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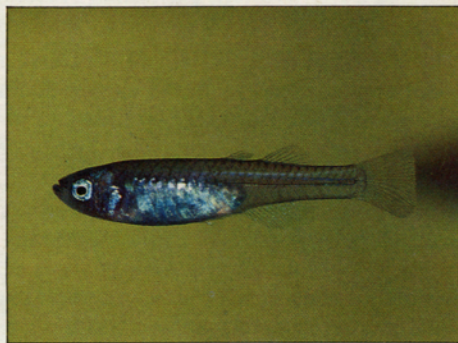
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FIGURE 1: *Scaturiginichthys vermeilipinnis*
MALE



x2 magnification
FEMALE

photos Neil Armstrong

A REDFINNED BLUE-EYE, A NEW SPECIES AND GENUS OF THE FAMILY PSEUDOMUGILIDAE FROM CENTRAL WESTERN QUEENSLAND

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Introduction

Blue-eyes have only been known from coastal regions, in freshwater streams, rivers and estuaries. The recent discovery by one of us (P.U.) of a new species of blue-eye, is of some significance as it represents a new species, genus and a new subfamily from inland aquifers of the Lake Eyre Drainage.

The region this fish inhabits, is generally considered arid, with low rainfall but with a number of permanent springs fed by the Artesian Basin waters. The new species, *Scaturiginichthys vermeilipinnis*, was discovered in very shallow springs at Edgbaston, a grazing property in the Aramac district of central western Queensland. This very small fish, not more than about 26mm total length, appears to be presently restricted to 5 of 22 visited pools on the property which runs cattle and sheep. ...

Materials and Methods

Specimens were collected for identification from five pools at Edgbaston Station, Queensland (22°44'S, 145°25'E) in December, 1990. A number of these was preserved, others were taken for breeding studies and for electrophoresis. The specimens were collected in very shallow water with dip nets.

The collected fish were counted and measured with the help of electronic digital calipers; the data was fed directly into a computer for processing using a programme written by David Crowley of Macquarie University. Standard procedures were used as outlined in Saeed *et al.* (1989). Table 1 gives details of measurements and counts for the holotype and 30 paratypes. Means, ranges and standard deviations are given for all morphometric and meristic values. Fin counts on unstained specimens other than the holotype were difficult to obtain because of the very small size and were taken from 22 macerated and stained specimens which were also used to study osteology.

Type material has been deposited in the following institutions:

AMS — Australian Museum, Sydney.

QM — Queensland Museum, Brisbane.

WAM — Western Australian Museum, Perth.

Description

SCATURIGINICHTHYINAE new sub-family.

Diagnosis: Shares all of the unique diagnostic characters of the family Pseudomugilidae as listed by Saeed *et al.* (1989): absence of mesethmoid; presence of only one anterior infraorbital (lachrymal); and articular bone equal to the height of dentary bone.

It is distinguished from all other members of the family Pseudomugilidae by the following: there are 5 branchiostegal rays (6 in others). The gill rakers are very reduced (well developed, long or short in others). There is no interhyal bone. The cleithrum and scapular bones are elongated, resulting in a lower position of the pectoral fin on the side of the body.

The species representing this subfamily is easily recognised by the emarginate or rounded caudal fin and reduced ventral fins, with fewer than 5 rays. The ventrals may occasionally be absent altogether.

SCATURIGINICHTHYS new genus

Type species: *Scaturiginichthys vermeilipinnis*

Diagnosis: *Scaturiginichthys* is monotypic. See diagnosis for the subfamily.

Etymology: *Scaturiginis* — Latin for bubbling spring, full of springs, referring to the habitat where these fish are found; *ichthys*, pertaining to a fish.

Scaturiginichthys vermeilipinnis new species



Table 1. Measurements (expressed as proportions) and counts for the holotype and 30 paratypes of *Scaturiginichthys vermeilipinnis*. Apart from the holotypes, the finray and vertebral counts were taken from the macerated specimens. The figures are expressed as means, ranges and standard deviations of each of the attributes. Abbreviations: Std. Dev., standard deviation; Pec. L., Pectoral length; H. max., maximum body depth; Width max., maximum body width; H. min., least body depth; Pec-anus., distance from dorsal origin of pectoral fins to anus; Sn., snout; OD1., origin of first dorsal fin; OD2., origin of second

dorsal; OV., origin of ventral; TV., tips of ventrals; OA., origin of anal; TA., intersection of last ray of anal; T Pec., tips of pectoral; Interorb., interorbital bone width; Postorb., postorbital length; Caud. ped., caudal peduncle length; Premax., premaxillary bone; Posit., position.

Character	Holotype	30 Paratypes		
	(SL)	Mean	Range	Std. Dev.
Standard Length	16.5	14.8	(12.8-20.0)	1.45
Measurements				
In (SL)				
Head	3.7	3.6	(3.3-4.0)	0.13
Pec. L.	6.8	6.2	(5.0-9.0)	0.80
H. max	4.3	4.6	(4.0-6.7)	0.50
Width max	6.4	6.0	(4.8-7.9)	0.53
H. min	7.3	8.0	(5.9-9.9)	0.78
Pec-anus	3.6	3.2	(1.8-3.9)	0.44
Sn-OD1	1.9	1.8	(1.5-1.9)	0.09
Sn-OD2	1.5	1.5	(1.3-1.6)	0.06
Sn-OV	2.1	2.0	(1.8-2.2)	0.08
Sn-TV	1.8	1.8	(1.5-1.9)	0.07
Sn-OA	1.6	1.6	(1.4-1.8)	0.08
Sn-TA	1.3	1.3	(1.1-1.4)	0.06
In Head				
Eye	3.0	3.0	(2.6-3.6)	0.23
Interorb	2.2	2.6	(1.2-3.5)	0.51
Postorb	2.2	2.3	(1.9-2.9)	0.22
Caud. ped	1.3	1.2	(1.0-1.9)	0.19
In Eye				
Snout	1.70	1.6	(1.2-2.0)	0.19
Premax.	1.10	1.1	(0.9-1.4)	0.12
Premax process	3.10	3.1	(2.0-4.1)	0.62
Lips/in premax	3.40	4.2	(2.6-5.4)	0.78
Counts				
Scales				
Midlateral	26.0	26.1	(24.0-28.0)	0.91
Transverse	6.0	6.1	(6.0-7.5)	0.32
Predorsal	13.0	14.1	(12.0-16.0)	0.96
Interdorsal	3.0	2.3	(2.0-3.0)	0.46
Fin Rays				
First Dorsal	4.0	4.0	(3.0-4.0)	0.18
Second Dorsal	6.0	6.0	(6.0-7.0)	0.18
Anal	10.0	9.7	(6.0-10.0)	0.81
Pectoral	10.0	10.9	(10.0-11.0)	0.30
Other attributes				
Vertebrae	27.0	26.9	(26.0-27.0)	0.30
Gill rakers	11.0	10.70	(9.0-12.0)	0.57
Posit. anus	F2.0	F1.30	(F0.5-2.0)	0.49
OD1 to TV	F3.0	F0.50	(F0.0-1.5)	0.60
OD1 to T Pec.	B3.0	B3.40	(B2.0-7.0)	1.06
OV to T Pec.	B1.0	B0.95	(B1.0-3.0)	1.30

... a redefined blue-eye ...

Holotype: AMS I.31189-001, 16.5mm standard length (SL), collected from a shallow pool (Fig. 2), 18 December, 1990, about 1.5km east of the homestead, Edgbaston, NW of Aramac, Central Western Queensland, 22°44'S, 145°25'E. Water clear, bottom clay with some vegetation (unidentified). Water temperature 26°C. Air temperature 28°C. Salinity of water 0. Collected with dip nets by P.U., W.I. and B.S.

Paratypes: AMS I.31189-002 (30 specimens, size range 12.8-20.00 mm SL); AMS I.31189-003 (20 alizarin specimens, unmeasured); QM I.26965 (15, 9.9-15.2mm SL); WAM P.30179-001 (19, 12.3-16.5mm SL), data for all paratypes as for the holotype.

Other material examined

Only the AMS specimens were used for measurements, counts and osteology. All other specimens collected from Edgbaston were examined but not included in the data.

Diagnosis: As for the subfamily and genus.

Description

Morphometrics: Small fish (20mm SL maximum) Head 3.6 (3.3-4.0); maximum body depth 4.6 (4.0-6.7); origin of pectoral to anus 3.2 (1.8-3.9), snout to origin of 1st dorsal fin 1.8 (1.5-1.9); snout to origin of 2nd dorsal fin 1.5 (1.3-1.6); all in SL. Eye 3.0 (2.6-3.6); interorbital 2.6 (1.2-3.5); postorbital 2.3 (1.9-2.9), all in head. Snout 1.6 (1.2-2.0); premaxilla 1.1 (0.9-1.4); dorsal process of premaxilla 3.1 (2.0-4.1) all in eye.

Meristics: Scales — Midlateral 26.1 (24.0-28.0); transverse scales usually 2 above midlateral band, 1 covering and 3 scales below midlateral band; interdorsal scales 2.3 (2.0-3.0). Vertebrae 26.9 (26-27).

Fins — 1st dorsal 4.0 (3-4); 2nd dorsal 6.0 (6-7); anal 9.7 (6-10); pectoral 10.9 (10-11). Other counts — gill rakers 10.7 (9-12); Position of anus from 0 to 2 scales in front of tips of ventral fins. Origin of 1st dorsal fin from 2.5-7.0 scales behind tips of pelvic fins. Dorsal, anal and pectoral fins with single spine preceding soft rays.



FIGURE 2: Pool 1 – Holotype habitat

photo Walter Ivanstovf

Unique amongst blue-eyes in possessing less than five rays in ventral fins; from 4 to total absence on one side or both sides.

General appearance: Mouth oblique and large (relative to the size of fish), sharp teeth visible in lower jaw. Pectoral fins low on body when compared to other blue-eyes. Caudal fin emarginate. Fins rounded and not projected into filaments in either sex. Body scales large, almost round and circuli complete. Scales on cheek bones very obvious.

Color: live fish silvery to translucent with swimbladder obvious. Body dusky above midlateral scales. Midlateral band apparent as iridescent sheen to about halfway along body. Opercles iridescent. Dorsum of head dusky. Pair of black spots on snout. Eye, silvery-blue with vertical darker stripe through centre of orbit. Fins clear or very faintly coloured in females and juveniles. All fins edged with brilliant vermilion in adult males in natural habitat; with some loss of colour once handled.

Preserved specimens creamy with distinct reticulate pattern corresponding with scales above midlateral band. Reticulate pattern sometimes extending below midlateral band and onto caudal peduncle. Dorsum of head dusky with distinct vertical dark band through eye. Two distinct spots on snout in front of eyes. All fins creamy to translucent in females. In males, vermilion colour of fins changed to broad dark band.

Etymology: *vermeilipinnis* from vermeil — old French red or vermilion; *pinnis* — Latin for fins; referring to the vermilion edged fins of the males.

Distribution and habitat

Presently known only from five pools on Edgbaston Station, Aramac. The pools are small and very shallow; with grass tussocks growing through the water making the pools difficult to distinguish from the surrounding habitat. Other unidentified vegetation includes a small plant with reddish leaves, not unlike the colour of the fins of the blue-eye. Most pools with redfined blue-eyes are more like puddles left after rain but the water is generally clear and the fish are easy to see. Small aggregations tend to swim between the tussocks. In the pool from which the holotype and paratypes were taken, fish tended to congregate in large numbers in sunny, open parts.

General comments

The discovery of a member of the family Pseudomugilidae in inland waters of the Lake Eyre Drainage System was most unexpected. The new species, although clearly a member of the family Pseudomugilidae, is not very closely related to other known members of the family suggesting a long and separate lineage. Although distinctly different from another atherinoid, the Phallostethidae of south east Asia and the Philippines, like the latter it has undergone a change in its ventral fins. The fact that it can be reduced or even totally absent, indicates that the process of reduction is still going on. Its relationships to other groups of blue-eyes and atherinoids is presently being studied by two of us (B.S. and W.I.).

The discovery of *Scaturiginichthys* in central western Queensland suggests that blue-eyes must have had a wider distribution and it is possible that other relic populations of this family are still to be discovered. This has been the case with members of the genus *Craterocephalus* where new species were discovered after a thorough study of the genus and its distribution. The new species will be put into a total biogeographic context with other fresh water fishes and this review is presently under way by one of us (L.C.).

... a redefined blue-eye ...

It would be interesting to determine how the presence of the other two species of fish found in this habitat, possibly a new species of the desert goby and the mosquitofish, affect each other and the blue-eye. A definitive survey of the area with all its springs ought to be contemplated soon since the introduction of the mosquitofish, a non-native fish, must be of recent origin. It is also known that new species of crustaceans and molluscs have been recently discovered from this area. These new finds suggest that much is yet to be learnt about this unusual environment.

Acknowledgments

We would like to thank Mr. and Mrs. A. Wills of Edgbaston who have so kindly allowed us access to their property and helped us with collecting. Their hospitality has been greatly appreciated. Macquarie University provided funds to cover transportation costs to central Queensland. One of us (P.U.) and Jason Cornford are credited with initially discovering and collecting the new species in November 1990.

We are greatly indebted to Neil Armstrong for the outstanding photographs he took specially for this publication. "Macrophotography in combination of patience requires a talent possessed by very few."

Reference

Saeed, B., Ivantsoff, W. and Allen, G.R., (1989) Taxonomic revision of the Family Pseudomugilidae (Order Atheriniformes). *Australian Journal of Marine and Freshwater Research*, 40:719-87.



INITIAL OBSERVATIONS ON SPAWNING AND CONSERVATION STATUS OF REDFINNED BLUE-EYE (*Scaturiginichthys vermeilipinnis*)

Peter Umack, Colin Brumley

The redefined blue-eye *Scaturiginichthys vermeilipinnis* is a newly discovered species from central Queensland in the Lake Eyre drainage division. This hardy fish has been reasonably easy to breed and raise providing a few basic conditions are met. It is stressed that the following observations are only preliminary, a lot more research is necessary before the breeding biology is better understood.

Habitat Conditions

The habitat conditions have been recorded from the type locality of the redefined blue-eye. These conditions are similar in the other springs in which the fish occurs. The water is very shallow (maximum 8cm) and in full sunlight most of the day. Air temperatures during mid summer are usually around 40°C, occasionally reaching 48°C (in the shade). During mid winter at night temperatures may drop to below freezing. It isn't yet known how cold the water in the spring gets in winter. The following conditions were recorded on November 11th 1990, water temperature 36°C, (air temperature wasn't recorded), and the pH was around 8.

A water sample was retained from which the following recordings were made, Calcium/Magnesium hardness 20ppm, conductivity 100 Ec and the salinity was less than 1%. On April 2nd 1991 the water temperature just before darkness varied between 23-25°C.