Supplemental Material

A new Lepisosteiformes (Actinopterygii : Ginglymodi) from the Early Cretaceous of Laos and Thailand, SE Asia

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Characters definitions

The characters used in the phylogenetic analysis are those from Sun & Ni (2017). Definitions of the characters are copied from Sun & Ni (2017, Supplementary Information) without the remarks these authors associated to some of them.

1. Relative position of the dorsal fin
    0 Contained between pelvic and anal fins
    1 Opposite to anal fin

2 Opposite to pelvic fins
3 Originates anterior to pelvic fins and extends opposite to anal fin

2. Posttemporal fossa
0 Absent
1 Present

3. Forward extension of exoccipital around the vagus nerve
0 Absent
1 Present

4. Intercalar
0 Present
1 Absent

5. Basisphenoid
0 Present
1 Absent

6. Sphenotic with small dermal component
0 Absent
1 Present

7. Posterior myodome
0 Present
1 Absent

8. Elongation of the rostral region anterior to the lower jaw symphysis
0 Extends anterior to the dentary symphysis by less than 20% of mandibular length
1 Extends well anterior to the dentary symphysis by more than 50% of mandibular length

9. Vomer in adults
0 Paired
1 Co-ossified

10. Autopalatine
0 Present
1 Absent

11. Ectopterygoid shape
0 Subrectangular to triangular, straight ventral border
1 Elongate, triangular, straight ventral border, deepest mid length
2 Elongate, with bar-like anterior portion and deeply expanded posterior portion
3 Crescent shape, concave ventral border

12. Ectopterygoid participation in palatal surface area
    0 Ectopterygoid form half or less of the palatal region
    1 Ectopterygoid forms the majority of the palatal region

13. Part of dorsal surface of ectopterygoid ornamented and forming part of skull roof
    0 Absent
    1 Present

14. Relative position of the lower jaw articulation
    0 At the centre of the orbit
    1 At the anterior border of the orbit
    2 In front of the orbit
    3 At the posterior border of the orbit
    4 Posterior to the orbit

15. Quadratojugal
    0 Plate-like
    1 Splint-like and independent
    2 Splint-like and partially fused to the quadrate
    3 Absent

16. Symplectic involvement in jaw joint
    0 Absent
    1 Present

17. Ornamentation of the dermal bones of the skull
    0 Ornamented with tubercles or ridges
    1 Smooth or very slightly ornamented
    2 Ornamented with firmly anchored large conical teeth

18. Number of extrascapular bones
    0 One pair
    1 Two pairs
    2 Three or more pairs

19. Posterior extension of parietals median to the single pair of laterally placed extrascapular bones
    0 Absent
    1 Present

20. Relative length of parietals and frontals
    0 Length of parietals less than one half but more than one third the length of frontals
    1 Length of parietals about half the length of frontals

2 Length of parietals less than one third the length of frontals

21. Length to width ratio of frontals in adult sized individuals
    0 Lower than 3
    1 Equal or larger than 3

22. Antorbital portion of frontal
    0 Broad
    1 Tapering gradually
    2 Tubular

23. Frontal ethmoidal sagittal lamina
    0 Absent
    1 Present

24. Triangular lateral expansion of antorbital portion of frontal
    0 Absent
    1 Present

25. Shape of nasal bones
    0 Broad, subrectangular, contacting at midline
    1 Irregularly shaped, separated medially
    2 Anteriorly broad, narrowing posteriorly, approximately crescentic shape
    3 Very narrow, separated medially
    4 Plate like, separated medially by parietals

26. Circumborbital ring Mis en forme : Anglais (États Unis)Mis en forme : Anglais (États Unis)
    0 Supraorbitals do not contact infraorbital series (including the antorbital) at the anterior rim of the orbit
    1 Supraorbitals contact infraorbitals, closing the orbit

27. Ventral border of infraorbital series flexes abruptly dorsally at the anterior margin of the orbit
    0 Absent
    1 Present

28. Size of supraorbital bones relative to orbit
    0 Small
    1 Large

29. Shape of most anterior supraorbital bone
    0 Subrectangular, contacting none or only one infraorbital bone
    1 Trapezoidal, longest ventrally, contacting more than one infraorbital bone

30. A series of toothed infraorbitals bordering the snout
    0 Absent
    1 Present

31. Minimal number of anterior infraorbitals
    0 One
    1 Two
    2 Three
    3 Four
    4 Five
    5 Six
    6 Seven

32. Most anterior infraorbital
    0 Lower than or equalling the posterior elements
    1 Higher than posterior elements

33. Relative size of the infraorbital bone (or bones) at the posteroventral corner of the orbit
    0 Not enlarged
    1 Enlarged, but do not reach the preoperculum
    2 Enlarged and reach the preoperculum

34. Shape of the infraorbital bones at the posterior border of the orbit
    0 Deeper than long, sometimes almost tubular
    1 Approximately quadrangular
    2 Large, expanded posteriorly, about half the length of the orbital diameter

35. Dermosphenotic participation in orbital margin
    0 Dermosphenotic reaches orbital margin
    1 Dermosphenotic does not reach orbital margin

36. Dermosphenotic/sphenotic association
    0 Closely associated with each other (i.e. contacting or fused to each other)
    1 Not in contact with each other

37. Quadrate laterally covered by infraorbital bones
    0 Absent
    1 Present

38. Suborbital bones
    0 Present
    1 Absent

39. Number of suborbital bones

0 One
1 Two
2 Three or four
3 More than four, usually numerous suborbitals

40. Arrangement of suborbital bones
0 One row, which does not extend anteriorly below the orbit
1 One row, which extends anteriorly below the orbit
2 Two rows
3 Mosaic of numerous suborbitals

41. Independent of the total number, there is a large suborbital covering almost the whole area between the infraorbital bones and the preoperculum
0 Absent
1 Present

42. First and last suborbitals are larger than the other suborbitals
0 Absent
1 Present

43. Suborbital series separating preoperculum from dermopterotic
0 Absent
1 Present

44. Triangular suborbital lateral to quadrate
0 Absent
1 Present

45. Premaxilla with nasal process
0 Absent
1 Present

46. Premaxillary nasal process forming an external dermal component of the skull roof
0 Absent
1 Present

47. Supraorbital canal in premaxillary nasal process
0 Absent
1 Present

48. Length of maxilla
0 Long, extends backwards lateral to the coronoid process of the lower jaw
1 Short, does not reach the coronoid process
2 Atrophied or absent

49. Depth of maxilla
    0 Shallow, < 0.5 of its length
    1 Deep, > 0.5 of its length

50. Supramaxilla
    0 Absent
    1 Present

51. Maxillary teeth
    0 Present
    1 Absent

52. Plicidentine
    0 Absent
    1 Present

53. Morphology of dentary teeth crown
    0 Conical
    1 Pencil-like, graceful
    2 High, with globular to cylindrical crowns
    3 Molariform, broader than high

54. Well-developed posteroventral process of the dentary
    0 Absent
    1 Present

55. Tooth organization of dentary
    0 Teeth in a single row and all of similar size
    1 In addition to a lateral single row of similar sized teeth, there is a medial row of much larger fangs

56. Extent of teeth on dentary (excluding coronoid toothplates)
    0 Tooth row extends over a third the length of dentary
    1 Tooth row is present on only the anterior one third or less of dentary

57. Shape of preopercle
    0 Dorsoventrally elongated without anteroventral arm
    1 Crescent-shaped
    2 L-shaped

58. Exposure of dorsal limb of preopercle
    0 Mostly exposed forming a significant part of the ornamented lateral surface of the skull anterior to the opercle

1 Entirely covered or nearly entirely covered by other dermal bones in adults

59. Posterior border of preopercle notched ventrally
    0 Absent
    1 Present

60. Shape of the opercle depth/width
    0 Deeper than long
    1 Approximately as deep as long

61. Subopercle with well-developed ascending process
    0 Absent
    1 Present

62. Shape of ascending process of the subopercle
    0 Broad
    1 Slender and tapering dorsally

63. High ascending process of the subopercle
    0 Less than or equal to half of the length of the opercle
    1 More than half of the length of the dorsal border of the bone

64. Subopercle maximal depth (excluding ascending process)
    0 More than half the depth of the operculum
    1 Less than half the depth of the operculum

65. Interopercle
    0 Absent
    1 Present

66. Size of interopercle
    0 Large, approximately as long as the ventral arm of the proeperculum
    1 Small, remote from mandible

67. Median gular
    0 Absent
    1 Present

68. Opistocoelus vertebrae
    0 Absent
    1 Present

69. Knob-like anteroventral process of posttemporal
    0 Absent

1 Present

70. Supracleithrum with a concave articular facet for articulation with the posttemporal
0 Absent
1 Present

71. Series of denticles along the ridge between the branchial and lateral surfaces of the cleithrum
0 absent
1 present

72. Fringing fulcra on pectoral fin
0 Present
1 Absent

73. Fringing fulcra on pelvic fin
0 Present
1 Absent

74. Number of dorsal fin rays
0 Less than 20
1 More than 20

75. Basal fulcra in the dorsal and anal fins
0 Small
1 Large

76. Number of principal caudal fin rays in the lower, non-axial lobe of the tail in adults
0 More than eight
1 Eight
2 Six

77. Body lobe scale row
0 Absent
1 Incomplete
2 Complete

78. Dorsal ridge of scales
0 Inconspicuous
1 Conspicuous, with a low spine
2 Conspicuous, with a high spine

79. Scale of the body with a strong posteriorly directed spine
0 Absent
1 Present

80. Vertical peg-and-socket articulation
    0 Present
    1 Reduced or absent

81. Longitudinal articulation of the scales of the body
    0 Absent
    1 Single
    2 Double

82. Posttemporal penetration by lateral line canal
    0 Present
    1 Absent

83. Supraorbital sensory canal in parietal
    0 Supraorbital canal penetrates parietals at the central portion of these bones
    1 Supraorbital canal running almost on the lateral rim of the parietals
    2 Supraorbital canal does not penetrate the parietals

84. Deep groove housing the middle pit line in dermopterotic and parietal
    0 Absent
    1 Present

85. Dermopterotic length to parietal length
    0 Dermopterotic significantly longer
    1 Lengths about equivalent
    2 Shorter than parietal

86. Predorsal length
    0 70% or less of SL
    1 75% or more of SL

87. Posterodorsal margin of the supracleithrum peculiarly ornamented
    0 Absent
    1 Present

88. Dentary teeth
    0 Present
    1 Absent

89. Shape of infraorbital bones forming the ventral border of the orbit
    0 Subrectangular, only slightly deeper than long
    1 Subrectangular, more than 1.5 times deeper than long
    2 Subtriangular, broader ventrally, ca. 2 times deeper than long

3 Longer than deep

90. Contribution of surangular to lateral surface of lower jaw
    0 Elongated, posterior and dorsal to quadrate, dorsal to angular
    1 Subtriangular, posterodorsal to dentary, anterodorsal to angular
    2 No distinct surangular in lateral view
    3 Large, dorsal to dentary, no suture with angular

91. Relative height of the posttemporal
    0 Heigh, reaching or almost reaching the dorsal midline
    1 Low, approximately as heigh as the dermopterotic
    2 Reduced

92. Supramaxillary notch on maxilla
    0 Absent
    1 Present

93. Molariform teeth on coronoids, pterygoids or vomers
    0 Absent
    1 Present

94. Supraorbital bone (s)
    0. Absent
    1. Present

95. Number of supraorbital bones
    0. Usually two
    1. Three or four
    2. More than 4

96. Shape of rostral bone
    0. Plate-like
    1. Much reduced, short tube-like, without lateral horns
    2. Roughly V-shaped with lateral horns
    3. No autogenous median rostral bone

97. Dermosphenotic bone attachment to skull roof in adult-sized individuals
    0. Loosely attached on the skull roof or hinged to the side of skull roof
    1. Firmly sutured into skull roof, forming part of it

98. Posterior margin of maxilla
    0. Rounded or straight
    1. Notched or concave

99. Anterior infraorbital bone(s)
    0. Absent
    1. Present

100. Tube-like canal bearing anterior arm on the antorbital bone
    0. Absent
    1. Present

101. Symplectic/quadrate articulation
    0. Present
    1. Symplectic separated from quadrate by a quadratojugal

102. Nasal process of the premaxilla pierced by a large foramen for the olfactory nerve
    0. No
    1. Yes

103. An apparent dorsal hump between head and dorsal fin.
    0. Absent
    1. Present

Data Matrix

Character coding is from Sun & Ni (2017) based on a series of previous papers not quoted here. We changed the coding of character [43] for the gars (*Atractosteus*, *Lepisosteus*, *Masillosteus*: the suborbital series separates preoperculum from dermopterotic, contra Sun & Ni [2017]). Character coding for taxa not present in Sun & Ni's analysis comes from previous studies: Cavin et al. (2015), Cavin & Brito (2001) and Grande (2010) for *Oniichthys falipoui* from the Cenomanian of Morocco; Wenz (2003) for *Lepidhoyas microrhis* from the Barremian of Las Hoyas; Deesri et al. (2014) for *Isanichthys lertboosi* from the Late Jurassic of Thailand; Woodward (1893) and personal observations for *Isanichthys latifrons* from the Middle Jurassic of United Kingdom.

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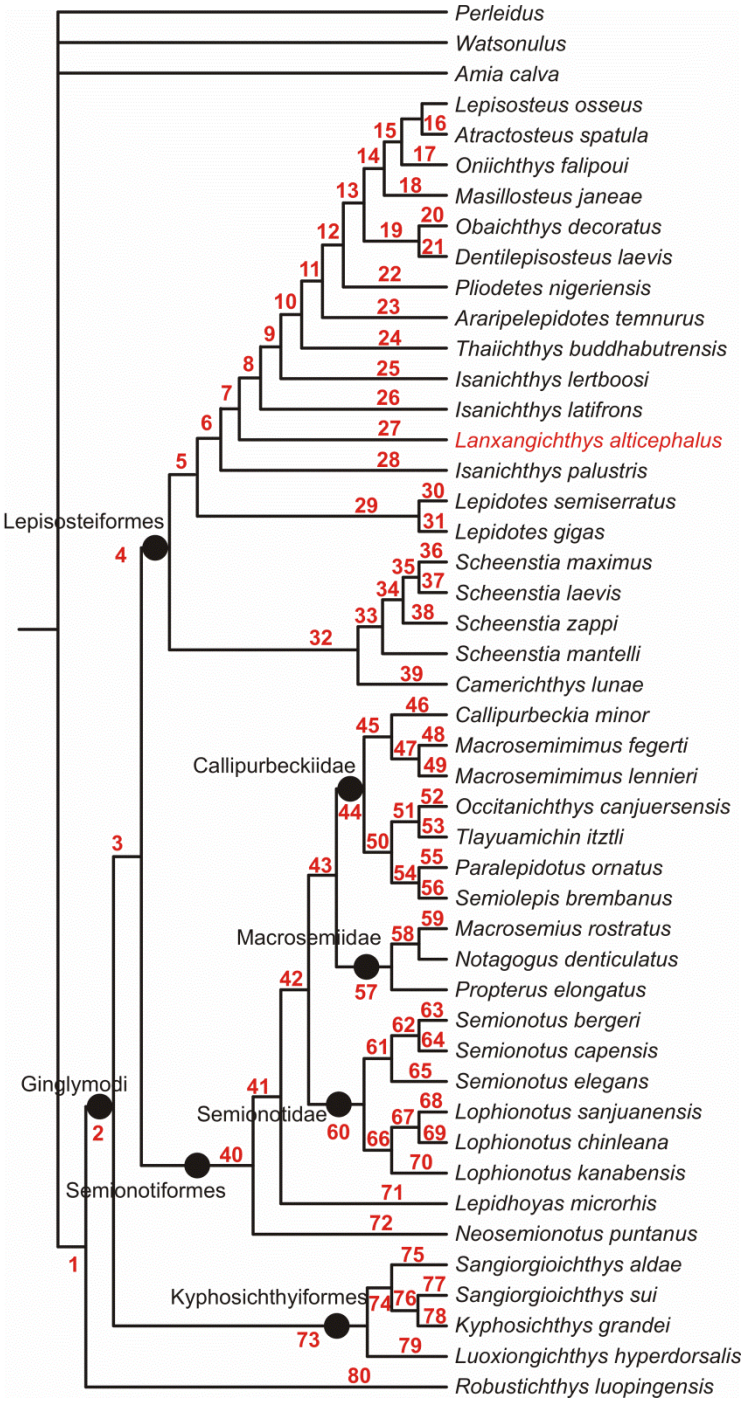
0	0	0	-	1	-	0	0	1	0	0	0	0	1	?	?	0	1	0	0	1	0	0	0	1	1	0	1	1	0	0	?	0	1	?	0	0	0	1	1	1	2
0	0	1	0	0	0	0	0	0	0	0	?	0	?	0	1	1	1	0	0	1	1	?	?	0																	
Lophionotus sanjuanensis						0	?	?	?	?	0	?	0	?	?	?	0	0	0	1	?	0	0	0	0	0	0	0	1	?	1	1	0	0	0	2	0	2	0	0	?
1	0	0	-	1	-	0	0	1	0	0	0	0	?	0	?	1	1	0	0	2	0	0	0	1	1	0	1	1	1	0	?	1	1	0	0	0	0	1	?	1	2
0	0	1	0	0	0	0	0	0	0	1	?	0	0	0	1	0	?	0	0	1	1	?	1	1																	
Lophionotus kanabensis						0	?	?	?	?	0	?	0	?	0	?	0	0	0	1	?	1	0	0	0	0	1	0	1	?	?	?	?	0	0	?	?	2	?	0	?
0	0	0	-	1	-	0	0	1	0	0	0	0	1	1	?	1	1	0	1	1	0	0	0	1	1	0	1	1	0	0	?	?	?	?	?	?	0	1	?	?	2
0	0	?	?	0	0	0	0	0	0	?	?	?	?	0	1	0	?	0	0	1	1	?	1	0																	
Lophionotus chinleana						0	?	?	?	?	0	?	0	?	?	?	0	0	0	1	0	1	0	0	0	0	0	0	1	?	1	1	0	0	0	2	0	2	0	0	?
1	0	0	-	1	-	0	0	1	0	0	0	0	?	0	?	1	1	0	0	1	0	0	0	1	1	0	1	1	1	0	?	0	0	?	0	0	0	1	1	?	2
0	0	?	0	0	0	1	0	0	0	1	?	0	0	0	1	0	?	0	0	1	1	?	?	0																	
Macrosemius rostratus						3	?	1	1	1	0	0	0	0	?	1	0	0	1	2	0	1	?	1	2	1	2	0	0	3	0	0	?	0	0	2	0	0	0	0	0
0	1	-	-	-	-	?	?	1	0	0	0	0	0	0	0	1	0	0	0	1	0	1	0	1	1	0	1	1	1	0	0	0	0	1	1	1	1	-	1	?	-
0	0	0	0	2	0	?	0	0	0	0	?	0	0	0	0	-	1	0	0	1	1	0	0	0																	
Notagogus denticulatus						3	?	?	?	?	?	?	0	?	?	?	0	0	1	2	0	1	?	1	2	1	2	0	0	?	0	0	0	0	0	?	0	0	0	?	0
0	1	-	-	-	-	?	?	1	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	1	1	0	1	1	1	0	0	0	0	1	(0/1)	1	1	0	1	?	0
0	0	0	0	2	0	-	0	0	0	0	?	1	0	0	1	1	?	0	0	1	1	?	?	0																	
Propterus elongatus						3	?	?	?	1	0	?	0	0	?	?	0	0	1	1	0	1	?	1	2	1	2	0	0	3	0	0	0	0	0	2	0	0	0	0	0
0	1	-	-	-	-	?	?	1	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	1	1	0	1	1	1	0	0	0	0	1	1	0	1	0	1	1	0
0	0	0	0	2	0	-	0	0	0	0	?	1	0	0	1	1	1	0	0	1	1	?	?	0																	
Neosemionotu spholidotum						0	?	?	?	?	0	?	0	0	?	?	?	?	3	?	0	1	2	0	0	0	0	0	0	3	1	0	1	0	0	0	0	0	1	0	0
0	0	2	0	0	0	0	0	1	0	0	0	0	1	0	0	0	1	0	0	1	0	0	0	1	1	0	1	1	1	0	?	0	1	?	?	0	0	1	0	0	1
0	?	?	0	0	0	0	1	0	0	3	0	0	0	0	1	0	1	0	?	1	1	0	1	0																	
Robustichthys luopingensis						3	?	?	?	?	1	?	0	?	?	?	?	?	4	1	?	0	1	0	0	1	1	0	0	3	1	-	0	0	0	-	1	1	0	0	0
0	0	3	3	1	0	0	0	1	0	?	0	0	1	0	0	0	1	0	0	1	0	0	0	1	1	0	0	1	0	1	?	0	0	1	0	0	1	0	0	1	0
0	?	?	0	?	0	0	0	0	0	3	1	0	1	?	1	0	?	0	0	0	1	?	?	0																	
Sangiorgioichthys aldae						0	?	?	?	?	0	?	0	?	?	?	0	0	0	?	?	0	0	0	0	1	0	?	0	3	0	0	0	0	0	0	0	2	0	0	0
0	0	3	3	0	0	1	1	1	0	0	0	0	1	1	?	0	1	0	0	1	0	0	0	1	1	0	1	1	0	0	?	0	?	?	0	?	0	0	?	2	1
0	0	0	0	0	0	1	0	0	0	2	1	0	?	0	1	0	0	0	0	1	1	?	?	0																	
Sangiorgioichthys sui						0	?	?	?	?	0	?	0	0	0	3	0	0	3	1	0	0	1	(0/1)	0	1	0	0	0	3	0	0	0	0	0	0	0	(1/2)	0	0	0
0	0	2	1	1	0	0	1	1	0	0	0	0	1	0	0	1	1	0	0	1	0	0	0	1	1	0	1	1	0	0	?	0	0	1	0	0	0	0	0	2	1
0	0	0	0	0	1	1	0	0	0	1	1	0	1	0	1	0	0	0	0	1	1	?	0	0																	
Kyphosichthys grandei						0	?	?	?	?	0	?	0	?	?	?	?	0	3	1	0	0	1	1	0	0	0	0	0	3	0	0	0	0	0	1	0	2	0	0	0
1	0	1	0	1	?	1	0	1	0	0	0	0	1	0	?	0	0	0	0	1	0	0	0	1	1	0	1	1	0	1	?	0	1	1	0	0	0	0	0	2	1
0	0	0	0	1	0	1	0	0	0	2	1	0	1	0	1	?	0	0	0	1	1	?	?	1																	
Luoxiongichthys hyperdorsalis						0	?	?	?	?	?	?	0	?	?	3	0	0	3	1	?	0	0	0	0	1	0	0	1	3	1	0	0	0	0	1	0	1	0	0	?
0	0	3	1	0	0	0	1	1	0	0	0	1	1	0	0	0	1	0	0	1	0	0	0	1	1	0	0	1	0	0	?	?	1	0	0	0	1	0	0	1	0
0	0	0	?	?	?	1	0	0	0	2	?	0	1	0	1	1	0	0	0	1	1	?	0	1																	
Isanichthys lertboosi						0	1	1	1	0	1	?	0	?	?	?	?	0	0	?	?	1	1	0	1	0	0	0	0	0	1	1	1	1	0	1	1	0	2	0	0
1	0	3	1	0	1	0	0	1	0	0	0	0	1	1	0	0	1	0	0	1	0	0	0	1	1	0	1	1	0	0	0	0	(0/1)	0	0	0	0	0	0	0	1
0	?	?	0	1	1	(0/1)	0	0	0	(0/1)	1	1	0	1	1	0	?	0	0	1	1	?	?	0																	
Lanxangichthys alticephalus						?	?	?	?	?	?	?	0	?	?	?	?	0	1	1	?	0	?	?	0	0	0	0	0	0	1	0	1	0	0	3	?	0	?	0	0
1	0	3	3	0	?	0	0	?	0	0	?	?	?	?	?	?	1	?	?	2	0	0	0	1	1	0	0	1	0	0	?	?	?	1	?	?	?	?	?	?	?
?	?	?	?	?	1	0	?	?	1	?	?	?	?	?	1	?	?	0	?	1	?	?	?	?																	
Lepidotes microrhis						0	?	?	?	?	?	?	0	1	?	?	?	0	1	?	?	1	0	1	0	1	0	0	0	1	1	0	0	1	0	1	0	2	0	0	0
0	0	1	0	1	0	1	0	1	0	0	0	1	1	1	0	1	1	0	1	1	0	0	0	1	1	0	1	1	0	0	?	0	1	?	0	0	0	1	1	2	0
0	?	?	0	2	1	1	0	0	0	1	0	0	0	0	1	0	1	0	0	1	1	?	?	0																	
Isanichthys latifrons						?	1	?	?	?	?	?	0	?	?	?	?	?	1	?	?	0	1	0	1	0	0	0	0	?	1	?	1	?	0	?	?	0	?	0	?
?	0	3	3	0	?	?	?	?	?	0	0	0	?	0	0	0	1	0	0	1	0	0	0	1	0	0	1	1	0	0	?	?	1	1	0	?	?	?	?	?	0
0	?	2	?	?	1	1	?	?	0	?	?	?	?	1	1	?	?	0	0	1	?	?	?	0																	
Oniichthys falipoui						1	0	?	?	?	?	?	0	?	?	?	?	1	2	1	0	0	1	0	0	1	1	?	0	?	1	1	1	1	1	5	0	2	2	0	1
1	0	3	3	0	0	1	0	1	1	1	2	-	0	-	1	0	0	1	0	2	1	0	1	?	?	0	0	1	1	0	1	0	1	?	0	?	?	?	?	?	0
0	1	1	?	2	1	1	1	?	0	3	3	2	-	0	1	0	?	0	-	1	?	1	?	0																	



Supplementary Figure S1. Nodes plotted on one of the the 145 most parsimonious trees of 424 steps (CI=0.3443; RI=0.6775; RC=0.2333)

List of apomorphies

Characters	ci	Change
node 1		
3	1.000	0-->1
4	0.250	0-->1
11	0.600	0-->3
15	0.600	3==>1
16	1.000	1-->0
21	0.111	0==>1
25	0.571	0-->3
39	0.300	0-->3
54	0.167	0-->1
60	0.500	1==>0
62	0.167	0-->1
66	0.167	1==>0
71	0.250	0==>1
77	0.400	0-->1
node 2		
14	0.400	4==>3
64	0.167	0-->1
67	0.500	1==>0
70	0.167	0==>1
85	0.286	0==>1
89	0.200	3-->1
99	1.000	0==>1
node 3		
28	0.250	0-->1
33	0.200	1==>0
53	0.200	0-->1
77	0.400	1-->0
81	0.333	0-->2
92	0.500	1==>0
96	1.000	0==>1
node 4		
9	0.250	0-->1
11	0.600	3-->0
25	0.571	3==>2
29	0.333	0==>1
34	0.333	0==>2
83	0.333	0==>1
84	0.143	0==>1
91	0.400	0==>1
node 5		
21	0.111	1==>0
32	0.333	0==>1
101	0.500	0==>1
node 6		
9	0.250	1-->0
10	1.000	0-->1
18	0.200	0==>1

25	0.571	2-->0
27	0.200	0-->1
53	0.200	1-->0
93	0.200	0-->1
node 7		
14	0.400	3==>1
37	0.333	0==>1
40	0.333	1-->3
node 8		
20	0.286	0==>1
node 9		
14	0.400	1==>0
17	0.222	0==>1
40	0.333	3-->0
51	0.111	0-->1
71	0.250	1==>0
78	0.250	0-->1
node 10		
2	0.500	1-->0
5	0.333	0-->1
25	0.571	0==>1
32	0.333	1==>0
33	0.200	0==>2
36	1.000	0==>1
48	0.667	0==>1
50	0.250	1==>0
54	0.167	1-->0
56	0.250	0==>1
57	0.500	1==>2
66	0.167	0-->1
83	0.333	1==>2
90	0.600	1-->2
93	0.200	1-->0
node 11		
1	0.500	0==>2
47	1.000	0-->1
60	0.500	0==>1
78	0.250	1-->0
79	0.500	0==>1
84	0.143	1-->0
85	0.286	1==>2
88	0.333	0-->1
node 12		
7	1.000	0-->1
17	0.222	1==>2
23	0.500	0-->1
31	0.316	1-->4
40	0.333	0==>2
46	1.000	0==>1
64	0.167	1==>0
65	0.250	1-->0
76	0.667	0-->2
81	0.333	2==>1

node13

1	0.500	2==>1
12	1.000	0==>1
14	0.400	0==>2
20	0.286	1==>0
22	0.250	0-->1
25	0.571	1==>4
51	0.111	1-->0
62	0.167	1-->0
68	1.000	0==>1
80	0.333	0-->1
84	0.143	0-->1
86	0.500	0==>1
88	0.333	1-->0
90	0.600	2==>3
91	0.400	1==>2

node 14

17	0.222	2==>0
43	0.200	0==>1
48	0.667	1==>2
52	1.000	0==>1
58	1.000	0==>1
79	0.500	1==>0
82	1.000	0==>1
85	0.286	2==>1

node 15

11	0.600	0-->2
13	1.000	0==>1
21	0.111	0==>1
30	1.000	0==>1
31	0.316	4-->2
55	1.000	0==>1
56	0.250	1==>0

node 16

18	0.200	1==>2
31	0.316	2-->3
63	0.333	0==>1

node 17

31	0.316	2-->5
40	0.333	2==>3
65	0.250	0-->1
89	0.200	1==>3

node 18

14	0.400	2==>1
22	0.250	1-->0
81	0.333	1==>2
89	0.200	1==>0

node 19

4	0.250	1-->0
6	0.200	0==>1
8	1.000	0==>1
28	0.250	1==>0
50	0.250	0-->1

65 0.250 0-->1
70 0.167 1==>0
95 0.286 0==>1
node 20
15 0.600 1==>3
31 0.316 4-->5
34 0.333 2==>1
62 0.167 0-->1
64 0.167 0==>1
80 0.333 1-->0
84 0.143 1-->0
node 21
21 0.111 0==>1
54 0.167 0==>1
89 0.200 1==>0
node 22
33 0.200 2==>1
node 23
2 0.500 0-->1
5 0.333 1-->0
39 0.300 3==>2
node 24
4 0.250 1-->0
18 0.200 1==>2
27 0.200 1-->0
31 0.316 1==>2
39 0.300 3==>1
41 0.167 0==>1
51 0.111 1-->0
53 0.200 0==>1
62 0.167 1==>0
89 0.200 1==>0
node 25
6 0.200 0==>1
40 0.333 0-->1
42 0.500 0==>1
node 26
62 0.167 1==>0
node 27
27 0.200 1-->0
29 0.333 1==>0
31 0.316 1==>3
57 0.500 1==>2
64 0.167 1==>0
85 0.286 1==>0
88 0.333 0==>1
node 28
35 1.000 0==>1
84 0.143 1==>0
node 29
34 0.333 2==>1
41 0.167 0==>1
80 0.333 0==>1

node 30

31	0.316	1==>2
89	0.200	1==>0

node 31

17	0.222	0==>1

node 32

4	0.250	1-->0
18	0.200	0-->2
31	0.316	1==>2
42	0.500	0==>1
49	0.200	0==>1
69	0.500	0-->1

node 33

14	0.400	3-->0
27	0.200	0==>1
48	0.667	0==>1
51	0.111	0==>1
93	0.200	0==>1

node 34

21	0.111	1-->0
31	0.316	2==>3
89	0.200	1-->0

node 35

14	0.400	0-->3
53	0.200	1==>2
62	0.167	1==>0

node 36

89	0.200	0-->1

node 37

21	0.111	0-->1

node 38

34	0.333	2==>1

node 39

22	0.250	0==>1

node 40

17	0.222	0==>1
39	0.300	3-->0
40	0.333	1==>0
75	0.333	0==>1
90	0.600	1==>0

node 41

14	0.400	3==>1
28	0.250	1-->0
41	0.167	0==>1
76	0.667	0==>1
77	0.400	0-->1

node 42

22	0.250	0==>1
31	0.316	1==>2

node 43

20	0.286	0==>2
26	0.200	1==>0
91	0.400	0==>1

95 0.286 0-->1
node 44
17 0.222 1==>0
51 0.111 0==>1
63 0.333 0==>1
95 0.286 1-->2
node 45
9 0.250 0-->1
39 0.300 0-->1
87 1.000 0==>1
node 46
26 0.200 0==>1
49 0.200 0==>1
78 0.250 0==>1
node 47
20 0.286 2==>0
22 0.250 1==>2
23 0.500 0==>1
93 (0.200 0==>1
node 48
17 0.222 0==>1
19 0.250 0==>1
31 0.316 2==>3
89 0.200 1==>0
node 49
28 0.250 0==>1
node 50
89 0.200 1==>2
node 51
6 0.200 0==>1
15 0.600 1-->2
31 0.316 2-->4
39 0.300 0-->2
41 0.167 1==>0
node 52
20 0.286 2==>0
63 0.333 1==>0
93 0.200 0==>1
95 0.286 2==>1
node 53
18 0.200 0==>1
31 0.316 4-->6
43 0.200 0==>1
49 0.200 0==>1
78 0.250 0==>1
90 0.600 0==>1
node 54
33 0.200 0-->1
75 0.333 1==>0
76 0.667 1==>0
81 0.333 2==>1
103 0.250 0==>1
node 55

1 0.500 0==>3
31 0.316 2==>0
74 0.200 0==>1
node 56
18 0.200 0==>2
33 0.200 1-->2
51 0.111 1==>0
66 0.167 0==>1
78 0.250 0==>1
node 57
1 0.500 0==>3
5 0.333 0==>1
11 0.600 3-->1
19 0.250 0==>1
22 0.250 1==>2
38 0.333 0==>1
50 0.250 1==>0
53 0.200 1-->0
54 0.167 1==>0
59 1.000 0==>1
66 0.167 0==>1
70 0.167 1==>0
72 0.500 0==>1
74 0.200 0==>1
75 0.333 1==>0
81 0.333 2-->0
83 0.333 0==>2
89 0.200 1==>0
102 0.500 1-->0
node 58
15 0.600 1==>2
73 0.500 0==>1
node 59
53 0.200 0-->1
91 0.400 1==>0
94 0.500 1==>0
node 60
14 0.400 1==>0
24 0.500 0==>1
78 0.250 0==>2
81 0.333 2==>1
85 0.286 1==>0
101 0.500 0-->1
node 61
6 0.200 0==>1
53 0.200 1-->0
89 0.200 1==>0
node 62
33 0.200 0==>1
95 0.286 0==>1
node 63
17 0.222 1==>0
node 64

18 0.200 0==>1
26 0.200 1==>0
node 65
31 0.316 2==>1
70 0.167 1==>0
91 0.400 0==>1
node 66
21 0.111 1==>0
27 0.200 0-->1
33 0.200 0==>2
71 0.250 1-->0
node 67
22 0.250 1==>0
37 0.333 0==>1
66 0.167 0==>1
node 68
17 0.222 1==>0
57 0.500 1==>2
69 0.500 0==>1
103 0.250 0==>1
node 69
70 0.167 1==>0
85 0.286 0==>1
node 70
51 0.111 0==>1
56 0.250 0==>1
node 71
9 0.250 0==>1
19 0.250 0==>1
25 0.571 3==>1
29 0.333 0==>1
33 0.200 0==>2
39 0.300 0-->1
43 0.200 0==>1
49 0.200 0==>1
51 0.111 0==>1
56 0.250 0==>1
77 0.400 1-->2
83 0.333 0==>2
84 0.143 0==>1
node 72
18 0.200 0==>2
21 0.111 1==>0
31 0.316 1==>0
34 0.333 0==>1
39 0.300 0-->2
53 0.200 1-->0
66 0.167 0==>1
78 0.250 0==>1
85 0.286 1==>0
86 0.500 0==>1
89 0.200 1-->3
node 73

44	0.500	0==>1
89	0.200	1-->2
102	0.500	1==>0

node 74

26	0.200	1==>0
31	0.316	1-->0
33	0.200	1==>2
43	0.200	0-->1
77	0.400	1-->2
78	0.250	0==>1

node 75

14	0.400	3==>0
40	0.333	1==>3
51	0.111	0==>1

node 76

18	0.200	0==>1
19	0.250	0-->1
39	0.300	3-->1
41	0.167	0==>1

node 77

39	0.300	1-->2
43	0.200	1-->0
53	0.200	0==>1
70	0.167	1==>0
84	0.143	0==>1
89	0.200	2==>1

node 78

21	0.111	1==>0
31	0.316	0-->1
37	0.333	0==>1
40	0.333	1==>0
44	0.500	1==>0
54	0.167	1==>0
67	0.500	0==>1
83	0.333	0==>1
103	0.250	0==>1

node 79

24	0.500	0==>1
49	0.200	0==>1
64	0.167	1-->0
71	0.250	1==>0
74	0.200	0-->1
95	0.286	0==>1
103	0.250	0==>1

node 80

1	0.500	0-->3
6	0.200	0==>1
18	0.200	0==>1
22	0.250	0==>1
32	0.333	0-->1
40	0.333	1-->3
41	0.167	0==>1

74 0.200 0-->1

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