

A new, nearly complete skull of *Procolophon trigoniceps* Owen, 1876 from the Sanga do Cabral Supersequence, Lower Triassic of Southern Brazil, with phylogenetic remarks

Eduardo Silva-Neves, Sean Patrick Modesto & Sérgio Dias-da-Silva

Supplementary Material

MATRIX

Nyctiphruretus

000000000000?00?00000?000000000000?000000000?000000000000000000

Owenettidae

000000000010?10?0[01][01]00?0000000000010?000000000?010000010010010000

Coletta

001001000000?10?0???0???0?10100020?011???0?0???????????????????

Pintosaurus

20?????????????????0???0?20100020?01101??10???????????????????

Sauropareion

????01010020?20?100000?110010000020?011010100?1???00?011011111?1

Phaanthosaurus

10101100??[12]0?????????1?????020110020?01001?010???????????????????

Eumetabolodon_dongshengensis

?????11???0?????????1?????????000030?01?01??00???????????????????

Theledectes

??????121030?20??11?????0?21010030?????0000??????????00???????

Tichvinskia

101001021030?20?1110100000021110131001001?01111?0?0???1101?01101

Timanophon

?????1020120?21010101?010?02?11013?0010010011?????????????????

Kapes

1111?1120130?20?11111????00211[12]013100100100[02]10?????????????????1

Thelephon

??????120120?20??111?????0???[12]101[34]1001?010?????????????????????

Eumetabolodon

211111021020?2101??21??10002111013100100100111?1?????????????????

Procolophon

211111011020?2101112100100021[12]00[12]31001[01]010011110101011110110110

1

Thelerpeton

2?111?011020?21011121??1?00211101[34]1001001001??????011???11?????

Teratophon

211111[01]110[23]0?21011121?010002111013100100100???1???1011110?????01

Pentaedrusaurus

[12]11111021230?21011111????1121110131?011010011[01]11?0?11111010?110?

Neoprocolophon

??1111?21[02]?0?210?21[12]1?????1?[12]??1[34]1?011??0?????????????????????

Sclerosaurus

???????310???311?2?????????3?[12]1?[12]31?????????????11010??11?101111?

Scoloparia

?????0031?311311???1?????1?311002[34]10??????0111?????????????????1?

Leptopleuron

?110002210310311?212111?1113?111[12]41?0111001?10??0?1??????????0?

Soturnia

10??0????????????1????113111124111????120?01?1????0??????

Hypsognathus

?01[01]0023103113110[12]1211111113111114111?11011????1?11????0????0?

Phonodus

1?1111????0?00?0???1????????10?[34]0?011101????????????????1

Kitchingnathus

[12]0??010?00[02]0?20??110????00[12]01001200??????111??????????????

CAPPA/UFSM 0189

???111011020??100112100??0021100?3100100001111??????????????1

Character list

* ordered character

¹ modified character

² created character

(0) Maxilla premaxillary subnarial process: present (0); absent (1); premaxilla posterodorsally expanded (2).*

(1) External naris: posterior or at level of first premaxillary tooth (0); anterior to first premaxillary tooth (1).

(2) External naris: anteroposteriorly elongated (0); subcircular or dorsoventrally expanded (1).

(3) Wide internarial bar: absent (0); present (1).

(4) Snout: long and flat (0); deep and short (1).

(5) Maxillary depression: absent (0); present (1).

(6) Prefrontal: medial border straight (0); medial border with a medial process (1); confined to the orbital rim (2).

(7) Posterior margin of orbitotemporal fenestra: anterior to posterior margin of pineal foramen (0); at level of posterior-most point of the pineal foramen (1); beyond the posterior border of the pineal foramen (2); considerably beyond the posterior border of the pineal foramen (3).*

(8) Pineal opening insertion: in a shallow fossa (0); flush with dorsal surface (1).

(9) Contour of the pineal opening: rounded (0); 'teardropshaped' (1); straight posterior border (2).

(10) Postfrontal: contacts frontal, parietal, and postorbital (0); contacts frontal, parietal, postorbital, and supratemporal (1); contacts frontal and parietal only (2); absent and area occupied by parietal or fused to parietal (3).

(11) Jugal lateral processes: absent (0); present (1).¹

(12) If the Jugal lateral process is present: one (0); two (1).²

(13) Temporal ventral margin: roughly straight (0); acutely emarginated (1); broadly excavated (2); convex (3).

(14) Quadratojugal lateral surface: spineless (0); with spine (1).¹

(15) If quadratojugal lateral is spined: one spine (0); two or more (1).²

(16) Squamosal ventral margin terminates: at least as far ventrally as quadratojugal (0); dorsal to quadratojugal in the tympanic notch (1).

(17) Posterior margin of the skull roof: concave (0); acute posterior process (1); broad posterior emargination (2).

(18) Postparietals: present (0); absent/fused (1).

(19) Supratemporal posterolateral margin: rounded (0); acute (1); prominent spine (2).*

(20) Vomer width: broader than choana (0); roughly equal or narrower (1).

(21) Epipterygoid columella: ends freely (0); contacts dorsally prootic and supraoccipital (1).

- (22) Parasphenoid cultriform process: directed anteriorly and tapers to sharp tip (0); projects vertically as robust pillar (1).
- (23) Relation of basioccipital tuber and quadrate condyle: approximately level (0); basioccipital projected far posteriorly (1).
- (24) Occipital condyle: uniform (0); tripartite (1).
- (25) Dentary ventral and dorsal surfaces: nearly parallel (0); oblique (1).
- (26) Relation of articular bone to marginal dentary teeth: roughly in line (0); well below (1).
- (27) Number of premaxillary teeth: five or more (0); four (1); three (2); two (3).*
- (28) Premaxillary teeth: subequal in size (0); enlarged mesialmost teeth (1).
- (29) Maxillary teeth with labiolingually expanded bases: absent (0); present (1).
- (30) Presence of prominently bulbous teeth in the maxilla: absent (0); present (1).
- (31) Maxillary tooth cervices: not constricted (0); constricted (1).
- (32) Maxillary tooth cusps: one (0); two (1); two and anterior monocuspid teeth absent (2).*
- (33) Number of maxillary teeth: 40 or more (0); 35 to 15 (1); 12 to 10 (2); eight to six (3); five or less (4).*
- (34) Maxillary cheek teeth: not inset (0); inset (1).
- (35) Deep occlusal depression in maxillary teeth: absent (0); present (1).
- (36) Anterior vomerine dentition: present (0); entirely absent (1).¹

- (37) If anterior vomerine dentition is present: several denticles (0); true teeth (1).²
- (38) Vomerine denticles or teeth along posterior medial suture: present (0); absent (1).
- (39) Palatine dentition: present (0); absent (1).¹
- (40) If palatine dentition is present: denticles (0); true teeth (1).²
- (41) Pterygoid dentition: present (0); absent (1).
- (42) Dentary incisors: two or more (0); one (1).
- (43) Dentary teeth in basal cross-section: circular (0); labiolingually expanded (1); mesiodistally elongated (2).
- (44) Dentary molariform tooth cusps: one (0); two (1).¹
- (45) If dentary molariform teeth had two cusps: very close (0); widely separated (1).²
- (46) Posterior dorsal zygapophyses: gracile (0); robust (1).
- (47) Presacral pleurocentral ridge: bearing a longitudinal sulcus (0); longitudinal sulcus absent (1).
- (48) Number of caudal vertebrae: 20 or more (0); 17 or less (1).
- (49) Ossified presacral intercentra: present (0); absent (1).
- (50) Rib cage: narrow (0); broad (1).
- (51) Posteromedial margin of lateral processes of the interclavicle: concave (0); straight (1).
- (52) Interclavicle medial ridge: smooth (0); prominent (1).

- (53) Distal ends of interclavicular lateral processes: straight (0); posteriorly recurved (1).
- (54) Ectepicondylar foramen or groove on humerus: present (0); absent (1).
- (55) Entepicondylar process: reduced (0); prominent (1).
- (56) Entepicondylar foramen on humerus: present (0); absent (1).
- (57) Nonterminal manual phalanges on digits II, III, and IV: long, slender (0); short, robust (1).
- (58) Length ratio of unguals/penultimate phalanges on manus: unguals short (0); unguals long (1).
- (59) Iliac anterior margin: convex (0); straight (1).
- (60) Femur/humerus length ratio: femur longer than humerus (0); femur length equal to humerus (1).
- (61) Femur: slender (0); robust (1).
- (62) Osteoderms: absent (0); present (1).
- (63) Lacrimal-ectopterygoid contact: absent (0); present (1).