fishes of Western Indonesia and Sulawesi, 1993

Koumans/Weber & de Beaufort: The Fishes of the Indo-Australian Archipelago, Vol X, 1953

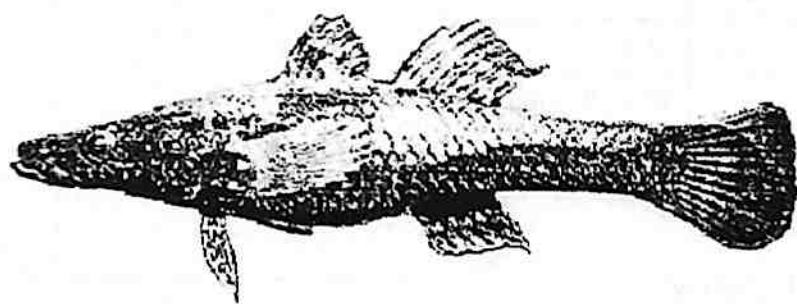
Dixon/Huxley: Donald Thompson's Mammals and Fishes of Northern Australia, 1985

Personal:

Helen Larson: 1994, Dave Wilson: 1994/95, Greg Ure: 1989

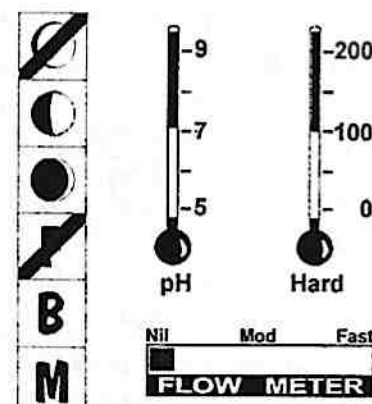
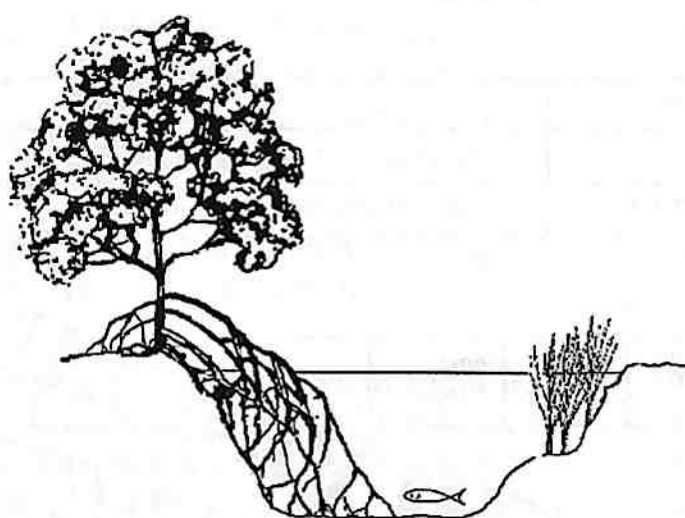
COMMENTS

- This is another attractive and interesting native fish that should appeal to those aquarists who like unusual fish with "character"
- Appears to like living in poly piping of a slightly larger diameter where the fish looks out at the world. The sensory papilla on each cheek may have developed as a means of sensing the environment in cray holes, tunnels
- Any person with experience of any aspect of this fish please advise the author for an update



Crimson-tipped Gudgeon, Flathead Gudgeon, Bony-snouted Gudgeon, Crazy Fish *Butis butis*

Meaning of names: *Butis* - unknown
Synonyms: numerous because of wide distribution, *Cheilodipterus butis*, *Eleotris papa* etc
Other species in genus: 5 species world wide with 3 in PNG. *Butis melamostigma*, *Butis amboimensis*
Description: Historical: Genus *Butis* - Bleeker 1856; Species *butis* - Hamilton 1822
 Features: cylindrical body compressed posteriorly, head depressed, snout pointed, paired pelvic fins
 colours: mottled brown/gray, black spot in pectoral base, top of tail clear, red in first dorsal tip and red spots elsewhere
 Size: to 110mm SL, 150mm TL
 Sex differences: ♂ tend to grow larger and coarser with larger fins and more colour; ♀ plumper in good condition
 Colour forms: minor variations in intensity of colours and especially amount of red
 Cons. status: probably secure



Distribution: widespread from east Africa across SE Asia to Indonesia, PNG and northern Australia

Stream: Type: brackish estuaries upto lower reaches of freshwater streams and coastal swamps
 Depth: usually 10cm to 1 metre
 Substrate: muddy
 Flow: mostly tidal areas with limited flow
 Riparian: mangroves to pandanus and melaleucas

Shared with: Fish: multiple estuarine species, esp gobies and juvenile ??? species, eg., toxotes, ambassis
 Invertebrates: various shrimps and prawns
 Plants: minimal aquatic, usually marginal grasses providing cover
 Other: in tropical areas beware of estuarine crocodiles

Water:

Temp	22 - 30°C
pH range	7.0 - 8+
Hardness	100ppm up
TDS	-
Salinity	marine to minimal

Light	near cover
Colour	-
Turbidity	clear to "pea soup"
SG	-
Conductivity	-

Collecting: Methods: most effective seems to be scoop-netting around mangroves and grasses
 Transport: hardy species, handles well, add extra salt in freshwater areas

AQUARIOLOGY

an inactive species, doesn't require a large aquarium but prefers rocks, wood and plants for security

Aquarium:

Volume	20 - 50 litres per trio
Salts	0.1 - marine
Equipment	u/g or box filter

Temp	25°C
pH	7.5 +
Hardness	200 - 400ppm

Feeding:

will take flake and frozen miztures but prefers small live fish and shrimps

Compatibility:

Own species: will not eat each other if small enough
Other species: not aggressive to specimens that are not "swallowable"
Aquarium plants: not damaged, enjoys the cover provided
Substrate: not disturbed
Equipment: not disturbed

Hardiness:

Lifespan: greater than 2 years in aquaria
Jump ability: jumps initially
Diseases & Toxins: reasonably hardy after initial "capture" fungal infections
Special problems: like most estuarine fish, probably needs several weeks per year in high salinity (half to full marine) to maintain good long term health

BREEDING

In nature: unknown - probably spawns on rocks or wood with some initial parental care. It is likely that this occurs in low estuarine areas and the tiny pelagic fry then slowly work their way upstream. Numerous juveniles (to 3 - 4cm) caught around Darwin in June/July

Conditioning:

Separate:
Feeding:
Water:
Duration:
Assessment:

Spawning:

Aquarium:

Volume	
Salts	
Equipment	

Temp	
pH	

Furnishings:
Ratios:
Trigger factors

Day/Night Ratio		Temp Change		Water Change		Water Levels		Feeding	
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Act of spawning

Behaviour:
Time of day:
Duration:
Frequency:

Eggs:

Physical:
Numbers:
Hatching:
Fertility:
Management:

Fry:

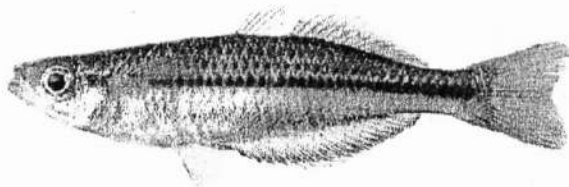
Free swimming:
Feeding:
Growth rates:
Management:

REFERENCES

Books: 2, 3, 4, 8, 9, 10, 14, 15
Johnson J: Wildlife of greater Brisbane; QH; 1995. Sandford G: An illustrated encyclopedia of aquarium fish; 1995. Herbert B et al: FW fish and aquatic habitat survey of Cape York Peninsula; DPI; 1995. Kottelat et al: FW fishes of Western Indonesia and Sulawesi; 1993. Munro ISR: The fishes of New Guinea; 1967. Inger/Chin: The FW fishes of north Borneo; 1962. Koumans FP: The fishes of the Indo-Australian archipelago, Vol 10; '53.
Journals: Todays Aquarium 2/1985: Uwe Werner.

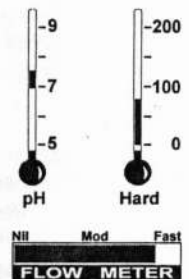
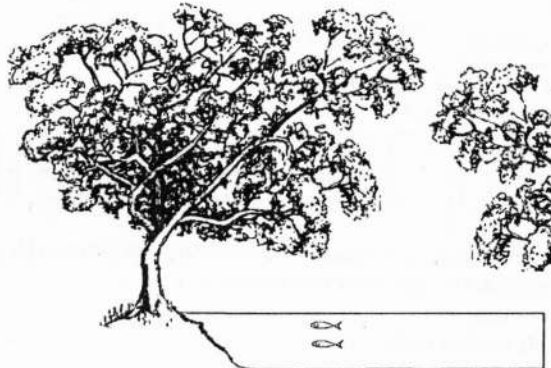
COMMENTS

- This is an interesting, mainly nocturnal, aquarium fish with the unusual habit of swimming upside down or vertically around objects. They seem happiest away from water movement and probably are more popular as an aquarium oddity overseas than here in Australia



Northern Soft-spined Sunfish, Cairns Rainbowfish *Cairnsictithys rhombosomoides*

- Meaning of names:** *Cairnsictithys* - Cairns fish
rhombosomoides - refers to pattern of scales
Rhadinocentrus rhombosomoides
- Synonyms:** -
- Other species in genus:** -
- Description:** Historical: *Rhadinocentrus rhombosomoides* - Nichols & Raven, 1928; *Cairnsictithys* - Allen, 1980
 Features: Body - compressed, elongated; olive brown above, light below. Mid lateral dark stripe, golden opercular spot
 Fins - tail yellow, others clear. ♂ have outer half of anal and 2nd dorsal yellow
 Size: ♂ to 70mm SL; ♀ to 65mm SL
 Sex differences: ♂ - larger body, larger and more colourful fins
 Colour forms: some populations have more yellow, whilst some specimens have a shorter second dark stripe on belly
 Cons. status: restricted, (but threatened by habitat destruction)



Distribution: North Queensland - Mulgrave and Russell drainages, also some streams near Innisfail and Mission Beach

Stream: Type: Pools and rapids of rainforest creeks in the hills
 Depth: 10 cm - 3 metres
 Substrate: rocky
 Flow: brisk
 Riparian: rainforest

Shared with: Fish: *Melanotaenia splendida*, *Pseudomugil signifer*, *Neosilurus* sp., *Kuhlia* sp., *Hephaestus* sp. and *Hypseleotris* sp.
 Invertebrates: *Macrobrachium* and *Cherax* sp.
 Plants: occasionally *Blyxa*, *Vallisneria*, *Aponogeton*
 Other: -

Water:

Temp	20 - 25°C
pH range	7.0 - 7.4
Hardness	0 - 80
TDS	low
Salinity	0

Light	open - slightly shaded
Colour	clear
Turbidity	minimal
SG	-
Conductivity	-

Collecting: Methods: try a fine seine net in pools near rapids
 Transport: adding salt and "stress coat" helps, select juveniles and don't overcrowd to avoid capture shock, insulate box to avoid overheating

AQUARIOLOGY

Aquarium:	Volume	50 litres per trio	Temp	20 - 25°C
	Salts	nil	pH	7
	Equipment	brisk aeration/filters	Hardness	50 ppm

Feeding: accepts all dry, frozen and live foods of appropriate size

Compatibility: Own species: dominance hierarchy in schools based on size (♂ or ♀)
 Other species: generally tolerated fairly well
 Aquarium plants: eats some duckweed but other plants safe generally
 Substrate: not disturbed
 Equipment: safe

Hardiness: Lifespan: up to 3 years (less than most rainbowfish)
 Jump ability: excellent jumpers
 Diseases & Toxins: keep water changes small and frequent
 Special problems: individuals (♂ or ♀) may be more aggressive than other rainbowfish

BREEDING **In nature:** has been observed spawning on grassy margins of creeks during overflow after rain. Probably breeds throughout summer once temperatures are high enough

Conditioning: Separate: increases egg yield for the first couple of days
 Feeding: increase live food
 Water: 50 - 80ppm
 Duration: 2 - 4 weeks
 Assessment: when ♀ plump

Spawning:	Aquarium:	Volume	50 litres per trio	Temp	25°C
		Salts	nil	pH	7.4
		Equipment	brisk aeration		

Furnishings: mops or plants each end of tank

Ratios: 2 ♀ per ♂

Trigger factors

Day/Night Ratio	=	Temp Change	↓ to 22°C	Water Change	↓ hard	Water Levels	↑	Feeding	↑ live foods
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Act of spawning

Behaviour: ♂ spreads fins and ♀ colours; ♀ drives ♂ to plants then tremble parallel before spawning
Time of day: usually in the first hour or two after dawn
Duration: 30 - 60 minutes
Frequency: daily for 2 - 3 weeks
Other: will eat spawn unless copious plants

Eggs: Physical: approx 1mm; adhesive with sticky filaments
 Numbers: 15 - 30 per day per ♂
 Hatching: 6 - 10 days dependant on temperature
 Fertility: sometimes low in captivity
 Management: eggs easily removed; methylene blue reduces risk of fungus

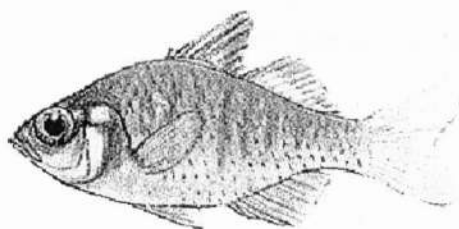
Fry: Free swimming: within 24 hours of hatching
 Feeding: initially infusoria, APR powder, egg yolk; then microworms and brine shrimp
 Growth rates: 10mm by 8 weeks; sexable by 20 weeks
 Management: frequent water changes help growth; grading for size reduces cannibalism
 Special problems: sensitive to big water changes

REFERENCES

Books: 1, 3, 6, 7, 9, 11
 Schmida GE: The Cold-blooded Australians, 1985. Derijst E: Check-list of the Rainbowfishes, 1989
 Wager R & Jackson P: The Action Plan for Australian Freshwater Fishes, 1993
Papers: Wager R: The Distribution and Conservation Status of Queensland Freshwater Fishes, 1993
Personal: ANGFA Cape York Survey, 1992

COMMENTS

• Attractive in a quiet way but rarely available commercially



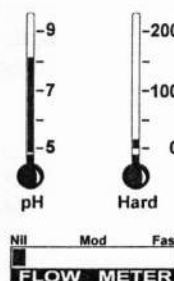
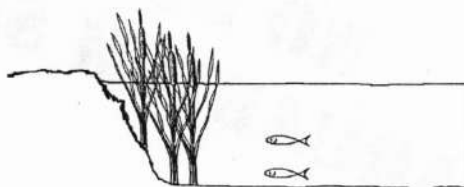
Pennyfish *Denariusus bandata*

Meaning of names: *Denariusus* - coin of small value ie., penny
bandata - banded

Synonyms: -

Other species in genus: -

Description: **Historical:** Whitley, 1948
Features: small glassfish with small mouth and 6 dark vertical bands. Background colour greenish olive, poorly defined lateral line. Fins: dusky bars to the ventral, anal and dorsal; black spot at the base of the pectorals
Size: to 45mm SL mostly under 35mm SL
Sex differences: ♂ - are plumper; ♀ to 45mm ♂ to 40mm
Colour forms: in some areas rich maroon colour in fins of mature specimens, probably indicates conditioning.
Cons. status: restricted



Distribution: central southern PNG - Bensbach and Fly systems
Murray swamps across to Darwin area - North Qld and NT, Australia

Stream: **Type:** small streams and swamps
Depth: less than 1 metre
Substrate: soft mud and sand, almost always near aquatic plants
Flow: low or none
Riparian: swamp, emergent sedges and shrubs

Shared with: **Fish:** various Ambassids, Rainbowfish, Blue-eyes, Gudgeons and catfish
Invertebrates: shrimps - *Atyids* and *Macrobrachium*, *Cherax* sp.
Plants: *Limnophila*, *Najas*, *Hydrilla*, *Vallisneria*, *Nymphaea*, *Nymphoides* and *Utricularia*
Other: often freshwater and estuarine crocodiles and tortoises share habitat

Water:

Temp	25 - 38°C
pH range	4.5 - 8.1
Hardness	low
TDS	-
Salinity	0

Light	prefers shaded
Colour	clear to tannin
Turbidity	0 - mild
SG	-
Conductivity	-

Collecting: **Methods:** usually caught with scoop net by day amongst plants
Transport: easily damaged but generally transport well

AQUARIOLGY

Aquarium:

Volume	50 litres for 10 fish
Salts	0
Equipment	gentle air

Temp	26+ °C
pH	6.0 - 7.0
Hardness	to 100ppm

Feeding:

prefers live food especially mosquito larvae, can be difficult to get to eat prepared foods

Compatibility:

Own species:	enjoys school of own species
Other species:	very peaceful
Aquarium plants:	enjoys the security of plants, does not damage them
Substrate:	not disturbed
Equipment:	not damaged

Hardiness:

Lifespan:	rarely lives past 2 years
Jump ability:	not excessive
Diseases & Toxins:	not particularly susceptible
Special problems:	keeping up the supply of small live food

BREEDING

In nature: mature at approx 25mm SL. Breeds continuously all year round with peak in early wet season

Conditioning:

Separate:	probably not necessary
Feeding:	copious live foods
Water:	
Duration:	
Assessment:	♀ becomes plumper

Spawning:

Aquarium:

Volume	
Salts	
Equipment	

Temp	
pH	

Furnishings:
Ratios:
Trigger factors

Day/Night Ratio		Temp Change		Water Change		Water Levels		Feeding	
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Act of spawning
Behaviour:
Time of day:
Duration:
Frequency:

**NO RECORD OF
AQUARIUM SPAWNING**

Eggs:

Physical:
Numbers:
Hatching:
Fertility:
Management:

I have bred them in outside ponds in summer in Brisbane with a small group of adults (2♂ + 3♀). Small numbers of fry regularly appeared every 8 - 10 days. Pond received a 10 - 15 % water change weekly.

Fry:

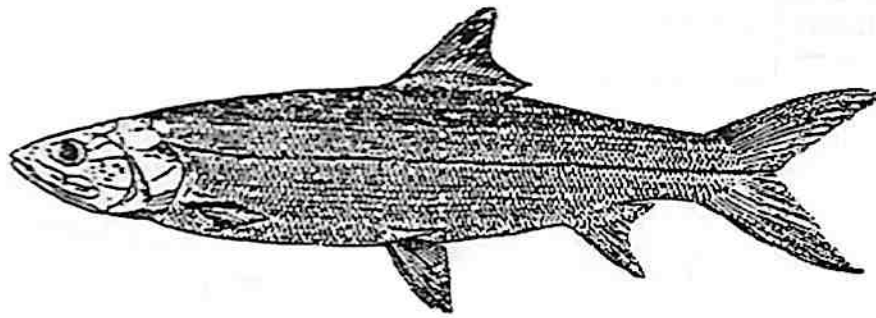
Free swimming:
Feeding:
Growth rates: growth to 10mm in 10 weeks
Management: problems with supply of suitable food

REFERENCES

Books: 3, 4, 5, 6, 7
Journals: A,B
Papers: Wager R: The distribution and conservation status of Qld freshwater fishes, 1993
Others: ANGFA (Qld): members habitat surveys, 1985...

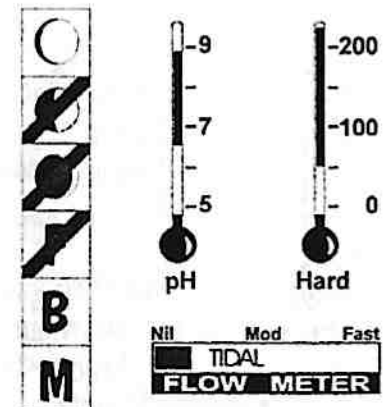
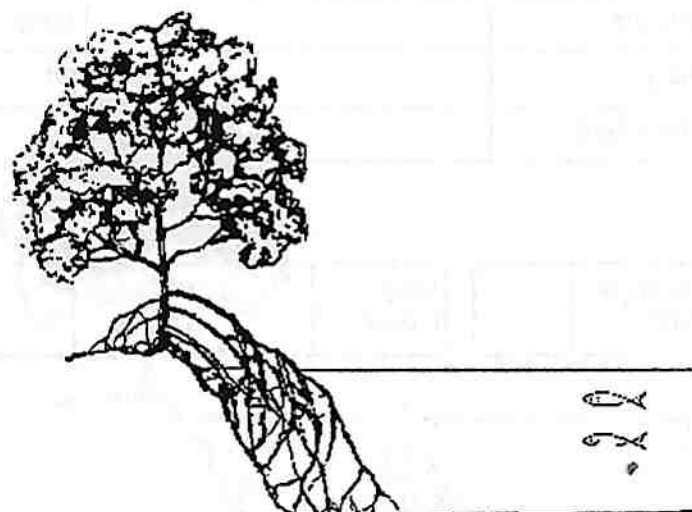
COMMENTS

- An attractive, peaceful little fish that does best in a small school or community of smaller compatible native species
- Occasionally available commercially as wild caught fish



Giant Herring, Ladyfish, Tenpounder, Big-eye Herring *Elops australis*

Meaning of names:	<i>Elops</i> - unknown <i>australis</i> - from Australia
Synonyms:	may only be one circumtropical species <i>E. machnata</i>
Other species in genus:	<i>E. machnata</i> , <i>E. hawaiiensis</i> , <i>E. saurus</i> , <i>E. affinis</i>
Description:	Historical: <i>Elops machnata</i> , Forsskal (1775) - Red Sea; <i>Elops australis</i> , Regan 1909
Features:	elongated, compressed body; small silver scales which sheath the bases of dorsal and anal fins, fins: yellow with black towards tips; forked tail. Gular plate underneath bottom gills. Large eyes with heavy gelatinous layer.
Size:	to 1200mm
Sex differences:	similar
Colour forms:	juveniles have white tips to fins
Conservation:	status secure



Distribution: world wide in tropical seas, in sheltered bays and estuaries, ½ way down east and west coasts of Australia - young fish frequently enter freshwater streams

Stream:
 Type: coastal shallows
 Depth: ½ to 5m
 Substrate: sandy or muddy
 Flow: tidal
 Riparian: estuarine and mangrove

Shared with:
 Fish: ambassids, archerfish, tarpon, arius catfish etc.
 Invertebrates: prawns, crabs etc
 Plants: seagrasses
 Other: crocodiles in appropriate areas

Water:	Temp	18 - 28°C	Light	open sun
	pH range	-	Colour	clear
	Hardness	-	Turbidity	nil - mild
	TDS	-	SG	brackish to marine
	Salinity	brackish to marine	Conductivity	-

Collecting:
 Methods: angling for adults, seine net for juveniles
 Transport: scales damage easily; immerse in ½ salt for 30 minutes after capture to allow regeneration of mucus lining then return to full salt

AQUARIOLGY

Aquarium:

Volume	-
Salts	
Equipment	-

Temp	mostly been kept in large public aquaria. Small specimens could be tried in larger tanks.	
pH		
Hardness		

Feeding:

crustaceans and small fish

Compatibility:

Own species: -
Other species: -
Aquarium plants: -
Substrate: -
Equipment: -

Hardiness:

Lifespan: -
Jump ability: likely to be superb jumpers
Diseases: -
Toxins: -

BREEDING

In nature:

believed to spawn offshore possibly upto 160km; Pelagic larvae (leptocephalae) thin and transparent with forked tail (similar to eel larvae). Whilst drifting inshore they gradually metamorphose into a miniature adult while shrinking to about ½ their length. Young fish common in mangrove swamps and salt marshes. Juveniles found around Darwin in October/November.

Conditioning:

Separate: -
Feeding: -
Water: -
Duration: -

Spawning:

Aquarium:

Volume	
Salts	
Equipment	

Temp	
pH	

Furnishings: -
Ratios: -
Trigger factors

Day/Night Ratio		Temp Change		Water Change		Water Levels		Feeding	
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Act of spawning

Behaviour: -
Time of day: -
Duration: -
Frequency: -

Eggs:

Physical: -
Numbers: -
Hatching: -
Fertility: -
Management: -

Fry:

Free swimming: -
Feeding: -
Growth rates: -
Management: -

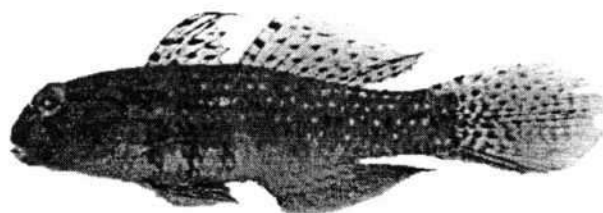
**NO RECORD OF
AQUARIUM SPAWNING**

REFERENCES

Books: 3, 4, 14; Whitley GP: Handbook of Australia Fishes, 1980; Munro ISR: The Fishes of New Guinea, 1967; Migdalski & Fichter: The Fresh & Saltwater Fishes of the World, 1976; Wheeler A: Fishes of the World, 1979; Nelson JS: Fishes of the World, 1984; Jordan/Evermann: The Shore Fishes of Hawaii, 1986

COMMENTS

- popular with sports fishermen in tropical coastal waters but flesh is poor eating and has numerous small bones.
- An occasional display fish in public aquaria.



Silver-spotted or Puntang Goby

Exyrias puntang

Meaning of Names:	<i>xyri</i> - iris <i>puntang</i> - locality name
Synonyms:	numerous- various combinations of the following Genera: <i>Gobius</i> , <i>Gnatholepis</i> , <i>Exyrias</i> , <i>Awaous</i> , <i>Acentrogobius</i> species: <i>puntang</i> , <i>puntangoides</i> , <i>andamanensis</i> , <i>canalae</i> , <i>maculipinnis</i> , <i>concolor</i> , <i>sindonis</i>
Other Species in Genus:	<i>E. bellissimus</i>
Description:	Historical: <i>Gobius puntang</i> by Bleeker in 1851; <i>Exyrias</i> by Jordan & Seale ?1905 Features: Compressed body, head with convex profile, sides covered with silver-blue spangles; First dorsal high with elongated rays; caudal rounded but elongated; fins have bands of dark spots. Size: approx. 170 mm TL Sex differences: males more bull-headed with taller dorsal rays and more colour. Colour forms: similar throughout range; body shape and profile changes with maturity. Cons. status: secure
Distribution:	Indonesia, Japan, Phillipines, Pacific including PNG and Cape York down at least as far as Townsville.
Stream:	Type: Coastal and brackish waters - includes estuaries and well up tidal parts of streams , often found near freshwater inflows. Depth: ½ - 2m Substrate: usually fine sand, always near rocks Flow: tidal Light: usually in full sun Riparian: Mangroves, Pandanus, marginal grasses etc
Shared with:	Fish: <i>P. signifer</i>, <i>Gerres</i> sp., <i>Lutjanids</i>, <i>Teraponids</i>, <i>Butis</i>, other gobies etc Invertebrates: various shrimps and crabs Plants: mainly algae Other: Estuarine Crocodiles are found in these areas too !
Water:	Temp: 20 - 30°C pH: 7.5 - 8.5 Hardness: - Salinity: from full seawater to partial Colour & Turb: usually unstained with mild to minimal turbidity
Collecting:	Methods: caught by dip net around the rocks Transport: hardy, handle well, no problems

AQUARIOLOGY

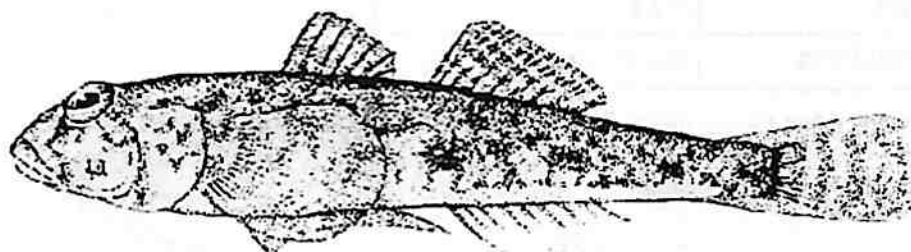
Aquarium:	Volume:	120 - 150 litres for 6 - 8 fish
	Temp:	20 - 30°C
	pH:	7.5 - 8.5
	Hardness:	if not using much salt try to keep the hardness high
	Equipment:	Trickle filter, protein skimmer, heater; under-gravel filters are usually unacceptable because the fish shift the substrate and prefer fine grades which do not work as well in these filters
Feeding:	Feeds by substrate sifting so does well on grated frozen "pea & shrimp" mix plus sinking pellets with occasional feeds of tubifex and white worms. Seem to demonstrate co-operative feeding techniques at times e.g. form a line as they sift the substrate	
Compatibility:	Own species:	Not too territorial so do well in small groups
	Other species:	compatible with many other species both smaller and larger; may compete with other gobies for food, so prefers tankmates that swim and feed at higher levels
	Aquarium plants:	not damaged, some forms of <i>Najas</i> , <i>Potamogeton</i> and <i>Vallisneria</i> may persist well in the lower salinities
	Substrate:	regularly moved around
	Equipment:	not damaged
Hardiness:	Lifespan:	has been recorded as living over 3½ years in captivity
	Jump ability:	like all Gobies needs a good cover glass to prevent suicide
	Diseases:	Resistant to most diseases and toxins, for most common problems add salt
	Toxins:	-
	Special problems:	-
BREEDING	In nature:	Spawns under a rock shelf, possibly female guards the eggs
Conditioning:	Separate:	don't need to separate
	Feeding:	increase the ratio of live food
	Water:	-
	Duration:	-
	Assessment:	males develop a yellow suffusion and richer colours
Spawning:	Furnishings:	plenty of rocks with areas of overhang
	Ratios:	pairs needed
	Trigger factors:	-
	Behaviour:	-
	Time of day:	apparently spawns at night
	Duration & Frequency:	-
Eggs:	Physical:	tiny
	Numbers:	several hundred
	Hatching:	approximately 3 days
	Fertility:	high
	Management:	planktonic larvae rapidly disappeared - probably due to a combination of cannibalisation, starvation and being "processed" by the trickle filter
Fry:	Free swimming:	-
	Feeding:	-
	Growth rates:	-
	Management:	-
	Special problems:	-

COMMENTS:

- A hardy, desirable and attractive community fish for the Brackish enthusiast

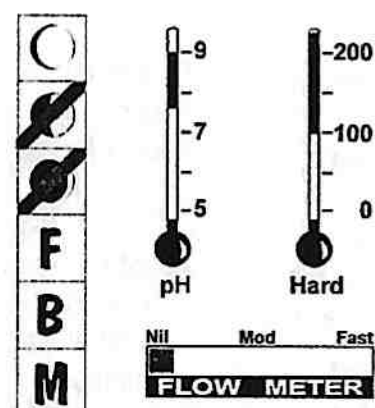
REFERENCES

Allen GR: Freshwater Fishes of Australia, 1989; Munro ISR: The Fishes of New Guinea, 1967; Kottelat M et al: Freshwater Fishes of Western Indonesia & Sulawesi, 1993; Kuiter RH: Guide to Sea Fishes of Australia, 1996; Koumans FP: Weber & de Beaufort: The Fishes of the Indo-Australian Archipelago, 1953.



Tamar Goby, Tamar River Goby *Favonigobius tamarensis*

- Meaning of names:** *Favonus* - West wind
tamarensis - from the Tamar River
- Synonyms:** *Gobius tasmanicus*, *Arenigobius tamarensis*
- Other species in genus:** Aprox 10 species, 6 in Australia; 3 may enter freshwater, *F. suppositus*, *F. lateralis*
- Description:** **Historical:** Johnston 1883
Features: mottled brown elongated body with flattened head, fused pelvics, eyes high on sides of head, ♀ - have dark spot in first dorsal
Size: to 110mm (TL)
Sex differences: ♂ - bigger, larger mouth; darker anal and pelvics; cheeks more bulbous
Colour forms: none
Conservation: status secure, often locally abundant



Distribution: New South Wales, Victoria, Tasmania and South Australia

Stream: **Type:** estuarine, coastal lakes, streams - often ranging into freshwater
Depth: to 1m
Substrate: mud and sand with nearby cover, eg., rocks, logs, plants
Flow: usually tidal or slow flow
Riparian: variable, mangrove to open

Shared with: **Fish:** estuarine species
Invertebrates:
Plants:
Other:

Water:

Temp	10 - 25°C
pH range	
Hardness	
TDS	
Salinity	marine to freshwater

Light	
Colour	
Turbidity	mild - moderate
SG	
Conductivity	

Collecting: **Methods:** scoop nets usually; difficult near burrows and cover
Transport: hardy to transport

AQUARIOLOGY

Aquarium:

Volume	60x30x30cm
Salts	0.1 - 0.5 marine
Equipment	shellgrit over U/G filter

Temp	20 - 25°C
pH	> 7.5
Hardness	50 - 200ppm

Feeding:

in nature: small benthic invertebrates, often taking mouthfuls of mud; live foods eg., bloodworms, tubifex

Compatibility:

Own species:	♂ especially territorial
Other species:	generally peaceful
Aquarium plants:	not damaged
Substrate:	likes to burrow in silt; small pieces of pipe useful but may cloud water with behaviour
Equipment:	not damaged

Hardiness:

Lifespan:	said to live upwards of 3 years in aquaria
Jump ability:	like all gobies, excellent escape artist especially via corners
Diseases:	once settled in quite hardy
Toxins:	generally accepts ordinary medications
Special problems:	needs live foods to thrive

BREEDING

In nature: September - November. ♂ develop a territory around burrow and colours darken, probably spawns in the burrow with subsequent parental care of eggs by male

Conditioning:

Separate:	not necessary
Feeding:	copious live foods
Water:	high quality
Duration:	unknown
Assessment:	♂ colour darkens

Spawning:

Aquarium:

Volume	
Salts	
Equipment	

Temp	
pH	

Furnishings:
Ratios:
Trigger factors

Day/Night Ratio	?	Temp Change	try ↑	Water Change	yes	Water Levels	?	Feeding	↑ live foods
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Act of spawning
Behaviour:
Time of day:
Duration:
Frequency:

Eggs:

Physical:
Numbers:
Hatching:
Fertility:
Management:

Fry:

Free swimming:
Feeding:
Growth rates:
Management:

feeding fry will be a problem; try APR (finest), marine rotifers, followed by artemia nauplii, microworms

REFERENCES

Books:	3, 7, 9, 10, 11, 12, 13, 14; Fulton W: Tasmanian Freshwater Fishes, 1990; Cadwallader P and Backhouse G: A Guide to the Freshwater Fish of Victoria, 1983; Jackson P and Davies JN: The Freshwater and Estuarine Fishes of Wilson's Promontory National Park, 1983.
Other:	Victorian Fisheries Notes: No 81, 1991

COMMENTS

- makes an attractive, interesting aquarium species which can be maintained in marine, brackish or freshwater tanks for extended period of time
- may eventually prove to be a geographical form of *F. suppositus* from Western Australia

**NO RECORD OF
AQUARIUM SPAWNING**



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Red Rainbowfish, Salmon-red Rainbowfish

Glossolepis incisus

Meaning of Names:	<i>glosso</i> – (Gk) tongue; <i>lepis</i> – (Gk) scale: refers to crenulation of rear edge of the scales <i>incisus</i> – refers to the step behind the head, especially in older males
Synonyms:	none recorded
Other Species in Genus:	approximately 6 species of colourful rainbowfish from northern half of New Guinea
Description:	
Historical:	described in 1908 by Weber
Features:	ovoid laterally compressed body depth increasing with age, especially in males which accentuates the nuchal hump. Juveniles and females are silvery, olive, but males are red with metallic flecks
Size:	maximum usually 15.0cm S/L females generally to 12.0cm with smaller body and fins
Sex differences:	males red with deeper bodies, females have clear fins and no red colour
Colour forms:	variability in shade and intensity of colour, red colour ranges from ox blood to scarlet; many captive populations seem to be losing intensity of colour
Cons. status:	not threatened
<u>HABITAT</u>	
Distribution:	Lake Sentani in Irian Jaya and small creeks that drain into it
Stream:	
Type:	large freshwater lake
Depth:	3m plus; rainbowfish come into the shallows in the evenings
Substrate:	sand and silt
Flow:	still water
Light:	full sun
Riparian:	palms, ferns and jungle vegetation
Shared with:	
Fish:	<i>Tilapia sp.</i> , <i>Glossamia sp.</i> , and sawfish (<i>Pristis microdon</i>), <i>Chilatherina</i> also present in the lake; <i>M. affinis</i> as well as <i>C. sentaniensis</i> in the streams. Occasional marine trevally, various gudgeons and gobies
Invertebrates:	not recorded
Plants:	abundant aquatic plants including <i>Vallisneria gigantea</i> , <i>Najas</i> , <i>Hydrilla</i> , <i>Potamogeton</i> , <i>Ottelia</i> , <i>Allismoides</i> and algae
Other:	-
Water:	
Temp:	28 – 30°C in lake and 23°C in shaded tributaries
pH:	8.3 – 9.2
Hardness:	-
Salinity:	-
Colour & Turb:	usually clear
Collecting:	
Methods:	various types of fine nets, seines and traps
Transport:	avoid overcrowding and overheating

AQUARIOLGY

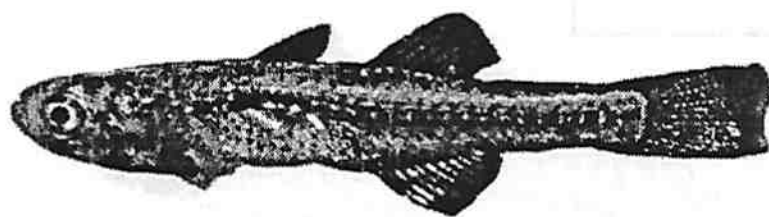
Aquarium:	General:	-
	Volume:	150 – 200 litres
	Temp:	22 – 28°C
	pH:	7.2 – 7.8
	Hardness:	150 – 250ppm
	Equipment:	adequate biological filtration and shellgrit substrate
Feeding:	eats all dried, frozen and live foods	
Compatibility:	Own species:	schooling species with regular dominance displays between males; some males may need to be discarded if too aggressive to other fish in community or unreceptive females
	Other species:	ok with other similar sized fish in community; often recommended as dither fish with African Rift Lake cichlids
	Aquarium plants:	not damaged but some duckweed often eaten
	Substrate:	not disturbed
	Equipment:	not disturbed
Hardiness:	Lifespan:	commonly lives to 5 or more years in captivity
	Jump ability:	excellent jumpers
	Diseases:	susceptible to velvet if water changes not frequent enough; females especially prone to wasting
	Toxins:	unable to tolerate chlorine or copper
	Special problems:	provide adequate cover for females
<u>BREEDING</u>	In nature:	spawns in aquatic plants, stimulated by temperature change and rainfall. Large numbers in the lake but usually swim around in small groups of mixed sizes and sexes.
Conditioning:	Separate:	advisable to allow females time to condition
	Feeding:	increase frozen and live food content especially for females
	Water:	similar to breeding tank
	Duration:	usually need 2 – 3 weeks separation
	Assessment:	fullness in females before feeding usually indicates eggs
Spawning:	Furnishings:	shell grit or coral over undergravel filter
	Ratios:	at least 2 females per male
	Trigger factors:	usually don't require any triggers, start spawning next morning
	Behaviour:	males intensify in colour, develop gold nape strips and spread fins fully; females swim to mops or plants and several eggs deposited repeatedly
	Time of day:	-
	Duration & Frequency:	tends to be continuous
Eggs:	Physical:	approximatel 1mm in diameter, translucent, golden and adhesive
	Numbers:	30 – 50 eggs per day per mature female
	Hatching:	6 – 7 days at 26°C
	Fertility:	usually high
	Management:	eggs need to be removed from breeders who are generally avid egg eaters
Fry:	Free swimming:	within a day or two are actively searching for food
	Feeding:	infusoria, micro encapsulated foods (APR), egg yolk infusion followed by baby brine shrimp, micro worms and fine foods
	Growth rates:	growth slow initially but by 4 – 6 months should be approximately 5cm. Red colour in growing males evident from 4 – 5cm onwards
	Management:	keep water hard and alkaline with regular small water changes
	Special problems:	need to cull regularly, removing larger young (usually male) should help to avoid cannibalism. Too many males may be due to too low a pH or too high temperatures

COMMENTS:

- eaten locally in dried form as a food supplement in villages on Lake Sentani
- this is an extremely popular aquarium rainbowfish world wide especially for the larger aquarium as a schooling community fish where the intense colour of the adult males always attracts admiration

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- Internet – Adrian Tappins Homepage – <http://www.ecn.net.au/~atappin/home.htm>



Glass Goby *Gobiopterus semivestitus*

Meaning of Names:

Gobiopterus - leaf goby
semivestitus - half garbed (refers to scales on 1/2 of body)

Synonyms:

Paraphya semivestita, *Munrogonobius semivestitus*

Other Species in Genus:

approx 10 species in Indo-Pacific with 4 in Australia

Description:

Historical:

Munro, 1949

Features:

small transparent elongated body - scales only on rear 1/2; scattered pigment - usually thin black line along side and black above anal fin. Fins transparent; small anal and 2nd dorsal well back. 1st dorsal and fused pelvics very small

Size:

35mm TL maximum

Sex differences:

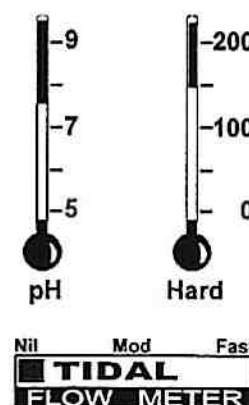
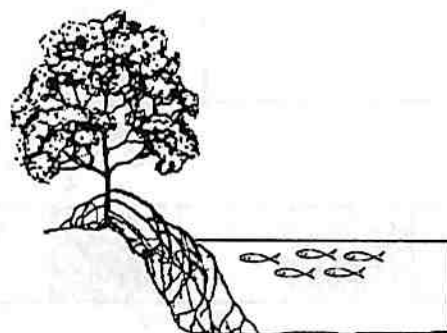
similar, female has small conical teeth (needs magnification)

Colour forms:

variable in amount and intensity of black spots

Cons. status:

widespread, abundant and secure



Distribution: SE Queensland to South Australia - no records from Tasmania

Stream:

Type:

Estuarine/brackish mostly - occasionally into freshwater

Depth:

usually less than 1m

Substrate:

mud

Flow:

tidal

Riparian:

mangroves

Shared with:

Fish:

Ambassids, various gobies and gudgeons, monos and scats

Invertebrates:

various prawns and shrimps

Plants:

seagrass where salinity sufficient

Water:

Temp	15-25° C
pH range	-
Hardness	-
TDS	-
Salinity	-

Light	open - light shade
Colour	-
Turbidity	mild - moderate
SG	-
Conductivity	-

Collecting:

Methods:

best caught in fine soft scoop net in estuarine shallows, often in huge schools

Transport:

easily damaged during capture, need to prevent overheating

AQUARIOLOGY

Aquarium:

Volume	60x30x30cm	Temp	20-25° C
Salts	third - half marine	pH	-
Equipment	sml p-head, u/g fil	Hardness	-

Feeding:

try mosquito wrigglers, artemia nauplii and vinegar eels

Compatibility:

Own species: peaceful schooling species
Other species: unlikely to cause problems for any other aquarium inhabitants
Aquarium plants: not disturbed
Substrate: not disturbed
Equipment: not disturbed

Hardiness:

Lifespan: so far has proved to be delicate immediately after capture
Jump ability: not observed to jump
Diseases: easily fungess after capture
Toxins:- very sensitive to water quality
Special problems: -

BREEDING

In nature: breeding biology in nature and captivity unknown. Possibly a school spawner and therefore unlike other gobies which mate in pairs with some male parental care for the eggs

Conditioning:

Separate: -
Feeding: -
Water: -
Duration: -
Assessment: -

Spawning:

Aquarium:

Volume	-	Temp	-
Salts	-	pH	-
Equipment	-	Hardness	-

Furnishings: -

Ratios:

Trigger factors:

Day/Night Ratio	?	Temp Change	?	Water Change	?	Water Levels	?	Feeding	?
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Act of spawning:

Behaviour: -
Time of day: -
Duration: -
Frequency: -

Eggs:

Physical: -
Numbers: -
Hatching: -
Fertility: -

Fry:

Free swimming: -
Feeding: -
Growth rates: -
Management: -
Special problems: -

REFERENCES

Books:

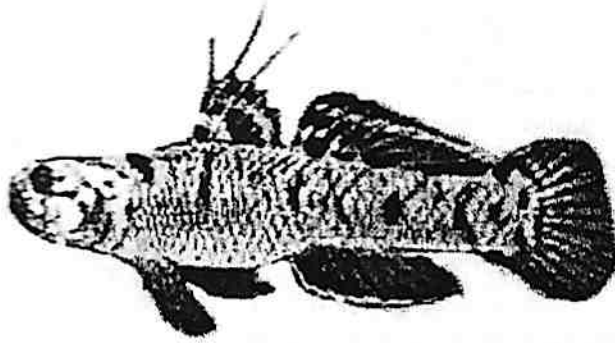
12, 13, Cadwallader & Backhouse: A Guide to the Freshwater Fish of Victoria, 1983;
Sterba G: Freshwater Fishes of the World, 1967; Kottelat et al: Freshwater Fishes of Western Indonesia and Sulawesi, 1993; Kaumans: The Fishes of the Indo-Australian Archipelago Vol X, 1953

Other:

Victorian Fisheries Notes - 81: Freshwater Fishes of Victoria - Gobies, 1991

COMMENTS:

- This is an interesting little fish that occasionally is found in freshwater and is a challenge to the aquarist. We need to know more about its basic biology and aquarium needs.



Hoeven's Goby, Celebes Goby *Hemigobius hoevenii*

Meaning of Names:

Hemigobius - half banded goby
hoevenii - after collector

Synonyms:

Gobius hoevenii, *Stigmatogobius hoevenii*

Other Species in Genus:

-

Description:

Historical:

Bleeker 1851 (*Gobius hoevenii*)

Features:

Cylindrical body anteriorly - more compressed to rear half. 6-8 oblique dark stripes (starting from nape) down upper ½ of body. Caudal peduncle has 2 ocelli with white and blue edges; blue patch behind pectorals. First dorsal has large dark spot; fins with white, blue and black edges. to 60mm TL

Size:

Sex differences:

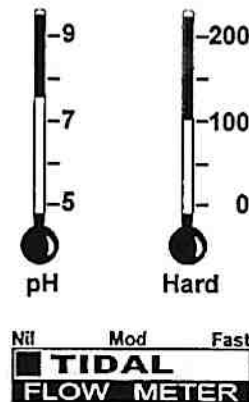
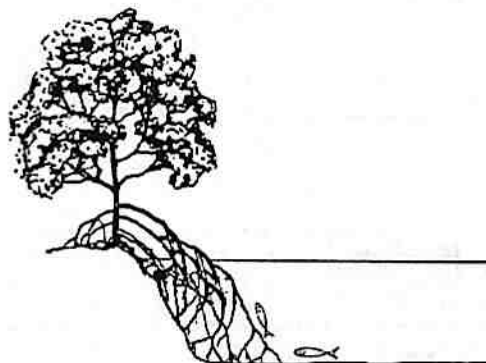
male has more distinct pattern, extended rays on first dorsal; female duller and more robust

Colour forms:

variability in pattern and colours with distribution and conditions

Cons. status:

uncertain probably secure



Distribution: Malaya, Indonesia, Thailand, Phillipines, possibly Western PNG (Munro) and recently from Darwin NT (Leaders Ck)

Stream:

Type:

marine, brackish and freshwater - upper tidal areas at freshwater interface

Depth:

12cm - 2m with the gobies mainly in shallows

Substrate:

sand or mud - usually found in leaf litter

Flow:

nil - tidal flushout twice a month

Riparian:

mangrove or paperbark

Shared with:

Fish:

Barramundi, Ox-eye herring, Empire gudgeons, Butis butis, Pandakas and other goby sp., Prionobutis Ambassadors, spangled gudgeons and mullet

Invertebrates:

Atyid and Macrobrachium sp., small crabs

Plants:

varies from native hairgrass sp. to Blyxa sp and Limnophylla

Other:

Leader's Creek is a well known Estuarine Crocodile habitat

Water:

Temp

27 C

November,
Leaders Ck.

pH range

7.5

Hardness

TDS

5000-19000

Salinity

5% - 19%

Light

scattered shade

Colour

light tannin

Turbidity

slight

SG

1.001-1.012

Conductivity

prob. low

Collecting:

Methods:

dipnetting leaf litter along margins

Transport:

seem quite hardy in bucket

AQUARIOLOGY

Aquarium:

Volume	5-20 lt
Salts	5-19% sea salt
Equipment	u/g filtration

Temp	26° C
pH	7.5-8.2
Hardness	

Feeding:

flake, frozen mix - especially likes small live food eg., mosquito wigglers, crustacea

Compatibility:

Own species: compatible but slightly territorial especially at feeding times
Other species: compatible with other small gobies (pandakas) and blue-eyes (cyandorsalis)
Aquarium plants: native hairgrass
Substrate: sand and shellgrit plus some leaf litter (well soaked leaves)
Equipment: not disturbed

Hardiness: Lifespan: probably 1-2 years
Jump ability: most gobies can jump
Diseases: seems hardy
Toxins:- apparently resistant to pollution and low oxygen levels
Special problems: none, often hangs vertically on glass by their united ventral fins which act as a sucking disk

BREEDING

In nature: unknown in nature or aquaria. Recommend heavy feeding with small live foods. Keep temperature in high 20's. Use UG filter over sand/shellgrit

Conditioning:

Separate: -
Feeding: -
Water: -
Duration: -
Assessment: -

Spawning:

Aquarium:

Volume	-
Salts	-
Equipment	-

Temp	-
pH	-
Hardness	-

Furnishings: -
Ratios: -
Trigger factors:

Day/Night Ratio	?	Temp Change	?	Water Change	?	Water Levels	?	Feeding	?
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Act of spawning:

Behaviour: -
Time of day: -
Duration: -
Frequency: -

Eggs:

Physical: -
Numbers: -
Hatching: -
Fertility: -

Fry:

Free swimming: -
Feeding: -
Growth rates: -
Management: -
Special problems: -

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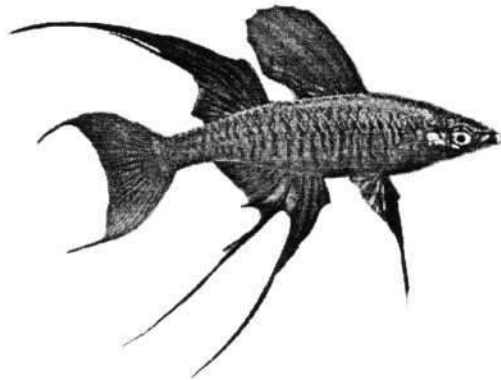
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Personal:

Larson H: Personal communication

COMMENTS:

- apparently kept in aquaria in Europe since 1912 (Sterba)
- aquarium specimens of this delightful little goby have only recently become available. It is likely to be "breedable" and desirable as an aquarium fish like several others in this family due to its small size, peaceful nature and colours.



Threadfin or Featherfin Rainbowfish, Werner's

Iriatherina werneri

Meaning of Names:	<i>Iri</i> - refers to Irian Jaya; <i>atherina</i> - atherine group of fishes; <i>werneri</i> - after Austrian zoologist
Synonyms:	-
Other Species in Genus:	-
Description:	
Historical:	described in 1973 by Dr H Meinken
Features:	small; compressed elongated body with pointed snout and small mouth. mature ♂ have extended filaments on tail edges and anterior edges of second dorsal and anal fins
Size:	wild to 40mm SL; captivity to 60mm SL
Sex differences:	♂ develop black elongated fin rays and a wider body with age. ♂ also more colourful with pinkish fins; ♀ fins transparent to yellowish with greenish cast to body
Colour forms:	varies in intensity with location and season - especially body colour (silver to salmon) and dark vertical bars on ♂. Yellowish form from around Weipa (Cape York).
Cons. status:	secure
Distribution:	3 areas so far in range:- southern New Guinea between Fly R and border with Irian Jaya; Northern Territory - Liverpool and Hann Rivers; Cape York - north of a line from Edward to Olive Rivers. Usually found in swampy lowland country.
Stream:	
Type:	billabongs, backwaters, rarely dune lakes, usually near aquatic plants
Depth:	less than 1 metre, fish swims midwater
Substrate:	fine sand to mud
Flow:	slow to still
Light:	full sun
Riparian:	swamp and local variations of tropical savannah
Shared with:	
Fish:	varies but can include pennyfish, <i>Ambassis sp.</i> , <i>Pseudomugil gertrudae</i> & <i>tenellus</i> , rainbowfish esp. <i>Melanotaenia nigrans</i> , <i>maccullochi</i> & <i>inornata</i> , <i>Oxyeleotris nullipora</i>
Invertebrates:	various macro and micro crustacea
Plants:	includes <i>Najas</i> , <i>Utricularia</i> , <i>Vallisneria</i> , <i>Nymphaea spp</i> , <i>Aponogeton</i> , <i>Blyxa</i> , <i>Monochoria</i>
Other:	several species of aquatic tortoises and both freshwater and saltwater crocodiles
Water:	
Temp:	25 - 32°C
pH:	5.2 - 6.8
Hardness:	soft
Salinity:	nil
Light:	open sun to shaded
Colour & Turb:	clear - dark tannin
Collecting:	
Methods:	easily collected with fine mesh nets (seine or frame). Must be handled gently and attention paid to water parameters and temperature
Transport:	sudden drops in temperature in small volumes of water can kill them quickly. Antibiotics and small amounts of salt useful.

AQUARIOLOGY

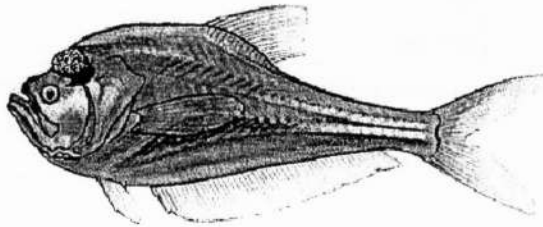
Aquarium:	General:	these fish will tolerate and even thrive under a wide range of conditions
	Volume:	50 litre upwards
	Temp:	22 – 30°C
	pH:	6 – 8
	Hardness:	50 – 150ppm
	Equipment:	heater, mild aeration and filter
Feeding:	small mouthed, mid-water feeder – takes all prepared and live foods of a suitable size, usually taken as it sinks	
Compatibility:	Own species:	best in a school of own species
	Other species:	does well with <i>Pseudomugils</i> and small rainbows, also tetras
	Aquarium plants:	needs plants or cover, doesn't damage plants
	Substrate:	not disturbed
	Equipment:	not at risk
Hardiness:	Lifespan:	usually not much more than 2 years
	Jump ability:	not notorious as jumpers
	Diseases:	susceptible to capture shock, low temperature stress and velvet
	Toxins:	needs good water quality and no pollutants
	Special problems:	needs swimming space to display and provide security from more boisterous tankmates
BREEDING	In nature:	♂ establish territories near aquatic plants and attract interested ♀ to spawn in plants. Fry very small but grow rapidly on infusoria and high temperatures. Juveniles eventually join the schools of ♀
Conditioning:	Separate:	not necessary but will result in a larger initial spawning
	Feeding:	small floating and live food – eg., micro and grindal worms, baby brine shrimp
	Water:	pH 7.5, hardness 50 – 150ppm, 23 – 24°C
	Duration:	can be continuous
	Assessment:	display by ♂; plumpness in ♀
Spawning:	Furnishings:	sponge or similar filter, spawning mops (floating) and plants
	Ratios:	at least 2 ♀ to each ♂
	Trigger factors:	water changes – especially lowering pH; raising temperatures
	Behaviour:	♂ spread fins widely and flick fins up and down, especially first dorsal, ♀ choose site and ♂ follows and fertilises small clump of eggs
	Time of day:	most spawning occurs in the first half of the day
	Duration & Frequency:	usually occurs over several days, duration is brief with the ♂ trying to attract another ♀ to repeat. Unoccupied breeders will follow and eat eggs if not well fed.
Eggs:	Physical:	tiny, slightly less than 1mm
	Numbers:	each ♀ can lay between 10 and 30 eggs per day
	Hatching:	varies with temperature usually 5 – 12 days
	Fertility:	generally high with mature fish
	Management:	best left on mops or plants rather than hand picked
Fry:	Free swimming:	within a day or two of hatching then move to surface
	Feeding:	very important – tiny infusoria and micro encapsulated foods (APR), supply continuously (eg., drip feed)
	Growth rates:	grow quickly, can reach 2cm by 6 weeks and sexable by 14 – 16 weeks
	Management:	maintain water quality with frequent water changes
	Special problems:	major problem is supplying enough small live foods in the early stages, however this can be overcome easily by pond breeding in tropical situations

COMMENTS:

- The delicate and intricate beauty of this peaceful little schooling fish has attracted many aquarists
- Still remains slightly challenging to maintain a population long term.

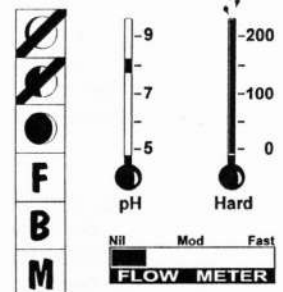
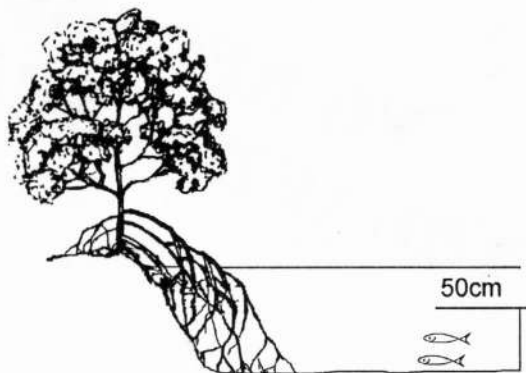
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- Journals – A (esp. pp78-79); TFH (Apr '75, Aug '83); Fish keeping answers (Sep '95); PAWG (Jan '96); The Rainbow Times (esp. V4/5 V6/4 V8/4 V9/1); Rainbowfish (IRG esp. V3/1 V5/3-4)
- Internet – Adrian Tappins Homepage – <http://www.ecn.net.au/~atappin/home.htm>



Nursery Fish, Breakfast Fish, Humphead, Hunchback *Kurtus gulliveri*

- Meaning of names:** *Kurtus* - origin unknown
gulliveri - patronym
- Synonyms:** none recorded
- Other species in genus:** only 2 species in genus and family, *Kurtus indicus* of SE Asia, India
- Description:** Historical: Genus *Kurtus* by Bloch in 1786; *K. gulliveri* - Castelnau, 1878
Features: very compressed body with prominent nuchal hump, tiny scales, mouth extends beyond eye, forked tail, anus close behind pelvic fins
Size: approx 500mm SL; or 600mm TL
Sex differences: mature ♂ (from 150mm TL) develop a downward pointing hook from hump
Colour forms: individuals vary from whitish semi transparent to dull yellowish brown; clear fins



- Distribution:** Central Southern PNG - especially Fly Delta westward to Bintuni Bay. Northern Australia from the Gulf of Carpentaria to Western Australia
- Stream:** Type: mangrove swamps, brackish tidal estuaries, slow turbid rivers
Depth: variable 5 - 10m
Substrate: soft mud
Flow: tidal, although there are some land locked populations
Riparian: mangrove
- Shared with:** Fish: archerfish, small-eyed gudgeon, anchovies, glass perchlet, bullrout, sawfish, threadfin salmon, mulloway, barramundi, mud skippers
Invertebrates: *Macrobrachium* sp., Atyid shrimp and small crabs
Plants: mangrove; diverse flood plains flora
Other: NB. estuarine crocodiles (from small to huge!)
- Water:**
- | | | | |
|----------|-----------------|--------------|------------|
| Temp | 25 - 28°C | Light | excluded |
| pH range | 7.8 - 8.2 | Colour | brown |
| Hardness | - | Turbidity | very muddy |
| TDS | 220 - 8000 | SG | - |
| Salinity | fresh to marine | Conductivity | - |
- Collecting:** Methods: cast nets - upto 12 foot
Transport: very susceptible to capture damage and transport shock. Add extra salt, antibiotics etc. Pack in styrofoam boxes to prevent overheating.

AQUARIOLOGY

Aquarium:

Volume	300 litres 600mm deep
Salts	sea salt
Equipment	ug filter, heater

Temp	28°C
pH	7.8
Hardness	5000 ppm

Feeding:

nocturnal feeder, only takes live shrimp in captivity, wild caught fish have had small fish in stomach as well

Compatibility:

Own species: peaceful towards each other
Other species: -
Aquarium plants: none will survive in these conditions
Substrate: coarse sand
Equipment: safe

Hardiness:

Lifespan: unknown
Jump ability: not known to jump
Diseases & Toxins: appear hardly once settled
Special problems: soft, so easily damaged during capture & transport. Dim lighting only.

BREEDING

In nature: ♂ carrying eggs have been found from July to September in both marine and low salinity streams. ♂ may need to be 375mm TL

Conditioning:

Separate:
Feeding:
Water:
Duration:
Assessment:

Spawning:

Aquarium:

Volume		Temp	
Salts		pH	
Equipment			

Furnishings:
Ratios:
Trigger factors

Day/Night Ratio	Temp Change	Water Change	Water Levels	Feeding
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Act of spawning

Behaviour:
Time of day:
Duration:
Frequency:
Other:

Eggs:

Physical: relatively large eggs
Numbers: small numbers
Hatching:
Fertility:
Management:

Fry:

Free swimming:
Feeding:
Growth rates:
Management:
Special problems:

OBSERVATION

Eggs laid in clusters with the membranes forming a twisted cord which is looped through the hook on the males head so that a small bunch hangs on each side of his head.

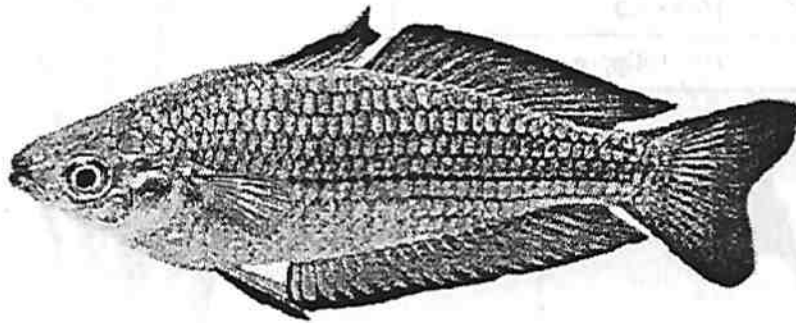
Forward and vertical movement of the male keeps the eggs clean and well oxygenated

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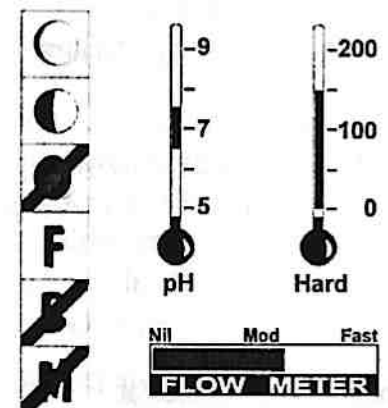
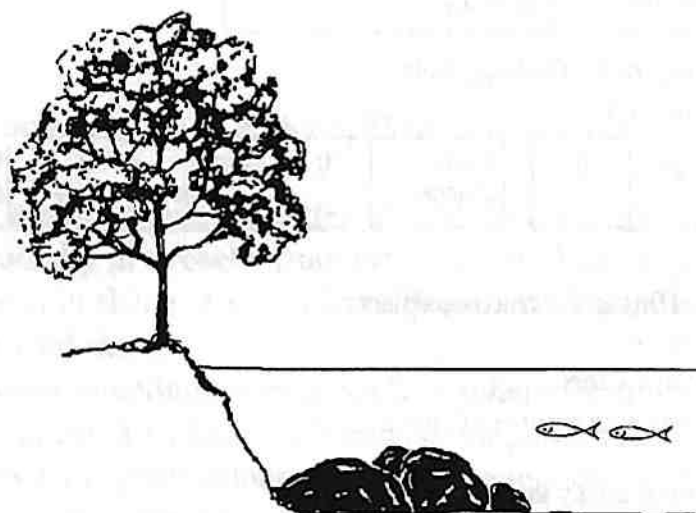
COMMENTS

- another unique native fish with breeding habits unlike any others and crying out for further observations on maintenance, care and breeding
- the experiences of the Territory Wildlife Park have added the observation that the hook develops at about 150mm



Crimson Spotted Rainbowfish *Melanotaenia duboulayi*

- Meaning of names:** *Melanotaenia* - Black band
duboulayi - after collector Mr Duboulay
- Synonyms:** *M. splendida fluviatilis*; *Atherinichthys duboulayi*; *Aristeus lineatus*; *Aristeus perporosus* (and erroneously in much aquarium literature as *M. nigrans*).
- Other species in genus:** *M. trifasciata*, *M. splendida*, *M. eachamensis* etc.
- Description:** Historical: Castelnau 1878
Features: body - compressed, olive green above, lighter below. Red spot on gill plate, thin red lines along sides often present
Size: ♂ to 90mm (SL); ♀ to 80mm (SL)
Sex differences: ♂ - deeper body, larger more colourful and pointed fins, often with black edges
Colour forms: The quantity of red in the body and fins varies considerably between populations, as does basic body colour. The Gin Gin form has a cream stripe through the anal fin. A colour form sheet will be issued at a later date.
Conservation: status secure



Distribution: Eastern coastal streams between Burnett R (Qld) and Macleay R (NSW)

Stream: Type: pools and rapids, creeks and rivers also some lakes on sand islands
Depth: 10cm to 5m
Substrate: rock, sand and silt
Flow: still to strong flow
Riparian: dry and wet sclerophyll forest, occasionally wallum

Shared with: Fish: *Anguilla reinhardtii*, *Retropinna semoni*, *Nematalosa erebi*, *Arius graeffei*, *Tandanus*, *Craterocephalus*, *Pseudomugil*, *Rhadinocentrus* and Gudgeons
Invertebrates: *Macrobrachium*, *Cherax* and *Atyids*
Plants: -
Other: turtles

Water:

Temp	14 - 26°C
pH range	6.0 - 7.8
Hardness	5 - 150ppm
TDS	variable
Salinity	slight tolerated

Light	open - light shade
Colour	tannin - clear
Turbidity	minimal
SG	-
Conductivity	-

Collecting: Methods: seine and scoop nets, traps
Transport: medium size fish 25 - 40mm travel best. Add some salt to relieve stress and keep cool (19 - 22°C)

AQUARIOLOGY

Aquarium:

Volume	100 - 300l
Salts	4gms/l
Equipment	good filtration

Temp	18 - 26°C
pH	6.5 - 7.5
Hardness	0 - 150ppm

Feeding:

good quality live, frozen and dried foods

Compatibility:

Own species:	fish of similar size do best in a school
Other species:	peaceful community fish
Aquarium plants:	do not damage plants
Substrate:	not disturbed
Equipment:	not disturbed

Hardiness:

Lifespan:	3 - 6 years
Jump ability:	will jump
Diseases:	ulcers, fungal problems if stressed
Toxins:	resistant to mild pollution
Special problems:	none

BREEDING

In nature: spawns in spring and summer on plants and rootlets, especially after rain

Conditioning:

Separate:	not necessary
Feeding:	live and frozen foods
Water:	change 1/3 each 7 days
Duration:	1 - 2 weeks
Assessment:	♀ roed up and ♂ displays

Spawning:

Aquarium:

Volume	50l per pair or trio
Salts	nil
Equipment	air stone

Temp	22 - 26°C
pH	6.5 - 7.0

Furnishings:

spawning mops/floating plants

Ratios:

1 x ♂ to 2 x ♀

Trigger factors

Day/Night Ratio	↑	Temp Change	↑	Water Change	↑ softer	Water Levels	↑	Feeding	↑ live foods
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Act of spawning

Behaviour:	♂ flares fins and enters mops/plants
Time of day:	daylight
Duration:	probably 1 - 2hrs
Frequency:	♀ spawns over number of days

Eggs:

Physical:	1 - 1.5mm, sticky threads
Numbers:	10 - 40 per day per ♀
Hatching:	6 - 8 days at 25°C
Fertility:	good
Management:	can be hand picked or left on mop

Fry:

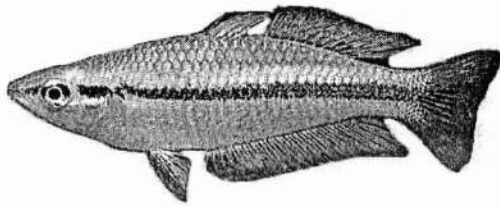
Free swimming:	soon after hatching
Feeding:	infusoria, fine foods, microworms, brine shrimp
Growth rates:	10mm by 8 weeks, sexable by 20 weeks
Management:	regular water changes, good food
Special problems:	shortage of foods creates uneven growth; should be graded for size to reduce cannibalism

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COMMENTS

- acid conditions appear to increase intensity of red in body and fins
- a nice sized school would be best kept in a 4 - 6ft aquarium
- this fish has been popular for many years overseas in the aquarium trade as "*Melanotaenia nigrans*" which of course is a very different fish
- Melanotaenia duboulayi* must be close to the ideal community fish
- the subdivision of *Melanotaenia splendida fluvialis* into the coastal *M. duboulayi* and the inland *M. fluvialis* has complicated much of the local aquarium literature



Black-banded Rainbowfish

Melanotaenia nigrans

Meaning of names:

Melanotaenia - black stripe
nigrans - black (refers to body stripe)

Synonyms:

Atherina nigrans, *Nematocentris nigra*, *Zanteela pussilla*

Other species in genus:

numerous eg., *M. maccullochi*, *M. fluviatilis*

Description:

Historical:

Richardson, 1843, Port Essington - NT

Features:

slender rainbowfish with distinct black band from snout through eye to base of tail. Fins may have black edges and shades of yellow, blue or pink.

Size:

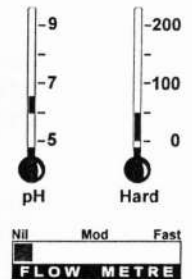
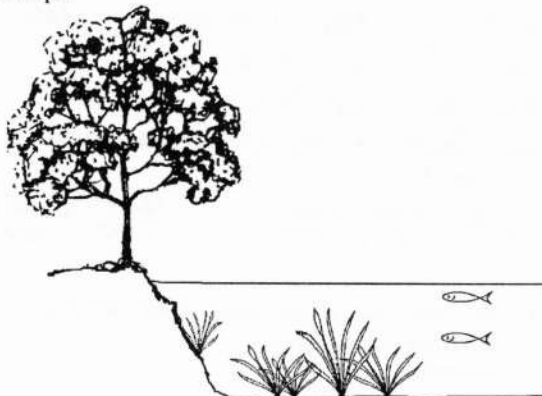
Nature: ♂ to 90mm (TL); Aquarium: ♂ to 70mm (TL)

Sex differences:

♂ wider, fins larger and more pointed, more colourful

Colour forms:

many minor local variations in amount of colour, fins and body. Leggett says Kimberley form has lines of dots below black stripe.



Distribution: Patchy populations through Kimberleys, NT - Daly R to Arnhemland, Qld - Jardine R and north also around Weipa, also some islands as well eg., Groote, Prince of Wales, Melville.

Stream:

Type:

mainly small coastal streams and swamps, some elevated sandstone streams

Depth:

usually less than one metre

Substrate:

sandstone country and coastal sandy and muddy substrates

Flow:

slow to minimal

Riparian:

wide variety

Shared with:

Fish:

varies a lot because of patchy distribution, eg., weneri, blue eyes, inornata, ambassids, hardiheads

Invertebrates:

various shrimps and f/w crayfish eg., Cherax and Macrobrachium

Plants:

often copious - especially *Nymphaeas*, *Najas*, *Limnophila* etc

Other:

may be crocodiles and tortoises as well

Water:

Temp

22 - 30°C

pH range

6 - 6.5

Hardness

0 - 50ppm

TDS

low

Salinity

minimal

Light

likes sunlight

Colour

often tannin stained

Turbidity

usually low

SG

Conductivity

Collecting:

Methods:

easily caught by spotlight and hand net at night, also fine seine, frame nets and traps by day.

Transport:

transports easily - small amount of salt to avoid shock, usually mixed in with other rainbowfish, hardiheads etc.

AQUARIOLOGY

Aquarium:	Volume	900 x 450 x 450	Temp	22 - 30°C
	Salts	none needed	pH	6.0 - 6.5
	Equipment	heater, airstone, filter (o)	Hardness	0 - 50ppm

Feeding: omnivorous - all live, frozen and dried foods taken readily

Compatibility: Own species: best in schools of own species of varying sizes and sexes
Other species: mixes well with other species and genera of peaceful fishes
Aquarium plants: eats some duckweed but generally safe with plants
Substrate: not disturbed
Equipment: not disturbed

Hardiness: Lifespan: very hardy, often lives to 5 years
Jump ability: very good jumper especially during water changes
Diseases: newly caught may have parasites, perhaps prone to oodinium
Toxins: some resistance to pollution
Special problems: none

BREEDING In nature: spawns continuously during summer, especially during the early "wet". Probably on aquatic and marginal plants and roots.

Conditioning: Separate: not necessary
Feeding: increase live foods and protein
Water: changing helps, especially rainwater
Duration: stay in good condition in a school because males have plenty of "targets"
Assessment: remove females if they don't become rounded

Spawning:	Aquarium:	Volume	900 x 450 x 450 (school)	Temp	25 - 30°C
		Salts	none, perhaps add peat	pH	5.5 - 6.5
		Equipment	heater, airstone		

Furnishings: plenty of plants or spawning mops along back and ends

Ratios: 2 - 3 ♀ per ♂

Trigger factors

Day/Night Ratio	↑ sun light	Temp Change	↑	Water Change	↑ rain water	Water Levels	↑	Feeding	↑ live foods
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Act of spawning

Behaviour: pairing with increased colour, spread fins followed by chasing into plants and vibrating together near surface
Time of day: within an hour of early morning
Duration: 10 - 20 minutes
Frequency: daily
Other: non-spawning fish can follow behind and eat eggs

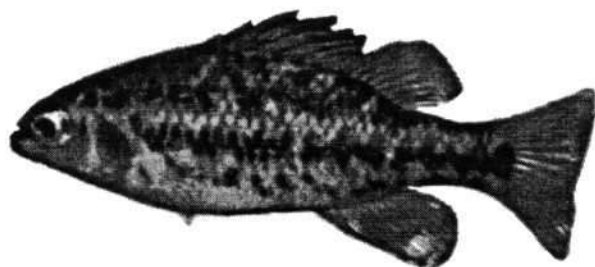
Eggs: Physical: 1.0 - 1.1 mm, attached by sticky threads
Numbers: 50 - 70 per ♀ per spawn
Hatching: 6 - 7 days at 25°C
Fertility: high in school situations
Management: can be picked from mops with fingers, or mops and plants can be removed to hatching trays of same water

Fry: Free swimming: swim well soon after hatching, feeding by 24 hrs
Feeding: infusoria, powdered dry food, egg yolk, microworms, artemia nauplii
Growth rates: 10mm by 6 weeks and sexable by 16 weeks
Management: grading for sizes and frequent water changes help survival
Special problems: variety of foods and keeping outside in sunlight reduces skeletal abnormalities

REFERENCES Books: 1, 3, 5, 6, 7
Journals: Fishes of Sahul

COMMENTS

- This was probably the first rainbowfish described scientifically as the true *M. nigrans* but the *M. nigrans* of aquarium literature in Europe and the US almost invariably refers to *M. duboulayi* or *M. fluviatilis*.
- *M. nigrans* is not kept as much as its peaceful nature and attractive but demure colours deserve.
- Probably no populations threatened at this time due to remote habitat.



Variegated Pygmy Perch

Nannoperca variegata

Meaning of Names:	<i>Nannoperca</i> - small perch; <i>variegata</i> - blotched colour pattern	
Synonyms:	-	
Other Species in Genus:	<i>N. australis</i> , <i>N. oxeleyana</i>	
Description:	Historical:	<i>Nannoperca australis</i> - 1861 from the Murray River, Gunther (A)
	Features:	♂ reddish orange ventrally with a golden mid-lateral band and 2 primary rows of brown blotches along side. ♀ are less brightly coloured, mainly whitish ventrally with 2 – 3 rows of irregular brown blotches along side
	Size:	upto 50mm max
	Sex differences:	as above, but ♂ captured in August (water temp 16°C) were extremely more reddish and generally body markings more intense
	Colour forms:	-
	Cons. status:	-
Distribution:	two locations only. A stream near Winnap in sw Victoria and Ewen Ponds in SA	
Stream:	Type:	freshwater
	Depth:	3 foot in August
	Substrate:	rock and gravel
	Flow:	rapid
	Light:	full sun
	Riparian:	Winnap – open hilly pastureland
Shared with:	Fish:	they co-exist with <i>N. australis</i> in Ewen Ponds, however <i>N. australis</i> lives in quiet still water while <i>N. variegata</i> likes rapid, running water. Although they share the same distribution area they have not been found co-existing in Victoria
	Invertebrates:	freshwater crayfish species
	Plants:	there are aquatic plants in the habitats but no examination of species was undertaken
	Other:	-
Water:	Temp:	14 – 26°C
	pH:	6.8 – 7.5
	Hardness:	150ppm
	Salinity:	nil
	Colour & Turb:	crystal clear
Collecting:	Methods:	handnet
	Transport:	small amount of cooking salt added to water and transport home in plastic bags

AQUARIOLOGY

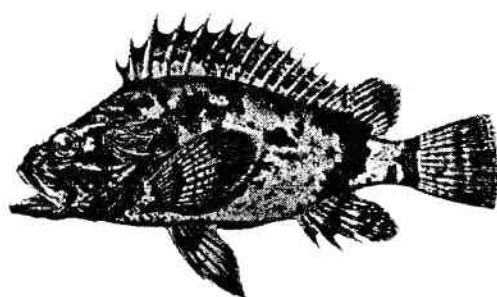
Aquarium:	Volume:	135 litre
	Temp:	18°C ideal but can take upto 27°C
	pH:	7.2
	Hardness:	150ppm (using calcium chloride to harden water)
	Equipment:	internal power filter for current flow
Feeding:	mosquito wrigglers and other live foods, frozen blood worm	
Compatibility:	Own species:	ok
	Other species:	fine with small natives such as small tupong, <i>Philypnodon sp.</i> etc.
	Aquarium plants:	<i>Potamogeton sp.</i> , <i>Triglochin striatum</i> , <i>Vallisneria</i>
	Substrate:	gravel and rocks
	Equipment:	only internal power filter
Hardiness:	Lifespan:	in my experience they live for 2 years, may be longer
	Jump ability:	not a problem
	Diseases:	none that it is prone to
	Toxins:	no more than other fish
	Special problems:	water changes a must, ¼ change once a week
BREEDING	In nature:	springtime
Conditioning:	Separate:	no
	Feeding:	live food
	Water:	good quality, fresh water
	Duration:	unknown, but certainly through early summer
	Assessment:	increased colour in ♂
Spawning:	Furnishings:	java moss, <i>Ceratophyllum</i>
	Ratios:	not important
	Trigger factors:	increased temperature, live foods
	Behaviour:	fry appear in outdoor ponds and as long as parents are well fed they do not appear to eat fry
	Time of day:	-
	Duration & Frequency:	-
Eggs:	Physical:	-
	Numbers:	-
	Hatching:	-
	Fertility:	-
	Management:	remove power filter and use airstones after hatching
Fry:	Free swimming:	uncertain
	Feeding:	greenwater, Aquasonic fry starter and then usual foods as used with other fish
	Growth rates:	reach 25mm with good body depth by end of summer
	Management:	use airstones instead of power filters when contemplating breeding
	Special problems:	large numbers are hard to raise. Keep temperature down to a safe level when summer gets hot

COMMENTS:

- These observations are compiled from memory of one spring and summers observations nearly 15 years ago.

REFERENCES

Papers – Kuitert RH and Allen GR: A synopsis of the Australian Pygmy Perches
Personal – Personal observations both in the field and captivity



Bullrout, Kroki, Freshwater Stonefish, Croaker

Notesthes robusta

Meaning of Names:

Notos - (Greek) back, refers to spines on back
robusta - broad or stocky

Synonyms:

-

Other Species in Genus:

-

Description:

Historical:

First described by Gunter in 1860

Features:

thick broad body and head with large mouth and spine opercula. Large dorsal fin with 15 spines around with various glands and large rounded pectorals. Fins and body broadly mottled with areas of brown and paler shades.

Size:

to 30cm

Sex differences:

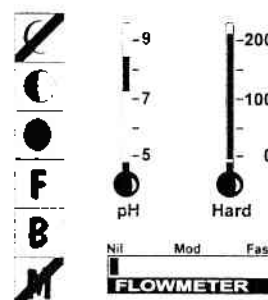
none obvious

Colour forms:

individuals highly variable; more contrast in juveniles

Cons. status:

secure; never found anywhere in large numbers



Distribution: estuarine and freshwater coastal streams of NSW and eastern Queensland, possibly not as far north as Cape York

Stream:

Type:

-

Depth:

less than 2m

Substrate:

rocky and weedy areas

Flow:

slow

Riparian:

mangroves sedges and grasses

Shared with:

Fish:

Ambassids, gudgeons, monos and seats, fork-tailed catfish and Pacific Blue-eyes

Invertebrates:

shrimps, prawns and crayfish

Plants:

Vallisneria, *Bacopa*, *Monniera*

Water:

Temp	20-26°C
pH range	7.2 - 8.5
Hardness	-
TDS	-
Salinity	marine to FW

Light	shaded
Colour	-
Turbidity	nil to high
SG	-
Conductivity	-

Collecting:

Methods:

large specimens occasionally caught by angling, smaller examples with scoop net amongst plants; wear strong footwear

Transport:

handle very carefully to avoid venomous spines, add salt if found in fresh water. Venom treated by prolonged immersion in hot water, occasionally needs medical attention

AQUARIOLOGY

Aquarium:

Volume	120 l for adults	Temp	20-25°C
Salts	¼ - ½ marine	pH	7.5 - 8.0
Equipment	UG or cannister	Hardness	200ppm +

Feeding: live worms, shrimps and small fish - some will take frozen foods

Compatibility:

Own species: compatible
Other species: compatible if too large to be swallowed
Aquarium plants: not damaged - preferred for cover
Substrate: enjoys the presence of rocks and wood
Equipment: not damaged

Hardiness:

Lifespan: upwards of 4 years if some salt in the water
Jump ability: rarely jumps
Diseases: hardy and resistant to diseases
Special problems: gradually waste away if not given live food. Have to be handled very carefully. Inclined to be nocturnal

BREEDING

In nature: undescribed, but some populations may breed in freshwater impoundments. General view is that they spawn downstream in a marine environment and the fry migrate upstream. Fry (20 - 40mm) are common in estuarine water plants in spring. Upstream migration documented in Summer and Autumn. Some authorities believe this fish may be a livebearer

Spawning:

Aquarium:

Volume	-	Temp	-
Salts	-	pH	-
Equipment	-	Hardness	-

Furnishings:

Ratios:

Trigger factors:

Day/Night Ratio	?	Water Change	?	Water Levels	?	Feeding	?
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Act of spawning:

Behaviour:

Time of day:

Duration:

Frequency:

Eggs:

Physical:

Numbers:

Hatching:

Fertility:

Fry:

Free swimming:

Feeding:

Growth rates:

Management:

Special problems:

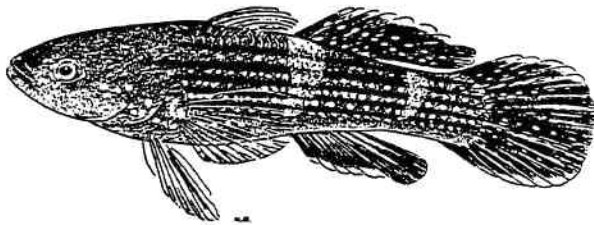
REFERENCES

Books:

3, 7, 8, 9, 10, 11, 14, 15, Whitley GP: Handbook of Australian Fishes (1980); Stead DG: Fishes of Australia (1906); Stead DG: Edible Fishes of NSW (1908); Sutherland SK: Venomous Creatures of Australia (1989); Covacevich/Davie/Pearu: Toxic Plants and Animals (1989); Readers Digest: Australia's Dangerous Creatures (1987); Herbert B & Peeters J: Freshwater Fishes of Far North Queensland (1995)

COMMENTS:

- makes an excellent specimen aquarium fish which will feed from the hand and shows "character"
- can make croaking sounds if stimulated or stressed
- they should be handled carefully and as a bonus they are quite edible



Spangled, Mud or Mullet Gudgeon, Flat-head Sleeper

Ophiocara porocephala

Meaning of Names:	<i>Ophicara</i> - snakehead; <i>porocephala</i> - poreheaded
Synonyms:	numerous; included are <i>Meuschenula darwiniensis</i> , <i>Eleotris</i> sp., <i>Agonostoma darwiniense</i> , <i>Eleotris viridis sindonis</i>
Other Species in Genus:	none
Description:	Historical: originally described by Cuvier & Valenciennes (as <i>E. porocephala</i>) in 1837 while the genus <i>Ophiocara</i> is attributed to Gill in 1863. Features: cylindrical body with depressed head; fins tend to have pale spots in the rays and a yellowish border especially to second dorsal, caudal and anal fins; dark back shading to pale belly; numerous white/greenish spangles on sides; pale transverse bands of juveniles fade with age. Size: to 320mm Sex differences: mature males have larger heads, larger fins and brighter colours. Colour forms: variable over the wide distribution; the Darwin form said to be more colourful. Juveniles are conspicuously banded with 2 or more pale vertical bands. Cons. status: secure
Distribution:	widespread in brackish and freshwater situations. From East Africa, including Madagascar across through the Indo-Australian Archipelago to Oceania, New Guinea and Northern Australia.
Stream:	Type: variable from marine harbours via estuaries to freshwater streams but usually with some tidal access. Large specimens and small juveniles are usually in the more saline areas Depth: less than 2m Substrate: varies from rocks and mangroves to mud; usually lurking near cover or banks Flow: from nil to moderate Light: usually near cover and tend to be in the shade Riparian: varies from mangroves to rainforest
Shared with:	Fish: a wide range of brackish and freshwater tropical species Invertebrates: various prawns, shrimp and macrobrachium-type species Plants: in freshwater habitats includes <i>Vallisneria</i>, <i>Nymphaeas</i>, <i>Najas</i>, <i>Blyxa</i> etc Other: need to beware of Estuarine Crocodiles and in season also the Box Jelly fish where appropriate
Water:	Temp: 25 - 30°C pH: 7.5 - 8.5 Hardness: from quite soft to very hard depending on the locality Salinity: 30 - 35ppt Colour & Turb: often tannin stained and not bothered by significant turbidity
Collecting:	Methods: small to medium specimens often collected amongst plants and marginal grasses in drains and streams by frame and scoop nets, also dip nets at night with spotlight, while larger specimens usually angled for with shrimp or fish flesh for bait. Transport: Usually handle well; if caught in freshwater add salt to avoid capture shock; larger specimens best bagged separately

AQUARIOLGY

Aquarium: Volume: best kept individually - a 30cm specimen will be quite content in a 60x45x45cm aquarium as long as adequate biological filtration is available.
Temp: 25 - 30°C
pH: 7.2 - 8.0, young specimens will do well in neutral water for a while
Hardness: preferably above 250ppm, marine salts are beneficial; if they look unhappy add more salt
Equipment: heater; undergravel filter with shellgrit substrate, air supply, good cover glass, provide rocks or driftwood for security

Feeding: Essentially carnivores - will take all frozen, fresh or live meaty foods and can usually be trained to take both floating and sinking "cichlid" pellets; small frozen shrimp and fish such as whitebait are useful substitutes for live foods - will take food from owner's hand.

Compatibility: Own species: best kept singly to avoid fighting since they are territorial
Other species: will eat anything small enough; will fight other similar sized gudgeons but can be kept with large fish such as Archerfish, Salmon-tailed Catfish, Grunters etc
Aquarium plants: not eaten but may be damaged accidentally during feeding lunges
Substrate: generally not disturbed
Equipment: heaters and cover glasses occasionally damaged during feeding

Hardiness: Lifespan: hardy - seem to need higher salinity with age, may live several years in captivity
Jump ability: very capable jumpers
Diseases: resistant to most milder diseases as long as temperature and salinity needs are met; when in doubt add more salt and increase temperature
Toxins: not especially susceptible
Special problems: major problems are keeping up the food and water changes to avoid nitrogenous waste build-up

BREEDING In nature: spawns Cichlid-style in lower estuaries from November to January, reports of large males fanning eggs on rocks in Townsville Harbour during summer months, other observations show female guards and fans eggs while male patrols the perimeter. Spawning appears to differ from others in the group, aquarium observations are urgently needed. Presumably the fry make their way upstream gradually.

Conditioning: -

Spawning: -

Eggs: -

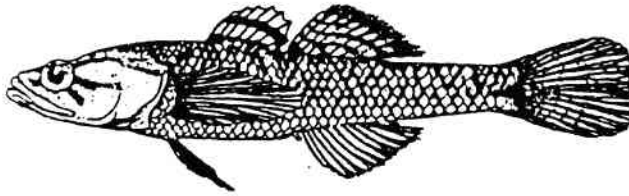
Fry: -

COMMENTS:

- This is another large attractive tropical gudgeon that makes an interesting and at times responsive aquarium subject.
- According to Helen Larson at the Darwin Museum the juvenile Spangled Gudgeons were in the past mistaken for new species (hence the mysterious *Lindemanella iota* described by Whitley in 1935).
- In the North large specimens (up to 1 kg) are taken by anglers and although good to eat are not favoured much as a sporting fish.

REFERENCES

Books 3, 4, 5, 7, 9, 11, 15. Munro I.S.R.: The Marine and Freshwater Fishes of Ceylon, 1955; Munro I.S.R.: The Fishes of New Guinea, 1967; Sterba G.: Freshwater Fishes of the World, 1967; Kottelat M. et al: Freshwater Fishes of Western Indonesia and Sulawesi, 1993; Smith H.M.: The Freshwater Fishes of Siam, or Thailand, 1965; Inger R.F. & Chin Phui Kong: The Freshwater Fishes of North Borneo, 1962; Koumans F.P. Weber & De Beaufort: The Fishes of the Indo-Australian Archipelago, Vol X, 1953; Baensch H.A. & Riehl R.: Aquarium Atlas Volume 2, 1993; Hungerford R.: Freshwater Fishing in Australia & New Zealand, 1978.



Dwarf flathead gudgeon

Philypnodon sp. 1

Meaning of Names:	<i>Philypn</i> - sleep loving <i>odon</i> - tooth	
Synonyms:	-	
Other Species in Genus:	<i>P. grandiceps</i>	
Description:	Historical:	still awaiting description
	Features:	Robust gudgeon, ventro-dorsally compressed. Fins erect with colourful dark spot on caudal fin base. Protruding noticeable lips compared to <i>P. grandiceps</i>
	Size:	to 60mm TL
	Sex differences:	similar sexes - larger. Mature males have more colour. Bulbous head, larger mouth and pectorals
	Colour forms:	brown-blackish, mottled dark patterns. Fins banded with black, orange and vibrant red. Lips can show brilliant red "lipstick".
	Conservation:	status is unthreatened and common in parts of range
Distribution:	coastal drainages in southern Queensland to South Australia and the Murray River through NSW and Victoria	
Stream:	Type:	brackish and freshwater
	Depth:	less than 1 metre
	Substrate:	mud, gravel and leaf litter
	Flow:	low - nil
	Riparian:	overhanging trees in low light conditions
Shared with:	Fish:	other gudgeons, gambusia and hardiheads
	Invertebrates:	<i>Cherax</i> , <i>Atyid</i> and <i>Machrobraccium</i> sp.
	Plants:	<i>Chara</i> , <i>Nitella</i> , <i>Vallisneria</i> and <i>Potamogeton</i>
	Other:	-
Water:	Temp:	10 - 20°C
	pH:	6.8 - 7.2
	Hardness:	100 - 160ppm
	Salinity:	fresh
	Colour & Turb:	clear/nil
Collecting:	Methods:	dipnetting amongst leaf litter and along bank overhangs
	Transport:	avoid changes in temperature

AQUARIOLGY

Aquarium:	Volume:	60 – 100 litre
	Temp:	20°C
	pH:	7
	Hardness:	120ppm
	Equipment:	undergravel filters

Feeding: flake is accepted however prefers worms, mosquito larvae, atyid shrimp and small fish

Compatibility:	Own species:	territorial, displays characteristic jaw opening
	Other species:	best with other gudgeons and larger fish
	Aquarium plants:	lives amongst Nitella sp. and Chara sp.
	Substrate:	gravel and rocks
	Equipment:	avoid foam backdrops with holes as they like hiding

Hardiness:	Lifespan:	unknown
	Jump ability:	no jumping mainly bottom dwelling
	Diseases:	none observed
	Toxins:	unknown
	Special problems:	avoid temperature shock, must maintain adequate food

<u>BREEDING</u>	In nature:	unknown in nature
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Conditioning:	Separate:	not required
	Feeding:	provide abundant flake and atyid shrimp
	Water:	normal tank conditions acceptable
	Duration:	unknown
	Assessment:	-

Spawning:	Furnishings:	Aquarium of at least 60litres, rootlets and Nitella sp in clumps, rocks
	Ratios:	pairs
	Trigger factors:	increase temps between 19 – 22C, ph 7.4, health and emotional state important
	Behaviour:	-
	Time of day:	-
	Duration & Frequency:	-

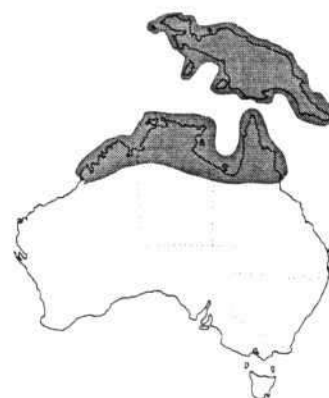
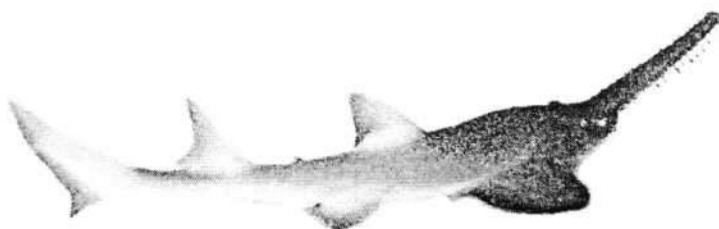
Eggs:	Physical:	tear drop shaped on stalk
	Numbers:	patch of 3 x 4cm included approximately 50 – 60 eggs
	Hatching:	eye spots at 4 days, hatch in 8 days
	Fertility:	only 1 or 2 infertile eggs

Fry:	Free swimming:	translucent bodies, 6-8mm long in midwater
	Feeding:	try greenwater cultures, higher concentration of Aquasonic fry food
	Growth rates:	-
	Management:	remove all other fish and shrimps when eggs are observed. Leave adult to fan eggs until first fry are free swimming
	Special problems:	feeding fry

<u>REFERENCES</u>	Books:	3, 6, 7, 10, 12, 13, Wager & Jackson: The Action Plan for Australian Freshwater Fishes; Schmida G: The Cold-blooded Australians
	Journal:	Fishes of Sahul Vol 2 No 3 – survey record, Albert River; Fishes of Sahul Vol 11 No 1; Victorian Fisheries Notes: No 64

COMMENTS:

- an entertaining and attractive gudgeon, especially combat between fish with bright red lips and fins.
- easy to care for and expected to breed like other gudgeons



Freshwater Sawfish

Pristis microdon

Meaning of Names:	<i>Pristis</i> – Gr for sawfish; <i>micro</i> – small; <i>odon</i> – tooth
Synonyms:	Leichardt's sawfish, smalltooth sawfish, northern sawfish, <i>Pristiopsis leichardti</i> , <i>Pristis pristis</i>
Other Species in Genus:	<i>P. clavata</i> , <i>P. pectinata</i> , <i>P. zijsron</i>
Description:	Historical: Latham 1794 Features: medium sized slender sawfish, 18 – 23 teeth on rostrum, broad based pectoral fins, definite lower lobe on tail Size: upto 7 metres, about 50cm at birth Sex differences: ♂ has paired claspers Colour forms: light honey colour to dark brown Cons. status: not threatened or endangered
Distribution:	fresh and brackish upper reaches of large northern Australian rivers. Also into similar habitats in New Guinea and Indonesia.
Stream:	Type: big rivers Depth: usually over a metre, will move into shallow water travelling upstream or hunting Substrate: sand, gravel or mud Flow: will negotiate rapids in wet season (personal observation in Daly River) Riparian: not found near riparian vegetation, usually found in channels
Shared with:	Fish: most northern freshwater species found in larger rivers Invertebrates: <i>Macrobrachium rosenburgi</i>, <i>Cherax quadricarinatus</i> and numerous brackish prawns in tidal reaches Plants: numerous Other: freshwater and estuarine crocodiles, pignose turtles, northern long neck turtles, snapping turtles, Mertens water monitors and others
Water:	Temp: 22 – 28°C pH: 7.5 – 8.2 Hardness: 200 – 500ppm Salinity: fresh to slightly salty, not recorded from full sea water Light: full sun Colour & Turb: extremely muddy in the Adelaide and South Alligator Rivers
Collecting:	Methods: angling with fish or prawns for bait, cast net or seine net Transport: large container with large lid, eg., tanker truck

AQUARIOLOGY

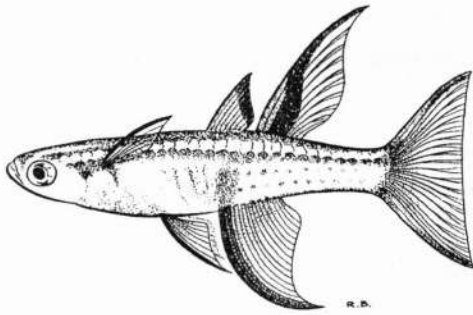
Aquarium:	Volume:	2,000 – 50,000 litres
	Temp:	22 – 28°C
	pH:	7.5 – 8.2
	Hardness:	hard water preferred, they are common in the Daly River where hardness is about 500ppm
	Equipment:	swimming pool filter for clarity and bio filter for ammonia
Feeding:	fresh fish and prawns	
Compatibility:	Own species:	ok as long as there is plenty of space
	Other species:	gets boisterous at feeding time with larger fish and will strike smaller fish with saw
	Aquarium plants:	large boisterous fish will uproot plants and disturb substrate
	Substrate:	ditto
	Equipment:	saw can scratch walls of aquarium (esp. perspex)
Hardiness:	Lifespan:	unknown, one specimen at Territory Wildlife Park grew from 600mm to 2600mm in 3 years (they grow very fast)
	Jump ability:	will jump out of pond or pool when new addition
	Diseases:	very hardy
	Special problems:	giving them the room they require, supplying enough food and keeping the water quality acceptable as they produce plenty of waste products
BREEDING	In nature:	can breed in freshwater, viviparous – young nourished by a primitive placenta. Young are born approximately 5 months after copulation, with numbers likely to range between 1 and 12.
Conditioning:	Separate:	-
	Feeding:	-
	Water:	-
	Duration:	-
	Assessment:	-
Spawning:	Furnishings:	-
	Ratios:	-
	Trigger factors:	-
	Behaviour:	-
	Time of day:	-
	Duration & Frequency:	-
Eggs:	Physical:	-
	Numbers:	-
	Hatching:	-
	Fertility:	-
	Management:	-
Fry:	Free swimming:	-
	Feeding:	-
	Growth rates:	-
	Management:	-
	Special problems:	-

COMMENTS:

- one of Australia's largest freshwater fish which is relatively easy to keep if the space is available
- obviously large public aquaria are better suited to the role of maintaining this species in captivity

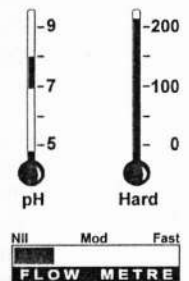
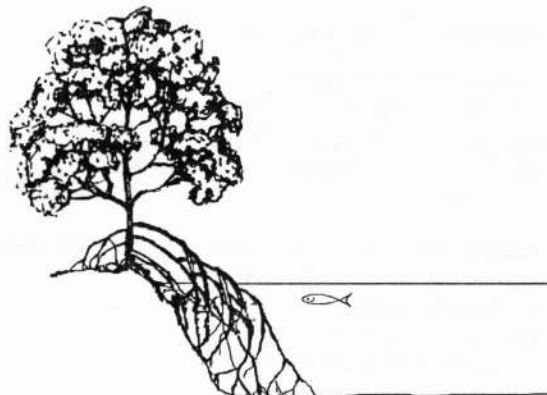
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- Journals – A, p133; TFH – Bleher Jan 1984: The Australian Freshwater Sawfish and Jun 1986: The Freshwater Sawfish in the Aquarium



Darwin Blue-eye, Broome Blue-eye, Blue backed Blue-eye *Pseudomugil cyandorsalis*

- Meaning of names:** *Pseudomugil* - false mullet
cyandorsalis - blue back
- Synonyms:** none
- Other species in genus:** *P. signifer*, *P. tenellus*, *P. gertrudae*, *P. inconspicuus*, *P. conniae*, *P. furcatus*, *P. paludicola* etc
- Description:** Historical: Allen & Sarti, 1983, Broome - WA
Features: elongated, slightly compressed body, fins sit well back, blue eyes
Size: Nature: ♀ to 30mm ♂ to 25mm (TL); Aquarium: ♀ to 35mm ♂ to 30mm (TL)
Sex differences: ♀ larger and plumper, light grey all over, fins small and clear.
♂ smaller, fins elongated and yellow with black edges off anal and second dorsal, electric blue stripe from eye to tail, spawning colour also includes gold suffusion to lower half of body.
Colour forms: no variations recorded at this time.



Distribution: Proven populations around Broome and Wyndham WA, as well as Darwin NT. May exist in areas between as well.

Stream: Type: estuarine and marine/mangrove areas
Depth: shallows - close to margins, surface swimmers
Substrate: soft grey mud
Flow: tidal
Riparian: mangroves

Shared with: Fish: *P. inconspicuus*, various juvenile ambassids, mullet, garfish, archerfish etc.
Invertebrates: marine shrimp, jellyfish etc.
Plants: mangroves, seagrasses etc.
Other: watch out for estuarine crocodiles

Water:

Temp	25 - 35°C
pH range	
Hardness	200ppm +
TDS	
Salinity	third - full marine

Light	full sunlight
Colour	normal
Turbidity	none - mild
SG	
Conductivity	

Collecting: Methods: small schools and individuals easily scooped up with fine mesh net from a boat or shore.
Transport: transport well as long as not overcrowded. Large numbers of immature fish sent south seasonally.

AQUARIOLOGY

Aquarium:	Volume	600 x 300 x 300	Temp	25 - 30°C
	Salts	.3 - .5 marine	pH	7 - 8
	Equipment	heater, u/g filter	Hardness	hard alkaline water

Feeding: flake, small brine shrimp, mosquito wrigglers

Compatibility: Own species: happily schools, multiples of males, females and juveniles
 Other species: compatible with any other small, peaceful, brackish fishes
 Aquarium plants: doesn't harm plants but few grow in brackish situations
 Substrate: shell grit substrate over u/g filter works well
 Equipment: not disturbed but can get caught behind backdrops etc

Hardiness: Lifespan: hardy, if given the right conditions, 2 years in captivity (probably less in nature)
 Jump ability: will jump if frightened or water added
 Diseases: wild caught fish often have parasites
 Toxins: susceptible to pesticides but handles copper quite well
 Special problems: does best if kept by themselves, lifespan shortened if kept in fresh water

BREEDING In nature: schools spawn constantly on marginal debris except colder months. Juveniles move into estuaries after wet.

Conditioning: Seperate: not necessary as they spawn continuously
 Feeding: increase live foods esp. mosquito wrigglers
 Water: regular partial changes help to maintain spawning condition
 Duration: -
 Assessment: -

Spawning:	Aquarium:	Volume	600 x 300 x 300	Temp	25 - 30°C
		Salts	.3 - .5 marine	pH	
		Equipment	heater, u/g filter		

Furnishings: spawning mops, floating type
 Ratios: 2 - 3 ♀ per ♂, groups of 8 - 10 good
 Trigger factors

Day/Night Ratio	↑ D > N	Temp Change	↑	Water Change	↓ salinity	Water Levels	↑?	Feeding	↑ live foods
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Act of spawning

Behaviour: ♂ display with fins spread and intense colour, then pairs spawn on mops, 1 - 5 eggs at a time
 Time of day: early morning when sunlight hits the tank
 Duration: only lasts a few seconds
 Frequency: each ♀ 1 - 2 times per day
 Other: unoccupied breeders may eat spawn

Eggs: Physical: 1.1 - 1.3mm, very sticky and tough
 Numbers: 2 - 12 per ♀ per day
 Hatching: 10 - 15 days, add FW if slow to hatch
 Fertility: high
 Management: hold separately either in trays or still on mops, methylene blue not usually needed

Fry: Free swimming: immediately on hatching
 Feeding: infusoria, artemia nauplii, microworms, powdered dry food
 Growth rates: 10mm SL in 6 - 8 weeks, sexable at 10 weeks, breeding 12 - 15 weeks
 Management: growth good if water quality maintained
 Special problems: only problem is maintaining some salinity

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Books: 5
 Journals: Fishes of Sahul 1990 p249, Hansen B; Taxonomic Revision of the family Pseudomugilidae 1989, Saeed B, Ivanstoft W and Allen GR; Reveu Francais d'Aquariologie 1983, Allen GR and Santi N
 Personal: Leggett R, Heidke G, Larson H
 Other: ANGFA National conference, Sydney 1987, Saeed B

COMMENTS

- Victorian ANGFA members were unsuccessful in establishing Broome populations in 1983/4. M. Heidke and R. Leggett established Darwin populations in 1986/7. Maintained intermittently since by various ANGFA members in Australia and overseas.
- A small school of adults in a species tank with the males in full display is a memorable sight. Should be kept more often. Broome populations may be a heavier bodied form.



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Forktail Blue-eye or Forktail Rainbowfish

Pseudomugil furcatus

Meaning of Names:	<i>pseudo</i> – false; <i>mugil</i> – mullet <i>furcatus</i> – forked, refers to black top and bottom of edges of tail
Synonyms:	<i>Popondetta furcata</i> , <i>Popondictichys furcatus</i>
Other Species in Genus:	small family of some 15 or so species found in Australia, Papua New Guinea and nearby islands. Best distinguished from <i>P. connieae</i> by black tail edges and yellow ventrals (not black) and pectorals (not white)
Description:	Historical: described by Nichols in 1955 Features: body more flattened than most <i>Pseudomugil</i>, with more rays in anal and second dorsal fins; yellow belly, ventrals and pectorals with black edges to upper and lower tail margins Size: males to 60mm and females to 50mm S/L Sex differences: males larger, proportionally longer fins and more pointed top dorsap, colour in males is more intense Colour forms: some variability in intensity of colour and shape of fins especially with age. Cons. status: probably secure but limited range
Distribution:	lowland streams around Safia, eastern PNG
Stream:	Type: clear streams broken by deep pools; the fish school where streams run into pools Depth: to 3m or more Substrate: rocky, gravel Flow: gentle to moderate Light: shade to sunlight Riparian: rainforest
Shared with:	Fish: includes peacock gudgeons Invertebrates: - Plants: usually found near aquatic plants Other: -
Water:	Temp: 19 – 25°C pH: 7.2 – 7.6 Hardness: 80 – 100 Salinity: - Colour & Turb: clear with minimal turbidity
Collecting:	Methods: fine seine, dip net and spotlighting should be excellent Transport: recommend added salt and styrofoam cooler, avoid overcrowding as these fish come from cooler, flowing and well oxygenated streams

AQUARIOLGY

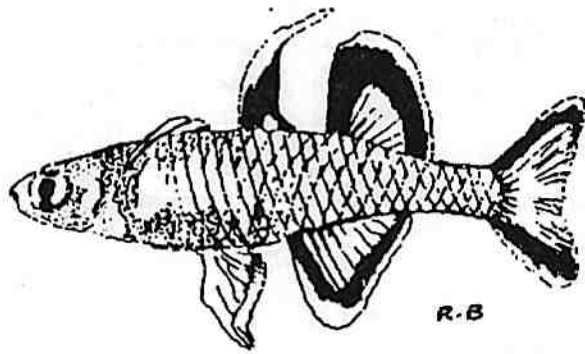
Aquarium:	General:	-
	Volume:	60x30x30cm or larger
	Temp:	20 – 26°C
	pH:	7.0 – 7.8
	Hardness:	50 – 170ppm
	Equipment:	recommend water movement, eg., powerhead or vigorous sponge filter
Feeding:	takes all foods but especially likes live mosquito wigglers	
Compatibility:	Own species:	best kept in species tank as a school
	Other species:	peaceful and mixes well with any other fish
	Aquarium plants:	not damaged but enjoys the cover provided
	Substrate:	not moved or modified
	Equipment:	not damaged
Hardiness:	Lifespan:	usually 2 – 3 years
	Jump ability:	excellent jumpers
	Diseases:	quite hardy
	Toxins:	susceptable to copper poisoning
	Special problems:	do not enjoy higher temperatures, eg., over 28°C
BREEDING	In nature:	breeding pairs separate from school and spawn in aquatic plants growing in margins of pools
Conditioning:	Separate:	not necessary to separate
	Feeding:	egg production improves with live food, especially wigglers
	Water:	weekly water change of 10% useful
	Duration:	-
	Assessment:	-
Spawning:	Furnishings:	floating spawning mops or watersprite and <i>Vesicularia</i>
	Ratios:	schools of at least 6, 20 better; equal sexes or no more than 2 females per male
	Trigger factors:	possibly morning sun
	Behaviour:	males display for dominance and flare fins to attract females. Tends to spawn in lower parts of mops (unlike <i>P. connieae</i>) and even in gravel
	Time of day:	most spawning occurs in the morning
	Duration & Frequency:	will spawn continuously every day for a few weeks. Spawning stops if temperatures too high
Eggs:	Physical:	large, approximately 2mm diameter
	Numbers:	upto 6 – 8 per day for each female but eagerly eaten
	Hatching:	12 – 20 days depending on temperature
	Fertility:	usually 50 – 80%, better at lower temperatures
	Management:	best removed and hatched separately
Fry:	Free swimming:	almost immediately after hatching
	Feeding:	needed immediately; use APR, powdered dry food, brine shrimp nauplii and/or infusoria
	Growth rates:	grow quite rapidly with 2cm by 12 weeks and sexable soon after. Can be placed with parents when eggs start to be produced around 25mm TL
	Management:	keep water hard and alkaline with regular small water changes
	Special problems:	keep in big enough school to maintain the breeding colony

COMMENTS:

- one of the most attractive blue-eyes of all
- best suited to a school in a species tank, or a community with other smaller, peaceful rainbowfish and blue-eyes
- deserves to be more available

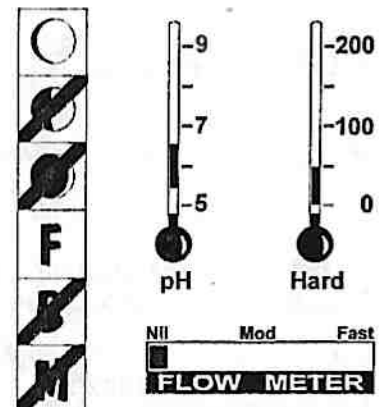
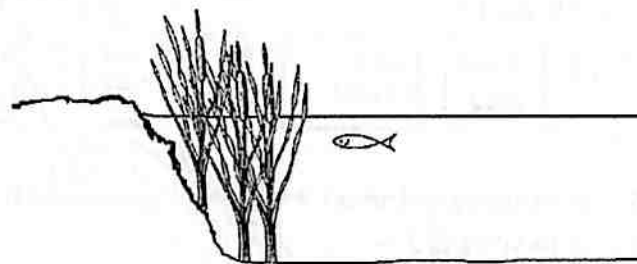
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| Internet – | Adrian Tappins Homepage – http://www.ecn.net.au/~atappin/home.htm |



Honey Blue-eye *Pseudomugil mellis*

- Meaning of names:** *Pseudomugil* - false mullet
mellis - honey (refers to colour)
- Synonyms:** nil
- Other species in genus:** family of small freshwater and brackish fishes of NE Australia and PNG - approx 15 species
- Description:** Historical: Allen & Ivanstoft, 1982, Marcus Ck - SE Qld. (kept by aquarists for at least 20yrs prior)
- Features: Body - slightly flattened, head and snout tapered, eyes are blue
♂ - rich gold to red-brown, fins have white edges and black submarginal band; ♀ - lighter
- Size: Nature: to 35mm (SL) usually under 25mm
- Sex differences: ♂ - enlarged colourful fins; ♀ - fins clear, ultimately larger especially in aquaria
- Colour forms: intensity of colour varies with locality and among individuals. Lake Wabby (Fraser Is) population are larger and more elongated. Lake Wanhar (Fraser Is) population are a smoky grey colour.



- Distribution:** Specialised waterways of wallum coastal heathlands, from Brisbane to Bundaberg including Fraser Island (Qld)
- Stream:** Type: swamps, lakes and a few streams
Depth: usually less than one metre
Substrate: fine sand
Flow: low to none
Riparian: usually marginal sedges and wallum shrubs
- Shared with:** Fish: *Nanoperca oxleyana*, *Melanotaenia duboulayi*, *Rhadinocentrus ornatus*, *Hypseleotris gallii*, *H. compressa*, *H. klunzingeri*, *Gobiomorphus australis*
Invertebrates: *Cherax*, *Macrobrachium* and *Atyid* shrimps
Plants: *Eleocharis ochrostachys* preferred, also emergent sedges, *Lillaeopsis*, *Myriophyllum*, *Nymphaea* and *Bacopa* sp.
Other: wallum frogs

Water:	Temp	15 - 32°C	Light	open sun
	pH range	4.5 - 6.5	Colour	tannin stained
	Hardness	0 - 50ppm	Turbidity	minimal
	TDS		SG	
	Salinity	none to minimal	Conductivity	low

- Collecting:** Methods: easily collected by fine scoop nets and traps in suitable areas. ♂ have territories near vegetation, ♀ and juveniles in small schools
- Transport: newly caught fish should be handled gently and not overcrowded. Add a small amount of salt.

AQUARIOLOGY

Aquarium:

Volume	600 x 300 x 300	Temp	20 - 25°C
Salts	none needed	pH	5.5 - 6.5
Equipment	peat in box filter	Hardness	0 - 50ppm

Feeding:

in nature: diatoms, desminids and invertebrates; in aquaria: small dry, live and frozen foods

Compatibility:

Own species: small schools of mixed adult and juveniles do well
 Other species: other native and exotic small peaceful fish that enjoy soft acid water
 Aquarium plants: enjoyed as cover and grazing substrate for food organisms
 Substrate: not disturbed
 Equipment: not disturbed

Hardiness:

Lifespan: maximum of 2 years so should be bred annually to maintain school
 Jump ability: jump well for size especially when water added
 Diseases: Hardy once settled in but may be susceptible to oodinium
 Toxins: susceptible to pollutants

BREEDING

In nature: ♂ establish territory near plants and attract ♀ by display. Spawn on plants. ♀ to be mature ie., >20mm SL. Also do well outside in ponds if weather suitable

Conditioning:

Separate: not necessary
 Feeding: dry and live foods of suitable size. Also like to graze on algae
 Water: prefer soft acid water but hardy in less favourable water too
 Duration: daily spawns so need live food regularly
 Assessment: ♀ rotund and ♂ when in colour

Spawning:

Aquarium:

Volume	600 x 300 x 300
Salts	nil
Equipment	peat filter

Temp	28 - 30°C
pH	5.0 - 6.0

Furnishings:

aquatic plants or mops for cover and spawning sites

Ratios:

several ♀ to each ♂

Trigger factors:

Day/Night Ratio	↑ sun light	Temp Change	↑ >28°C	Water Change	not req.d	Water Levels	likes shallows	Feeding	↑ live foods
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Act of spawning

Behaviour: ♂ defend territories and attract ♀ with display and colour, interested ♀ and ♂ spawn in nearby plants
 Time of day: mostly in mornings
 Duration: brief deposition of a few eggs
 Frequency: daily over several days

Eggs:

Physical: large for size of fish, 1.29 mm diameter with adhesive filaments
 Numbers: 40 - 120 eggs over 7 - 9 days per ♀
 Hatching: 5 - 7 days at 28°C
 Fertility: high
 Management: easily removed manually for separate hatching, methylene blue reduces fungus. In a well planted tank some fry will survive

Fry:

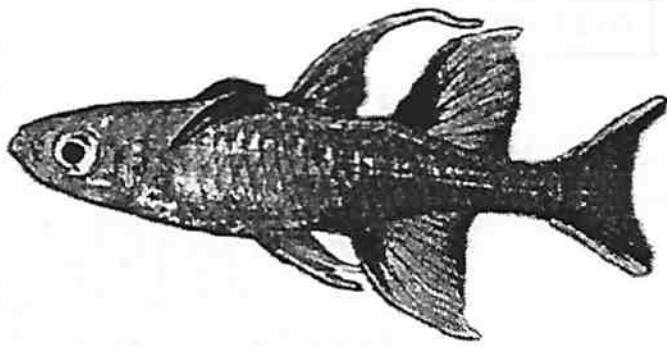
Free swimming: immediately
 Feeding: infusoria, APR dusted on surface, microworms, artemia etc
 Growth rates: grow quickly outside, sexable in 3-4 months, breeding at 6 months
 Management: self maintaining populations outside seems to be the most successful method long-term

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 Other: Workshop on conservation of *P. mellis* and *N. oxleyana*; Brisbane (1994)

COMMENTS

- Mainland populations threatened by urban development, water pollution, over-collecting by fish and frog enthusiasts and competition with feral fishes.
- This is a delightful, desirable little aquarium fish that should be available by aquaculture rather than wild collection.



Pacific Blue-eye *Pseudomugil signifer*

Meaning of names:

Pseudomugil - false mullet

signifer - marked or signed (refers to fins)

Synonyms:

P. signatus (Northern Blue-eye) now considered synonymous; *Atherina signata*; *Atherinosoma jarnesonii*
family of small freshwater and brackish fishes of NE Australia and PNG - approx 15 species

Other species in genus:

Description:

Historical:

Kner, 1865; known in Germany by aquarists since 1936

Features:

Body - compressed olive or silver often with bluish bluish towards tail and row of spangles down side. Eyes are blue. ♂ - orange to yellow second dorsal and anal fins with black edges.

Size:

♂ - 35mm (SL); ♀ - 30mm (SL); some northern populations much larger

Sex differences:

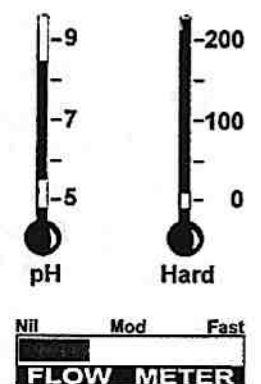
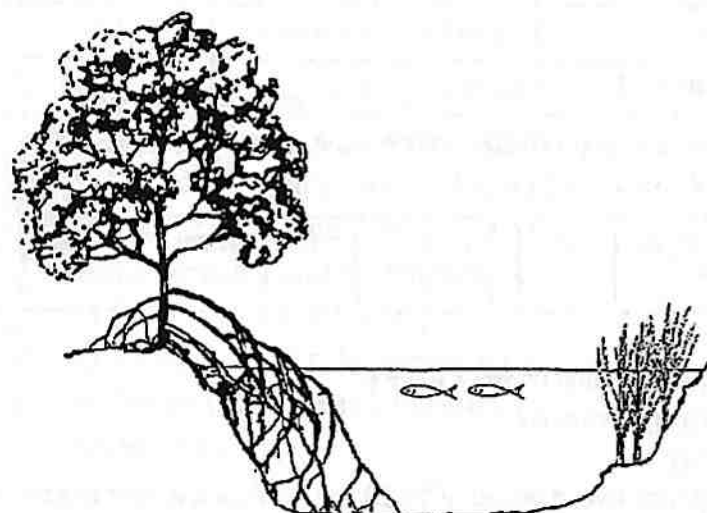
♂ - deeper body, larger more pointed colourful fins, upper and lower tail edges striped

Colour forms:

some variations in size and colour throughout range. Fish from acid wallum streams often show deep orange on dorsal and anal fins.

Cons. status:

secure



Distribution: Starke R. (Cape York) to Ulladulla (NSW) - coastal, estuarine and freshwaters

Stream:

Type:

pools and rapids in creeks; swamps and estuaries

Depth:

5cm - 1m

Substrate:

sand, silt

Flow:

none to medium, often tidal

Riparian:

dry and wet sclerophyl forest

Shared with:

Fish:

eels, gudgeons, rhads, rainbowfish, gobies and catfish

Invertebrates:

Atyid and *Macrobrachium* shrimps, crayfish

Plants:

native aquatic plants

Other:

turtles

Water:

Temp	14 - 26°C
pH range	5.5 - 8.5
Hardness	5 - 400ppm
TDS	
Salinity	fresh to salt

Light	open
Colour	tannin to clear
Turbidity	minimal
SG	
Conductivity	

Collecting:

Methods:

easily collected by scoop nets and seine nets, traps

Transport:

don't crowd, add some salt if collected from freshwater, keep cool 18-22°C

AQUARIOLOGY

Aquarium:	Volume	50 - 300 litre	Temp	18 - 24°C
	Salts	10 gms/l	pH	6.5 - 7.8
	Equipment	good filtration	Hardness	50 - 200ppm

Feeding: live food, frozen and dry also accepted

Compatibility: Own species: medium to large ok, except Ross R. and Harvey Ck forms where the ♂ can be aggressive
 Other species: ok for community of similar size fish
 Aquarium plants: no problems
 Substrate: not disturbed
 Equipment: not disturbed

Hardiness: Lifespan: maximum of 2 - 3 years
 Jump ability: will jump
 Diseases: few
 Toxins: resistant to mild pollution
 Special problems: Harveys Ck form - can usually only keep one ♂ per aquarium if females are present, male schools are fine

BREEDING In nature: spawns in spring to summer often at edges of creeks in shallow or encroaching marginal grasses and sedges. Cairns forms often spawn in the gravel

Conditioning: Separate: not necessary
 Feeding: variety of good foods
 Water: change 1/3 weekly
 Duration: 1 - 3 weeks
 Assessment: ♀ roed up and ♂ displays

Spawning:	Aquarium:	Volume	50 litre	Temp	22 - 26°C
		Salts	5 gms/l for coastal forms	pH	7
		Equipment	airstone		

Furnishings: spawning mops, floating and weighted
 Ratios: 1x ♂ - 3x ♀

Trigger factors

Day/Night Ratio	↑	Temp Change	↑	Water Change	yes	Water Levels	↓ 100 - 150mm	Feeding	↑ live foods
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Act of spawning

Behaviour: ♂ flares fins and drives ♀ to mop
 Time of day: morning to evening
 Duration: all day
 Frequency: ♀ spawns over a period of 5 - 10 days, only a few eggs at a time

Eggs: Physical: 1.5 - 1.8mm with long sticky threads
 Numbers: 10 - 20 eggs per day per mature ♀
 Hatching: 17 - 21 days
 Fertility: good
 Management: can be hand picked to hatching trays or hatched on mops

Fry: Free swimming: soon after hatching
 Feeding: infusoria, vinegar eels, brine shrimp etc
 Growth rates: 10mm by 12 weeks, sexable by 24 weeks
 Management: regular partial water changes, good foods

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COMMENTS

• Needs special care with food and water quality to keep orange colour in fins of blue-eyes collected with this colour.



Blackmast, Strawman *Quiricthys (Craterocephalus) stramineus*

Meaning of Names:

Quirites straminei - were the effigies of straw thrown into the Tiber River by the ancient Romans. Refers to the straw colour the fish can be.

Craterocephalus - strong or sturdy head (hence hardyhead)

Synonyms:

Quiris stramineus

Other Species in Genus:

Craterocephalus stercusmuscarum, *C. marjoriae*, *C. eyresii*, *C. cuneiceps*, *C. dalhousiensis* etc

Description:

Historical:

Whitley first described this fish in 1950.

Features:

Fusiform shape with body depth about $\frac{1}{3}$ length; black stripe along the side; small mouth with 1-2 rows of teeth on outside of the lips; first dorsal tall and black; body colour pale yellowish blue; eye colour blue.

Size:

to 70mm in nature

Sex differences:

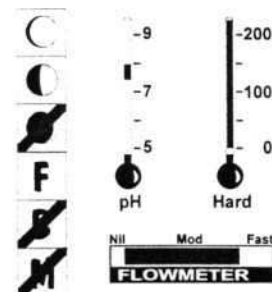
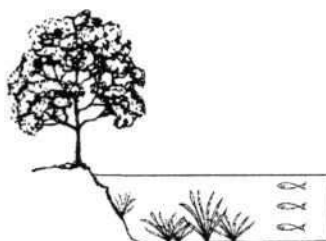
Sexes similar but females rounder; fins in males tend to be longer and have more colour.

Colour forms:

no significant variation reported

Cons. status:

secure



Distribution: Qld - Upper Gregory System; NT - Victoria, Daly, Katherine and Finiss Rivers; WA - Ord River System including the Ord River Dam.

Stream:

Type:

various habitats from streams to dams

Depth:

tend to be found around the edges and near submerged debris.

Substrate:

sandy to rocky

Flow:

usually in clear water from fast flowing to still

Riparian:

over-hanging and snags; some schools seen swimming in open water

Shared with:

Fish:

Melanotaenids, Hardyheads, Catfish (both *Neosilurid* and *Ariid*), Perchlets and Grunters.

Invertebrates:

Several species of *Macrobrachium*, *Cherax* and freshwater crabs

Plants:

Vallisneria, *Aponogeton* etc

Water:

Temp	24-28°C
pH range	7.5 - 7.9
Hardness	high - 1800ppm
TDS	
Salinity	

Light	shade - open
Colour	clear
Turbidity	minimal - none
SG	
Conductivity	

Collecting:

Methods:

best collected in small hand nets that do not damage the fish too much. This helps to reduce any capture shock effects. If your fish survive the first 10 minutes after capture there seems to be no real hassles with transporting them back to your tank

Transport:

A dark coloured container is required into which a small amount of salt is added. Get the fish home as soon as possible and place them in a well planted aquarium with a high pH. Keep the tank reasonably dark for the first 24 hours

AQUARIOLOGY

Aquarium:

Volume	150 litres
Salts	small amount
Equipment	U/G

Temp	25°C
pH	7.6
Hardness	140-180ppm

Feeding: Takes most prepared and live foods.

Compatibility:

Own species: keep in schools with females outnumbering males 3 to 1 to reduce fighting between males.
Other species: non-aggressive so makes a good community aquarium fish
Aquarium plants: not damaged
Substrate: not disturbed
Equipment: not damaged

Hardiness:

Lifespan: Quite hardy after the initial capture period. some reports of individuals living beyond 4 years in aquaria.
Jump ability: Good jumpers so need a well-fitted cover.
Diseases: Subject to stress if the pH allowed to drop.
Toxins: No special difficulty
Special problems: Must be kept in good clean water with high pH, preferably with a good current.

BREEDING

In nature: Accurate information on breeding in nature unavailable.

Conditioning:

Separate: Not necessary to separate sexes.
Feeding: Increasing live foods and vegetable content helps.e.g. frozen "pea and prawn mix"
Water: pH 7.5; hardness approx. 220 ppm; temp 24-27°C
Duration: about 1 week
Assessment: observation of spawning behaviour and roundness in females indicates readiness.

Spawning:

Aquarium:

Volume	55 litres
Salts	hard alkaline
Equipment	U/G, shellgrit

Temp	27°C
pH	7.5
Hardness	300ppm

Furnishings: Nylon wool spawning mops, heater.

Ratios: Will breed in pairs or in groups.

Trigger factors:

Day/Night Ratio	?	Temp Change	?	Water Change	?	Water Levels	?	Feeding	?
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Act of spawning:

Behaviour: Spawning starts with intermittent chasing and displaying by the male - includes erection of fins and leads female into mops. Up to 4 eggs are laid at a time
Time of day: unrecorded
Duration: -
Frequency: Produce a few eggs daily over an extended period of time.

Eggs:

Physical: -
Numbers: -
Hatching: 7-9 days at 27°C
Fertility: variable

Fry:

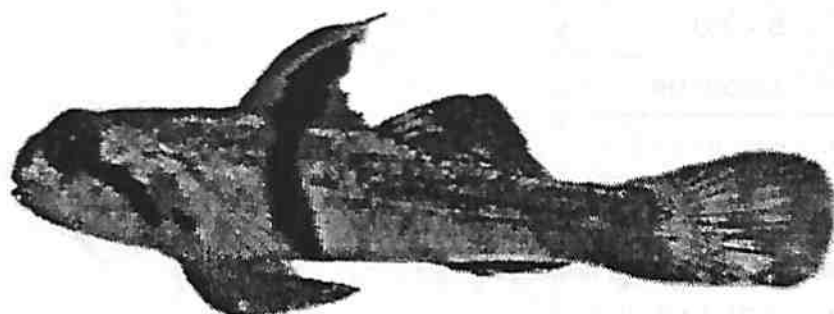
Free swimming: Initially float near the surface at 7-9 days
Feeding: Initially infusoria, APR, etc followed by vinegar eels, microworms, brine shrimp nauplii and fine prepared foods.
Growth rates: Rather slow growing - 10mm at 5 weeks
Management: Regular water changes necessary and ensure pH doesn't drop.
Special problems: The problem of pH control may be helped by regular additions of Sodium Bicarbonate and the use of salt preparations designed and available for Rift Lake Cichlids.

REFERENCES

Books: 2, 3, 5, 6, 7, 9, 11; Crowley LELM & Ivantsoff W: Redefinition of the freshwater fish genus *Craterocephalus* (Teleostei:Atherinidae) of Australia and New Guinea with an analysis of three species.1992. Ichthyol. Explor. Freshwaters.
Journals: Fishes of Sahul, Vol 1, No 3 - A. Tappin

COMMENTS:

- Some of this information is the result of collecting and keeping this fish while living in the N.T. Some of the young fish caught in the Katherine River never attained the body depth of those seen swimming in the wild even upon growing to full size.



Rhinohorn Goby, Girdled Goby *Redigobius balteatus*

Meaning of Names:

Redi - reduced (fin rays in dorsal); *gobius* - goby
balteatus - girdle (L: refers to black markings)

Synonyms:

Vaimosa balteata; *Acentrogobius balteatus*

Other Species in Genus:

15-20 species throughout Indo-Australian Archipelago

Description:

Historical:

First described by Herre in 1935

Features:

Laterally compressed body with blunt snout and small mouth. Black oblique stripe over head through eyes to opercle. Black band vertically down from 1st dorsal to belly. Front 1/3 of 1st dorsal bright yellow to red. Body colour mottled olive/pink.

Size:

to 5cm

Sex differences:

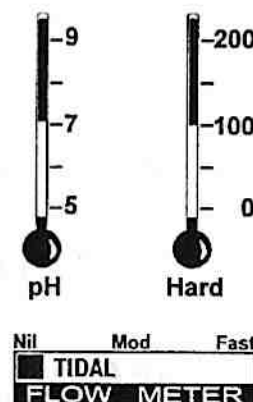
♂ has more bulbous head; longer and more reddish dorsal; also mouth deeper split

Colour forms:

none known

Cons. status:

secure and widespread in the wild



Distribution: Brackish lower estuaries in SE Asia, Phillipines, western PNG, Australia (northern Queensland to NT) to Africa

Stream:

Type: rocky and mangrove estuaries
Depth: down to about 90 cm
Substrate: rock and fine sand
Flow: tidal
Riparian: mangroves

Shared with:

Fish: various marine & estuarine fishes over a wide distribution
Invertebrates: various shrimps, limpets etc
Plants: algae, mangroves etc

Water:

Temp	25-28 C
pH range	marine
Hardness	
TDS	
Salinity	

Light	open
Colour	
Turbidity	clear
SG	35ppt
Conductivity	

Collecting:

Methods: Usually by dip net during daytime at low tide
Transport: Reasonably hardy but do not over-crowd

AQUARIOLOGY

Aquarium:

Volume	10l up	Temp	22-28C
Salts	500ppm up	pH	7.5 - 9.0
Equipment	filtration	Hardness	300ppm up

Feeding:

small mouth so needs tiny food e.g. finely scraped frozen mix, grindal worms etc

Compatibility:

Own species: small family groups do well as long as only one dominant mature ♂
Other species: safe with other small peaceful estuarine fishes e.g. blue-eyes
Aquarium plants: depends on salinity e.g. Caulerpa in marine set-ups
Substrate: rocks with fine sand between
Equipment: adequate but gentle filtration, heater

Hardiness:

Lifespan: Possibly 2-3 years if like others in the genus - especially if kept marine
Jump ability: like all gobies need overhangs all round to prevent escape/suicide
Diseases: susceptible to a range of problems if kept under too low a salinity for too long
(perhaps increase to almost marine for a month every 6 mths)
Toxins:-
Special problems: Try not to keep them in very soft water.

BREEDING

In nature: unknown

Conditioning:

Separate: maintain family group
Feeding: increase live food
Water: -
Duration: -
Assessment: ♀ become plumper

Spawning:

Aquarium:

Volume	40l	Temp	26C
Salts	35ppt	pH	8
Equipment	filtration	Hardness	300ppm

Furnishings: plenty of rock

Ratios: 3 ♀ to each ♂

Trigger factors:

Day/Night Ratio	?	Temp Change	?	Water Change	?	Water Levels	?	Feeding	?
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Act of spawning:

Behaviour: fin flaring and head to tail displays

Time of day: early evening (with lights on)

Duration: 2-4 hours

Frequency: repeated at 2-3 weekly intervals; guarded by ♂

Eggs:

Physical: 0.5mm
Numbers: 200-300, usually on a vertical surface
Hatching: approx. 48 hours
Fertility: about 80%

Fry:

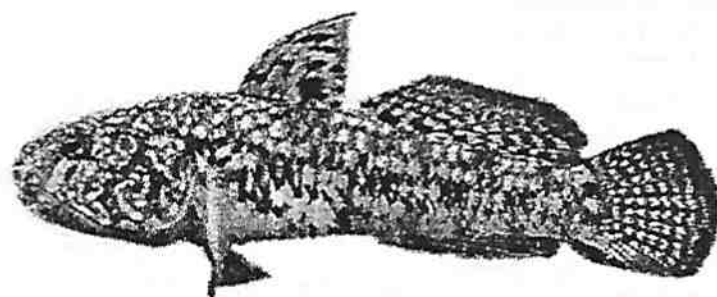
Free swimming: less than 36 hours
Feeding: Vitamin-enriched rotifers, APR; many fry starve (they don't chase food)
Growth rates: 10mm in about 12 weeks
Management: must maintain good water quality
Special problems: besides malnutrition fry seem prone to a viral infection?

REFERENCES

Books: Baensch HA & Riehl R: Aquarium Atlas 2; Weber & de Beaufort: The Fishes of the Indo-Australian Archipelago Vol. X by Koumans FP; Allen GR: Freshwater Fishes of Australia; Kottelat M et al: Freshwater Fishes of Western Indonesia and Sulawesi
Personal: R. Bowman (ANGFA)

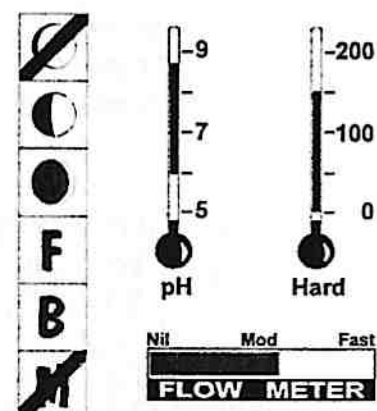
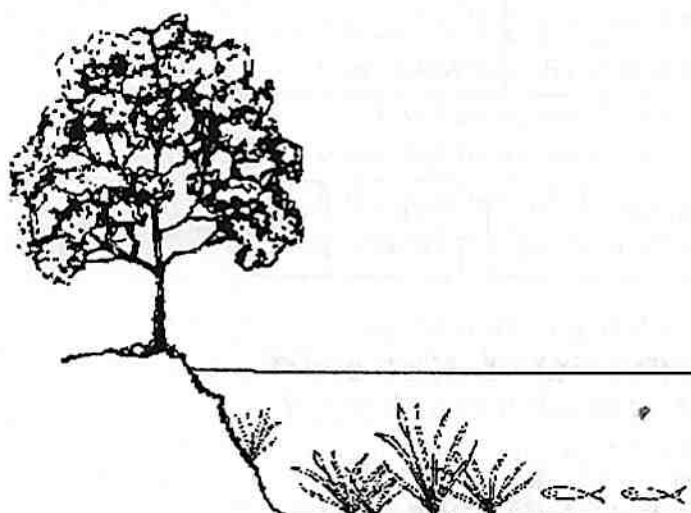
COMMENTS:

- An attractive and active little fish suited to small aquaria



Bug-eyed Goby, Speckled Goby *Redigobius bikolanus*

Meaning of names:	<i>Redigobius</i> - reduced Goby (refers to reduced number of dorsal spines) <i>bikolanus</i> - after Bicol province, Phillipines
Synonyms:	<i>Vaimosa bikolana</i> , <i>Psuedogobius bikolanus</i>
Other species in genus:	15 - 20 species in estuaries and streams of Indo-Australian Archipelago eg., <i>R. chrysosoma</i> , <i>R. balteatus</i>
Description:	Historical: Herre, 1927 Features: Body: compressed cylindrical, pale overlaid with dark spots and blotches. Head: intricate pattern in light brown and grey. 3 - 4 dark patches above anal fins, fins speckled, pelvic fins fused. Size: ♂ to 43mm SL ♀ to 30mm SL Sex differences: ♂ - more robust head and body; colours darker and larger fins. ♀ in condition develops pinkish belly area Colour forms: no significant variation Conservation: status secure



Distribution: from Japan and Phillipines south through Indonesia and New Guinea to northern Australia

Stream: Type: pools in creeks and rivers; land locked populations in L. Wobby (Fraser Is.) and L. Manchester
Depth: 5cm - 3m
Substrate: rock, sand to silt
Flow: variable - often found in pools at base of small waterfalls
Riparian: dry and wet scherophyl forests to mangroves

Shared with: Fish: varied due to wide distribution and salinity tolerances
Invertebrates: various shrimps, crayfish and prawns
Plants: native aquatics especially in freshwater habitats
Other: turtles and even crocodiles (both freshwater and estuarine) in tropics

Water:

Temp	15 - 25°C
pH range	6.0 - 7.8
Hardness	5 - 200
TDS	variable
Salinity	very tolerant

Light	from light to heavy shade
Colour	clear to tannin
Turbidity	slight to nil
SG	FW - marine
Conductivity	

Collecting: Methods: scoop nets in shallows and plants
Transport: hardy but don't overcrowd; keep cool (19 - 22°C); add salt if from FW habitat

AQUARIOLOGY

Aquarium:	Volume	30x20x20cm/pair	Temp	18 - 26°C
	Salts	4gms/l	pH	6.5 - 7.8
	Equipment	filtration	Hardness	0 - 150ppm

Feeding: live and frozen foods are best; fails to thrive on dried foods

Compatibility: Own species: compatible with mixed sizes
Other species: ok with other small and peaceful species
Aquarium plants: not damaged, enjoys plants for cover
Substrate: minor disturbance only; provide rocks and wood for cover
Equipment: not damaged

Hardiness: Lifespan: 3 - 5 years
Jump ability: may jump
Diseases: few
Toxins: resistant to mild pollution
Special problems: requires live foods to thrive

BREEDING In nature: probably spawns in spring with increasing temperature and possibly storms

Conditioning: Separate: not necessary
Feeding: live foods such as blood worms, tubifex, whiteworms etc
Water: regular water changes eg., 1/3 every 7 days
Duration: 3 - 5 weeks
Assessment: roed up ♀ develops rotund pink belly and chooses site

Spawning:	Aquarium:	Volume	2 - 5l	Temp	22 - 26°C
		Salts	?nil	pH	6.5 - 7.2
		Equipment	airstone		

Furnishings:
Ratios:
Trigger factors

Day/Night Ratio	↑ day	Temp Change	↑	Water Change	↑ softer	Water Levels	?	Feeding	↑ live foods
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Act of spawning

Behaviour: spawns in caves so the activity is hidden
Time of day: possibly early morning or late evening
Duration: unknown
Frequency: every 4 - 8 weeks

Eggs: Physical: tiny - less than 0.5mm
Numbers: 1000+ in a patch
Hatching: 7 - 12 days
Fertility: good
Management: leave with parents for some care or remove and place near airstone

Fry: Free swimming: 1 - 2 days
Feeding: difficult - very tiny and usually perish in 4 - 5 days, probably from lack of appropriate food
A few fry occasionally found in backdrop filters of larger tanks and small numbers raised in ponds in summer
Growth rates: unknown
Management: try smallest APR

REFERENCES

Books: 3, 4, 6, 7; Qld Museum: Wildlife of Greater Brisbane; KOumans: The Fishes of the Indo-Australian Archipelago, Vol 10; Inger/Chin: The Freshwater Fishes of North Borneo; Kottelat et al: Freshwater Fishes of Western Indonesia and Sulawesi; Wager/Jackson: The Action Plan for Australian Freshwater Fishes; Herbert/Peeters: Freshwater Fishes of Far North Queensland

COMMENTS

- a very desirable aquarium fish making a great display in a species tank
- breeding technique needs more work - especially feeding fry



Long Tom, Fitzroy Garpike, Freshwater Longtom *Strongylura krefftii*

Meaning of names:

Strongylura - unknown
krefftii - after Krefft (naturalist)

Synonyms:

Belone krefftii, *Stenocaulus krefftii*

Other species in genus:

32 species in family worldwide, only 2 freshwater

Description:

Historical:

Gunther, 1866

Features:

elongated slender body with dorsal and anal fins set well back and opposite, both jaws very elongated and lined with small teeth. Body is silver-beige with iridescent green lateral stripe, some black blotches, fins are clear to yellow, black edge to dorsal and caudal

Size:

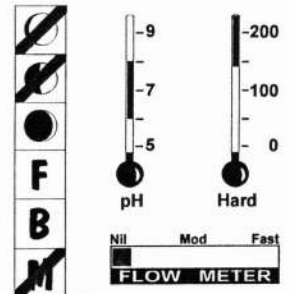
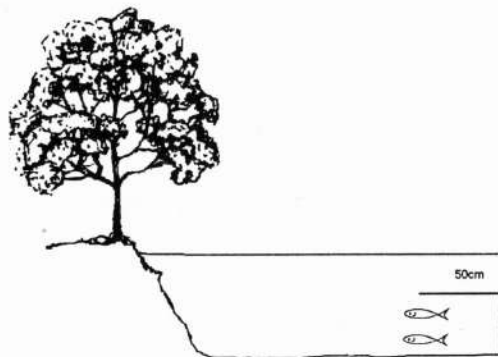
max to 900mm TL usually to 400mm TL (upto 1.5kg)

Sex differences:

sexes are similar. ♂ - usually smaller and may have more black; ♀ less slender

Colour forms:

New Guinea specimens tend to have more black areas



Distribution: across northern Australia from Dawson R in Qld to Fitzroy R in WA, and into PNG

Stream:

Type:

larger rivers and streams, both brackish and fresh

Depth:

rarely less than 1/2 metre

Substrate:

variable

Flow:

backwaters away from flow

Riparian:

likes to lie in wait under overhangs and Pandanus roots

Shared with:

Fish:

a wide variety of fresh and brackish species, usually found in small groups or individually

Invertebrates:

Macrobrachium sp. and yabbies

Plants:

Vallisneria, *Aponogeton* and *Nymphaea*

Other:

-

Water:

Temp	10 - 30°C
pH range	6.0 - 8.0
Hardness	-
TDS	-
Salinity	marine to minimal

Light	prefers shadow
Colour	clear to slightly tannin
Turbidity	often mild turbidity
SG	-
Conductivity	-

Collecting:

Methods:

best collected in soft long-handled dip net, spot lighting is effective

Transport:

add extra salt and keep water cool, use dark container and exclude light during transport. When home transfer to blacked out tank with extra salt, slowly uncover over 1 - 2 days to avoid panic.

AQUARIOLGY

do not like directional flow so avoid power heads

Aquarium:

Volume	180 - 500l
Salts	not necessary
Equipment	ug filter, 6mm gravel

Temp	24 - 26 °C
pH	7.5
Hardness	140 - 350ppm

Feeding:

live foods only, prefers live fish which are swallowed head first. In wild they also take insects

Compatibility:

Own species:	best kept in small groups when young
Other species:	not aggressive unless other fish is bite size. Timid with fast moving species
Aquarium plants:	not damaged
Substrate:	not disturbed
Equipment:	not damaged

Hardiness:

Lifespan:	2 - 10 years at least, if properly cared for
Jump ability:	"Olympic high jump finalist" standard
Diseases & Toxins:	fungal infections from capture injuries, prevent with triple sulfur
Special problems:	susceptible to capture shock but hardy when settled. Needs live food. Tend to damage jaws on tank walls. Skin can be damaged by excess salt. Skeletal remains of the feeder fish are excreted undigested

BREEDING

In nature: not recorded in nature or captivity yet, maybe similar to marine longtoms (*S. notata*) usually from September - December. R. Wager has collected running ripe ♀ in April

Conditioning:

Separate:	probably not necessary
Feeding:	small live fish
Water:	-
Duration:	2 - 3 months
Assessment:	probably sexually mature at 200mm, ♀ plumper

Spawning:

Aquarium:

Volume	500l
Salts	0
Equipment	ug filter

Temp	26 °C
pH	7.6

Furnishings:

open water, rocks and plants in background

Ratios:

in nature 10 - 12 ♂ with 1 - 2 ♀

Trigger factors

Day/Night Ratio	day	Temp Change	26 °C	Water Change	-	Water Levels	full	Feeding	live fish
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Act of spawning

Behaviour:	rub bodies together while dropping clusters of eggs
Time of day:	late morning to late afternoon
Duration:	upto 3 hours usually 30 - 60 minutes
Frequency:	every 2 - 3 weeks for 6 - 10 weeks then break for 2 - 3 months
Other:	two ripe ♀ will spawn without a ♂ present

Eggs:

Physical:	2.5 - 4mm adhesive with tendrils, translucent gold with black thread
Numbers:	15 - 20 in each cluster, usually 2 or more clusters per day
Hatching:	1 - 5 weeks at 24°C (<i>S. notata</i>), clusters float free
Management:	no parental care observed

Fry:

Free swimming:	-
Feeding:	-
Growth rates:	-
Management:	-

OBSERVATION

K. Gough has observed juveniles to 25mm with yolk sac

S. notata larvae stages have increased pigment and a stage where the lower jaw elongates before the upper jaw

REFERENCES

Books:	2, 3, 4, 5, 7, 8, 11, 14, 15, Leis JM & Trnski T: The larvae of Indo-Pacific Shorefishes
Journals:	A (p182 - 187)
Personal:	R. Wager: survey Callide Dam, Qld - 1992; K. Gough: collection of juveniles Townsville area; W. Murfett: St Kilda Aquarium, spawning and keeping experiences

COMMENTS

- An unusual and interesting fish that is a challenge to keep
- The breeding habits of this fish need more study
- The maximum size of this species in the wild is not universally agreed upon



Fly River Garfish *Zenarchopterus novaeguineae*

Meaning of Names:	Ze- fish, <i>archo</i> - chief, <i>pterus</i> - wing or fin
Synonyms:	<i>Hemiramphus novaeguineae</i>
Other Species in Genus:	Indo-Pacific genus of about 12 species in brackish and freshwater habitats. 7 species in PNG and perhaps 3 in Northern Australia.
Description:	Historical: Genus <i>Zenarchopterus</i> by Gill in 1864; species described by Weber in 1913 Features: Elongated cylindrical fish with dorsal and anal fins set well to the rear; upper jaw small with lower extended into a rod-like beak; caudal rounded and both caudal and anal dusky; back is olive and white ventrally separated by silver midlateral stripe. Size: to 170mm SL Sex differences: males more bull-headed with taller dorsal rays and more colour. Colour forms: no variation recorded Cons. status: secure in PNG; uncertain in Australia (perhaps some populations may be vulnerable)
Distribution:	In PNG widespread in southern rivers such as Fly, Lorentz and Laloki. In Australia in the upper Wenlock and perhaps Archer rivers.
Stream:	Type: Brackish and freshwater streams and billabongs often hundreds of kilometres upstream. Depth: - Substrate: varies - billabongs may be rocky or sandy and estuaries silty Flow: from tidal to still Light: open sun with some overhanging vegetation Riparian: varies from mangroves to eucalypt and melaleuca scrub
Shared with:	Fish: a wide variety of estuarine and freshwater tropical species from Blue-eyes to Saratoga Invertebrates: <i>Macrobrachium</i> sp Plants: includes <i>Myriophyllum</i> sp., <i>Vallisneria</i> sp., and <i>Nymphaeas</i> Other: includes Tortoises and crocodiles
Water:	Temp: Usually high from 28°C upwards pH: alkaline conditions preferred e.g. 7.4 - 8+ Hardness: high Salinity: from full seawater downwards Colour & Turb: mild turbidity
Collecting:	Methods: Capture carefully in a soft net and try to avoid damage to scales and beak. Add salt and antibacterial agent to capture water. Keep dark to avoid panic Transport: fish appear to travel surprisingly well if not damaged at capture

AQUARIOLGY

Aquarium:	Volume:	5 - 6 specimens will happily occupy a 120cm aquarium
	Temp:	25°C upwards to about 30°C
	pH:	7.4 - 8
	Hardness:	200 ppm+ and salts from 1tsp/g upwards
	Equipment:	undergravel filter and heater
Feeding:	Very easy to care for; happily takes all floating foods including flake; try to keep a high vegetable content. Outside they are able to include surface insects in diet as well.	
Compatibility:	Own species:	Peaceful towards own species - perhaps males may fight when breeding (half-beaks are a species attracting bets for fighting in SE Asia)
	Other species:	peaceful towards other fish; may eat the surface swimming fry of other species.
	Aquarium plants:	not damaged
	Substrate:	not disturbed
	Equipment:	not damaged
Hardiness:	Lifespan:	Not much information recorded but so far going well after 6 months
	Jump ability:	renowned jumpers in the wild especially when trying to catch them with seine nets: often skim along above the surface with just the bottom of the tail in the water.
	Diseases:	hardy except for capture shock and fungus from damage
	Toxins:	-
	Special problems:	short gut, so need to be fed frequently to keep them in good condition. This is one fish that an automatic feeder may be a good idea for
BREEDING	In nature:	Most Garfish breed in the sea but some populations in impoundments are self-sustaining. Eggs either float on the surface or are attached to aquatic plants by sticky threads. High temperatures (above 28°C) seem necessary. Fry have symmetrical jaws initially and the lower one elongates with maturity.
Conditioning:	Separate:	-
	Feeding:	-
	Water:	-
	Duration:	-
	Assessment:	-
Spawning:	Furnishings:	-
	Ratios:	-
	Trigger factors:	-
	Behaviour:	-
	Time of day:	-
Eggs:	Physical:	-
	Numbers:	-
	Hatching:	-
	Fertility:	-
	Management:	-
Fry:	Free swimming:	-
	Feeding:	-
	Growth rates:	-
	Management:	-
	Special problems:	-

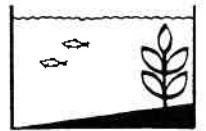
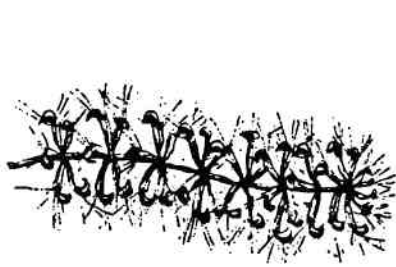
NOT KNOWN TO HAVE BEEN BRED IN CAPTIVITY

COMMENTS:

- This is an unusual little aquarium oddity which has surprisingly been quite easy to keep in captivity. A related species was kept and bred for several generations in Europe.
- There was some thoughts that some species are live bearers and that variation in the anal fins of the males of the various species was for sperm transfer.
- Probably prefers sufficient surface area to patrol but appear to take well to captivity and certainly enjoy pond situations in warmer areas or summer months.

REFERENCES

Allen GR: Field Guide to the Freshwater Fishes of New Guinea, 1991; Herbert B & Peeters J: Freshwater Fishes of Far North Queensland, 1995; Munro ISR: The Fishes of New Guinea, 1967



WATERWHEEL PLANT

Aldrovanda vesiculosa

Droceraceae

Meaning of Name: *Aldrovanda* - patronym for Ulisse Aldrovandi
vesiculosa - bubbles or blisters
 Synonyms: waterbug trap
 Other Species in Genus: nil

DESCRIPTION

Historical: Aldrovanda was named by Monti, an Italian botanist in 1747 after Ulisse Aldrovandi an other Italian botanist
 Features: fully aquatic rootless free floating aquatic carnivorous plant. Small hinged traps arranged in whorls of about 8 around a central stem. Supplementary nutrition from trapped aquatic organisms.
 Size: 2-3cm across and up to 30cm long
 Variations: Australian form apparently bigger than others

DISTRIBUTION

Australia: Western Australia, Northern Territory, Queensland and northern New South Wales
 Other: India, Africa, East Europe, Central Europe and Japan
 Conservation Status: rare and endangered in Europe, difficult to find everywhere else

COLLECTING

Methods: find it first - it tends to be inconspicuous
 Transport: carry in water from habitat; quite fragile and dries easily
 Problems: dies off quickly when conditions are not correct

HABITAT

Type: soft neutral to acidic waters with much decaying plant matter - typically swamps and billabongs
Substrate: sand or mud (grows in water column)
Flow: still waters
Depth: 2cm to 2m
Water Parameters:

pH	Hardness	Salinity	Temp	Turbidity
5.0 - 7.0	10ppm	0	17 - 30	0-heavy

Light: normally found under shade of spike rush, melaleucas, pandanus or swamp box. Seems to go red then disintegrate in full Northern Territory sun
Seasonality: not in Northern Territory, reported to form turions which sink to bottom when water temperature falls below 17°C
Associated Aquatics: *Blyxa* sp., *Nymphaea* sp., *Eleocharis* sp. (spike rush), *Utricularia* spp. (bladder worts), *Dentella dioeca* and various grasses
Riparian: *Melaleuca* sp. (Paperbarks), *Lophostemon* sp. (swamp box), *Pandanus spiralis* (screw palm), various grasses

PROPAGATION

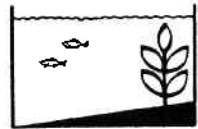
In Nature: from seed
Cultivation: vegetatively and from seed
Compatibility: seems to grow better when grown among actively growing aquatic plants and near a carbon dioxide source
Comments: highly sought after plant by carnivorous plant enthusiasts around the world. Difficult to grow unless conditions are suitable, it seems to have a narrow set of water quality parameters where it will thrive.

Cultivation:	Substrate	Water	Depth	CO2	Light	Fertilizer
Ponds:	mud or sand	soft/neutral	>2cm	not required	70% shade	yes - lightly
Aquaria:	mud or sand	soft/neutral	>2cm	15mg/l	-	yes - lightly
Greenhouse:	-	-	-	-	-	-
Hydroponics:	-	-	-	-	-	-
Tissue Culture:	-	-	-	-	-	-

REFERENCES

Literature:

- GR Sainty and SWL Jacobs: Waterplants of New South Wales; Water Resources Commission of New South Wales
- Adrian Slack: Carnivorous plants; Doubleday
- Gordon Cheers: A guide to the Carnivorous plants of the world; Angus and Robinson
- Rica Frickson: Plants of Prey; University of Western Australia Press
- Jiri Stodola: Encyclopedia of Water Plants; TFH
- Helen Aston: Aquatic Plants of Australia; Melbourne University Press



BLYXA

Blyxa spp. - *B. aubertii* (vars *aubertii* & *echinosperma*); *B. octandra*
HYDROCHARITACEAE

Meaning of Name:

Blyxa - greek for flow
aubertii - after Aubert du Petit Thouars
echino - spiny; *sperma* - seed
octandra - for 8 stamens (actually 9)

Synonyms:

(Generic) *Diplosiphon*, *Hydrotrophus*, *Enhydrias*, *Saivala*, *Blyxopsis*, *Chymene*

Other Species in Genus:

All 11 species aquatic, 3 species in Australia 5 in PNG

DESCRIPTION

Historical:

Du Petit Thouars ex. L.C. Richard, 1814, Madagascar

Features:

Submerse:

Australian species cannot be differentiated by vegetative characters alone, all have leaves arranged radially in a rosette from the rhizome. Typically long thin pointed leaves similar to *Vallisneria* in shape. Correct identification only possible with seeds, each has a distinctive seed shape.

Emerse:

tips of flowers sometimes seen at surface, otherwise entirely submerse

Size:

leaves 10 - 50cm, 4 - 12mm wide and tapering to a point

Variations:

usually very pale green colour; in full sun young leaves can develop a crimson hue, particularly in *B. octandra*

DISTRIBUTION

Australia:

In Australia found throughout coastal Queensland and the Northern Territory. *B. octandra* is not in southern or central Queensland. The common local species in SE Queensland is *B. aubertii* var *aubertii*.

Other:

Genus found throughout Africa and SE Asia as well. Established and local in some parts of North America.

Conservation Status:

becoming uncommon in developed areas

COLLECTING

Methods:

rhizomes gently separated from substrate, plant wrapped in damp newspaper, sealed in a plastic bag and kept cool in a styrofoam box.

Transport:

keep cool and limit duration to less than four days

Problems:

Soft and damages easily, suffers from temperature shock upon transferral. Large specimens almost impossible to replant because of extreme bouyancy

HABITAT

Type: variety of habitats:- sandy streams, wetlands, clay-based farm dams but not in large water storages

Substrate: sandy to clay

Flow: still to medium

Depth: less than 1m - deeper if water transparency high

Water Parameters:

pH	Hardness	Salinity	Temp	Turbidity
5.5 - 7.2	0 - 100	0	15 - 35	0 - mild

Light: Open sun preferred

Seasonality: habitat regularly dries out in summer, plant returns by seed after wet season

Associated Aquatics: *Aponogetons*, *Nymphaea*, *Vallisneria*, *Limnophila*, *Najas*, *Potamogeton* etc

Riparian: Sparse to very dense

PROPAGATION

In Nature: small delicate and inconspicuous flowers are projected above the water surface in Spring/ Summer and are pollinated by small insects. In *B. aubertii* var. *aubertii* where the water is too deep flowers will self pollinate and set seed without opening at the surface. Seeds are then distributed when the flower rots, floating for a couple of days then sinking. For best results seeds require full sun and a muddy substrate. Mature plants may divide at the rhizome.

Compatibility: compatible with most other plants that do not shade it too much. Avoid aggressive, boisterous, herbivorous or digging fish. Allelopathy unknown.

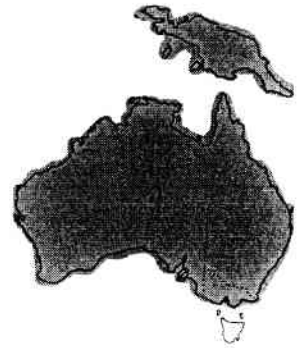
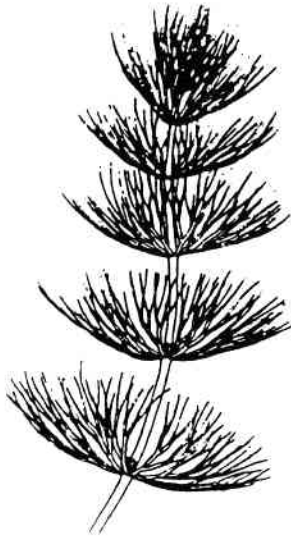
Comments: an extremely attractive aquarium plant with its popularity limited by availability, tenderness and necessity to grow from seed. Aquarium literature offers conflicting advice on culture.

Cultivation:	Substrate	Water	Depth	CO2	Light	Fertilizer
Ponds:	mud/clay	soft/tap	to 1m	not required	full sun	enhances
Aquaria:	mud/fine sand	soft	to ½m	can help	daylight fluoro	enhances
Greenhouse:	mud/sand	soft/tap	to ½m	not required	sun	enhances
Hydroponics:	-	-	-	-	-	-
Tissue Culture:	-	-	-	-	-	-

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Literature:

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Hornwort, Foxtail, Coontail

Ceratophyllum demersum

Meaning of Name:	<i>Cerato</i> - hour <i>phyllum</i> - leaf <i>demersum</i> - of the sea
Synonyms:	various erroneous species names; <i>Dichotophyllum demersum</i>
Other Species in Genus:	at least 6 species worldwide, all submerged aquatics; <i>C. submersum</i> , <i>C. echinatum</i>

DESCRIPTION

Historical:	First described by Linnaeus in 1753
Features:	
Submerge:	free growing, non-rooting perennial with branching stem. Leaves brittle, dark green and feathery, covered in small "horns" (hence the common name - Hornwort), and branching 2-4 times. Inconspicuous male and female flowers are water pollinated. <i>C. submersum</i> is much more finely divided.
Emerse:	does not have an emerge form
Size:	stems to 2m in length; whorls to 6cm in diameter
Variations:	shades of green vary more with light rather than locality

DISTRIBUTION

Australia:	All mainland states and New Guinea
Other:	worldwide cosmopolitan species found in most temperate and tropical regions
Conservation Status:	widespread and secure

COLLECTING

Methods:	easily collected from the wild, pinch out healthy green tips and wash off algae, dirt, snails and other pests.
Transport:	seal in plastic bags and keep cool in styrofoam cooler
Problems:	make sure all chlorine is gone from aquarium water. Susceptible to high temperatures

HABITAT

Type:	swamps, pools and lagoons
Substrate:	immaterial but rarely in rocky areas
Flow:	prefers still, stagnant or slow moving waters
Depth:	mostly found in shallows
Water Parameters:	prefers harder alkaline water with <i>C. demersum</i> preferring temperate and <i>C. submersum</i> preferring tropical conditions
Light:	often under shade
Seasonality:	perennial
Associated Aquatics:	numerous - varies with location but often under the shade of the floating leaves of waterlilies
Riparian:	varies

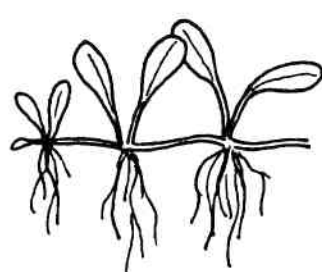
PROPAGATION

In Nature:	mainly by fragmentation, occasionally by seed and also in cooler areas by "turion" formation i.e., water buds of close packed leaves. Although modified leaves may anchor to the substrate nutrition is essentially via the water column so regular fertilization helps – especially nitrogenous compounds.
Compatibility:	produces allelopathic substances to help control blue-green algae blooms by chemical inhibition
Comments:	can grow so profusely that it becomes a weed species in drainage channels and hydro-electric stations. Useful in aquaria as backdrop and surface plant to cut down light, or act as a refuge for spawn or fry. Useful in ponds to take up excess nutrients and compete with algae.

REFERENCES

Literature:

- Aston H I: (1973) Aquatic Plants of Australia, Melbourne University Press
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D.P.



GLOSSOSTIGMA or SMALL MUDMAT

Glossostigma elatinoides

Scrophulariaceae

Meaning of Name:

Glosso - Greek for tongue

stigma - refers to tongue-like stigma

elatinoides - resembling Elatine (a similar aquatic plant)

Synonyms:

unknown

Other Species in Genus:

G diandra - occurs down through the middle of the continent from Northern Territory to South Australia; *G drummondii*. There are six species worldwide including Africa and India.

DESCRIPTION

Historical:

(Bentham) ex J.D. Hook

Features - Submerse:

very small creeping plant with spatulate leaves of bright green arranged in opposite pairs along stem. Plant roots at nodes and can form dense mats.

- Emerse:

Growth slightly different with more elongate leaf shape and preponderance of short, upright stems

Size:

leaves vary from 0.7cm to 2.0cm long

Variations:

not known

DISTRIBUTION

Australia:

Found in New South Wales, Victoria and Tasmania but may have more extensive range.

Other:

Both species also found in New Zealand.

Conservation Status:

Stated as locally common but patchy occurrence over range. Author has found plant only in one small area of Southern NSW

COLLECTING

Methods:

carefully remove pieces of runner from substrate (usually mud), keep moist in plastic bag or other sealed container.

Transport:

travels well with reasonable care

Problems:

no problems, but avoid drying out (as with most other aquatics!)

HABITAT

Type: farm dams, particularly muddy margins, swamps, lagoons especially in the higher country
Substrate: clay or silt/gravel
Flow: still to none
Depth: 10cm or less

Water Parameters:

pH	Hardness	Salinity	Temp	Turbidity
6.0 - 7.5	0 - 100	0	10 - 35	0-heavy

Light: full sun to light shade
Seasonality: may die down in summer (drying out)
Associated Aquatics: *Crassula helmsii*, *Chava*, *Eleocharis sphacelata*, *Elatine gratioloides* etc
Riparian: low growing grasses, sedges also thick spike rushes

PROPAGATION

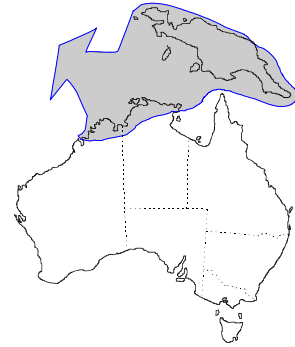
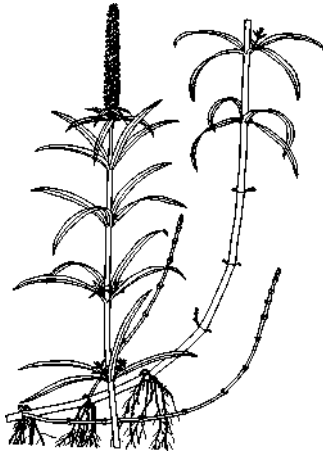
In Nature: small whitish flowers (0.5cm across) probably pollinated by insects
Cultivation: in cultivation easiest method is division of runners, take cuttings with at least 2-3 nodes.
Compatibility: needs light position in aquarium or pond. No diggers or plant eaters please!
Comments: delightful foreground carpeting plant. Seems easy to grow given good light and fertile substrate. See T Amano's book for inspiration!

Cultivation:	Substrate	Water	Depth	CO2	Light	Fertilizer
Ponds:	mud/gravel	tapwater	to 40cm	not required	full sun	not required
Aquaria:	sand/gravel	tapwater	to 30-40cm	useful	triphosphor/ metal halide	useful
Greenhouse:	mud/gravel	tapwater	0 to 30cm	not required	sun	useful
Hydroponics:	-	-	-	-	-	-
Tissue Culture:	-	-	-	-	-	-

REFERENCES

Literature:

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- Cook CDK: Aquatic Plant Book - 1990



Star Rotala, Eusteralis, Dysophylla

Pogostemon stellatus stellatus
Labiatae

Meaning of Name:	<i>Pogo</i> - (Gr) beard <i>stemon</i> - (Gr) crown, referring to flowers <i>stellatus</i> - star shaped, refers to whorls of leaves
Synonyms:	<i>Dysophylla stellata</i> , <i>D. verticillata</i> , <i>Eusteralis stellata</i>
Other Species in Genus:	<i>P. stellatus roxburgianus</i> – the only difference between the 2 subspecies seems to be in the number of leaves at each whorl and their width. In <i>roxburgianus</i> there are only 4 leaves per whorl and upto 1cm wide

DESCRIPTION

Historical:	First described by H Keng in 1978
Features:	
Submerge:	grows two to three meters in flowing water, when wet season flow ceases growing point breaks through the surface and flowers produced
Emerse:	flowers: terminal cylindrical spike of pinkish-purple colour
Size:	10cm – 1m high
Variations:	colour of submerge leaves can be light green above with pale mauve undersides to deep maroon above and purple undersides

DISTRIBUTION

Australia:	north-west of Western Australia; Darwin district, Adelaide River district and Arnhem Land in the NT
Other:	Indonesia, PNG, Malaysia, Phillippines, India, South China and Japan
Conservation Status:	locally abundant in the NT

COLLECTING

Methods:	clip submerge cuttings just below a root, try to collect while creeks still flowing for highest quality specimens, try to choose a variety of leaf shapes and colours
Transport:	seal in plastic bags with no added water after washing off any dirt, algae or snails, then keep cool in a styrofoam box
Problems:	cuttings without roots may be hard to strike, soft tops start rotting and losing leaves after two to three days

HABITAT

Type:	open wet places, grasslands, swamps, lake beds, flowing creeks and rivers growing on margins or in shallow water to one meter depth
Substrate:	sand or mud
Flow:	still or fast flowing water, fast water tends to maintain the submers state
Depth:	0 – 1m
Water Parameters:	prefers clear to slightly tannin stained waters, soft and neutral, with a preferred temperature range of 22°C – 30°C
Light:	partial shade to full sun
Seasonality:	mostly annual but sometimes perennial
Associated Aquatics:	<i>Aponogeton elongatus</i> , <i>Limnophila australis</i> , <i>Myriophyllum sp.</i> , <i>Hygrophila angustifolia</i> , <i>Staurogyne leptocaulis</i> , <i>Nymphaea sp.</i> , <i>Nymphoides sp.</i> , <i>Blyxa auberti</i> , <i>Eriocaulin spp.</i> , <i>Triglochin sp.</i> , <i>Xyris sp.</i> , various grasses
Riparian:	<i>Melaleuca spp.</i> , <i>Pandanus spiralis</i> , <i>Pandanus aquatica</i> , <i>Barringtonia acutangula</i> , various grasses

PROPAGATION

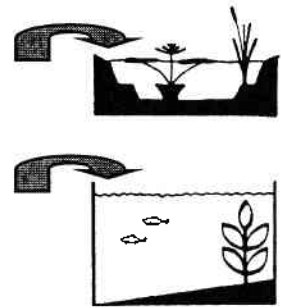
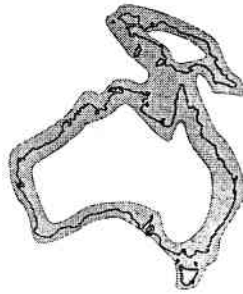
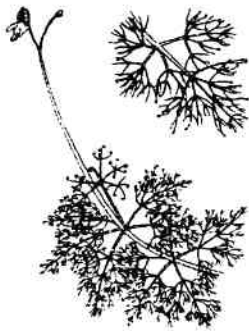
In Nature:	grows from seed each year in places that dry completely; vegetatively from stalks of mature plants in places that are wet all year
Cultivation:	vegetatively or from seed – cuttings may be difficult to root
Compatibility:	prefers not to be shaded if submerge; allelopathy unknown
Hydroponics:	likely to be quite successful for the emerse state
Tissue Culture:	successfully used by Pisces Enterprises at one stage to produce multiple stemmed cuttings but not commercial
Comments:	physical variability in the two subspecies which often occur together makes this a very desirable but challenging plant to grow in aquaria. Requires soft water, substrate fertility, good light and CO2 seem to be needed for consistent success. Pond culture in the tropics works well. It can become quite spindly and fragile if not given enough CO2.

REFERENCES

Cultivation:	Substrate	Water	Depth	CO2	Light	Fertilizer
Ponds:	loam and laterite clay	soft	0 – 2m	15mg/l	full sun – shade	from fish manure
Aquaria:	sand and laterite clay	soft – medium hard	-	yes	bright	PMDD
Greenhouse: emerse	garden soil and loam	mist spraying regularly each day	-	no, already in the atmosphere	70% shade cloth	osmocote

Literature:

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BLADDERWORT

Utricularia spp. (7 aquatic Australian species) *U. aurea*, *U. australis*, *U. biloba*,
U. gibba ssp *exoleta*, *U. stellaris*, *U. tubulata*, *U. sp.*

LENTIBULARIACEAE

Meaning of Name: *utriculus* - From the Latin meaning bladder or sac
Other Species in Genus: over 250 species described, 40 species in Australia
only 7 or 8 can be regarded as truly aquatic

DESCRIPTION

Historical: Linnaeus, 1753
Features - Submerse: Aquatic species submerged, free-floating with no floating or emergent leaves. Plant form long, occasionally branching stems or stolons which intertwine to form loose mats. Leaves submerged, root-like, branching into numerous fine segments interspersed with sub-globular or ovoid bladders, transparent, and flattened from the sides. Submerged foliage may be confused with *Ceratophyllum demersum* or *Myriophyllum* spp.
- Emerse: Terrestrial species evident by small olive-green oval-shaped leaves up to 8cm in length, semi-erect, or lying along the ground
Size: Stems up to 2.5m long, leaves 0.5-1.5cm long and bladders 1-2.5mm long
Variations: Aquatic species vary with respect to the size and arrangement of foliage and traps with some species resembling roughly intertwined amorphous floating mats and others forming branching stems closely resembling *Myriophyllum*

DISTRIBUTION

Australia: Throughout much of coastal Australia including Tasmania
Other: Representatives of this genus can be found on every continent of the world with the exception of Antarctica
Conservation Status: Distribution affected by wetlands clearing in many parts of the world

COLLECTING

Methods: Aquatic species do not produce roots, but may grow tightly entangled with other plants or snags. Plants can be gently lifted from the water and entangled stems cut free to facilitate easy removal
Transport: Plastic bag or bucket
Problems: Transports well

HABITAT

Type: river backwaters, ponds, lakes and coastal swamps and lagoons
Substrate: sandy to muddy silt
Flow: still
Depth: up to 2m

Water Parameters:

pH	Hardness	Salinity	Temp	Turbidity
5.0 - 7.0	0 - 50	0	15 - 35	20 - 100ppm

Light: full sunlight to semi-shaded positions
Seasonality: produces turions, or "winter-buds" at the end of slender branches. These turions allow for survival of the plant throughout periods of unfavourable environmental conditions
Associated Aquatics: *Eleocharis*, *Philydrum*, *Nymphoides*, *Nymphaea*
Riparian: *Melaleuca*

PROPAGATION

In Nature: Inflorescence an emergent raceme of 2-8 flowers on slender erect pedicels up to 15cm long. Produced between April and November, flowers may vary in colour from bright yellow to whitish-blue and purple; seeds often not produced. Mature plants may reproduce by fragmentation.
Compatibility: incompatible with finely branching plants which may entangle its foliage, also easily fouled by filamentous algae.
Comments: not particularly well suited to aquariums, however an interesting plant to grow in tubs and ponds. Small tubs to 60cm in depth should be prepared with a 2cm layer of peat moss covered by a 1cm layer of washed river sand before adding water. The plants should not be weighted down, but left to float freely in the container. A few caps of pond water containing planktonic invertebrates can be added to the tub occasionally to supplement the plant's food supply. Will flower readily during spring and summer.

Cultivation:	Substrate	Water	Depth	HF CO2	Light	Fertilizer
Ponds:	peat/sand	soft	to 1m	not required	semi-shaded	not required
Aquaria:	peat/sand	soft	to 60cm	not required	fluorescent	not required
Greenhouse:	peat/sand	soft	to 60cm	not required	semi-shaded	not required
Hydroponics:	-	-	-	-	-	-
Tissue Culture:	-	-	-	-	-	-

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