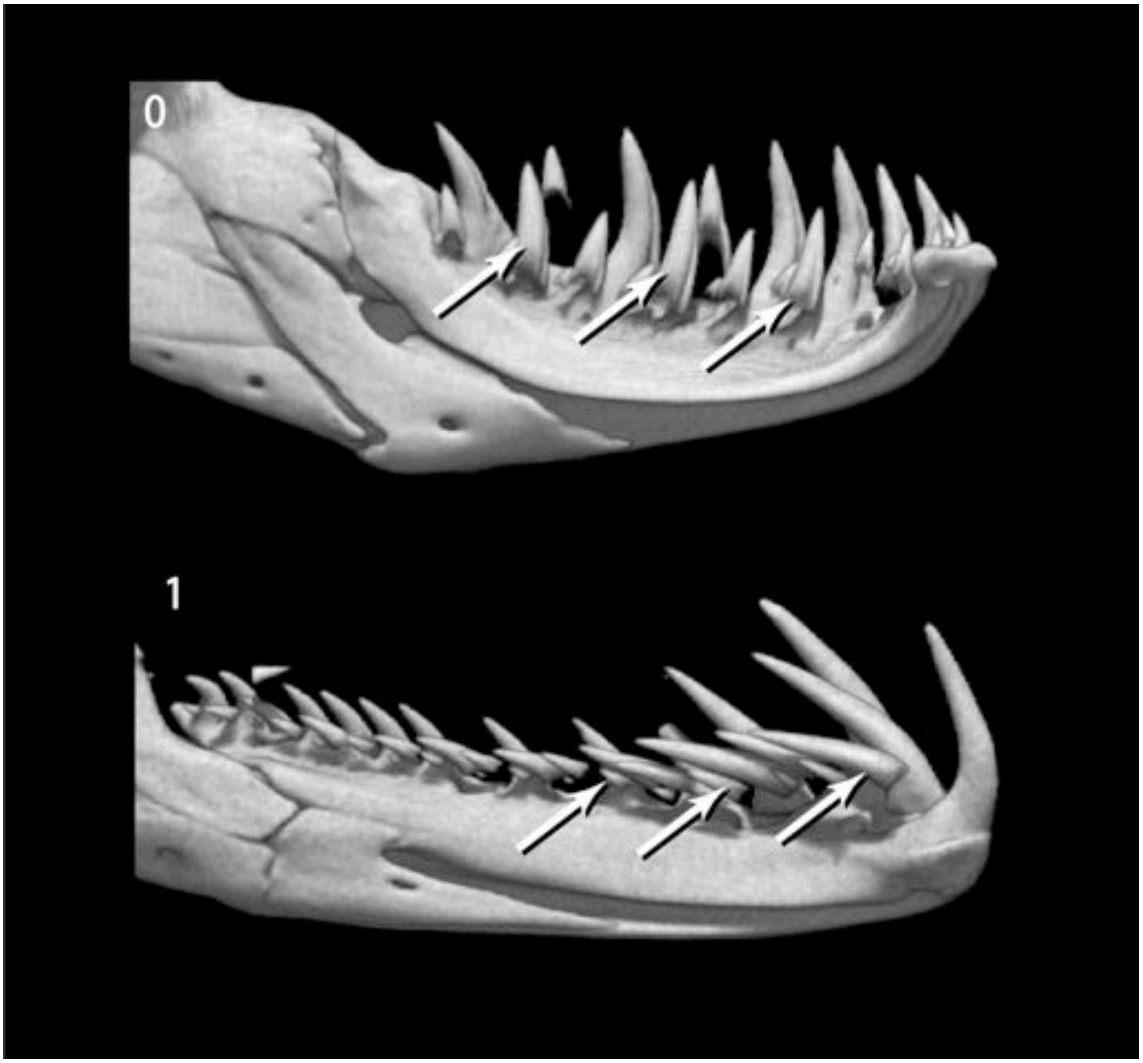
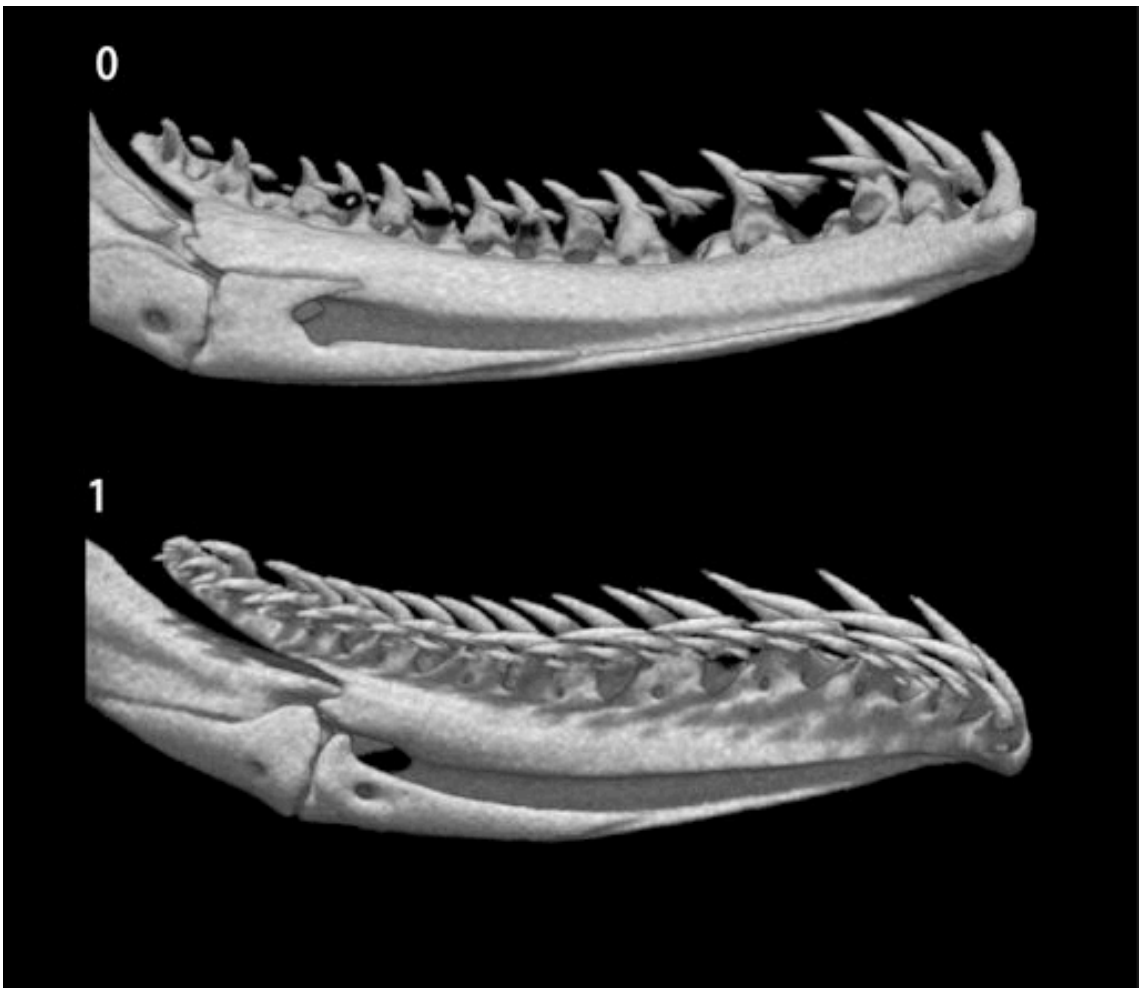
doi:10.1038/nature11227

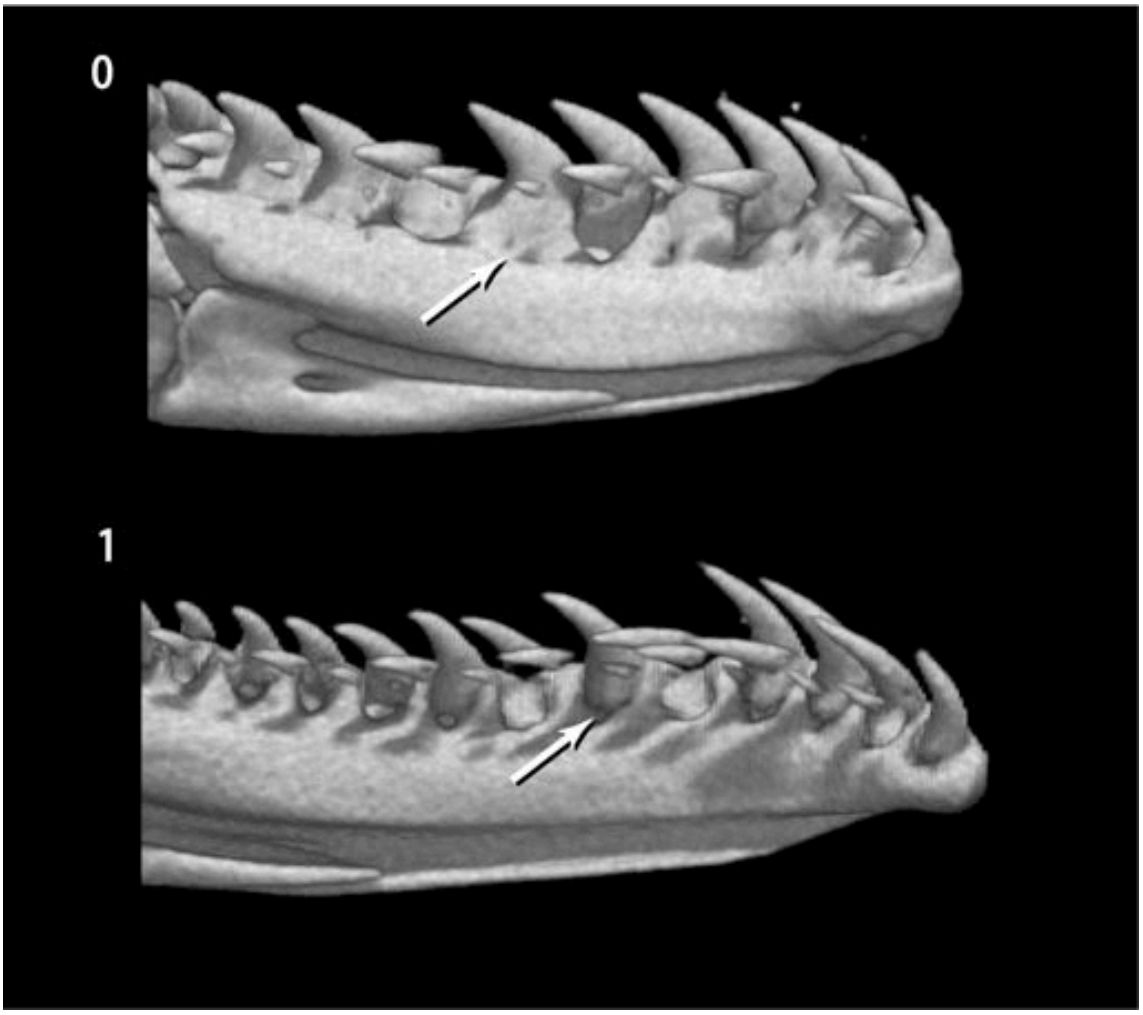
Character 155, interdental ridges. Absence of interdental ridge (0) shown in *Parasaniwa wyomingensis* (Platynota). Interdental ridges (1) shown in *Coniophis precedens*.



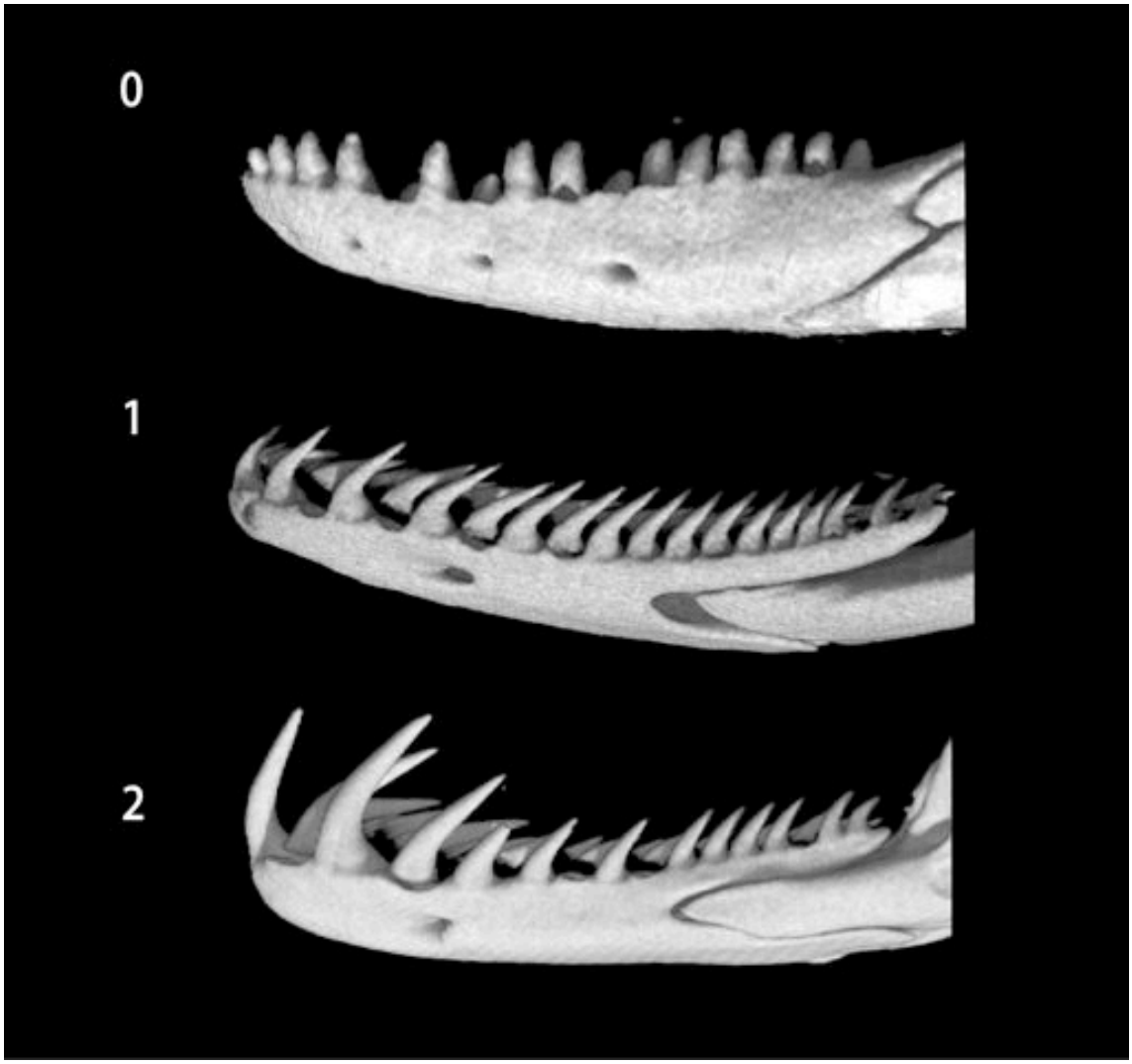
Character 156, horizontally oriented replacement teeth. Replacement teeth develop upright in jaw (0) shown in *Heloderma horridum* (Helodermatidae), replacement teeth lie horizontal in jaw (1) shown in *Epicrates striatus* (Boinae).



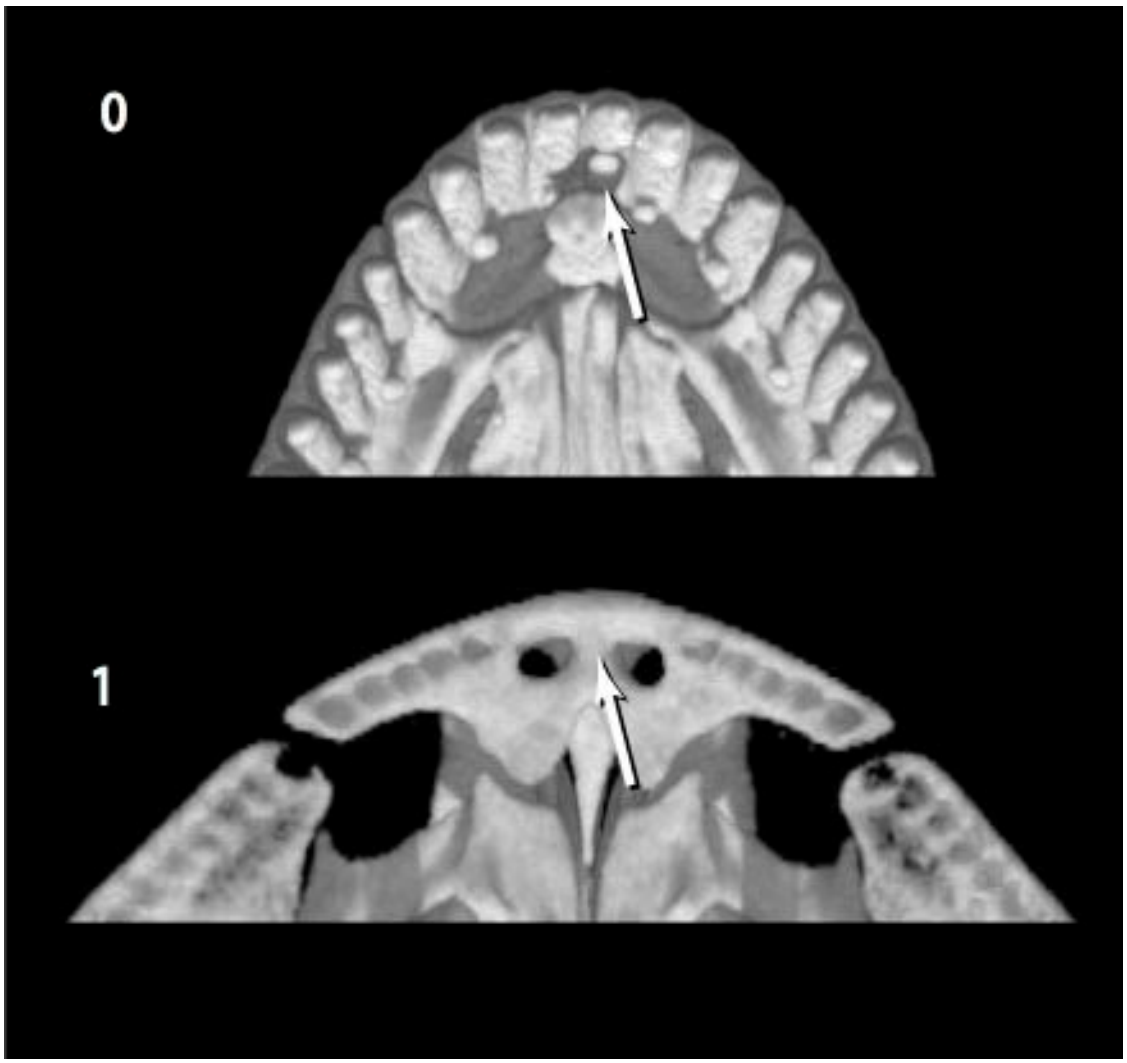
Character 157, multiple replacement teeth. Single replacement tooth per tooth position (0) shown in *Loxocemus bicolor* (Loxocemidae), multiple replacement teeth (1) shown in *Tropidophis haetianus* (Tropidophiidae).



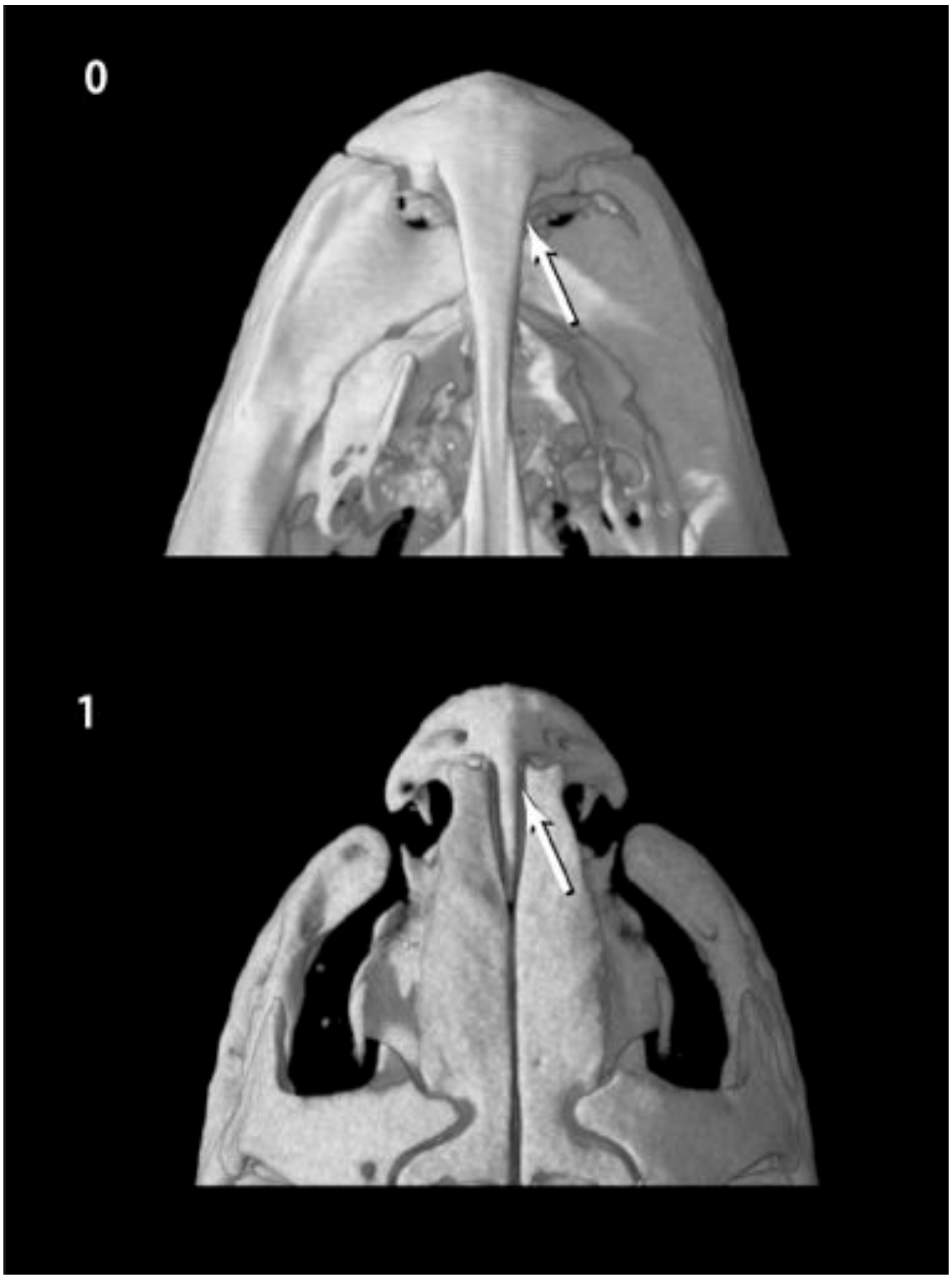
Character 158 teeth not ankylosed to jaws. Ankylosis of teeth to tooth-bearing elements (0) shown in *Cylindrophis ruffus* (Uropeltidae), teeth held loosely in sockets by ligaments (1) shown in *Loxocemus bicolor* (Loxocemidae).



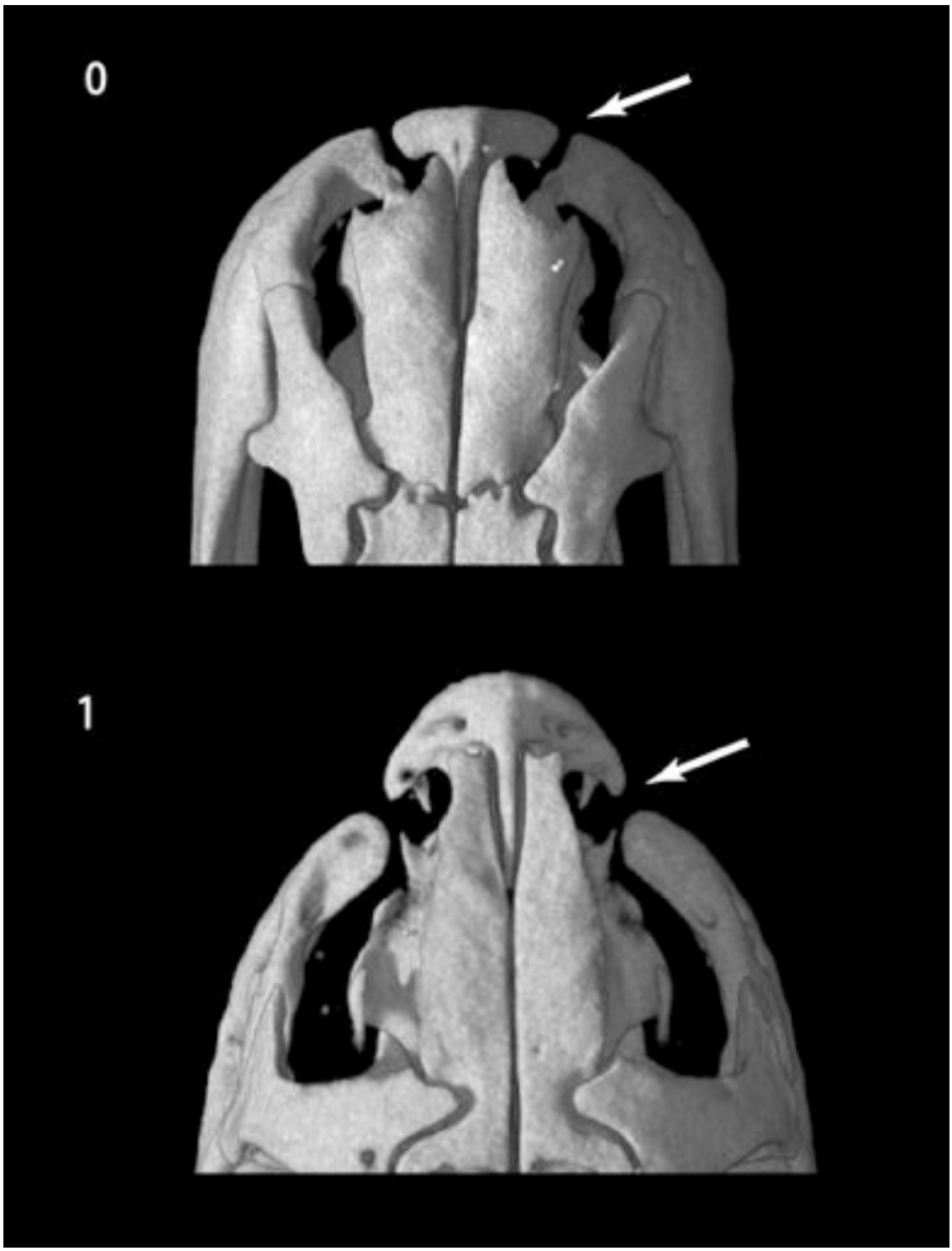
Character 159 enlarged anterior teeth. Anterior teeth subequal to or shorter than posterior teeth (0) shown in *Celestus enneagrammus* (Anguidae), anterior teeth enlarged relative to posterior teeth (1) shown in *Loxocemus bicolor* (Loxocemidae); hypertrophied, fang-like anterior teeth (2) shown in *Epicrates striatus* (Boinae).



Character 160 premaxilla diastema. Medial teeth present (0) shown in *Xenosaurus grandis* (Xenosauridae); medial teeth absent (1) shown in *Xenopeltis unicolor*.

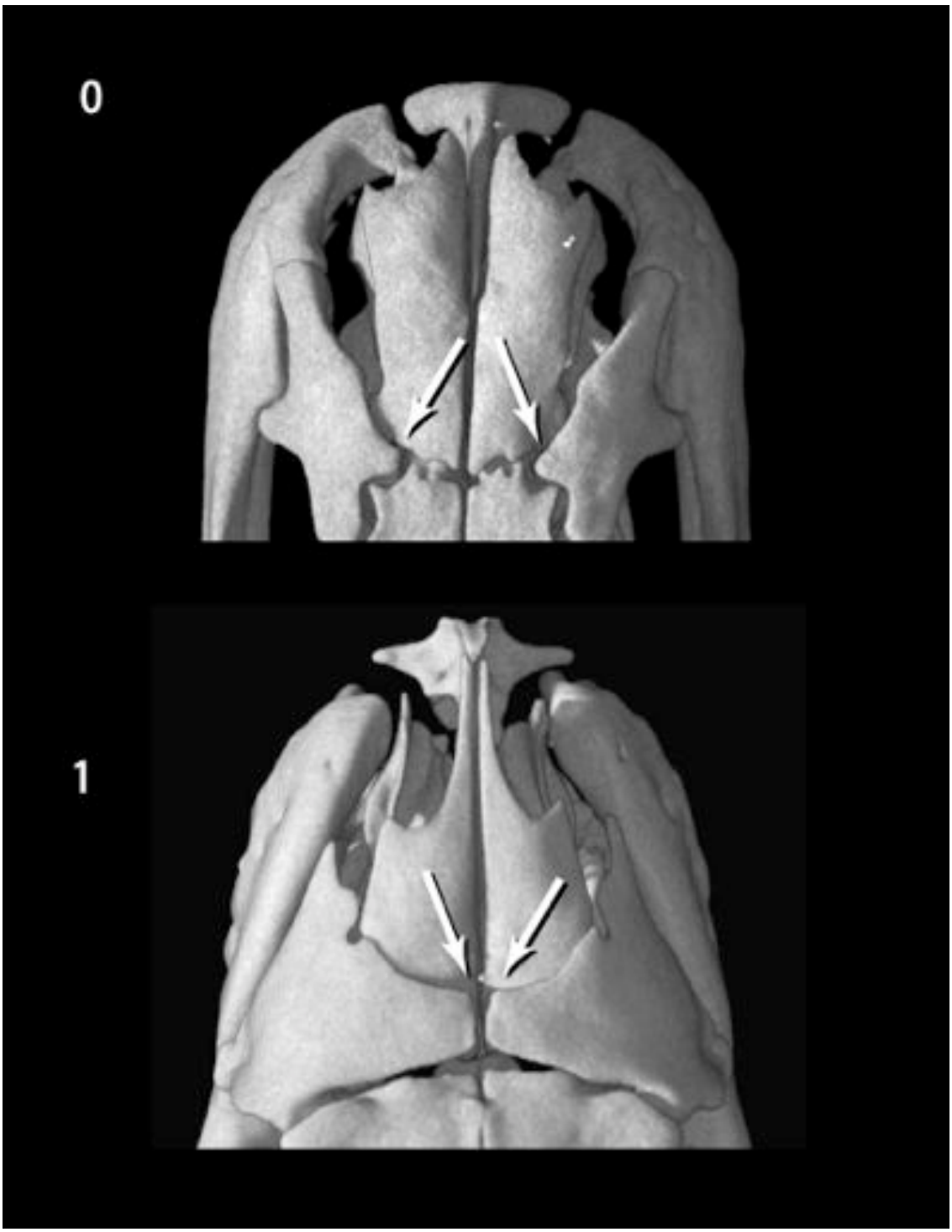


Character 161 narrow nasal process. Mediolaterally broad nasal process (0) shown in *Varanus exanthematicus* (Varanidae); narrow nasal process (1) shown in *Loxocemus bicolor* (Loxocemidae).

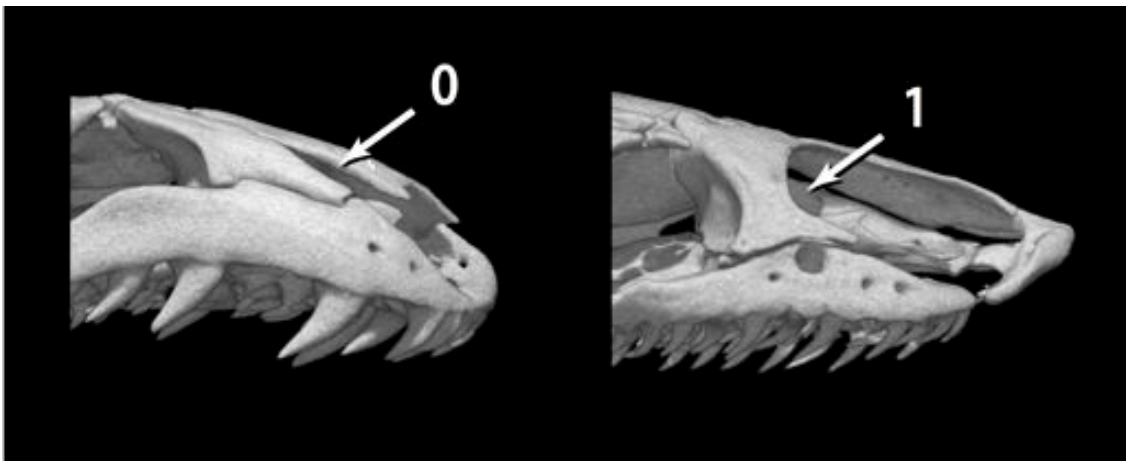


Character 162 position of premaxilla. Premaxilla medial to maxillae (0) shown in *Anilius scytale* (Aniliidae); premaxilla anteriorly displaced (1) shown in *Loxocemus bicolor* (Loxocemidae).

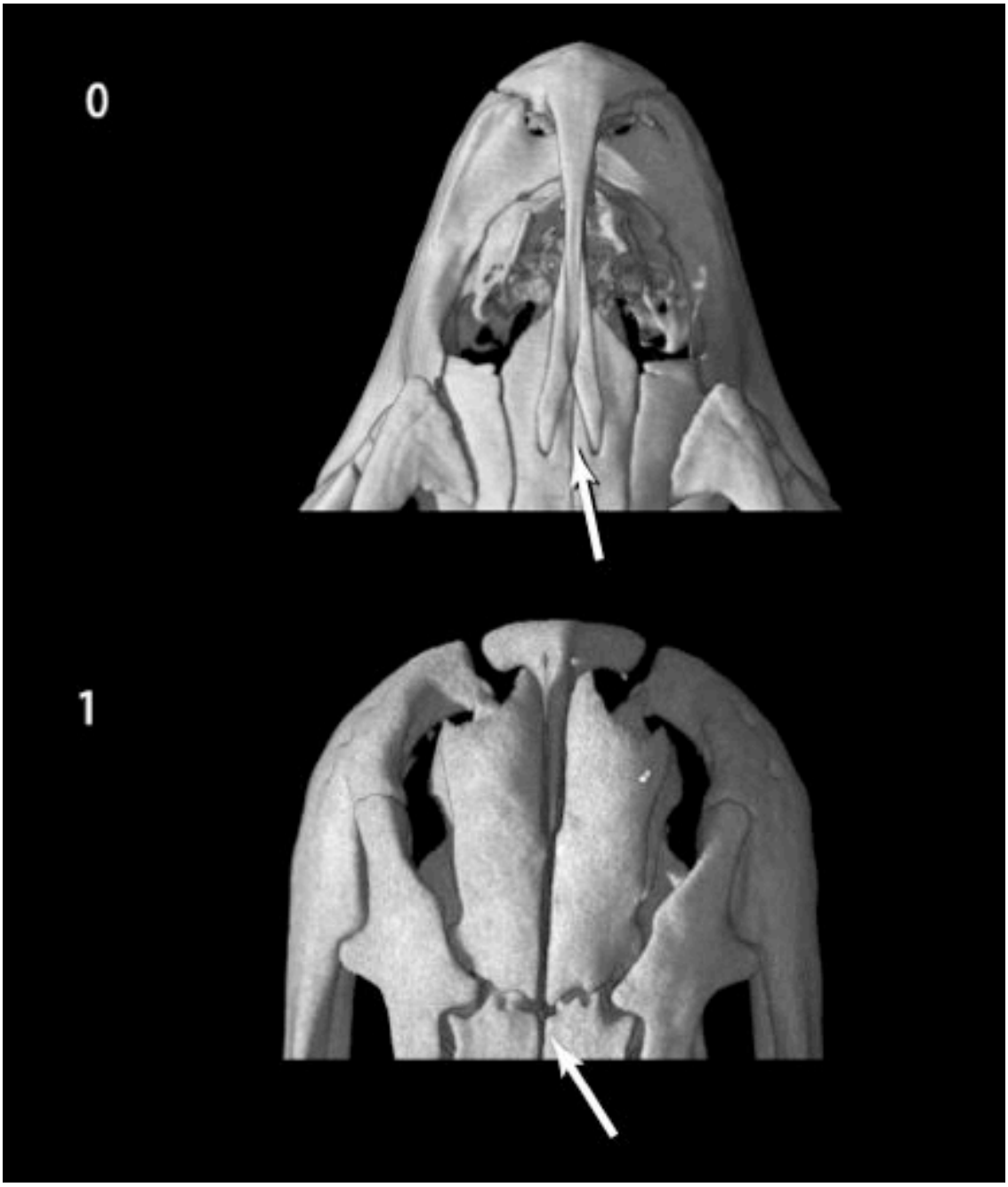
Character 163 prefrontal notch for maxilla. Absence of notch (0) shown in *Loxocemus bicolor* (Loxocemidae), tab-and-notch articulation (1) shown in *Cylindrophis ruffus* (Uropeltidae).



Character 164 medial extension of nasals towards the midline. Limited medial expansion of prefrontals (0) shown in *Cylindrophis ruffus* (Uropeltidae), prefrontals extend across almost the entire anterior margin of the frontals (1) shown in *Epicrates striatus* (Boidae).



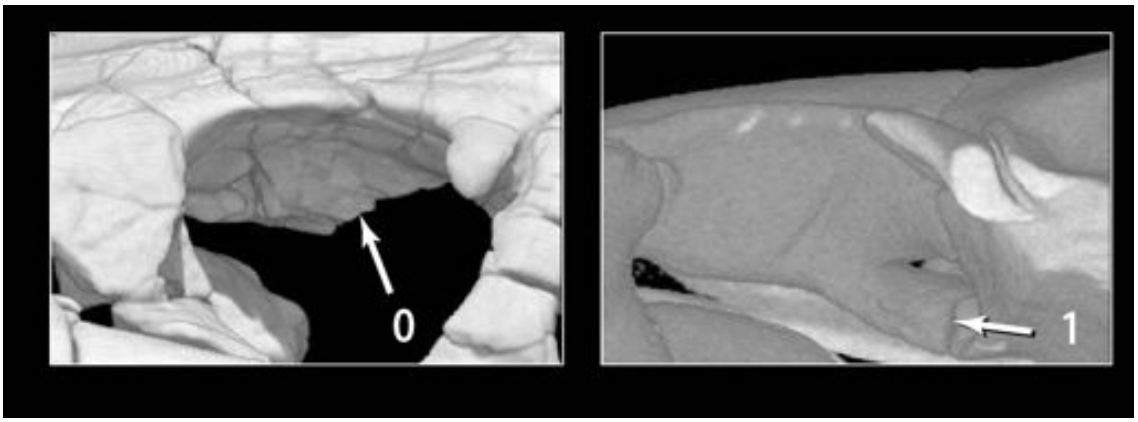
Character 165 expanded naris. Weakly developed naris (0) shown in *Anilius scytale* (Aniliidae); strongly concave anterior margin of prefrontal bordering naris (1) shown in *Loxocemus bicolor* (Loxocemidae).



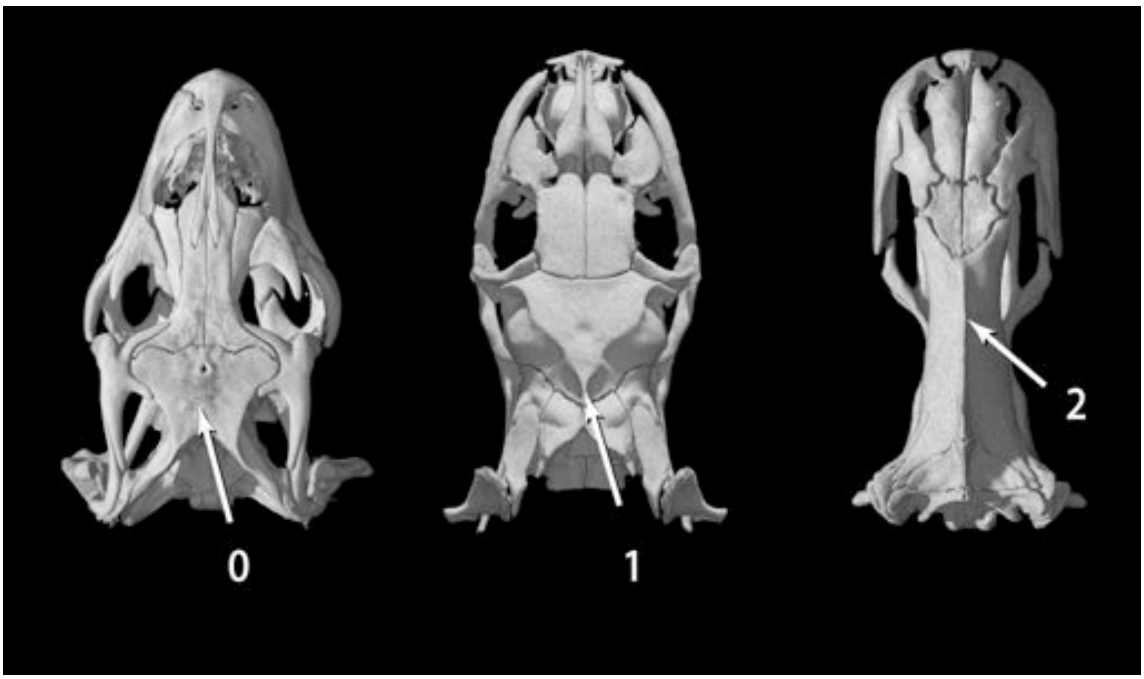
Character 166 loss of nasal processes of frontals. Long median processes of frontal projecting between nasals (0) shown in *Varanus exanthematicus* (Varanidae), loss of nasal processes of frontal (1) shown in *Cylindrophis ruffus* (Uropeltidae).

Character 167, frontals broad anteriorly. Narrow frontals (0) shown in *Varanus acanthurus* (Varanidae); broad frontals (1) shown in *Tropidophis haetianus* (Tropidophiidae).

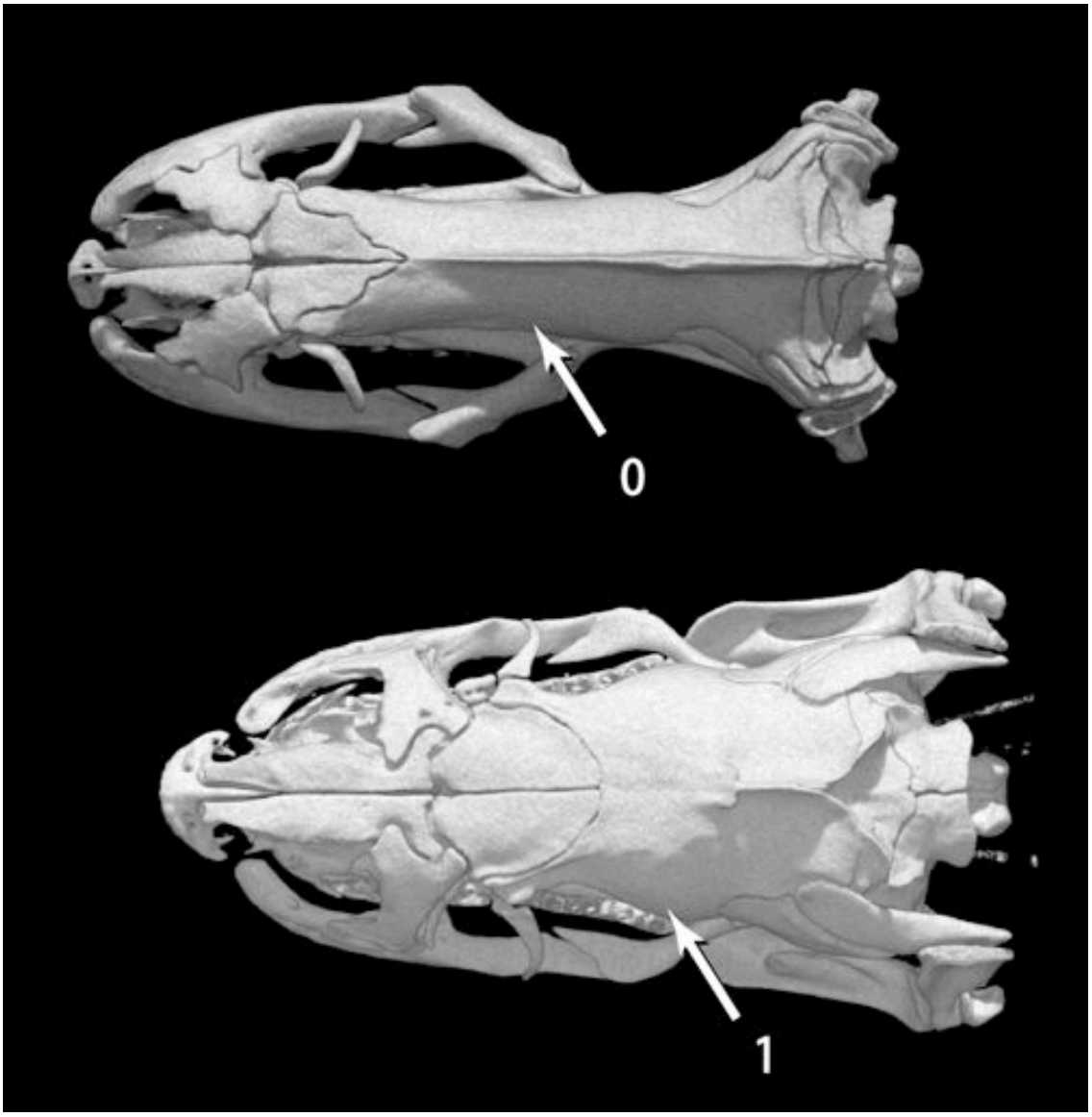
Character 168, frontal peg for prefrontal. Akinetic, abutting contact (0) shown in *Varanus exanthematicus* (Varanidae); kinetic joint (1) shown in *Leptotyphlops dulcis* (Scolecophidia) kinetic peg-and-socket joint (2) shown in *Cylindrophis ruffus* (Uropeltidae).



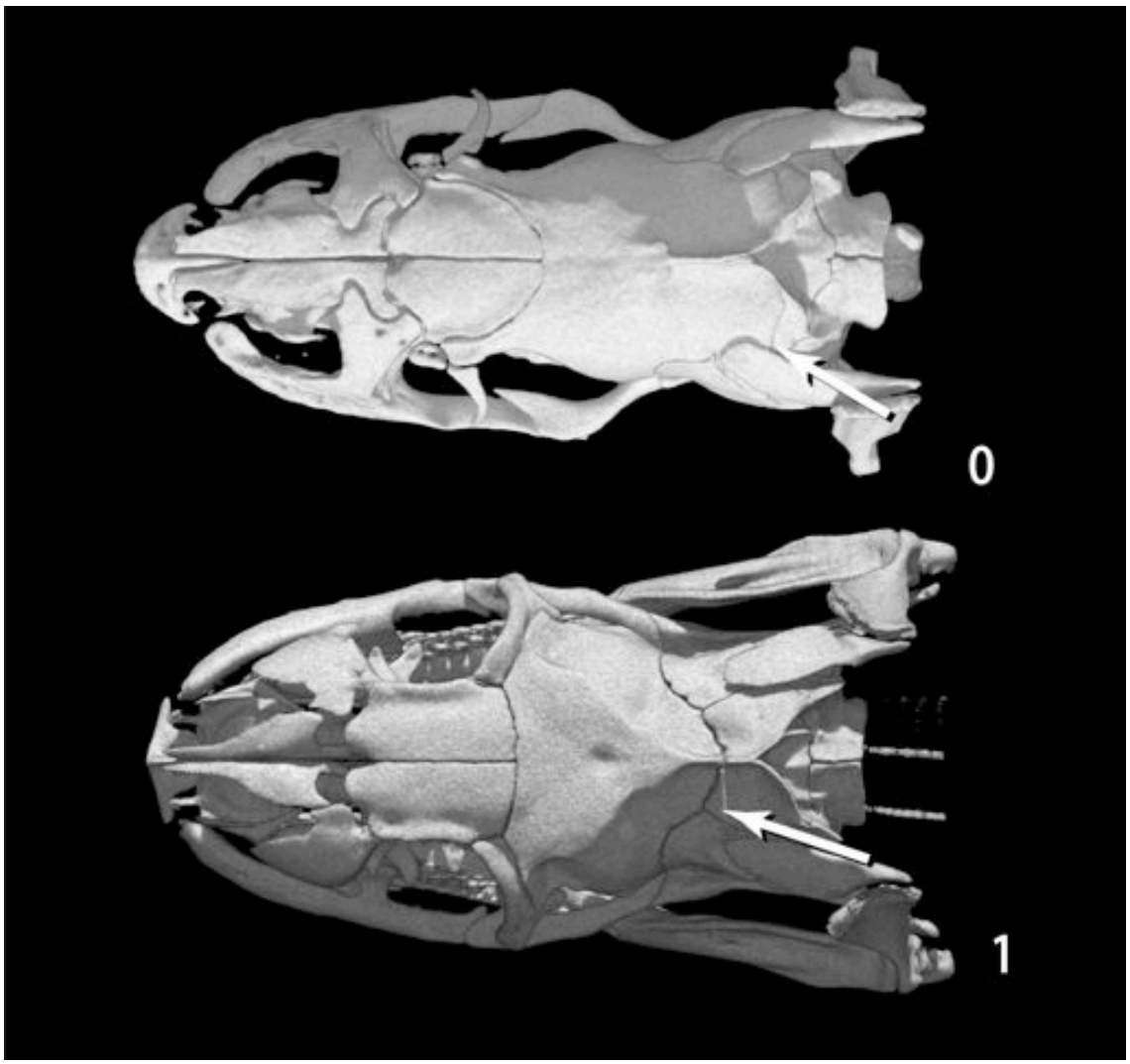
Character 169, enclosed optic foramen. Ventrally open braincase (0) shown in *Dinilysia patagonica*; optic foramen enclosed (1) shown in *Tropidophis haetianus* (Tropidophiidae).



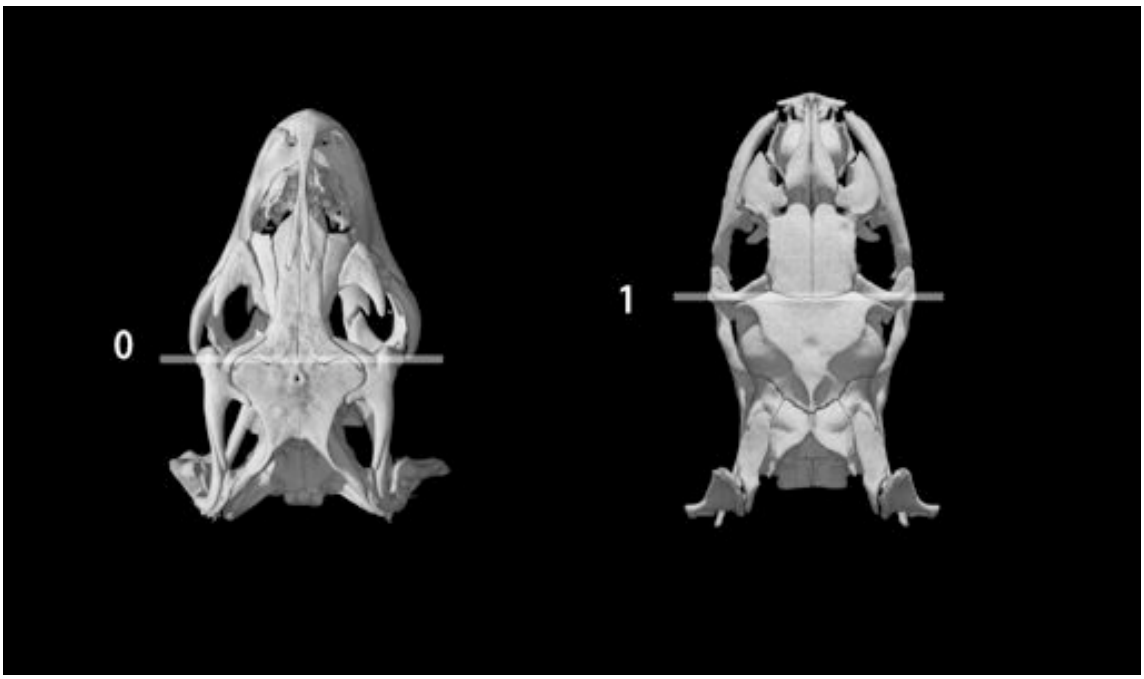
Character 170 saggital crest. Absence of parietal saggital crest (0) shown in *Varanus exanthematicus* (Varanidae), short parietal saggital crest (1) shown in *Tropidophis haetianus* (Tropidophiidae), elongate parietal saggital crest (2) shown in *Cylindrophis ruffus* (Uropeltidae).



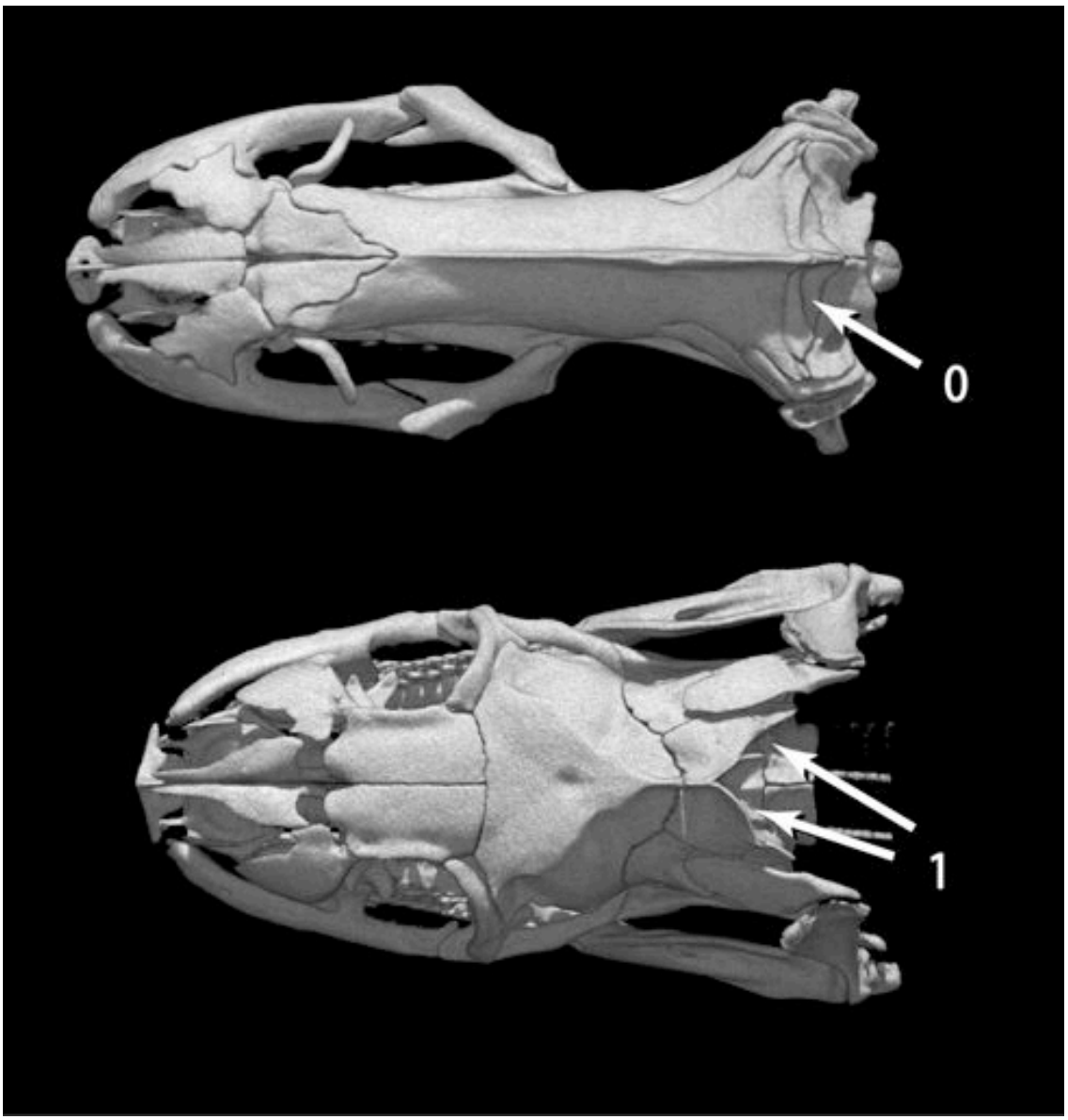
Character 171 inflated parietal. Uninflated parietal (0) shown in *Cylindrophis ruffus* (Uropeltidae), inflated postorbital region of parietal (1) shown in *Loxocemus bicolor* (Loxocemidae).



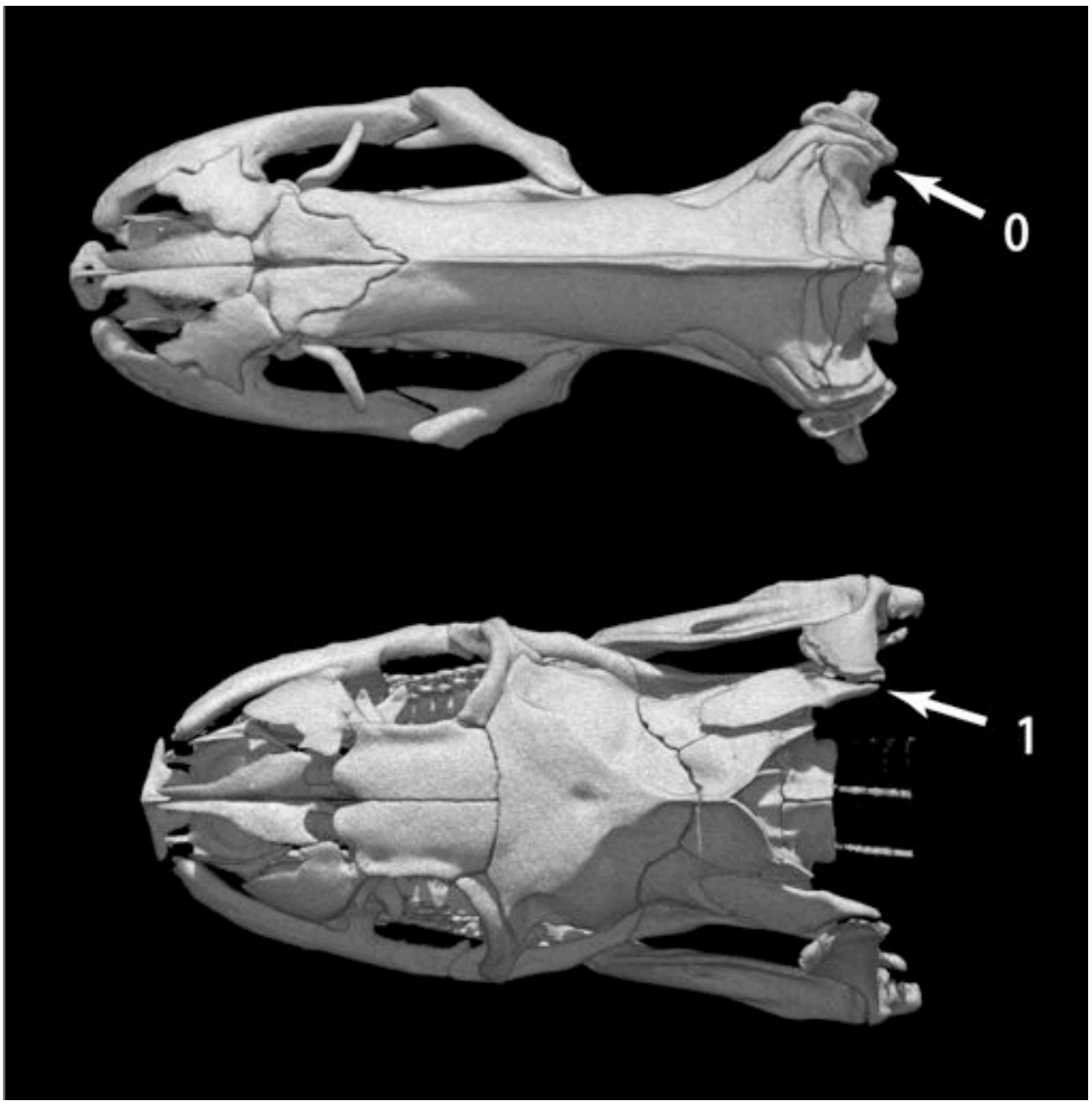
Character 172 posteriorly narrow parietal. Posteriorly broad parietal (0) shown in *Loxocemus bicolor* (Loxocemidae) (1); posteriorly narrow parietal (1) shown in *Tropidophis haetianus* (Tropidophiidae)



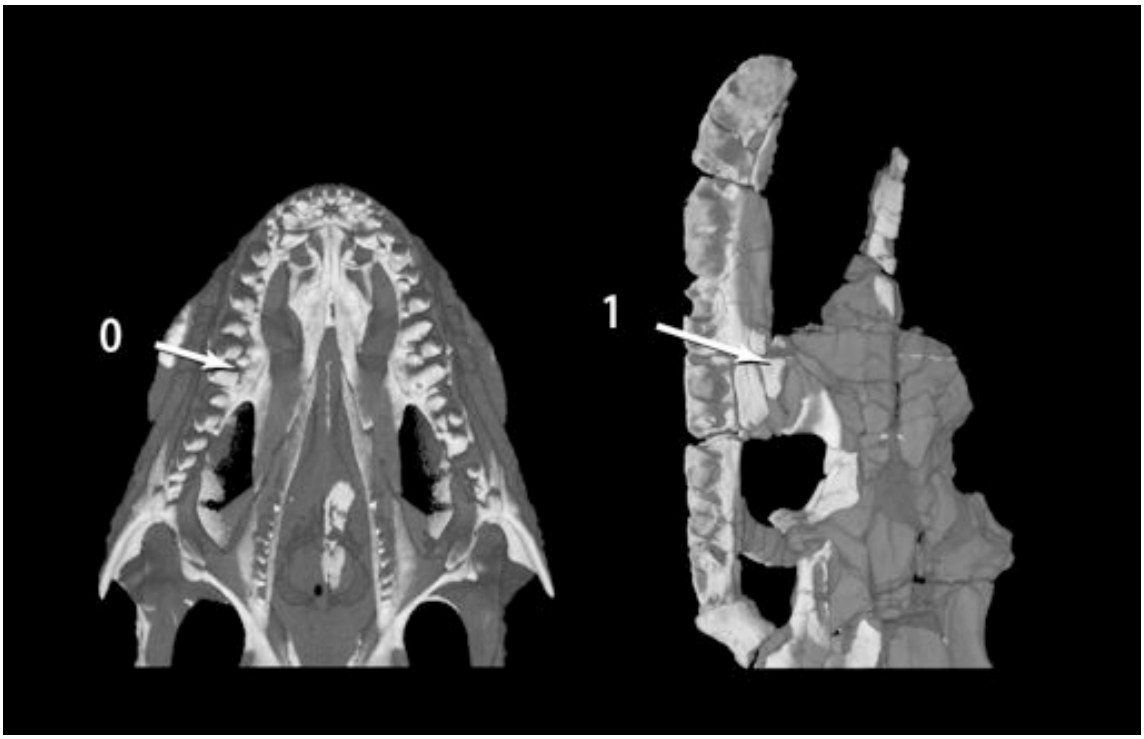
Character 173 elongate postorbital region of the skull. Short postorbital region (0) shown in *Varanus exanthematicus* (Varanidae), long postorbital region (1) shown in *Tropidophis haetianus* (Tropidophiidae).



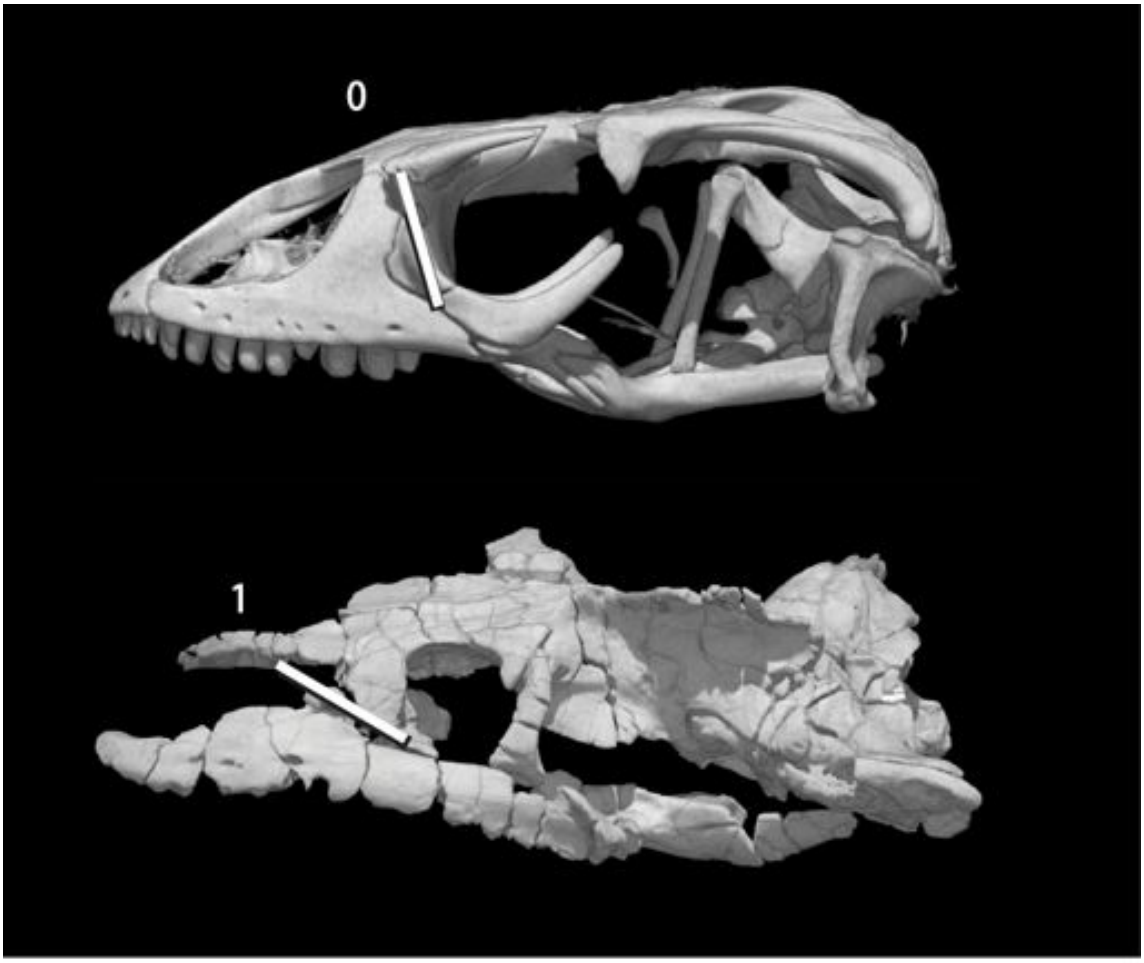
Character 174 nuchal crests of supraoccipital. Absence of transverse crest (0) shown in *Cylindrophis ruffus* (Uropeltidae), prominent transverse crests on supraoccipital and/or parietal (1) shown in *Tropidophis haetianus* (Tropidophiidae).



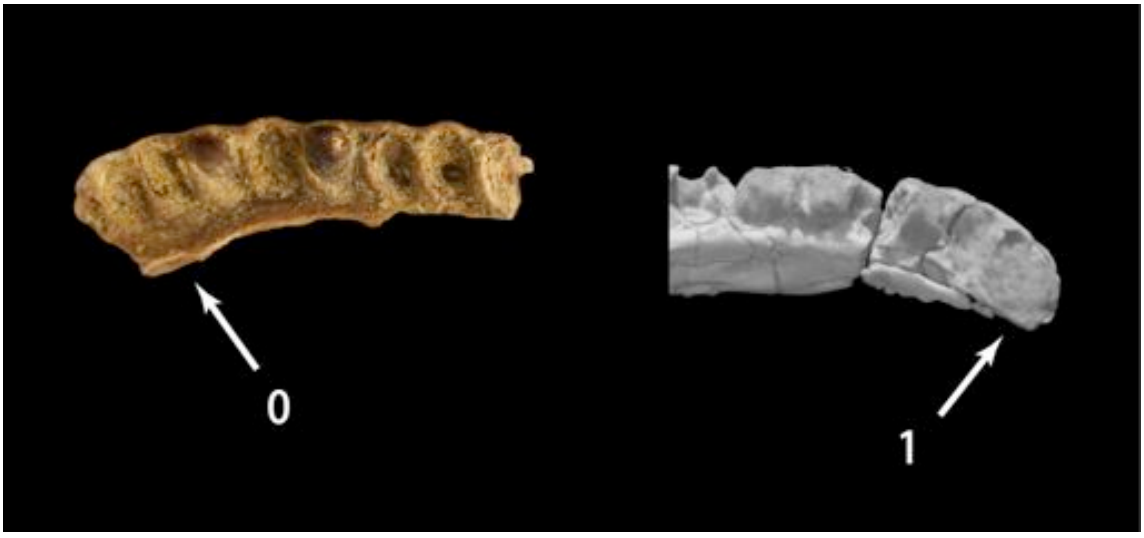
Character 175 elongate supratemporal. Supratemporal does not project beyond paroccipital process (0) shown in *Cylindrophis ruffus* (Uropeltidae), supraoccipital projects beyond paroccipital process (1) shown in *Tropidophis haetianus* (Tropidophiidae).



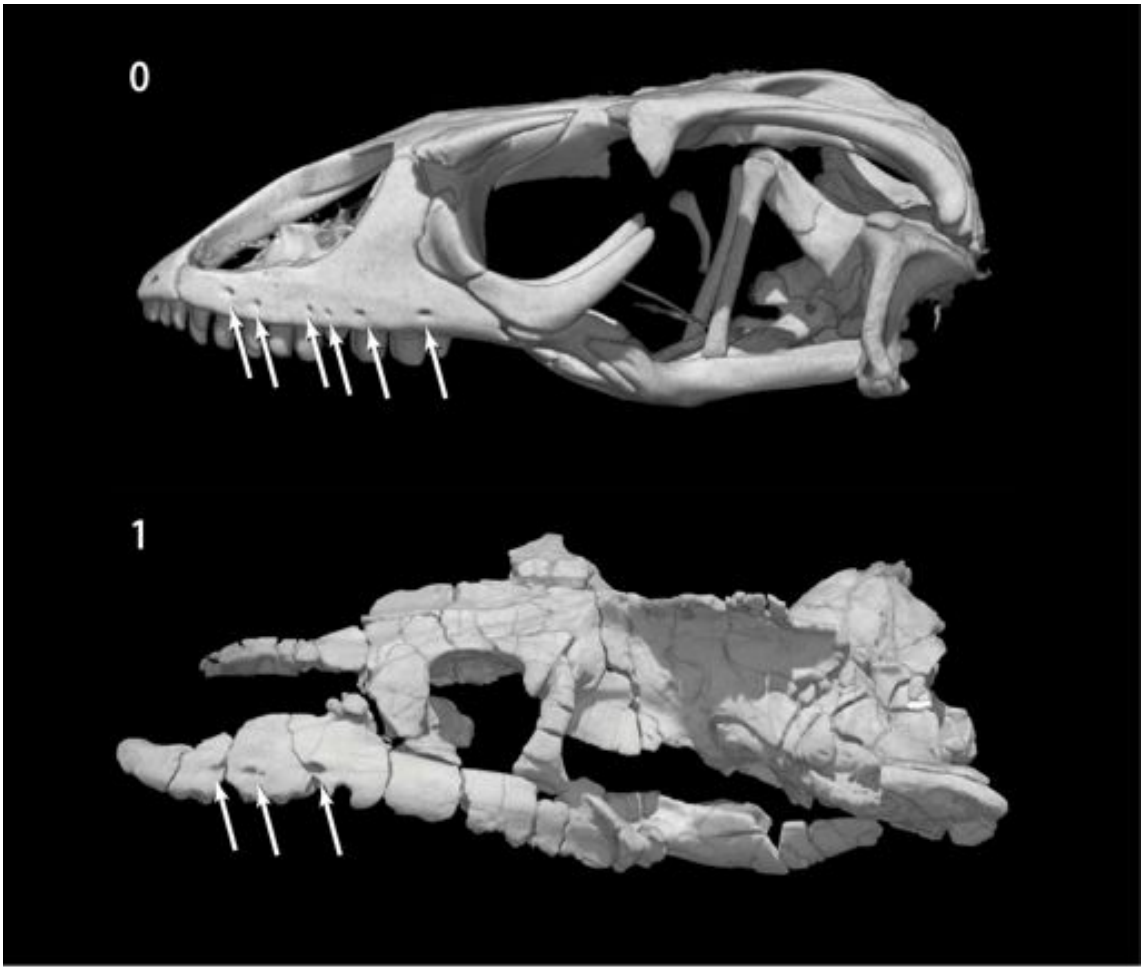
Character 176 medially projected palatine process. Short palatine process (0) shown in *Shinisaurus crocodilurus* (Xenosauridae), large palatine process (1) shown in *Dinilysia patagonica*.



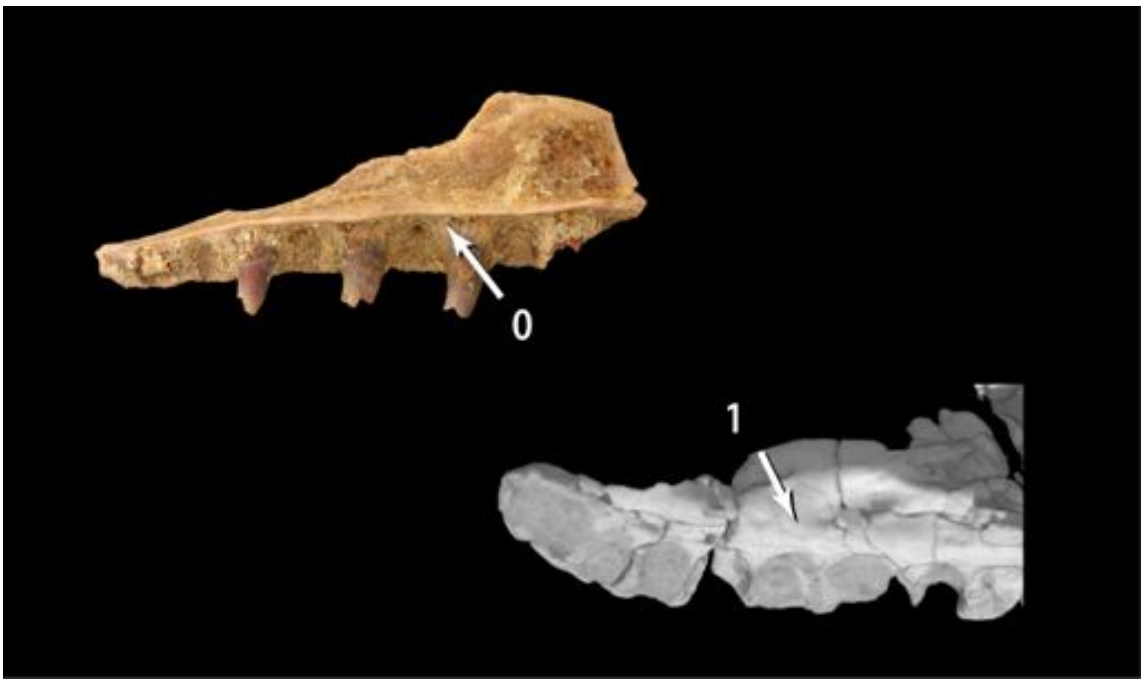
Character 177 dorsally oriented posterior margin of the maxilla. Steeply inclined posterior margin of maxillary facial process (0) shown in *Varanus exanthematicus* (Varanidae), anteriorly inclined margin of facial process (1) shown in *Dinilysia patagonica*.



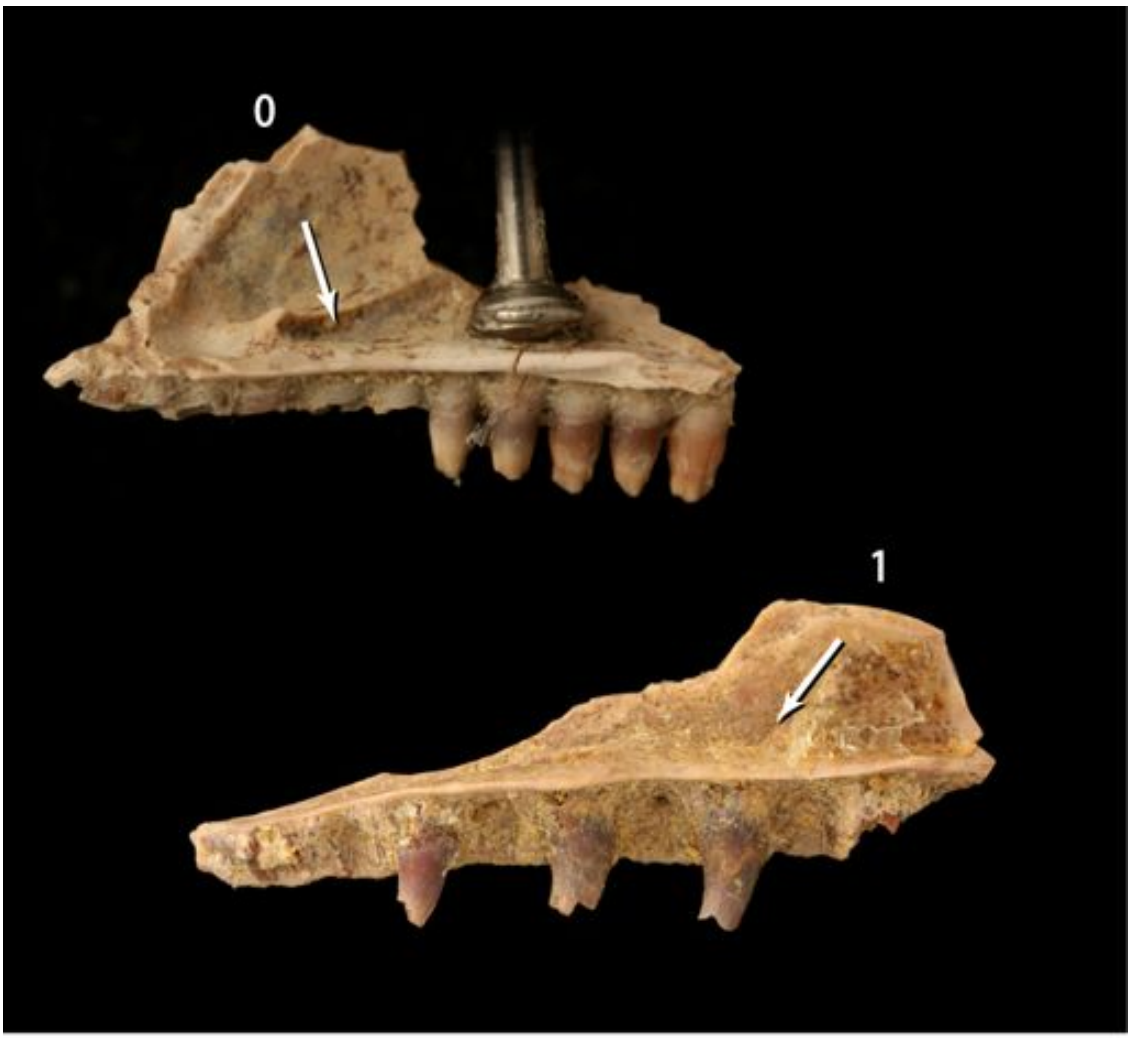
Character 178, reduced vomerine process. Large vomerine process (0) shown in *Coniophis precedens*; loss of vomerine process (1) shown in *Dinilysia patagonica*.



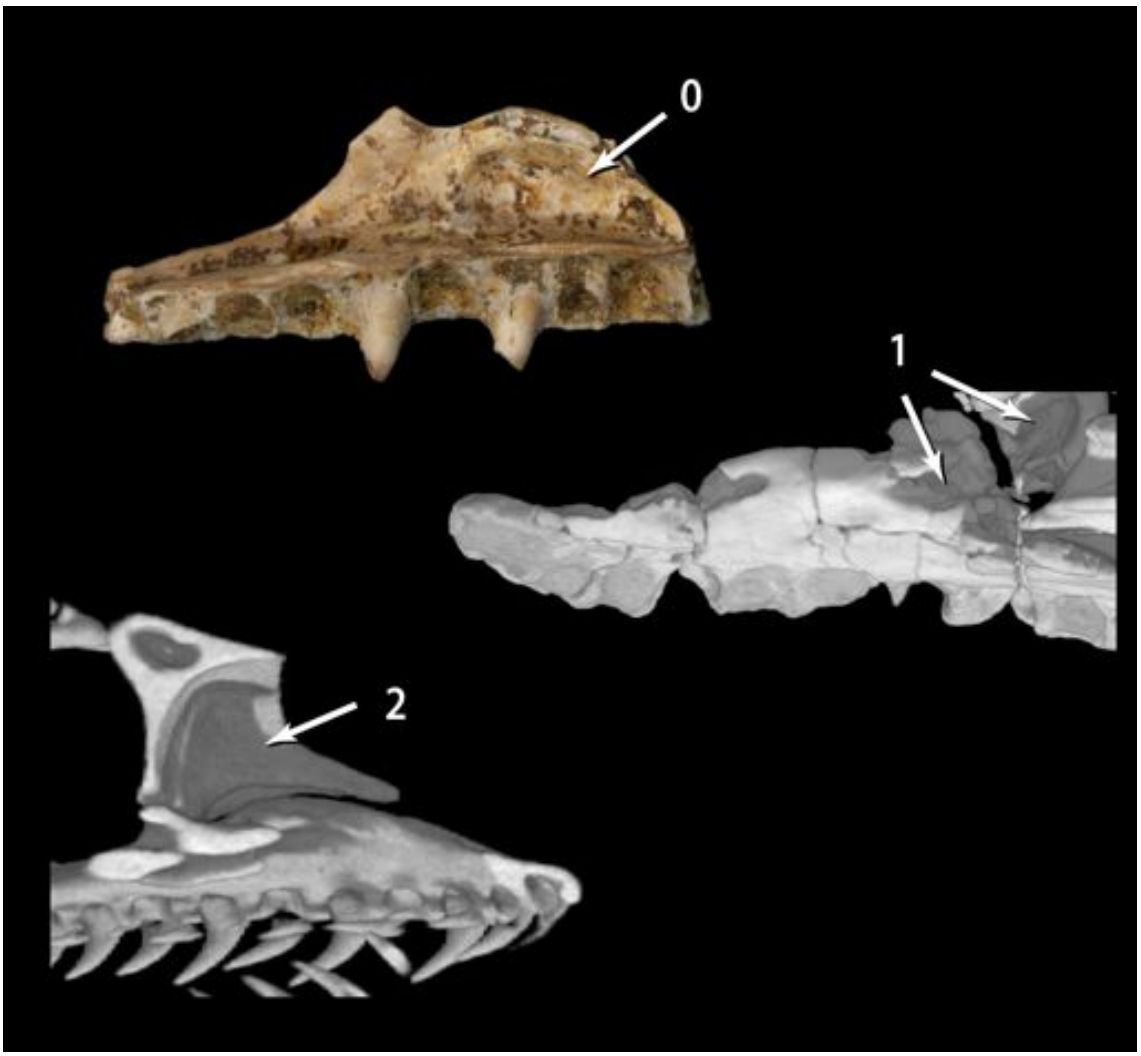
Character 179, Reduced number of mental foramina. Multiple mental foramina (0) shown in *Varanus exanthematicus* (Varanidae); fewer than five mental foramina (1) shown in *Dinilysia patagonica*.



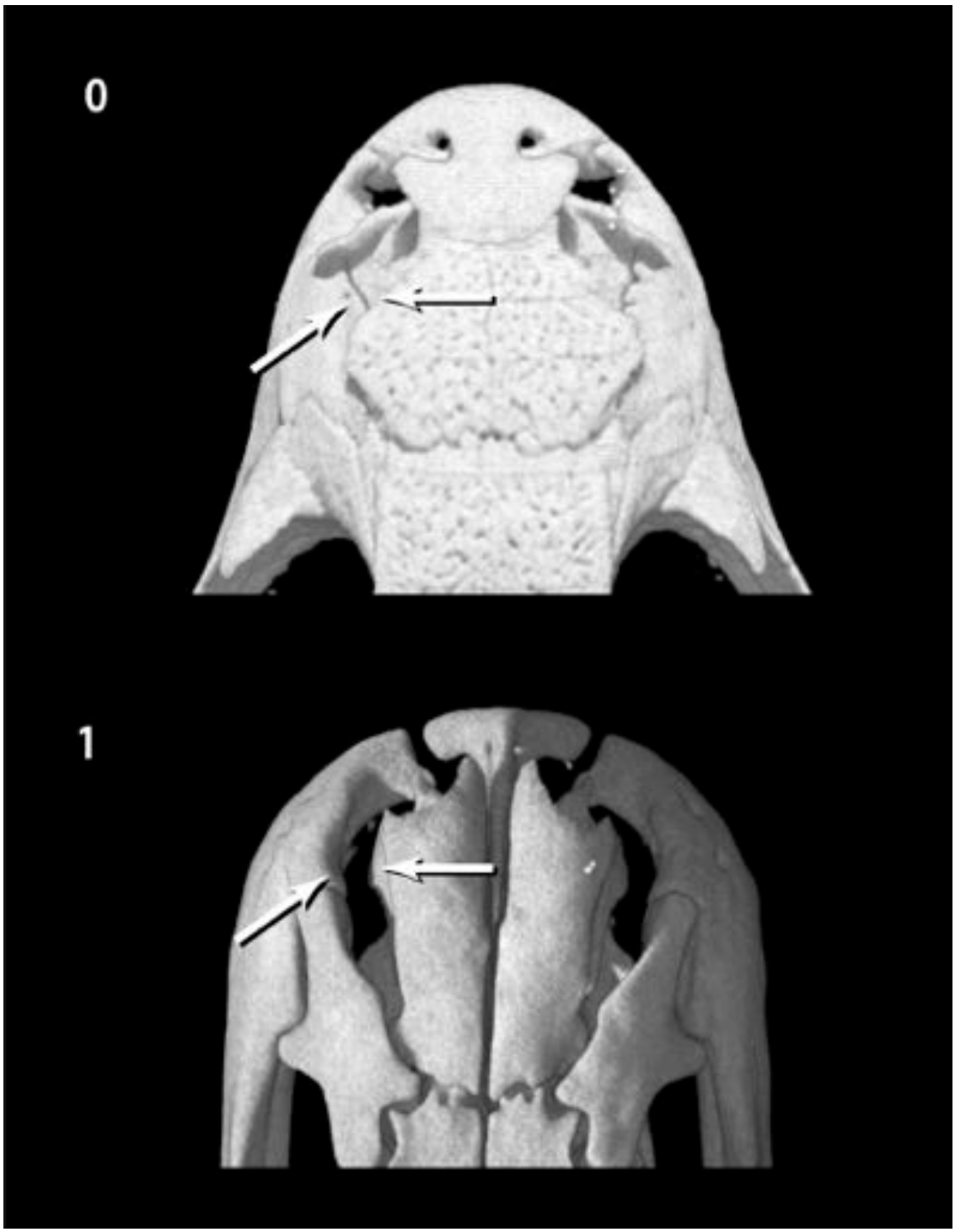
Character 180, development of supradental shelf. Supradental shelf(0) shown in *Coniophis precedens*; loss of supradental shelf (1) shown *in Dinilysia patagonica*.



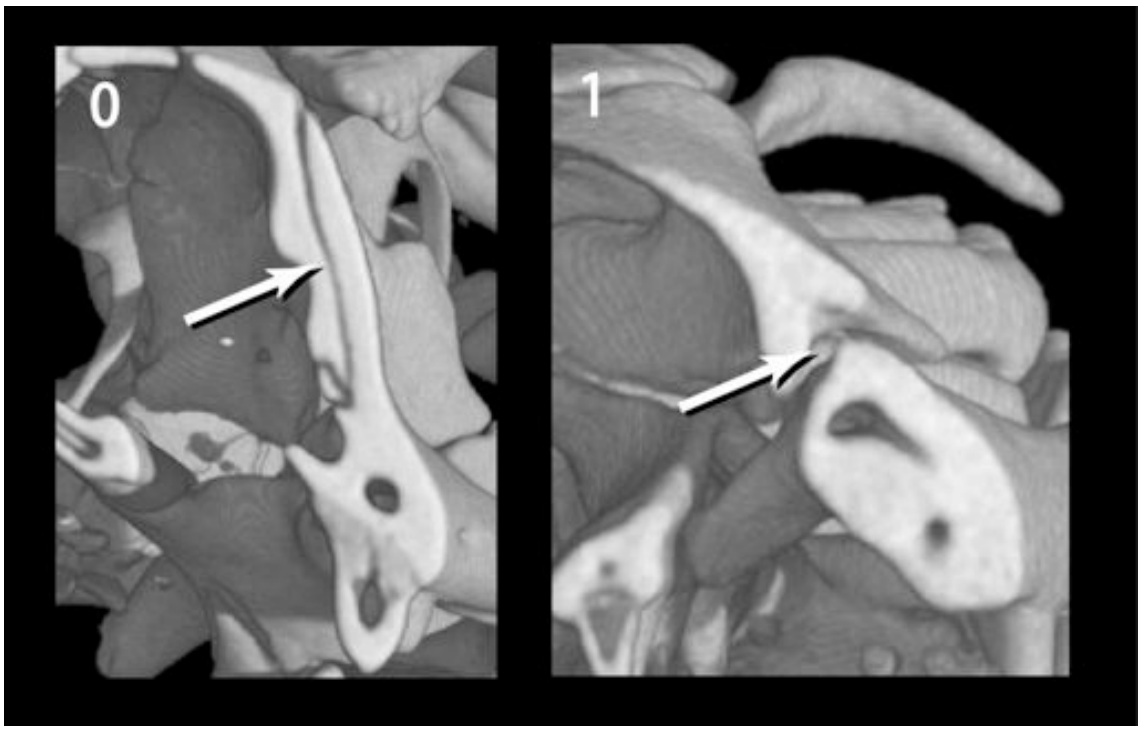
Character 181, Lacrimal fossa reduced. Lacrimal fossa (0) shown in *Chamops segnis*; absence of lacrimal fossa (1) shown in *Coniophis precedens*.



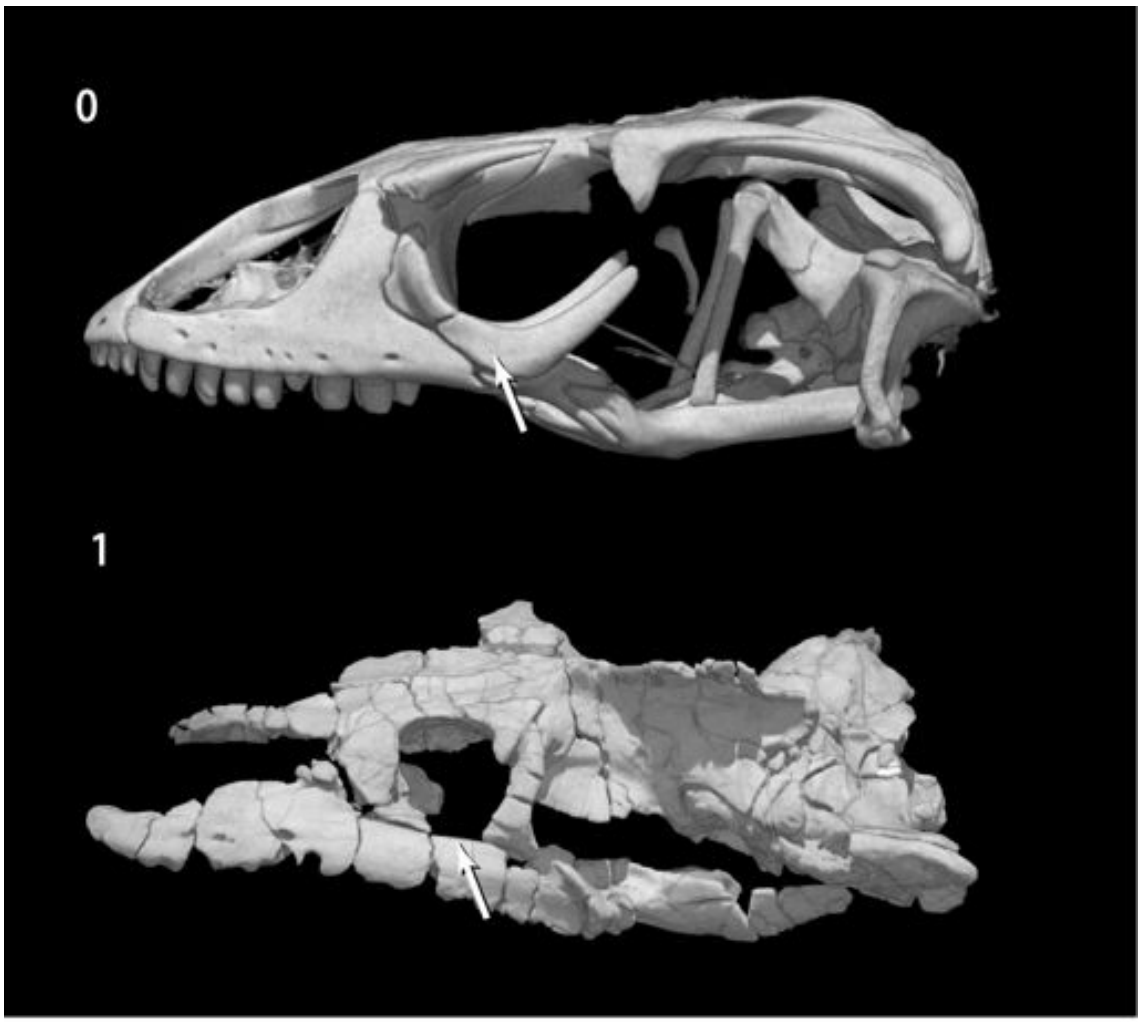
Character 182, fossa for nasal capsule. Large fossa for nasal capsule on the maxilla (0) shown in *Coniophis precedens*; small, posteriorly positioned fossa on maxilla (1) shown in *Dinilysia patagonica*; development of fossa exclusively on prefrontal [2] shown in saggital cut of *Loxocemus bicolor* (Loxocemidae).



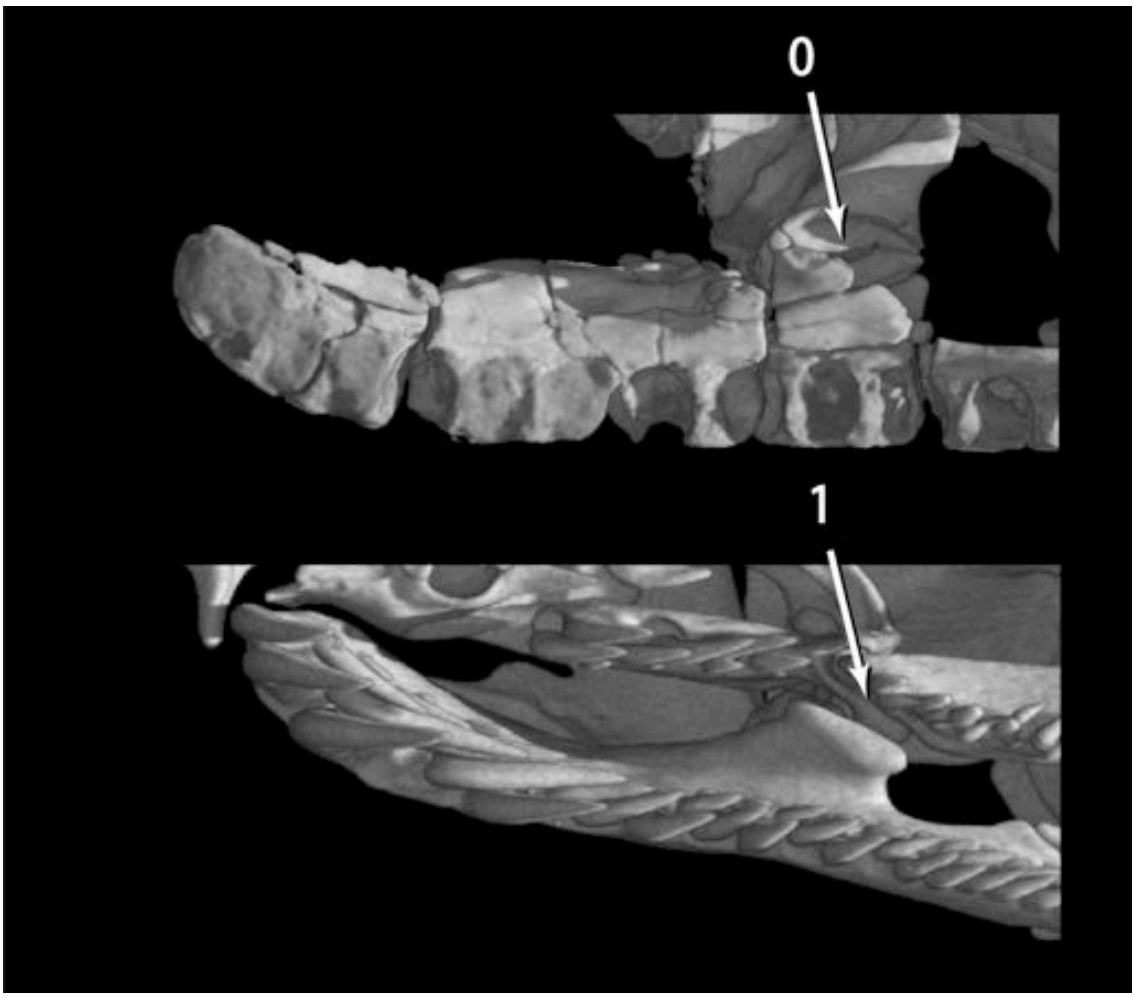
Character 183 nasals do not contact maxilla. Nasal-maxilla contact (0) shown in *Celestus enneagrammus* (Anguidae); loss of nasal-maxilla contact (1) shown in *Anilius scytale* (Aniliidae).



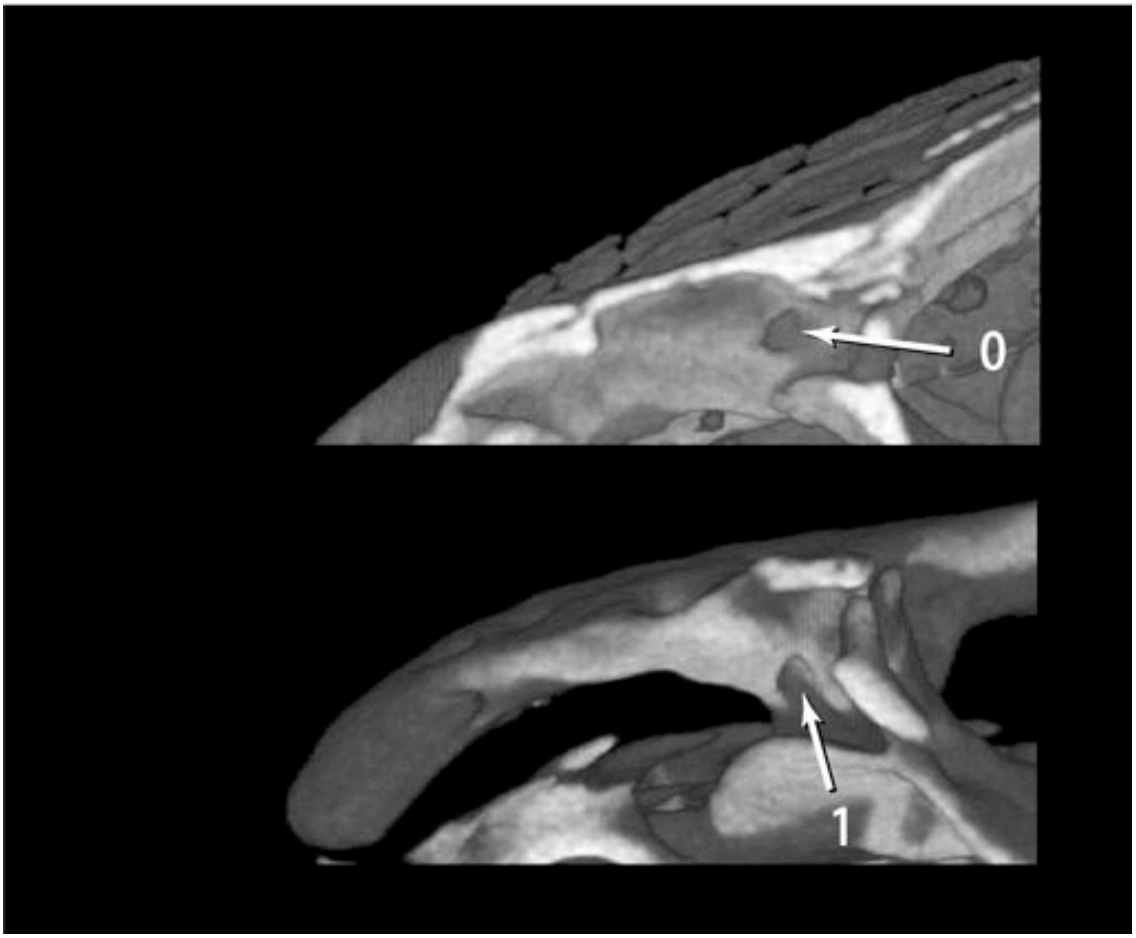
Character 184 maxilla-prefrontal contact. Prefrontal overlapped by maxilla laterally (0) shown in *Varanus exanthematicus* (Varanidae); prefrontal sits atop maxilla (1) shown in *Cylindrophis ruffus* (Uropeltidae).



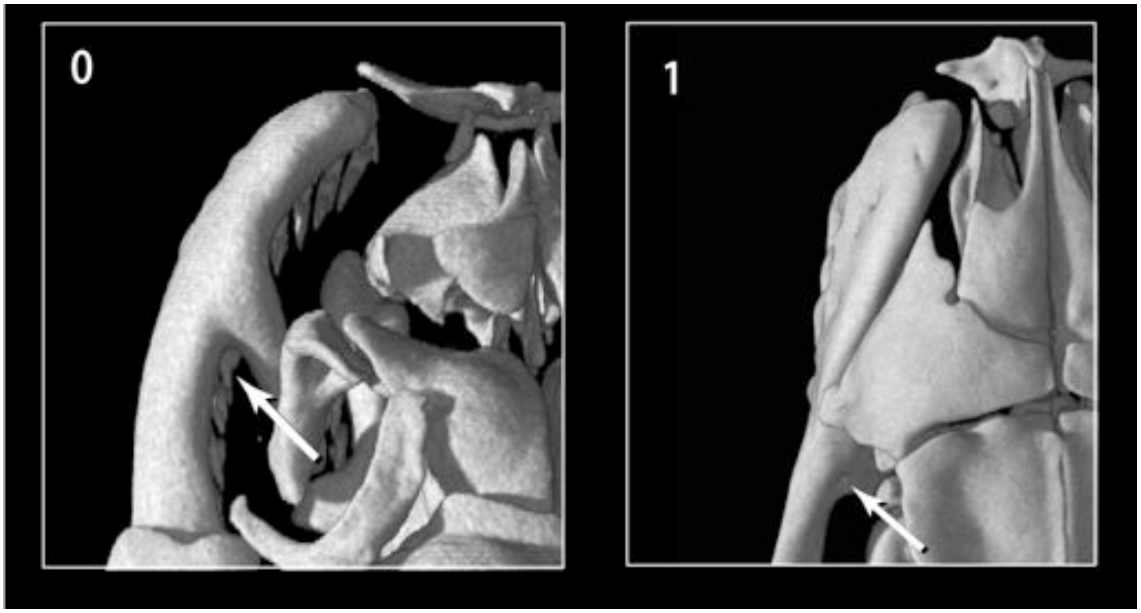
Character 185, Jugal contribution to orbit. Jugal contribution to anteroventral margin of orbit (0) shown in *Varanus exanthematicus* (Varanidae); absence of jugal from anteroventral margin of orbit (1) shown in *Dinilysia patagonica*.



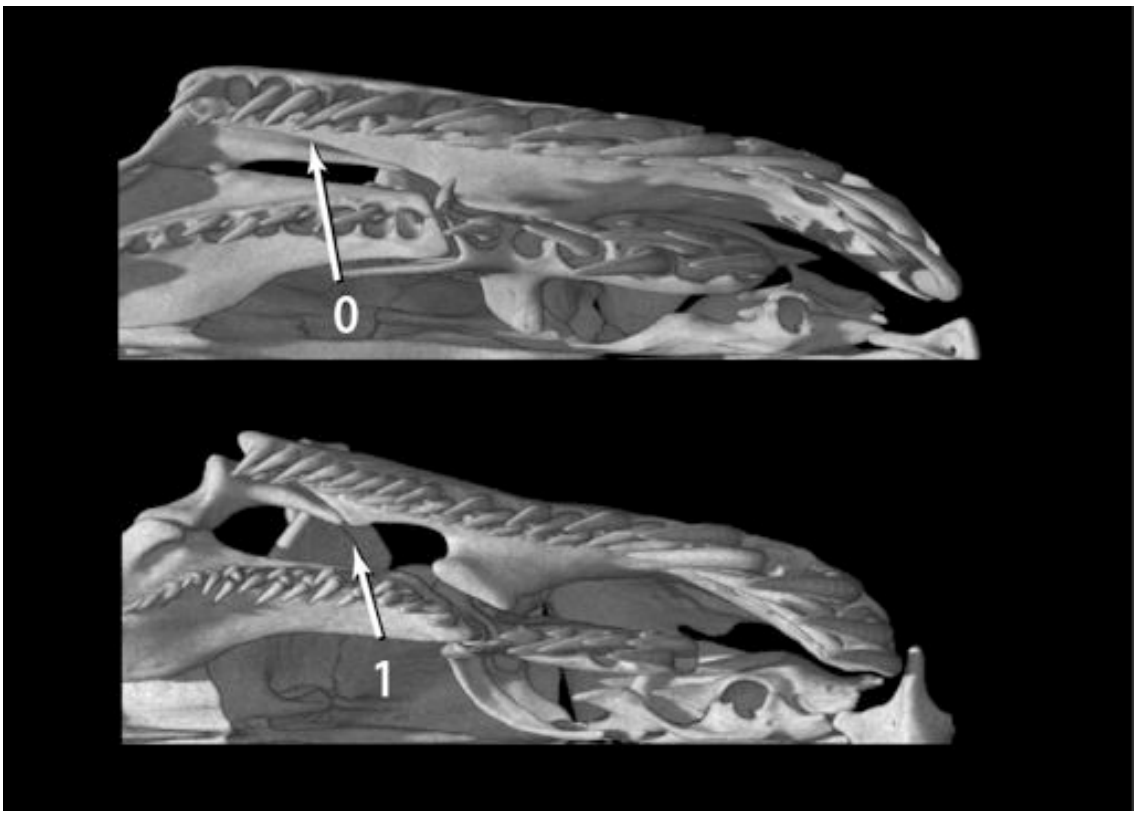
Character 186, pendant palatine process of maxilla. Medially projecting palatine process (0) shown in *Dinilysia patagonica* (0), pendant palatine process (1) shown in *Epicrates striatus* (Boinae).



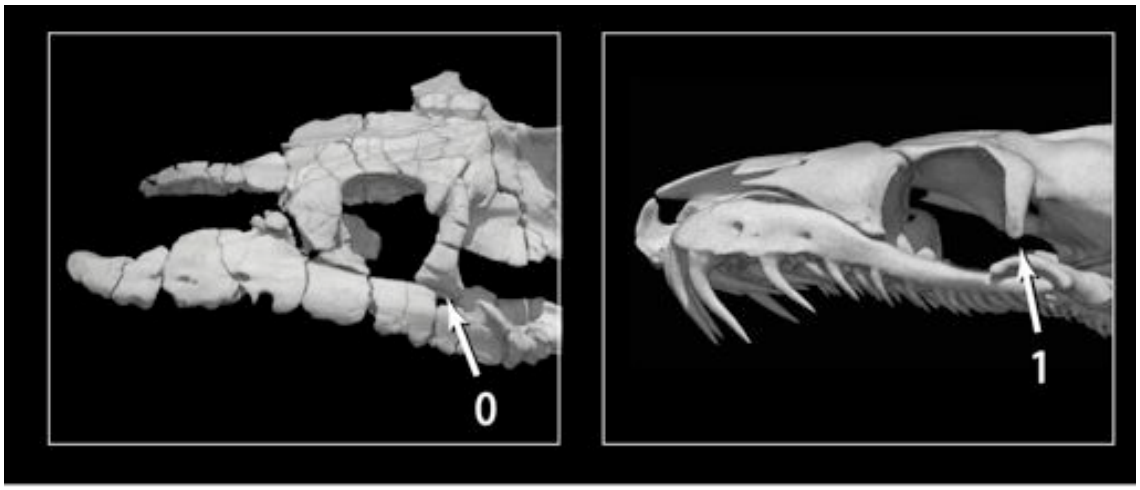
Character 187, orientation of maxillary superior alveolar foramen. Centrally placed, dorsally opening superior alveolar foramen (0) shown in horizontal cut of *Celestus enneagrammus* (Anguidae) showing the maxilla in dorsal view (0), anteriorly positioned, medially opening foramen (1) shown in dorsal view of maxilla *Loxocemus bicolor* (Loxocemidae).



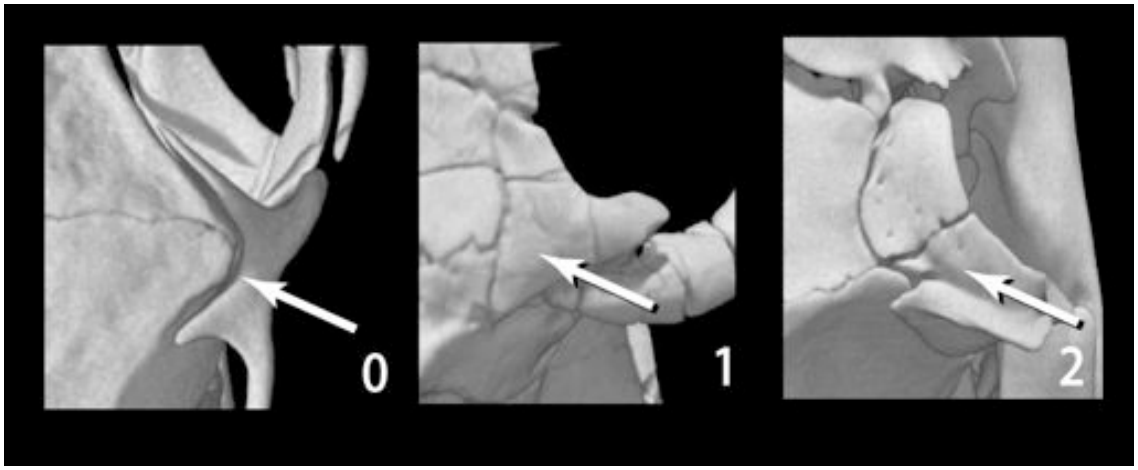
Character 188, accessory foramen of maxilla. Absence of foramen (0) shown in *Acrochordus granulatus* (Acrochordidae), accessory foramen of maxilla (1) shown in *Epicrates striatus* (Boinae).



Character 189, ectopterygoid process of maxilla. Absence of ectopterygoid process of maxilla (0) shown in *Python molurus* (Pythoninae) (0), ectopterygoid process of maxilla (1) shown in *Epicrates striatus* (Boinae).

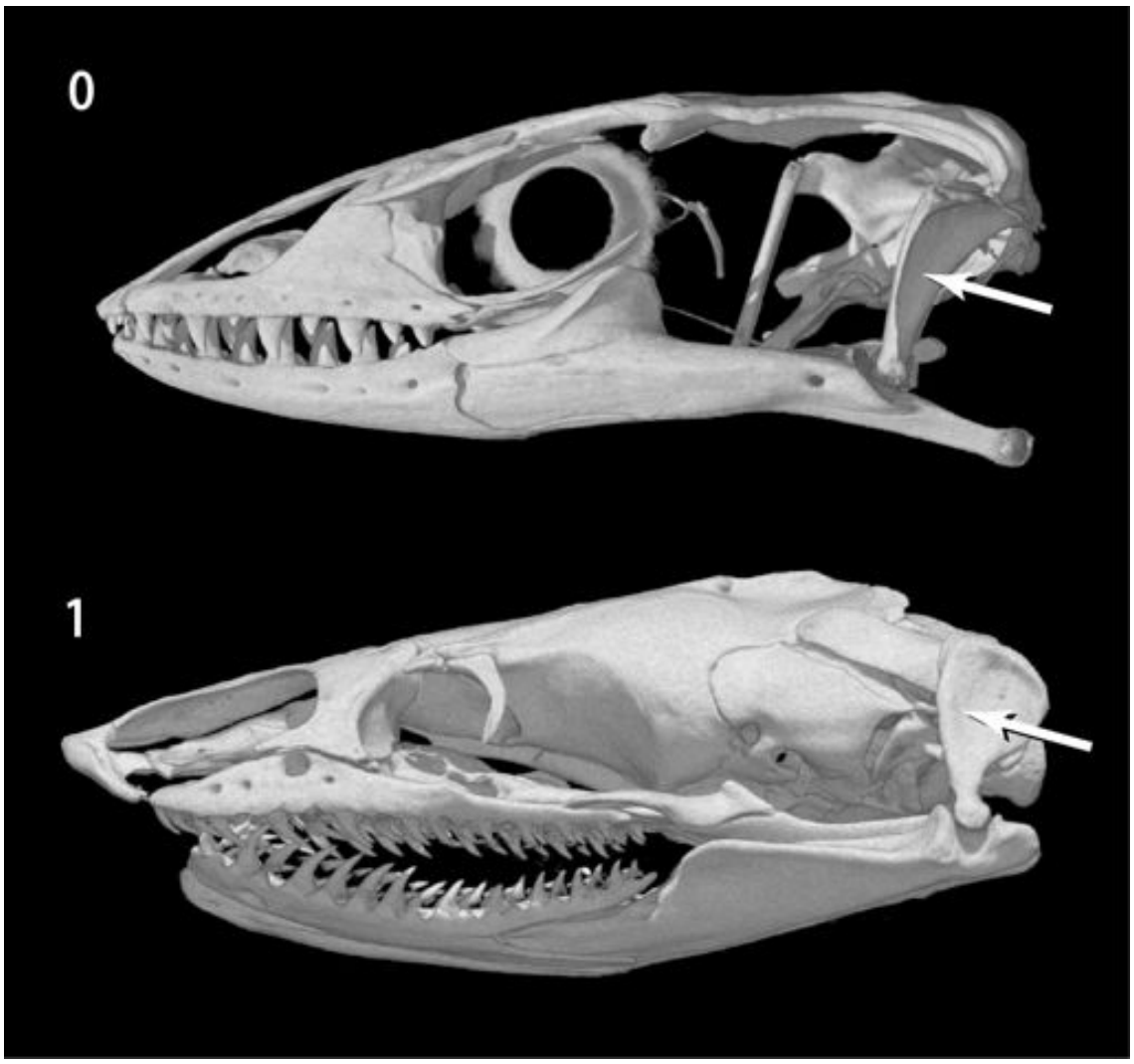


Character 190, complete postorbital bar. Postorbital bar contacting maxilla (0) shown in *Dinilysia patagonica*; incomplete postorbital bar shown in *Epicrates striatus* (Boinae).



Character 192, postfrontal shape. Triradiate postfrontal clasps frontal and parietal (0) shown in *Varanus acanthurus* (Varanidae); triradiate postfrontal abutting frontal and parietal (1) shown in *Dinilysia patagonica*; reduced prefrontal lacking distinct anterior and posterior processes (2) shown in *Python molurus* (Pythoninae).

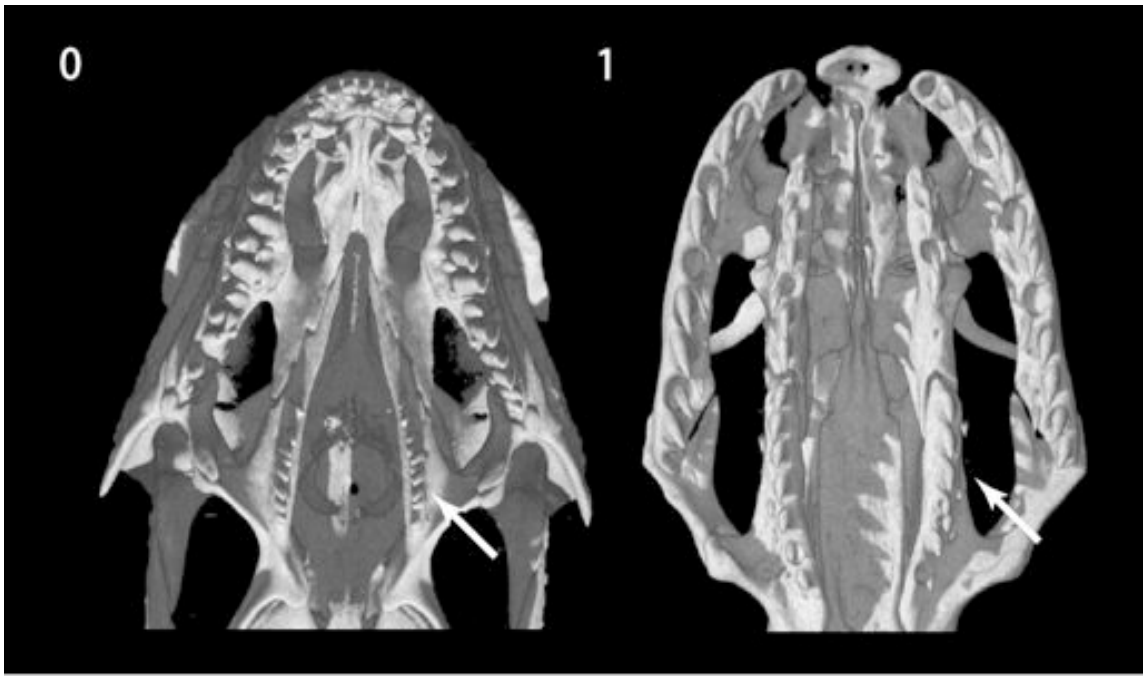
Character 193, upturned supratemporal. Downturned free caudal end of supratemporal (0) shown in *Loxocemus bicolor* (Loxocemidae); upturned supratemporal (1) shown in *Epicrates striatus* (Boinae).



Character 194, loss of lateral conch. Quadrate with distinct lateral depression (0) shown in *Varanus acanthurus* (Varanidae); lateral conch lost (1) shown in *Loxocemus bicolor* (Loxocemidae).

Character 195, elongate quadrate. Long quadrate shaft (0) shown in *Loxocemus bicolor* (Loxocemidae), short quadrate shaft (1) shown in *Anilius scytale* (Aniliidae).

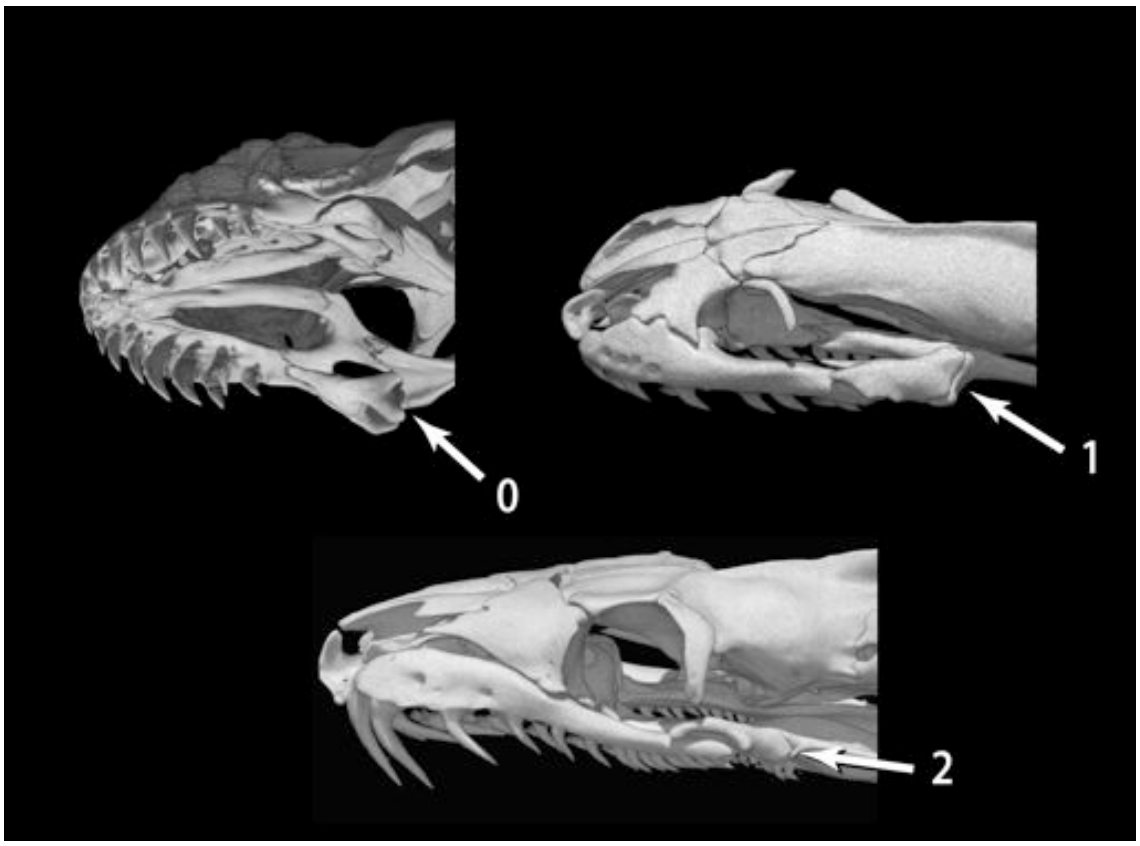
Character 196, platelike quadrate head. Massive quadrate head (0) shown in *Anilius scytale* (Aniliidae), broad, platelike quadrate head (1) shown in *Loxocemus bicolor* (Loxocemidae).



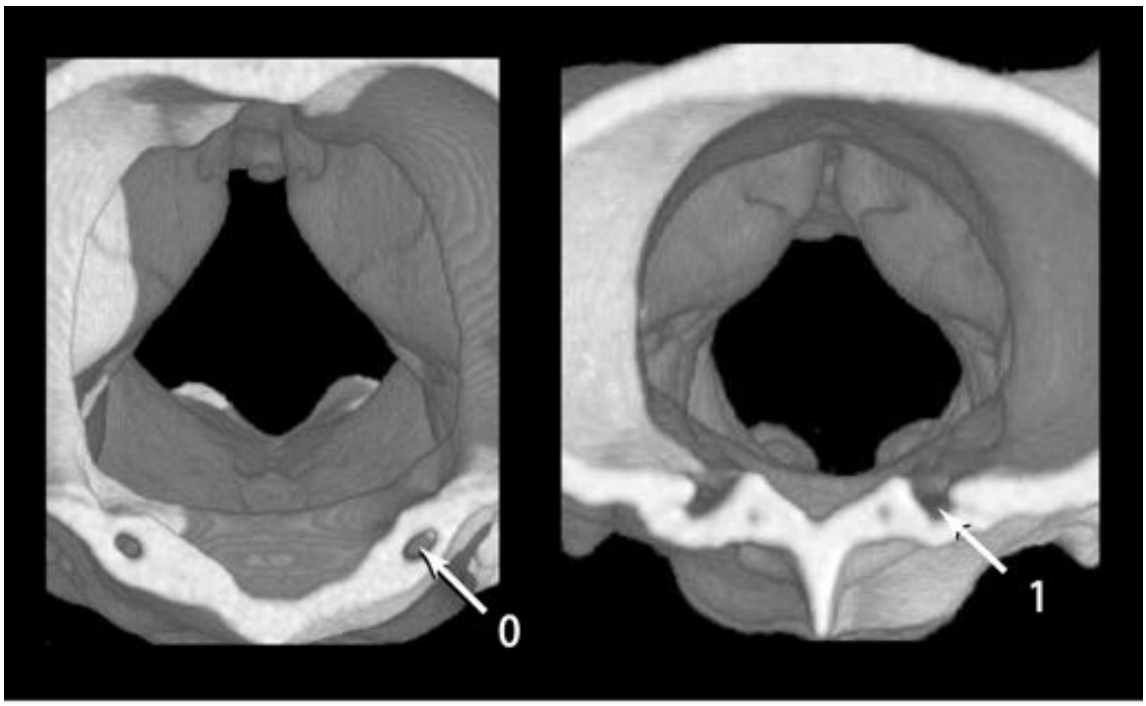
Character 197, enlarged palatal teeth. Small palatal teeth (0) shown in *Shinisaurus crocodilurus* (Xenosauridae); enlarged palatal teeth (1) shown in *Cylindrophis maculatus* (Uropeltidae).

Character 198, long maxillary process articulates with lateral margin of prefrontal. Short maxillary process (0) shown in *Tropidophis haetianus* (Tropidophiidae); elongate maxillary process (1) shown in *Loxocemus bicolor* (Loxocemidae).

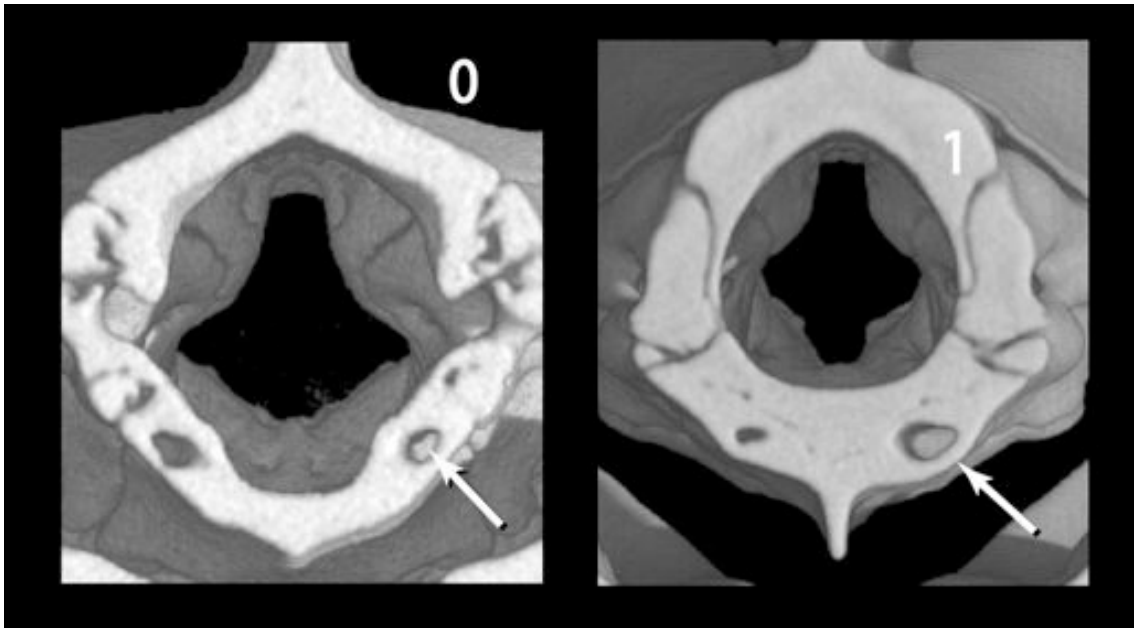
Character 199, epipterygoid absent. Epipterygoid present (0), or epipterygoid absent (1).



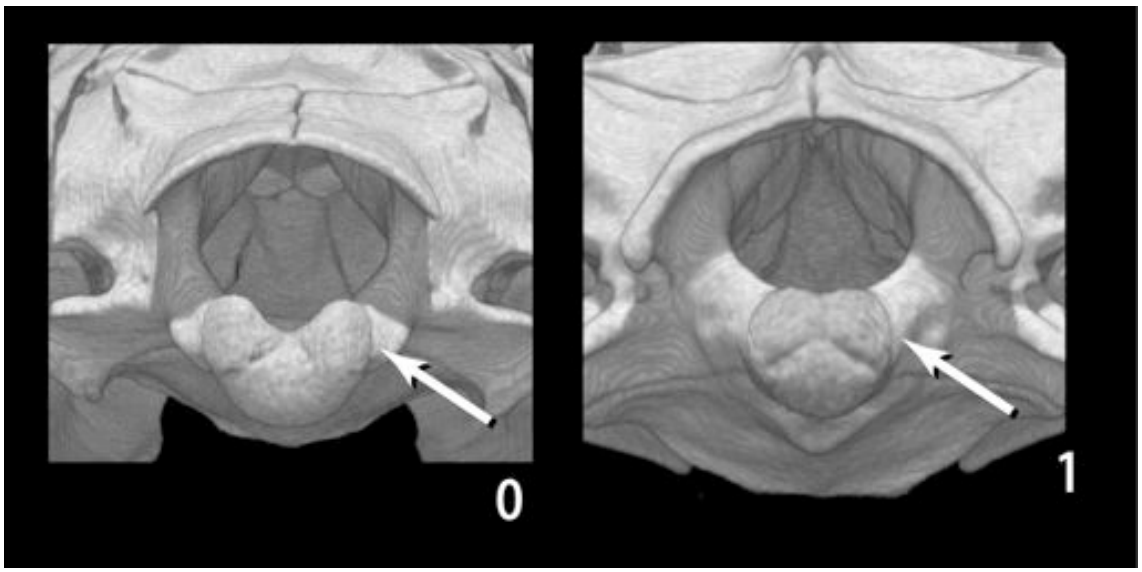
Character 200, ectopterygoid overlap with pterygoid. Ectopterygoid embracing pterygoid anteriorly (0) shown in *Heloderma horridum* (Helodermatidae); ectopterygoid overlapping pterygoid dorsally (1) shown in *Cylindrophis ruffus* (Uropeltidae); ectopterygoid abutting pterygoid laterally (2) shown in *Epicrates striatus* (Boinae).



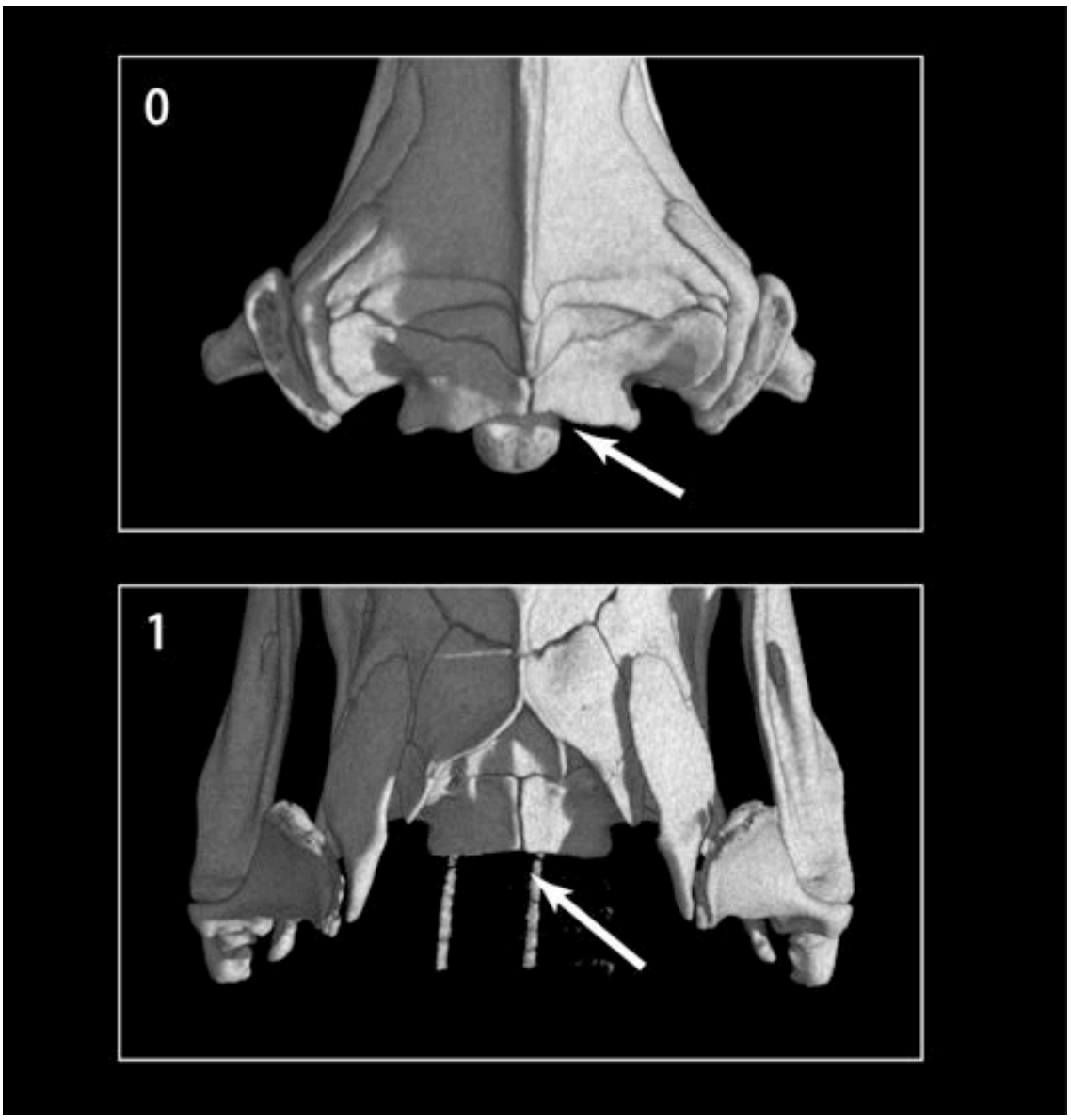
Character 201, vidian canal opens intracranially. Vidian canal enclosed by sphenoid (0) shown in *Loxocemus bicolor* (Loxocemidae); Vidian canal opens intracranially (1) shown in *Epicrates striatus* (Boinae).



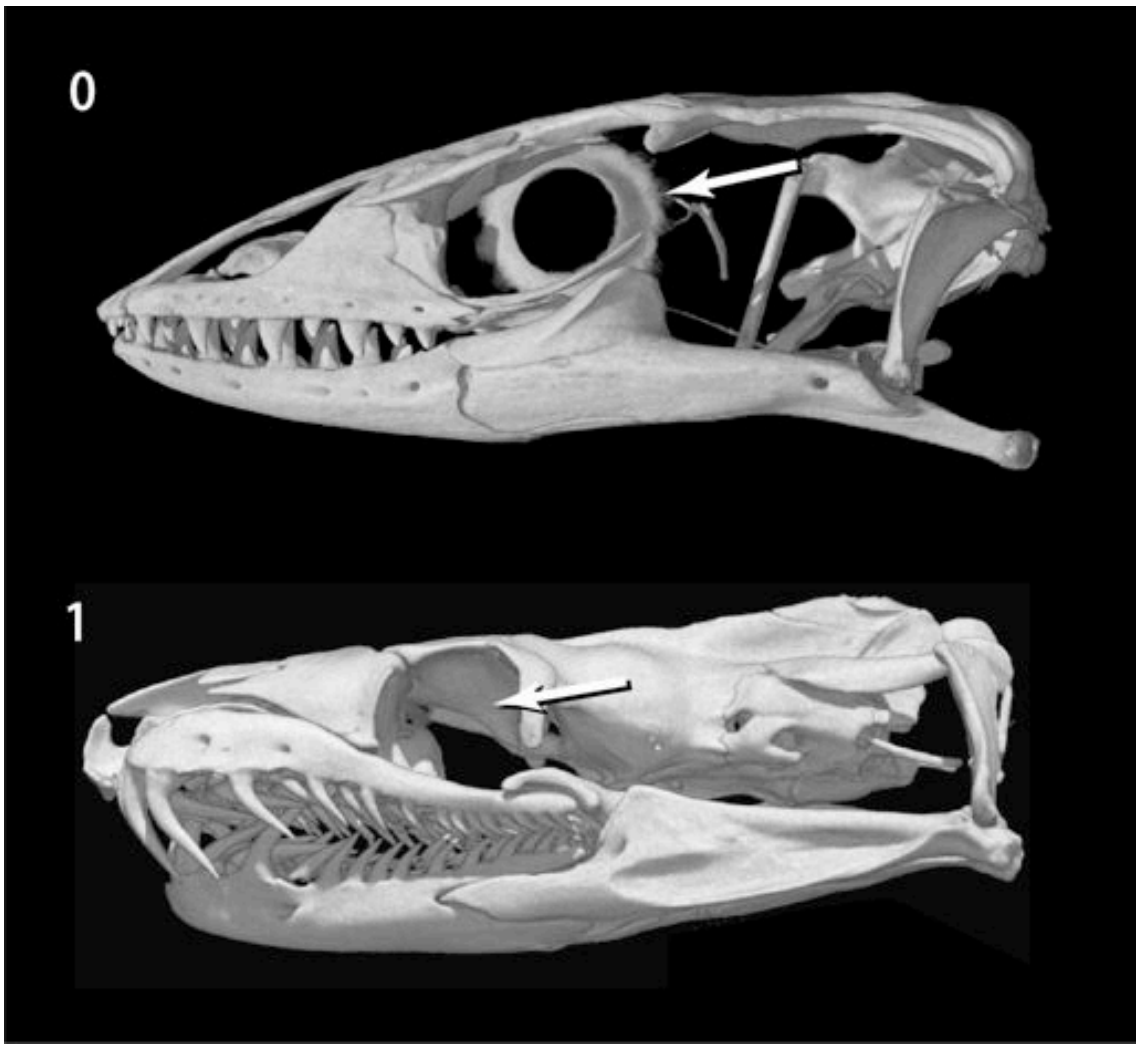
Character 202, vidian canals asymmetrical. Vidian canals symmetrical (0) shown in *Anilius scytale* (Aniliidae) ; Vidian canals with asymmetrical posterior openings (1) shown in *Python molurus* (Pythoninae).



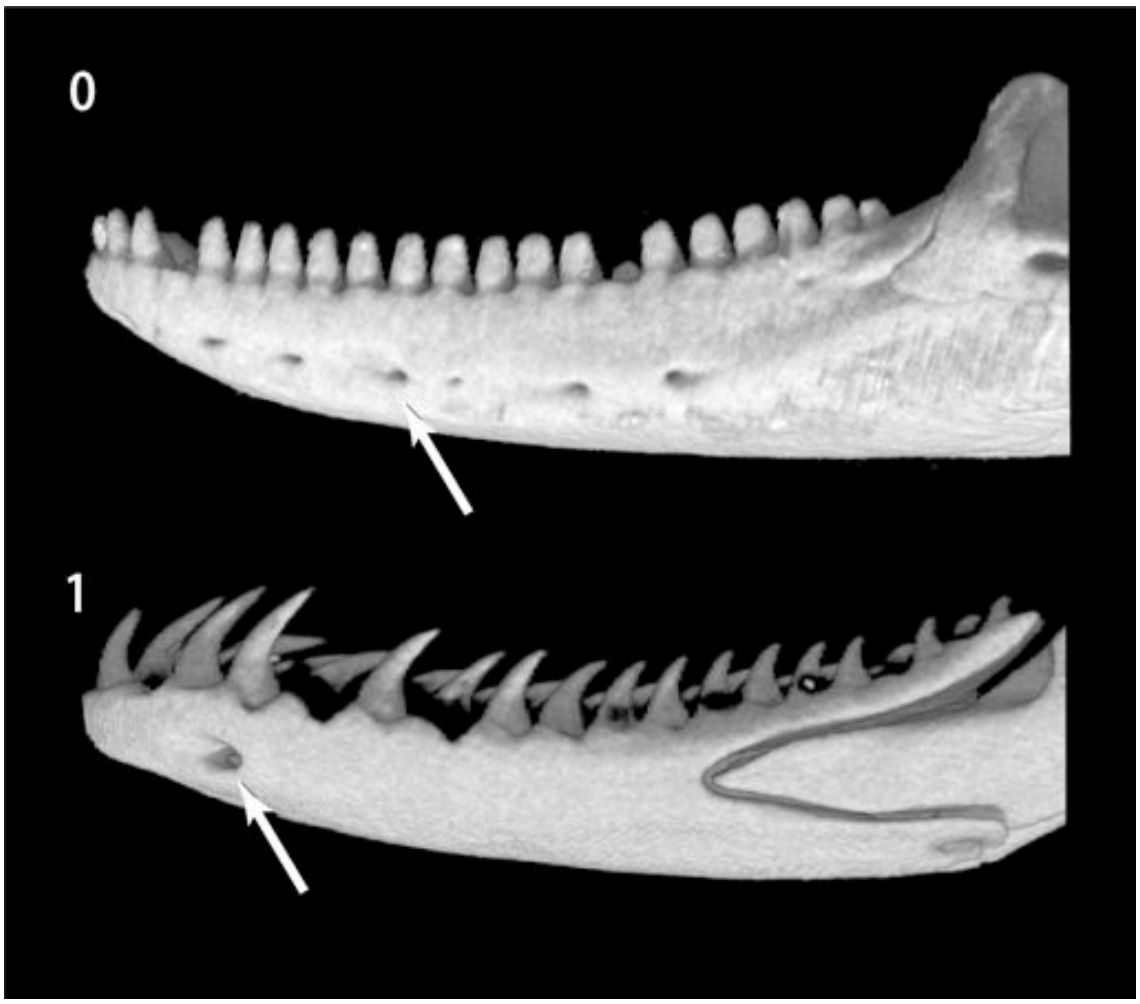
Character 203, exoccipitals contact ventrally. Exoccipitals separated (0) shown in *Loxocemus bicolor* (Loxocemidae) ; Exoccipitals contact (1) shown in *Cylindrophis ruffus* (Uropeltidae).



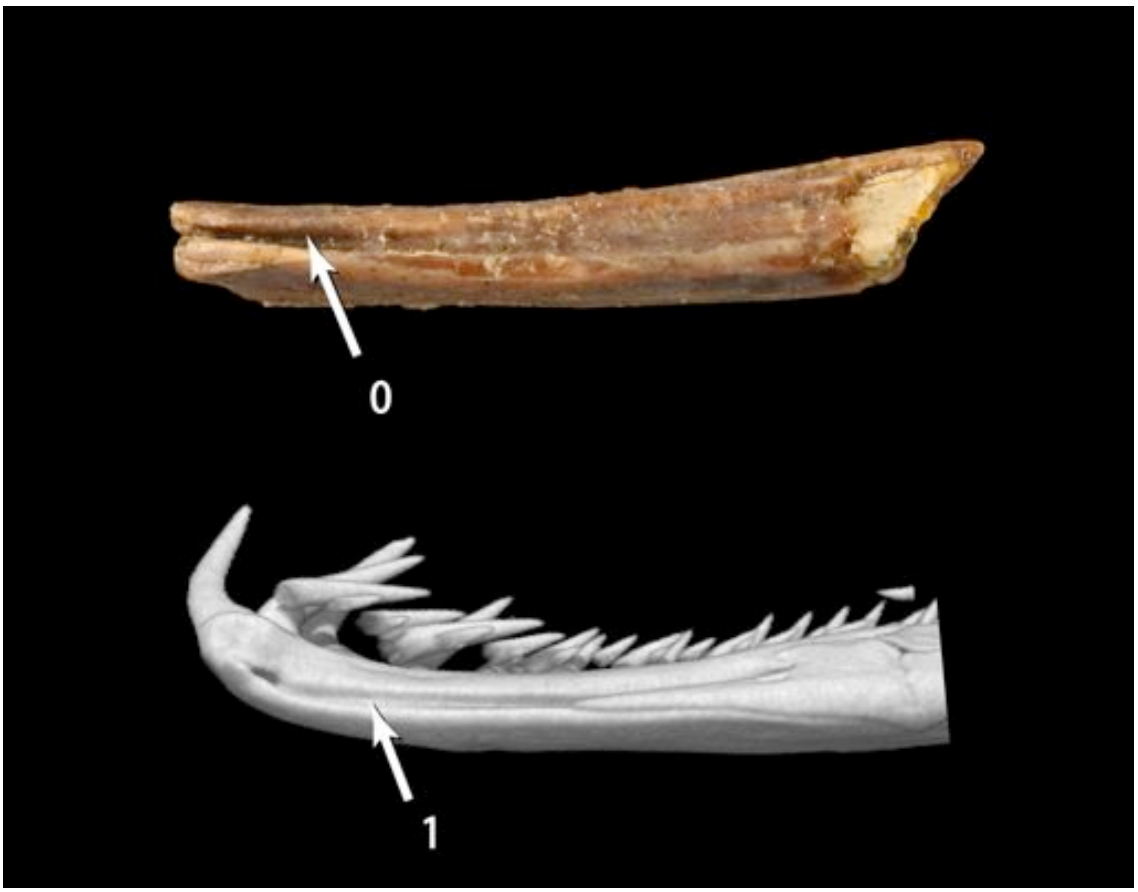
Character 205, otoccipital crest. Otoccipitals do not obscure occipital condyle (0) shown in *Cylindrophis ruffus* (Uropeltidae), otoccipitals projecting posteriorly to cover occipital condyle in dorsal view (1) shown in *Tropidophis haetianus* (Tropidophiidae).



Character 206, loss of sclerotic ring. Sclerotic ring present (0) shown in *Varanus acanthurus* (Varanidae); Sclerotic ring absent (1) shown in *Epicrates striatus* (Boinae).

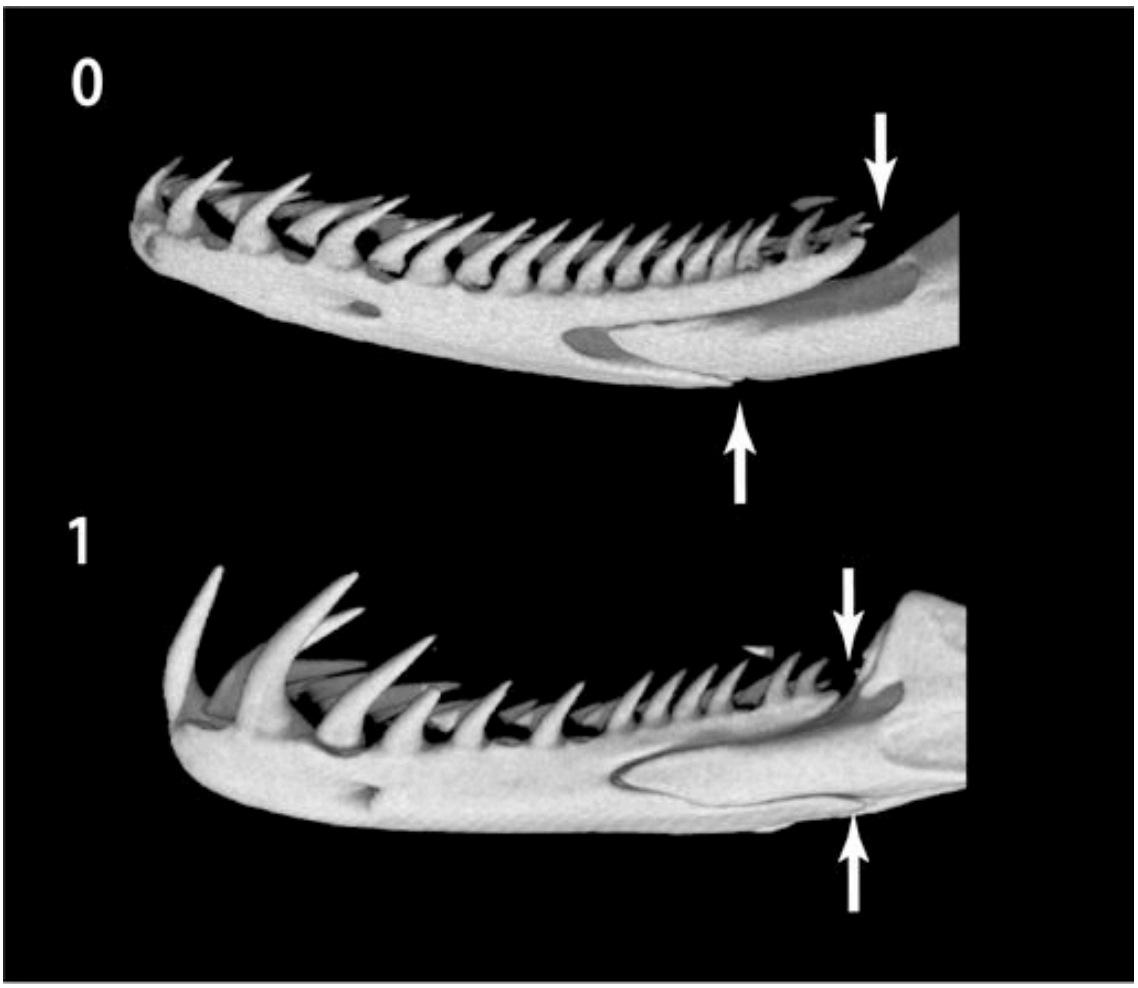


Character 207, enlarged mental foramen. Small mental foramina (0) shown in *Xenosaurus grandis* (Xenosauridae); enlarged mental foramen (1) shown in *Loxocemus xenopeltis* (Loxocemidae).



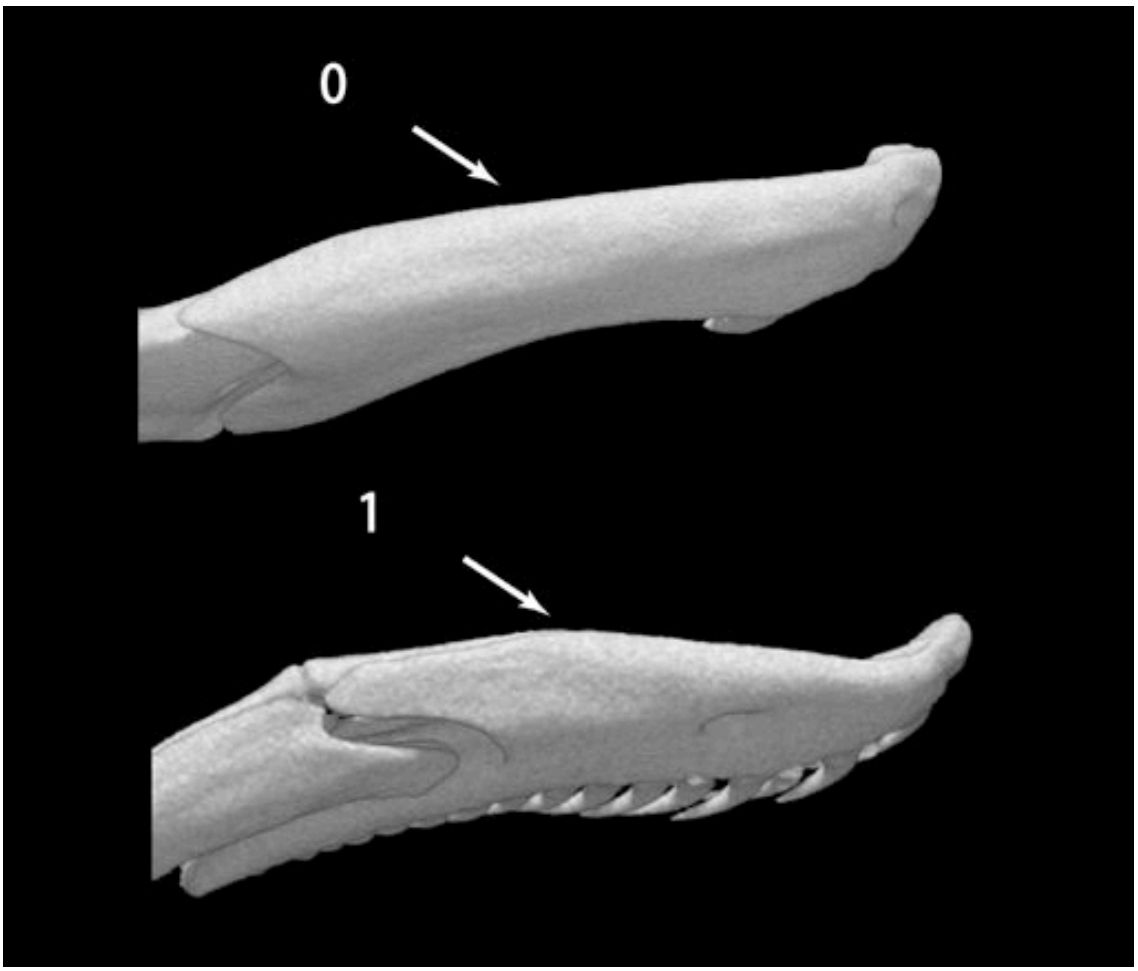
Character 208, Shallow Meckelian groove. Deep Meckelian groove at tip of jaw (0) shown in *Coniophis precedens*, right dentary in ventral view; shallow Meckelian groove (1) shown in *Epicrates striatus* (Boinae), dentary in ventromedial view.

Character 209, Orientation of posteroventral margin of dentary. Angular process of dentary does not wrap beneath dentary (0) shown in *Coniophis precedens*, right dentary in ventral view; angular process wrapping beneath dentary (1) shown in *Dinilysia patagonica* right dentary in ventromedial view.

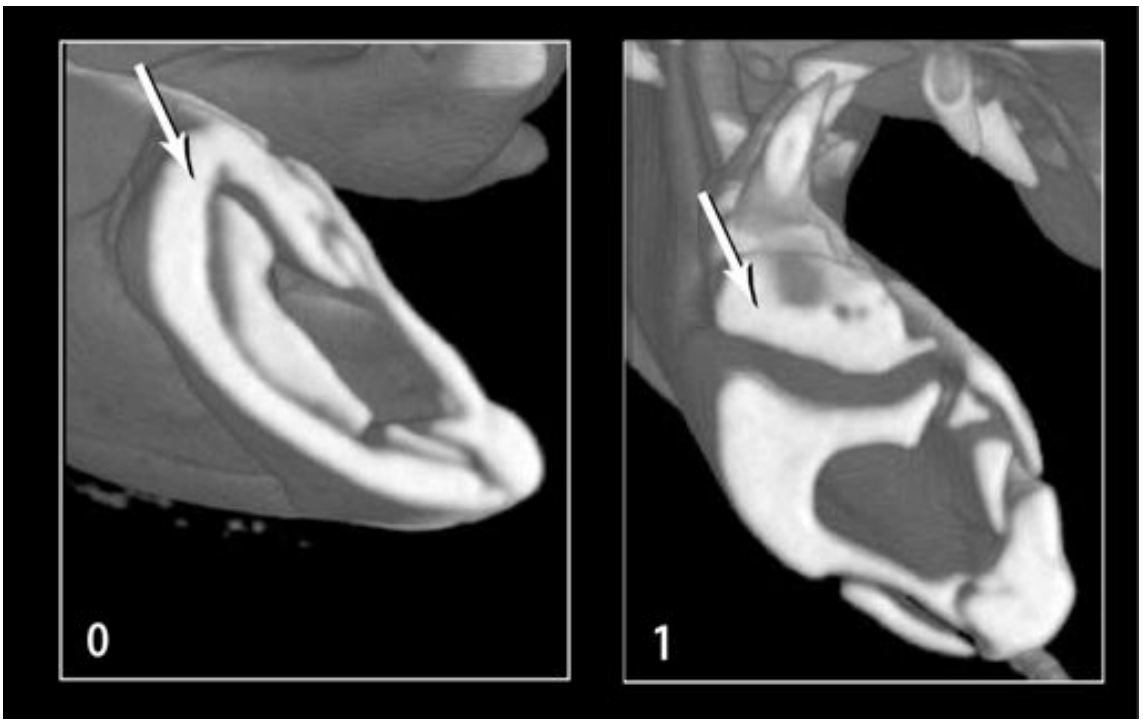


Character 210, elongate angular procss. Angular process of dentary short (0) shown in *Tropidophis haetianus* (Tropidophiidae); angular process extends to back of dentary (1) shown in *Epicrates striatus* (Boinae).

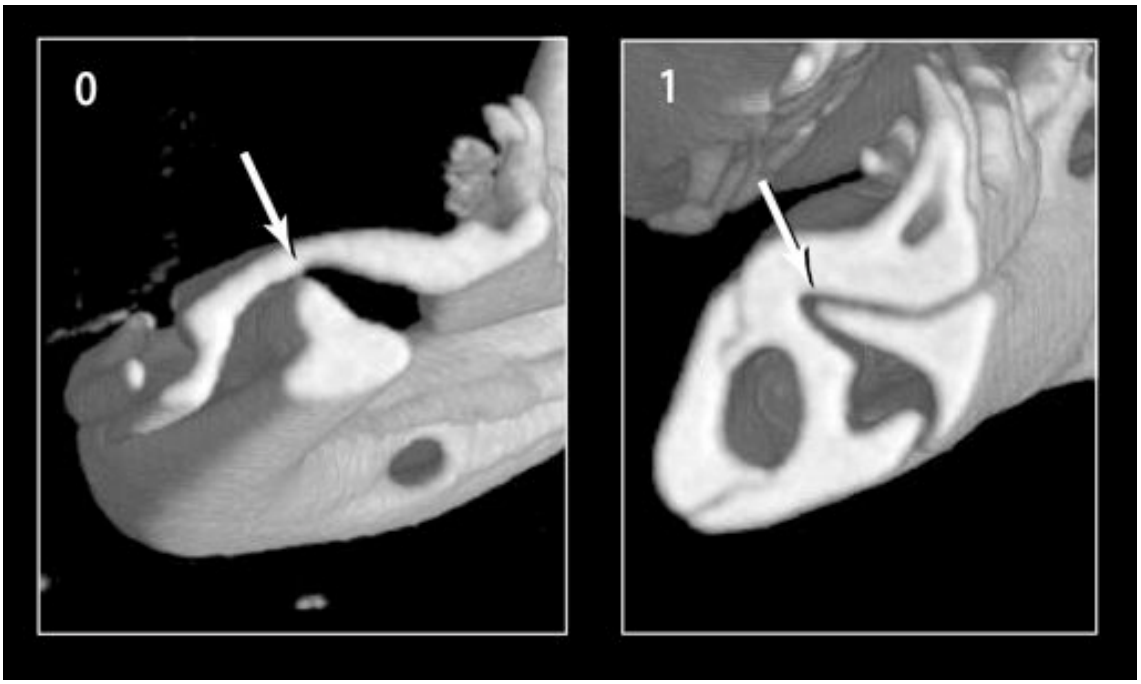
Character 211, medially projecting symphysis. Symphysis does not strongly project medially (0) shown in *Shinisaurus crocodilurus* (Xenosauridae); strong medial projection of symphysis (1) shown in *Tropidophis haetianus* (Tropidophiidae).



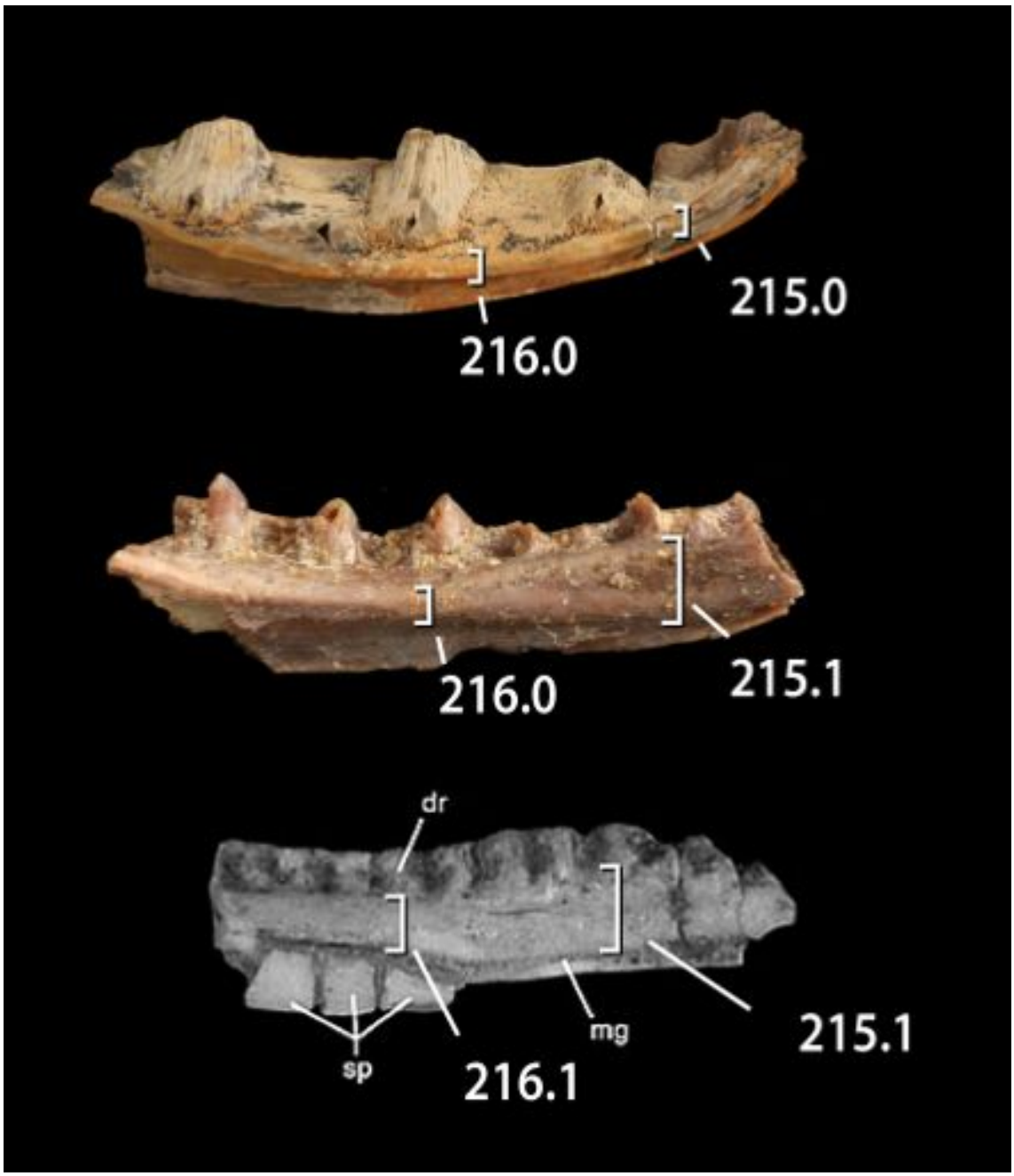
Character 212, medioventral flange of dentary. Absence of medial flange (0) shown in *Anilius scytale*; medially projecting, crescentic flange (1) shown in *Tropidophis haetianus*.



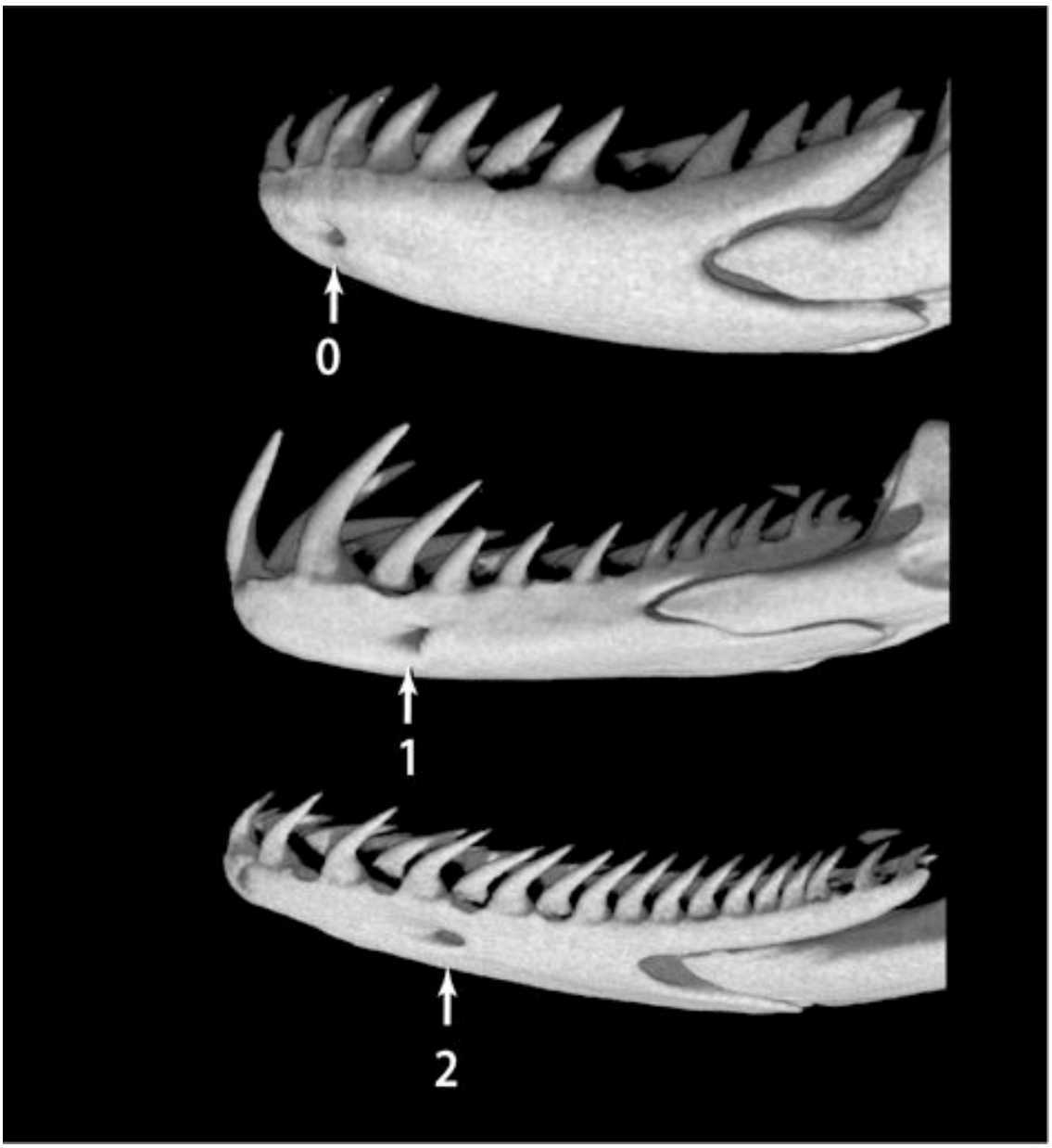
Character 213, dentary overlies surangular. Posterodorsal process of dentary embraces surangular (0) shown in *Varanus exanthematicus* (Varanidae); posterodorsal process overlies surangular (1) shown in *Python molurus* (Pythoninae).



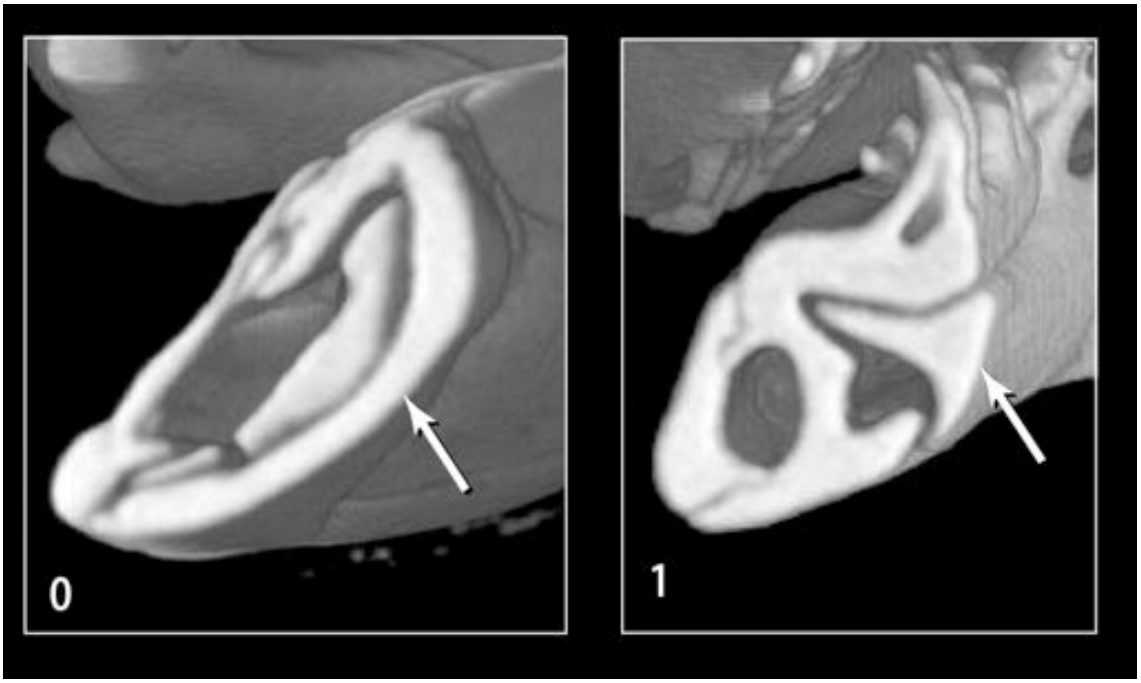
Character 214, dentary subdental slot. Surangular does not insert beneath subdental shelf (0), shown in a coronal section of *Xenopeltis unicolor* (Xenopeltidae); surangular inserts into a distinct slot beneath the subdental shelf (1) shown in *Epicrates striatus* (Boinae).



Character 215 and 216, dentary subdental ridge. Top, *Palaeosaniwa* cf *canadensis* (Platynota); middle, *Coniophis precedens*; bottom, *Najash rionegrina* (from Zaher et al. 2009).

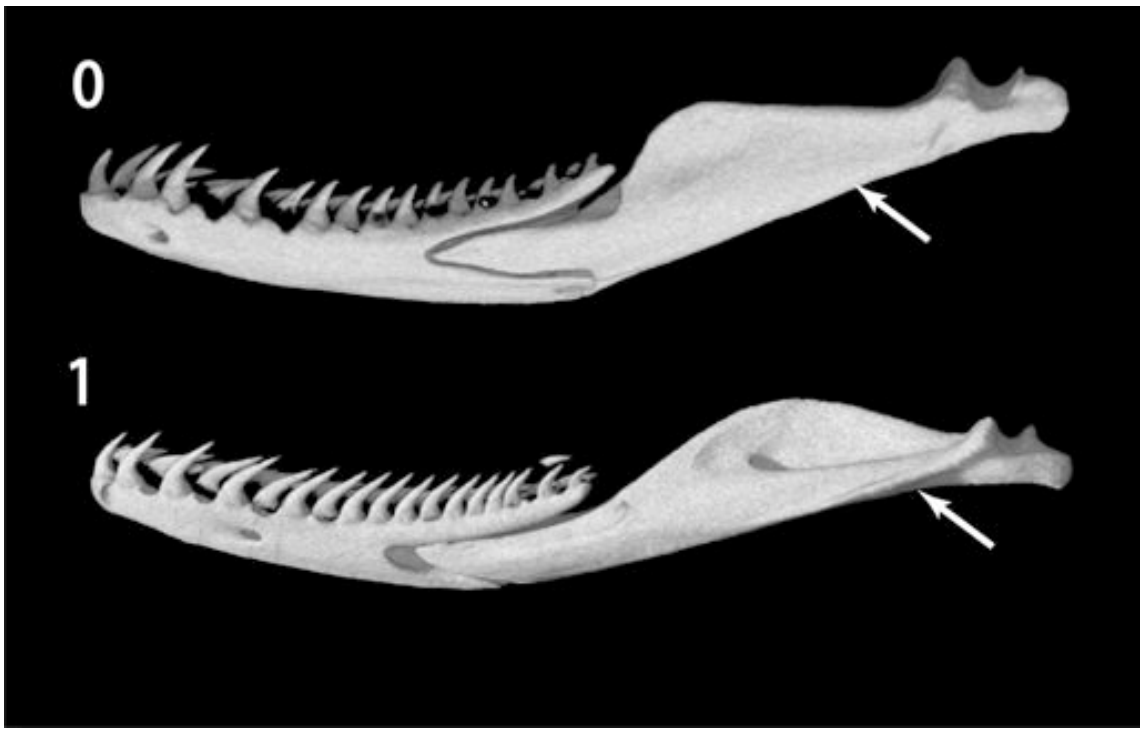


Character 217, position of enlarged mental foramen. Distally placed mental foramen (0) in *Cylindrophis ruffus* (Uropeltidae); posteriorly displaced mental foramen (1) in *Epicrates striatus* (Boinae); mental foramen located halfway between symphysis and surangular notch (2) in *Tropidophis haetianus* (Tropidophiidae).

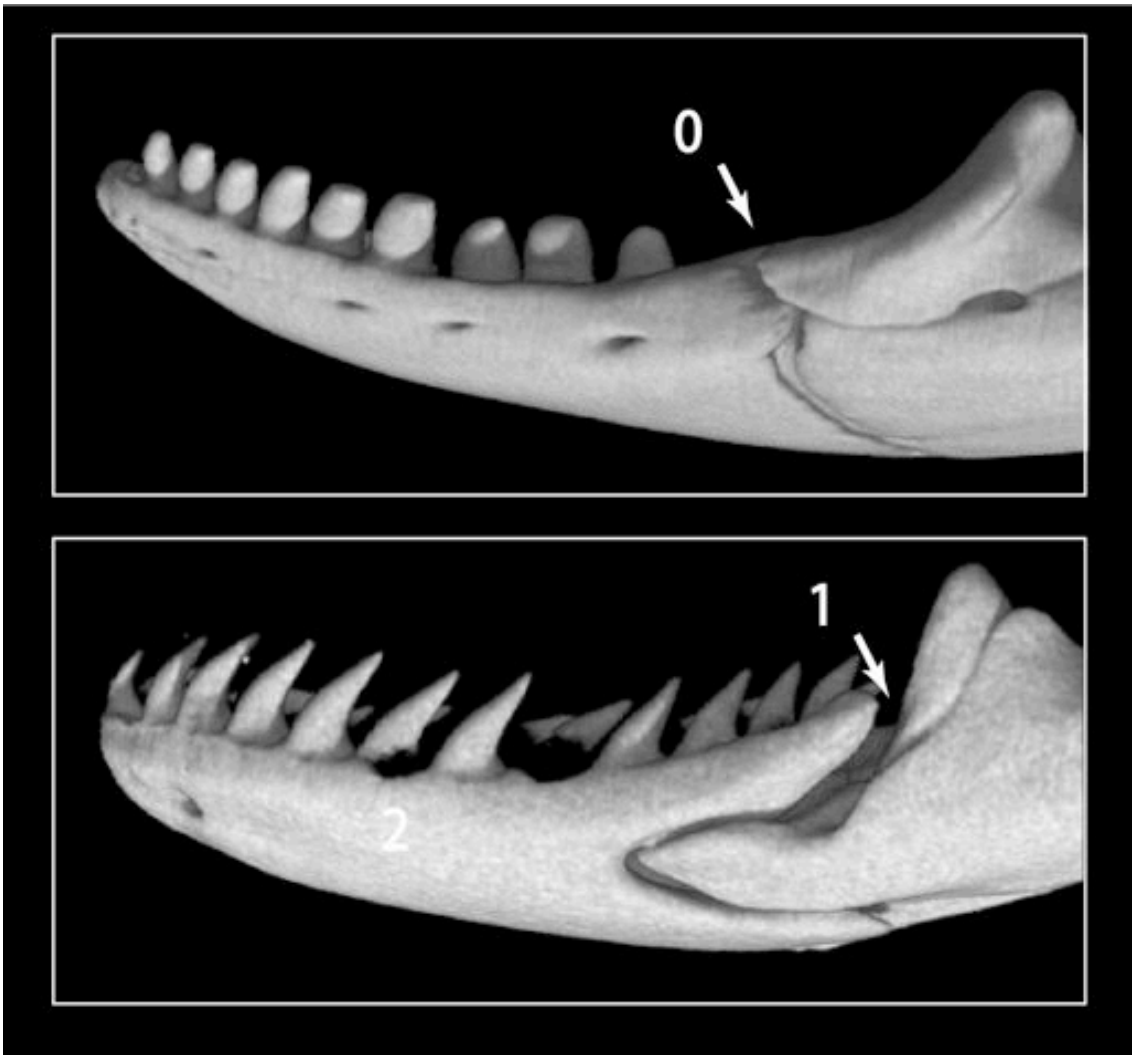


Character 218, triradiate anterior process of surangular. Surangular with a blade-like anterior process (0) shown in *Varanus exanthematicus* (Varanidae); surangular with a triradiate anterior process (1) shown in *Epicrates striatus* (Boinae).

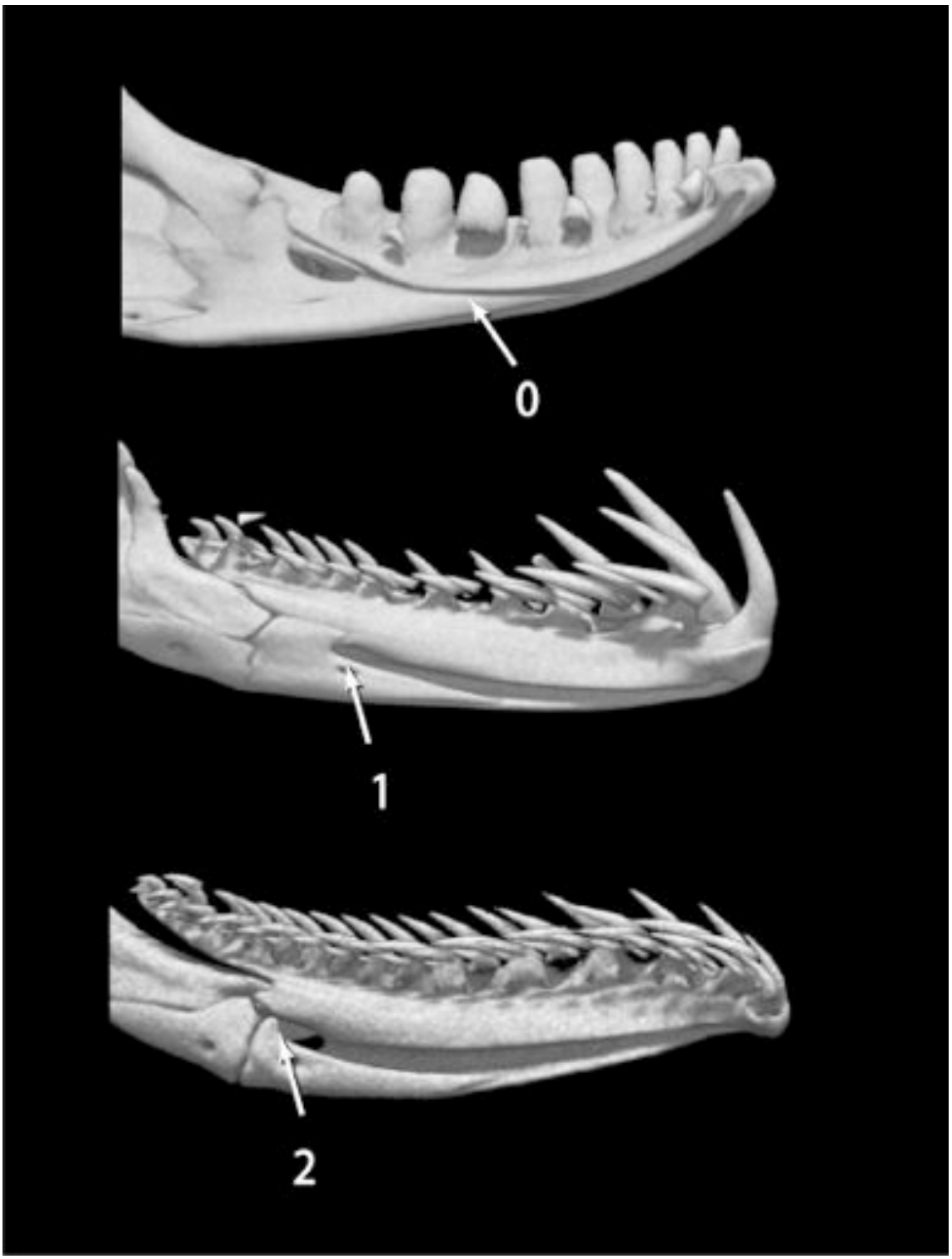
Character 219, posterior extension of adductor fossa. Limited caudal extension of adductor fossa (0) in *Cylindrophis ruffus* (Uropeltidae); caudal extension of the adductor fossa (1) in *Epicrates striatus* (Boinae).



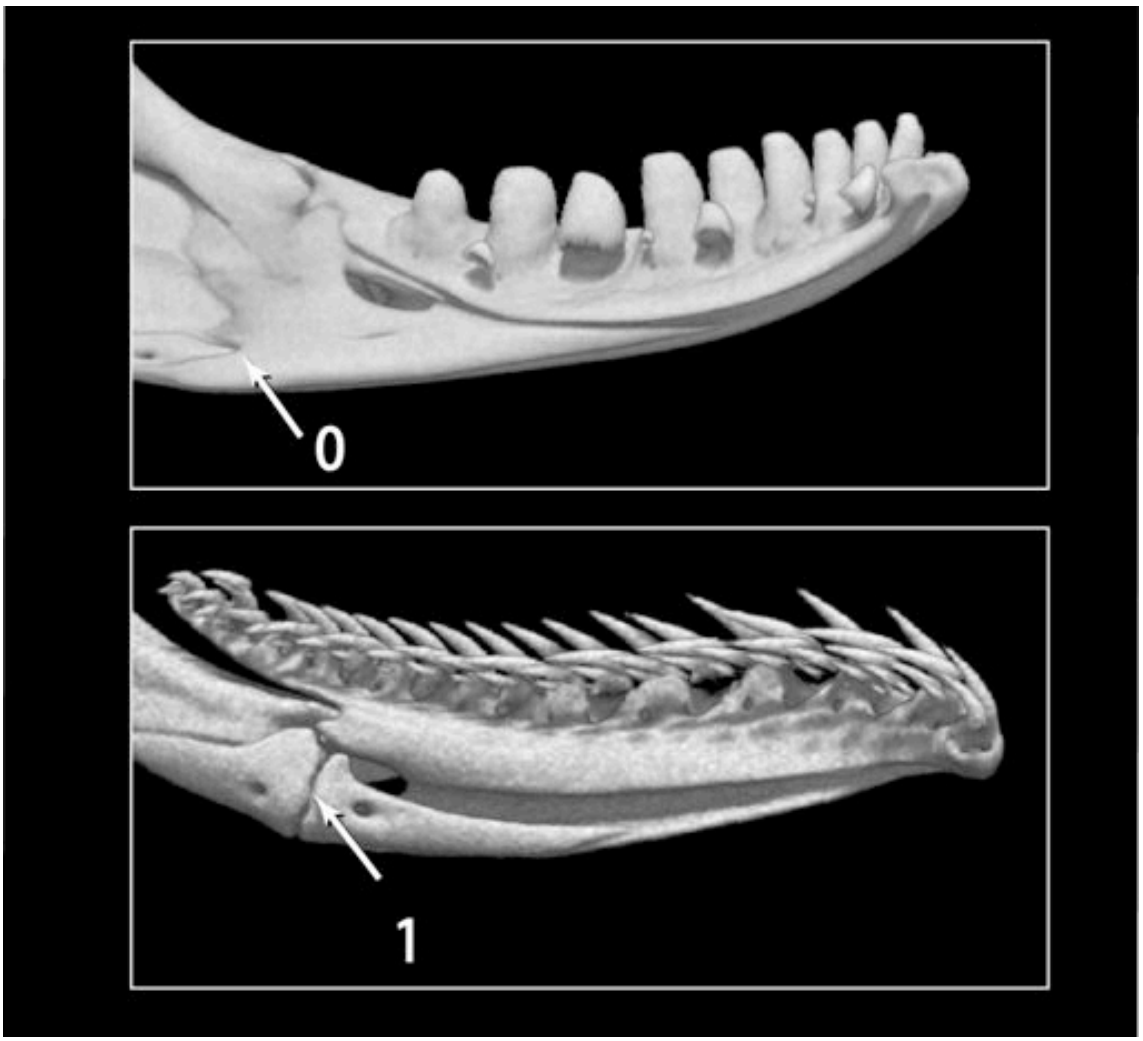
Character 220, posteroventral crest of surangular. Posteroventral surface of mandible smooth (0) shown in *Loxocemus bicolor* (Loxocemidae); posteroventral surface of mandible bearing a distinct crest (1) shown in *Tropidophis haetianus* (Tropidophiidae).



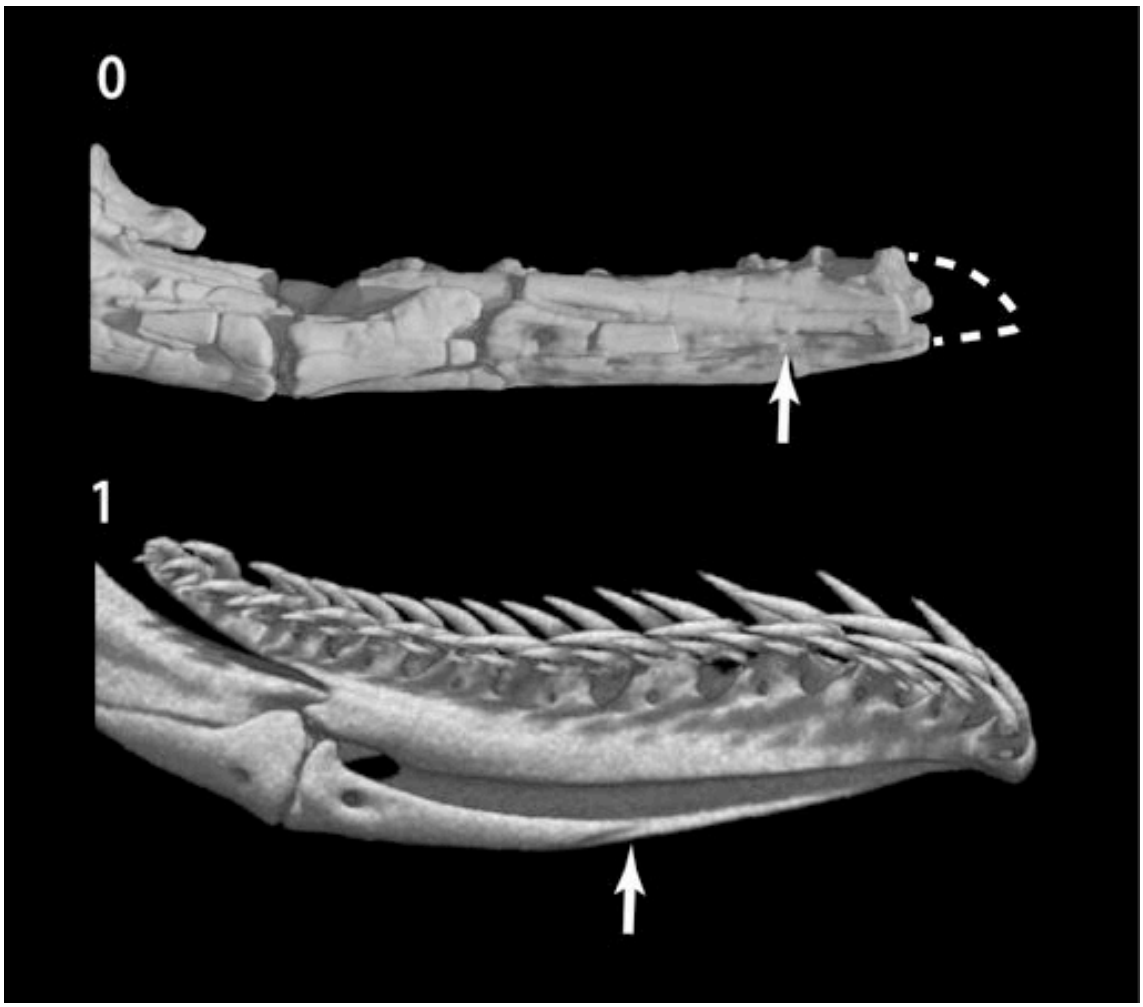
Character 221, coronoid does not overlap dentary laterally. Lateral overlap of coronoid onto the dentary (0) in *Varanus exanthematicus* (Varanidae); loss of lateral overlap (1) in *Cylindrophis ruffus* (Uropeltidae).



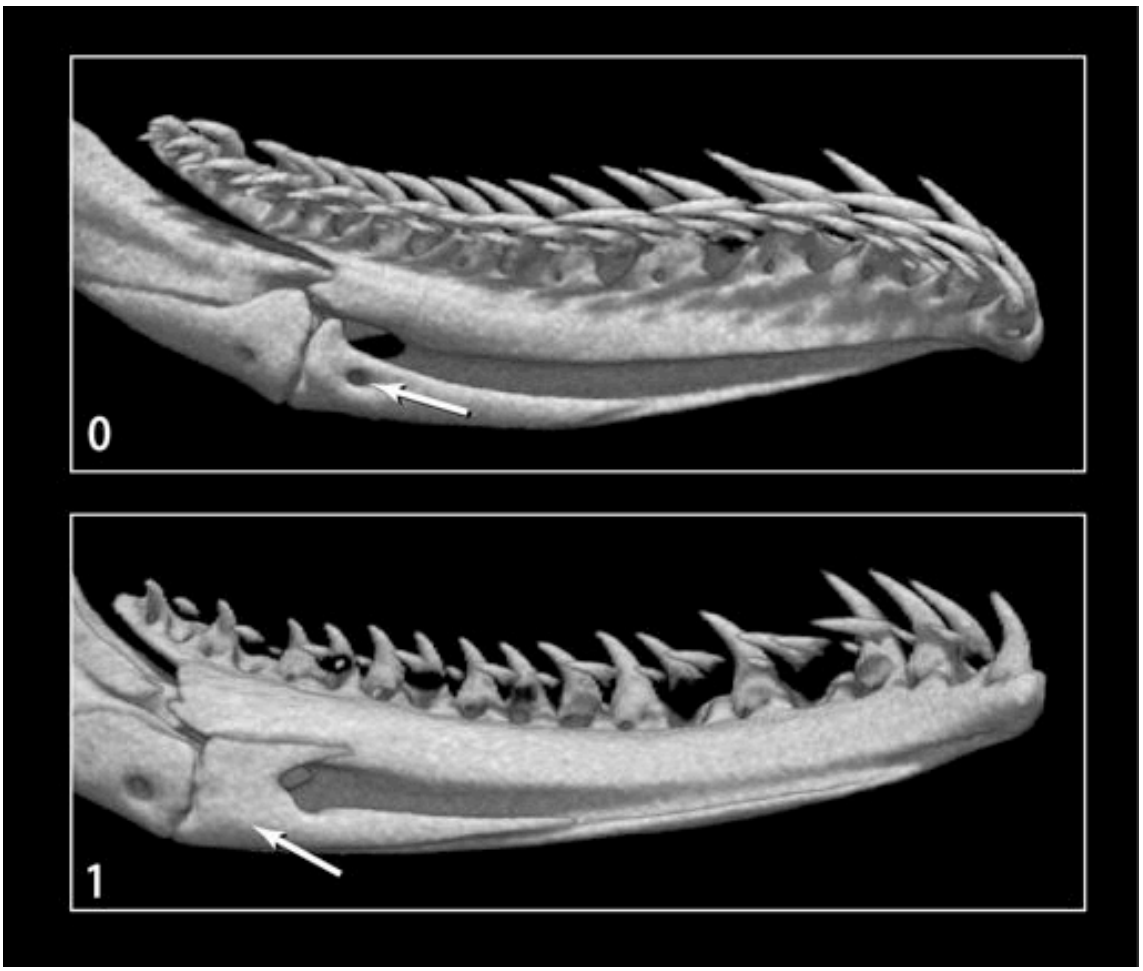
Character 222, splenial contact with subdental ridge reduced. Extensive contact of splenial with subdental ridge (0) shown in *Varanus exanthematicus* (Varanidae), splenial contacting subdental ridge posteriorly (1) shown in *Epicrates striatus* (Boinae), reduced articulation (2) shown in *Trophidophis haetianus* (Tropidophiidae).



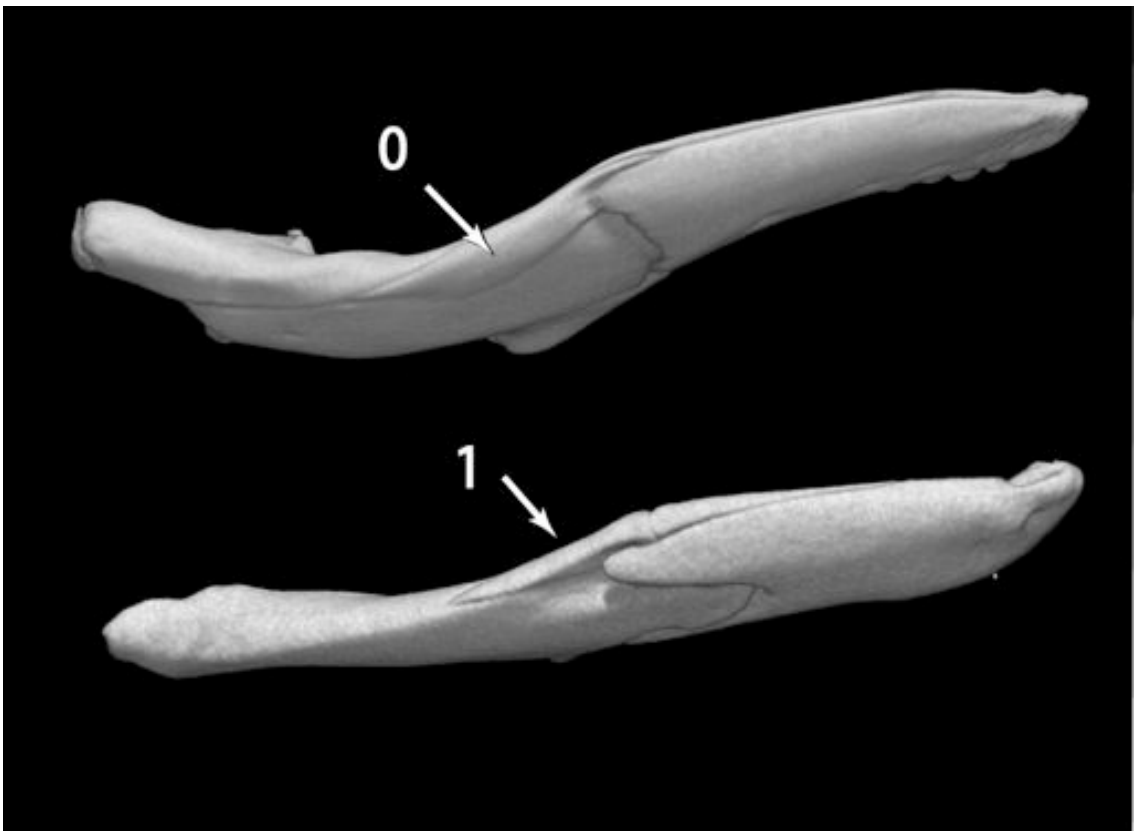
Character 223, splenial-angular hinge. Overlap of splenial onto angular (0) shown in *Varanus exanthematicus* (Varanidae), hinge between splenial and angular (1) shown in *Tropidophis haetianus* (Tropidophiidae).



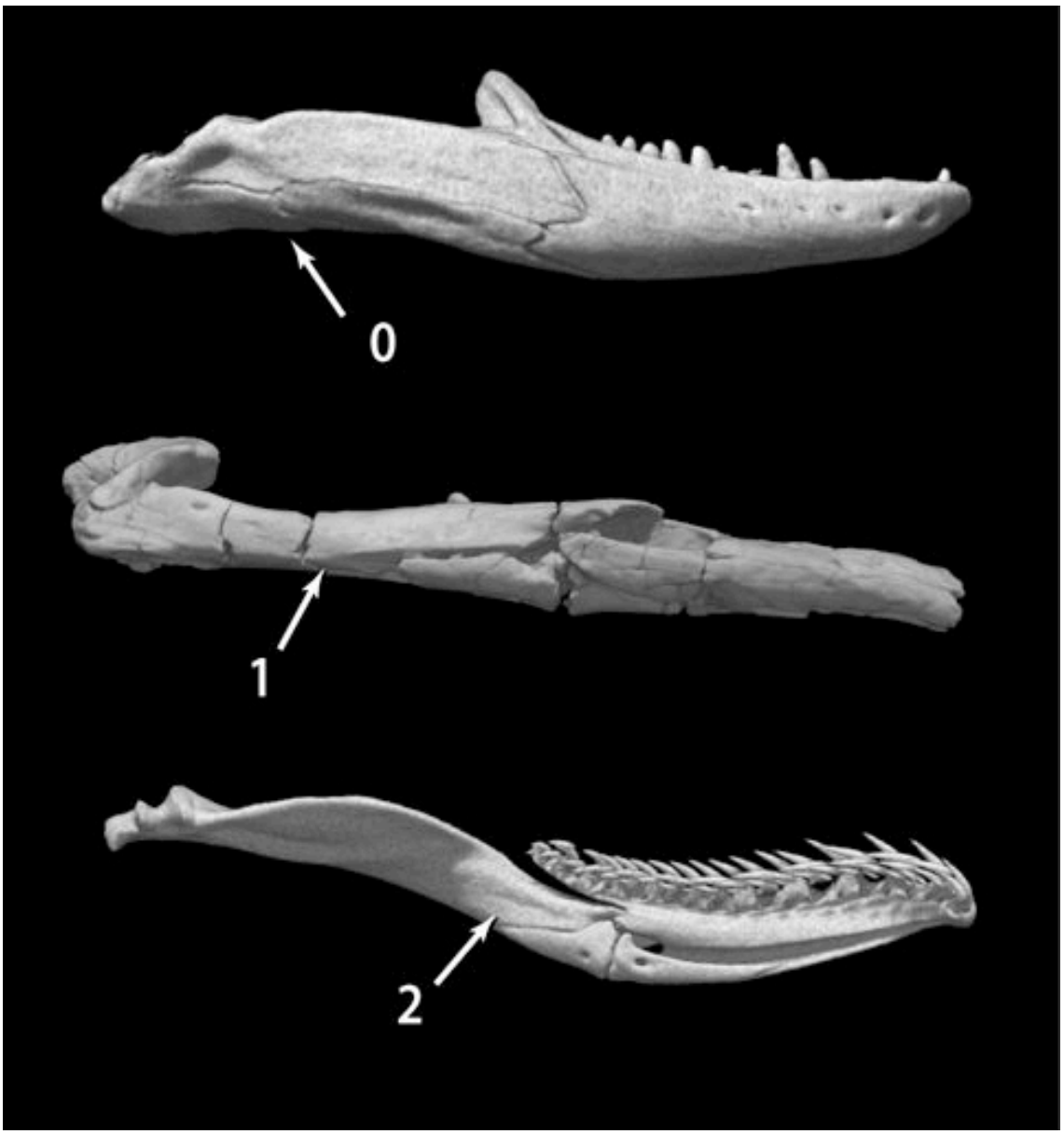
Character 224, shortened splenial. Elongate splenial (0) shown in *Dinilysia patagonica*; short splenial (1) shown in *Tropidophis haetianus* (Tropidophiidae).



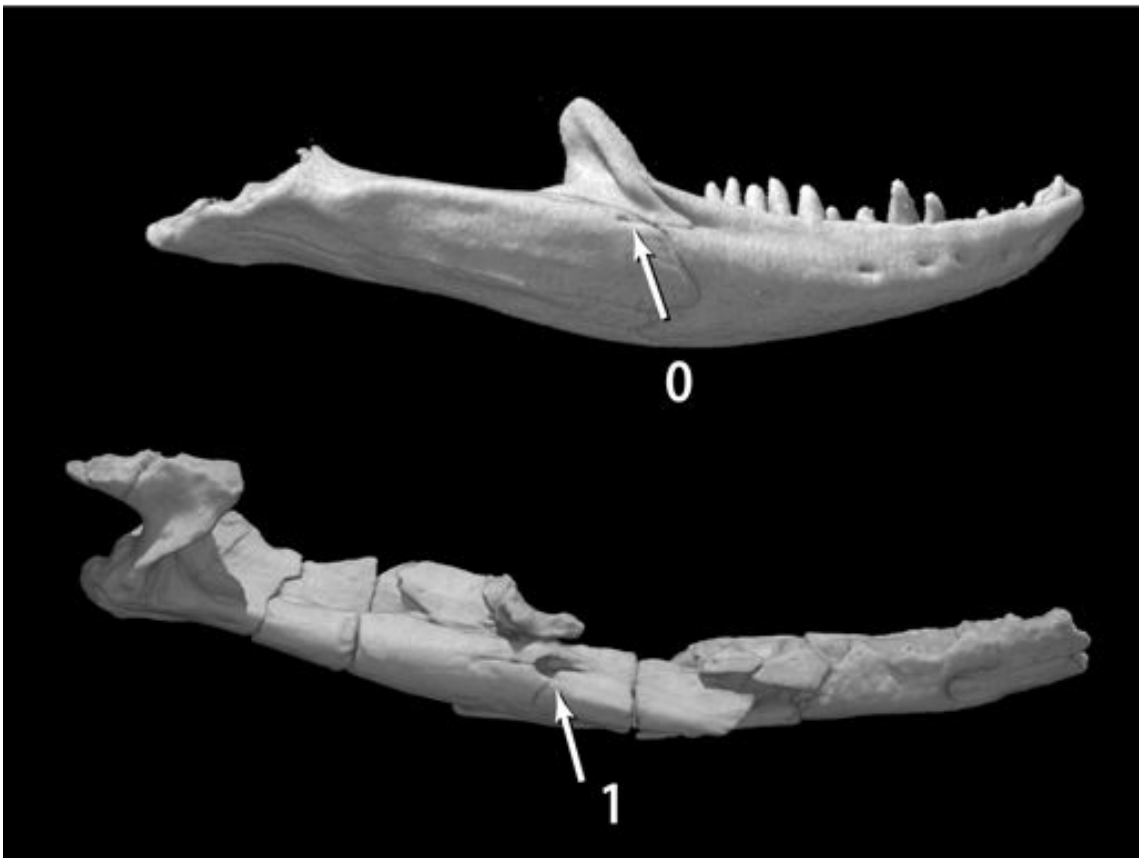
Character 225, loss of anterior mylohyoid foramen. Anterior mylohyoid foramen (0) shown in *Tropidophis haetianus* (Tropidophiidae), loss of foramen (1) shown in *Loxocemus bicolor* (Loxocemidae).



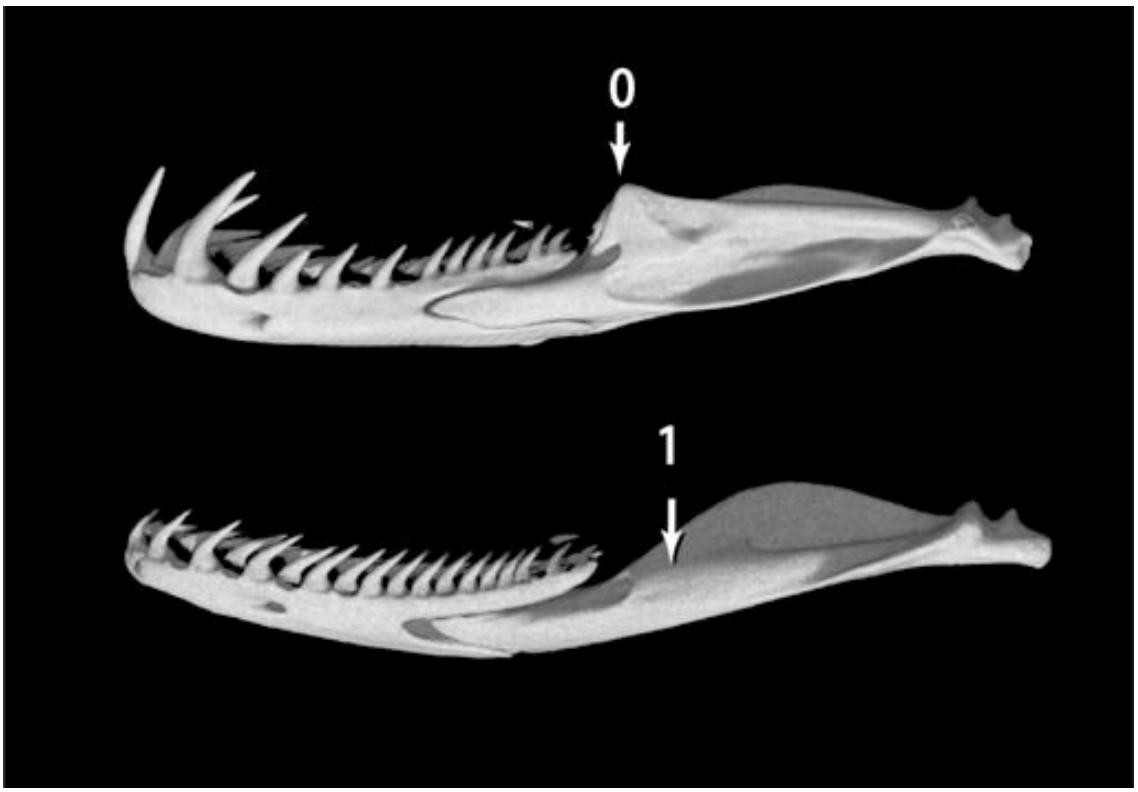
Character 226, Angular on ventromedial aspect of mandible. Ventrolaterally positioned angular (0) shown in *Varanus exanthematicus* (Varanidae), ventromedially positioned angular (1) shown in *Cylindrophis ruffus* (Uropeltidae)



Character 227, shortened angular. Elongate angular (0) shown in *Varanus exanthematicus* (Varanidae), shortened angular (note long facet; posterior tip is broken) (1) shown in *Dinilysia patagonica*; highly reduced angular (2) shown in *Tropidophis haetianus* (Tropidophiidae).

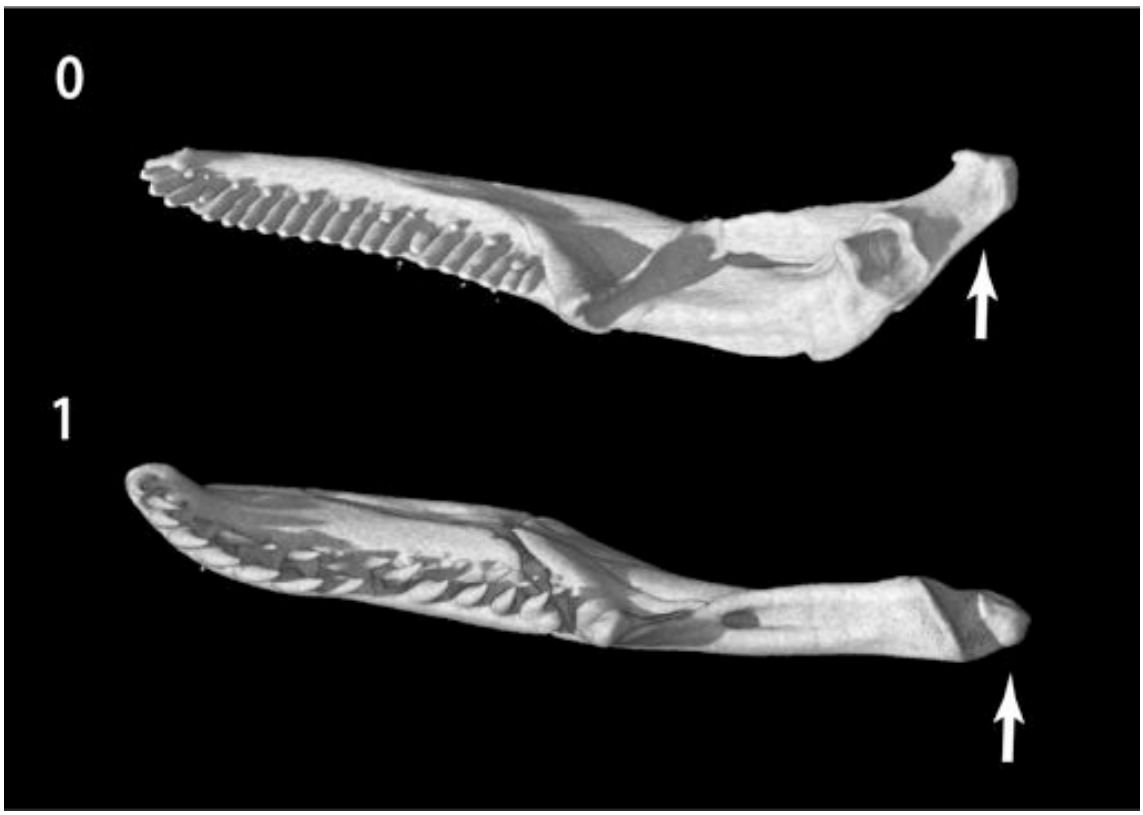


Character 228, enlarged surangular foramen. Small surangular foramen (0) shown in *Shinisaurus crocodilurus* (Xenosauridae), enlarged surangular foramen (1) shown in *Dinilysia patagonica*.



Character 229, loss of coronoid eminence. Coronoid eminenc formed of coronoid and dorsal wing of surangular (0) shown in *Epicrates striatus* (Boidae), loss of coronoid eminence of coronoid/surangular (1) shown in *Tropidophis haetianus* (Tropidophiidae).

Character 230, quadrate cotyle shape. Primitive state (0) shown in *Varanus exanthematicus* (Varanidae), saddle shaped cotyle (1) shown in *Epicrates striatus* (Boinae).



Character 231, reduced retroarticular process. Long retroarticular process (0) shown in *Xenosaurus grandis* (Xenosauridae), short retroarticular process (1) shown in *Cylindrophis ruffus* (Uropeltidae).

Character 237, separation of condyle from centrum. Condyle confluent with centrum (0) shown in *Coniophis precedens*, distinct separation of condyle from centrum by a groove (1) shown in unnamed Lance snake.