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Understanding Reptile Dental Anatomy: Clinical Applications

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By: **Christal Pollock, DVM, DABVP (Avian Practice)**
Reviewed by: Reviewed by: **Leigh Ann Clayton**, DVM, DABVP (Avian), DABVP (Reptilian/Amphibian), **Eric Klaphake**, DVM, DACZM, DABVP (Avian Practice), DABVP (Reptile & Amphibian Practice), and **Sara Ruane**, PhD
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Key Points

- Lizards lack tooth sockets or alveoli and their dentition is acrodont or pleurodont.
- Acrodont dentition is superficially attached to the biting edges of the mandible and maxilla.
- Chameleons and agamid lizards, such as bearded dragons and water dragons, possess acrodont dentition.
- Acrodont teeth are easily lost and are not replaced. Instead as teeth wear, the biting surface eventually becomes the bone itself.
- It is particularly important to take care when handling reptiles with acrodont dentition as

- Pleurodont dentition is found in snakes and many lizard species, including iguanid lizards and monitors.
- With pleurodont dentition, a larger surface area of the tooth is in contact with the jawbone creating a stronger attachment.
- Pleurodont dentition is regularly replaced throughout life.
- Periodontal disease is particularly common in agamid lizards and chameleons. Owners often do not recognize any dental problems until disease is quite advanced.

Introduction

One of the primary differences between reptiles and mammals is the structure and replacement of teeth. Repeated replacement of teeth or polyphyodonty is essential in many reptiles and there are many reasons for this strategy. First, the jaw is relatively small at hatch and must increase many-fold before maturity requiring multiple sets of teeth (Cooper *et al* 1970). The simple structure of reptilian teeth can also benefit from frequent replacement to maintain proper shape and sharpness of the dental crown (Klaphake 2015, O'Malley 2005, Edmund 1970). Most importantly, dentition is loosely attached to underlying bone in many reptiles, and teeth are easily lost during feeding or capture of prey. This superficial dental attachment is most pronounced in agamid lizards and chameleons, which creates special considerations during restraint and handling.

Terminology is central to any discussion of dental anatomy. Visit the glossary for definition of select dental anatomy terms.

Types of dentition

Like mammals, reptile teeth are composed of enamel, dentin, and cementum (Klaphake 2015, O'Malley 2005). Mammals possess heterodont dentition with four functionally different types of teeth: incisors, canines, premolars, and molars (Phulari 2014). Most vertebrates, including most reptiles, have homodont dentition. All teeth have the same shape, although they can differ in size (Phulari 2014, Mehler 2003). One exception to this homodontic rule of thumb is agamids, which possess more than one tooth type.

Three classical types of dental attachment have been described in the modern reptile: acrodont, pleurodont, and thecodont (Fig 1) (Table 1) (Edmund 1970). The degree to which the teeth are attached to the wall and to the lingual shelf varies greatly between species, between upper and lower dentitions in the same species, and even along the length of a single jaw (Edmund 1970).

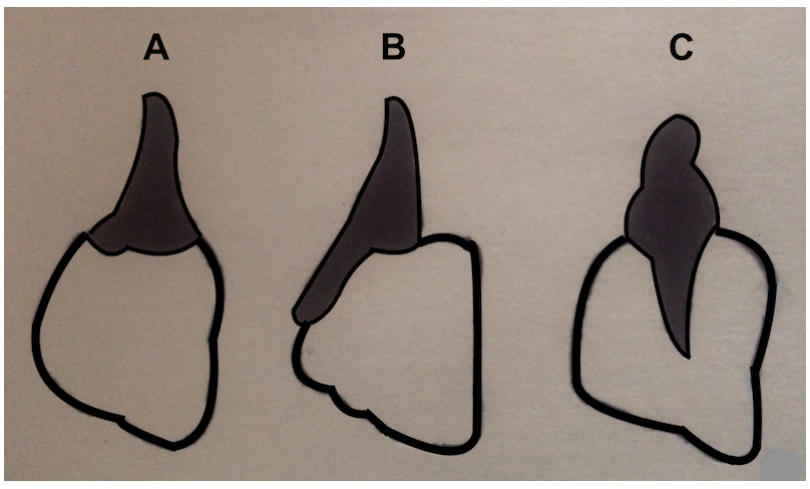

Figure 1. Diagrams of the three common types of dental

thecodont. Image credit: Dr. Christal Pollock modified from Edwards 1970. *Click image to enlarge*.

Table 1. Types of Dentition in Reptiles (Klaphake 2015, O'Malley 2005, Chandra, McCracken 1999, Edmund 1970)

Type	**Acrodont**	**Pleurodont**	**Thecodont**
Site of attachment	Crest of bone	Inner side of mandible	Deep, bony socket
Strength of attachment	Superficial Teeth are easily lost	Stronger	Strongest,
Seen in…	Agamid lizards Chameleons Tuataras	Many lizards, including iguanids, monitors	Crocodilians Snakes (modified thecodont)
Replacement	Teeth are not replaced	Teeth are constantly shed and replaced throughout life	Frequency and speed of replacement decreases as animal ages

Edit

CLINICAL TIP: When managing an infected or fractured tooth in a reptile, it is important to know the dental type for your species of interest. Is the most appropriate approach extraction or salvage, because there will be no replacement tooth? (Klaphake 2015).

Acrodont

Acrodont teeth are seen in agamid lizards (e.g. water dragon, bearded dragon), uromastyx, chameleons, and tuataras (Table 1) (Klaphake 2015, Cooper *et al* 1970, Edmund 1970). Acrodont teeth are superficially ankylosed to the rim of shallow, crater-like depressions on tooth-bearing bone (Fig 1) (Mehler 2003, Cooper *et al* 1970, Edmund 1970). This attachment is relatively weak and teeth are easily lost while feeding or capturing prey (Klaphake 2015 O'Malley 2005, Edmund 1970).

As the animal grows, new teeth can be added at the posterior end of the tooth row, however acrodont teeth are replaced "only very rarely" in the adult (Mehler 2003, Cooper *et al* 1970, Edmund 1970). Instead teeth are worn down with age leaving only the dorsal crest of the mandible and the ventral crest of the maxilla (O'Malley 2005, Mehler 2003, McCracken 1999, Cooper *et al* 1970). The resultant cutting edge in older animals is similar to chelonian jaw, except that the surface remains serrated (Cooper *et al* 1970). Glancing contact between the occlusal surfaces when the jaws close, ensures wear maintains a sharp edge (Cooper *et al* 1970).

CLINICAL TIP: Take special care when handling species with acrodontic dentition as the teeth will not be replaced if damaged or broken (Diaz-Figueroa 2006).

Pleurodont

Pleurodont teeth are seen in snakes, many lizards, including iguanids, varanids (monitors), basilisks, chuckwallas, and anoles, (Table 1) (Klaphake 2015, Edmund 1970, Chandra). With pleurodont dentition, a larger surface area is in contact with the jawbone, which creates a stronger attachment than acrodont dentition (Fig 1).

a few months before being shed and ingested with prey during feeding (Edmund 1970).

As each tooth completes its life cycle, the bone of attachment is actively formed and resorbed (Edmund 1970). A new tooth sits in reserve in pits within the gum lingual to the old tooth (Klaphake 2015, O'Malley 2005, Edmund 1970). Tooth replacement does not appear to occur in response to wear or injury of individual teeth. Instead each tooth is replaced as part of a regular wave-like pattern affecting the entire dental arcade (Klaphake 2015, O'Malley 2005, Edmund 1970).

Boids, pythonids, and colubrids (e.g. corn snake) display a back-to-front progression of alternating waves. Some venomous snakes, like viperids and crotalids, tend to display simple alternate replacement, while in elapids, such as the cobra and coral snake, replacement waves progress from front to back (Edmund 1970). This replacement rhythm may or may not be synchronous on both sides of the mouth. If synchrony is present, it usually manifests only on the premaxilla (Edmund 1970).

Thecodont

The thecodont tooth has a relatively long cylindrical base set in a deep bony socket (Fig 1) (Edmund). All mammals exhibit thecodonty, however crocodilians are the only living reptiles with thecodont dentition (Table 1) (O'Malley 2005, Mehler 2003, Edmund 1970). Thecodont teeth have deep attachments, allowing teeth to withstand strong forces (Mehler 2003). Lost teeth can be replaced by a limited number of replacement teeth in crocodilians, however the frequency and speed of replacement decreases as the animal ages (Mehler 2003).

Traditionally, snake dentition has been described as pleurodont (Edmund 1970), however snake teeth have more recently been described as modified thecodont because each tooth is fused to the rim of a shallow socket (Jacobson 2007).

Lizards

Unlike snakes and chelonians, many lizards chew their food and tear off pieces when food items are too large to swallow (O'Malley 2005). Lizards usually have sharp, tricuspid or cone-shaped dentition (Fig 2) (O'Malley 2005, Mehler 2003). The number of teeth in the dental arcade is usually greater in the adult than in the young (Edmund 1970).

Figure 2. Like many lizards, bearded dragon (*Pogona vitticeps*) teeth are a simple, uniform cone shape. *Click image to enlarge*.

Tuataras, chameleons, and agamid lizards, like water dragons and bearded dragons, are the only species that have true acrodont dentition (Klaphake 2015, Mehler 2003, Edmund 1970). Acrodont teeth are weakly attached and lost relatively easily while feeding or capturing prey (Klaphake 2015, O'Malley 2005, Edmund 1970). With the exception of chameleons, most acrodontic species also have a number of conical pleurodont teeth in the rostral-most portion of the upper and lower jaws (O'Malley 2005, McCracken 1999, Cooper *et al* 1970, Edmund 1970). The crowns of these pleurodont teeth are long with sharp points curved inwards and backwards (Cooper *et al* 1970). Among the living reptiles, these two distinct types of dentition are a rare example of marked heterodonty (Cooper *et al* 1970).

In chameleons, the premaxilla is quite reduced with fewer teeth in this rostral location (Fig 3) (Edmund 1970).

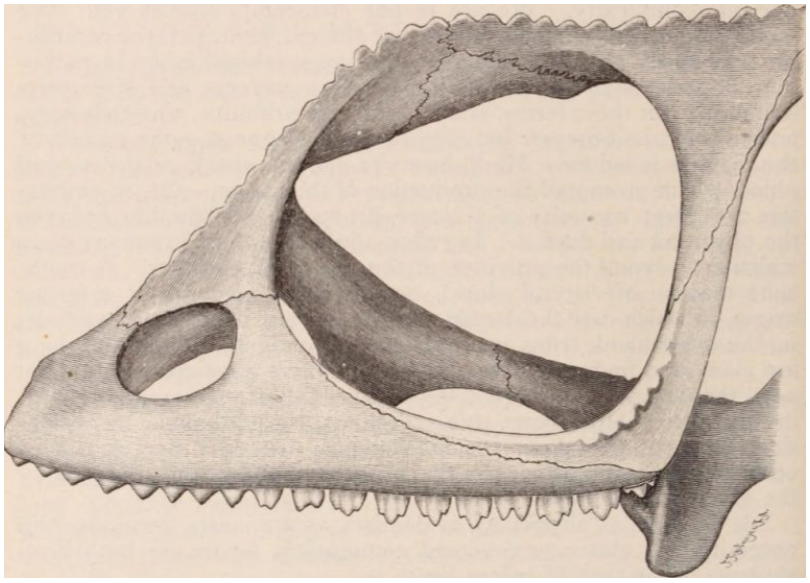

Figure 3. The teeth of Family Chamaeleonidae are similar to those of agamids in being triangular and strongly acrodont however chameleon teeth lack anterior pleurodont teeth. Photo credit: dentalcosmos3518whit via Wikimedia Commons. *Click image to enlarge*.

In family Agamidae these acrodont teeth are broad-based, somewhat laterally compressed, and triangular in profile (Cooper *et al* 1970, Edmund 1970). The crowns of herbivorous agamid Uromastyx spp. show no division into cusps but are chisel-shaped and extremely sharp at their working edges (Cooper et al 1970). In adult uromastyx, the two anterior teeth in each maxilla and dentary bone and four teeth on the premaxilla are worn to such an extent that a continuous cutting edge. This biting plate is used to cut and tear plant material (Diaz-Figueroa 2006, Cooper *et al* 1970).

CLINICAL TIP: Periodontal disease is common in lizards with acrodont dentition in captivity but not in the wild (Wellehan 2014, Mehler 2006).

Pleurodontic lizards

Pleurodont teeth are found in many lizards, including all iguanids, all varanid lizards, as well as members of family Gekkonidae (Klaphake 2015, Mehler 2003, Edmund 1970). These teeth tend to be isodont, or approximately the same size and form (Edmund 1970).

In many lizards, especially family Iguanidae, the typical tooth is cylindrical, sometimes slightly constricted below the crown, and often compressed laterally and expanded anteroposteriorly to create a sharp, serrated

(Edmund 1970). Each tooth may be replaced five times a year (Edmund 1970) and as many as four teeth per year may be added to the posterior end of the tooth row in rapidly growing animals (Edmund 1970).

Figure 4. Lateral view of a green iguana (*Iguana iguana*) skull illustrating the denticulate or finely toothed cutting edge (Fig 5). Photo credit: Brian Gratwicke via Wikimedia Commons. *Click image to enlarge*.

In monitors, the teeth have broadly flaring bases and in most species the teeth are conical, relatively short, laterally compressed, and cultriform (knife-life, with fairly sharp tips) (Fig 5) (Edmund 1970). The teeth increase in size toward the rear of the jaw (Edmund 1970). In most species, there are one or two replacement teeth at each position, but the Komodo dragon (*Varanus komodoensis*) may have as many as four or five (Edmund 1970).

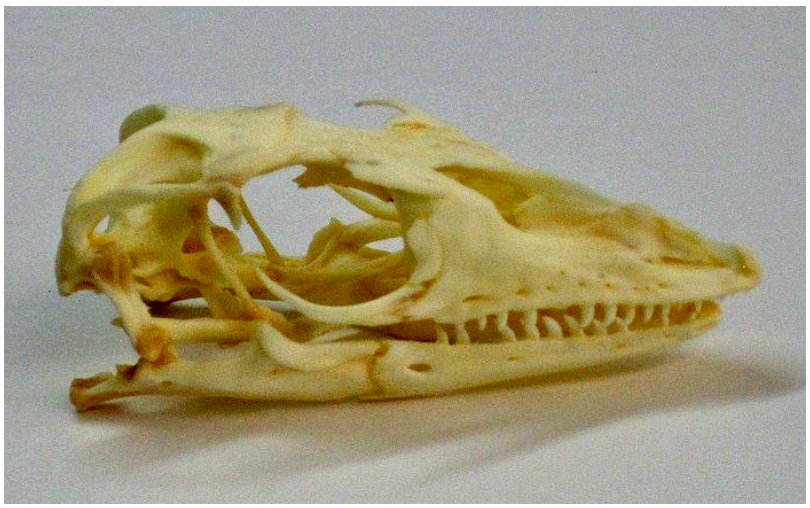

Figure 5. Lateral view of a mangrove monitor (*Varanus indicus*) skull illustrating the conical teeth. Photo credit: Joey Williams, Museum of Osteology courtesy of Dr. Cornelia Ketz-Riley. *Click image to enlarge*.

Unique lizard dentition

Some lizard species that utilize unique dental strategies. The caiman lizard (*Dracaena guianensis*) and adult

with crowns that have expanded to form broad crushing or grinding surfaces (Fig 6) (Edmund 1970). Interestingly, the cheek teeth of the Nile monitor are conical and sharp during much of its life, but when the animal reaches maturity and its nutritional strategy changes to durophagy, or a molluscivorous diet, the teeth become broad and biscuit-shaped (D'Amore 2015, Edmund 1970).

Figure 6. Specialized molariform teeth in a South American caiman lizard (*Draceana guianensis*). Photo credit: Sean McCormack, BSc (Hons), MVB, MRCVS. *Click image to enlarge*.

The Gila monster (*Heloderma suspectum*) and Mexican beaded lizard (*Heloderma horridum*) possess venom glands in the lower jaw (Beck 2005). Venom is delivered through unique grooved mandibular teeth as the helodermatid chews on its prey (Beck 2005, Clayton 2014, Beck 2005, Ast 2003). Each groove is flanked by a cutting flange, which makes the tooth better adapted for piercing flesh (Fig 7) (Beck 2005).

Figure 7. Gila monster (*Heloderma suspectum*) skull. Photo credit: National Zoological Park, Smithsonian Institution via Wikimedia Commons. *Click image to enlarge*.

Snakes

Suborder Ophidia swallow prey whole (O'Malley 2005), therefore snake teeth are primarily designed for holding prey and not chewing (O'Malley 2005, Edmund 1970). In most species, the teeth are long, thin, and curved backwards to prevent escape (Fig 8) (O'Malley 2005, Edmund 1970).

Figure 8. Most snakes possess long, think, recurved dentition. Shown here, a green tree python (*Morelia viridis*) skull. Photo credit: Sebastian Enault via Skulls, Bones and Fish Soup. *Click image to enlarge*.

CLINICAL TIP: If a snake bites and attaches to a human, simply pulling the snake free can tear the skin. Gently extract the snake by pushing the head forward to "unlock" the teeth (Diaz-Figueroa 2006).

Snakes have modified thecodont dentition (O'Malley 2005). The arrangement and number of teeth varies. Some species have almost no teeth and others have many, highly developed teeth (O'Malley 2005). In all colubrids the premaxilla is toothless, but teeth are usually well developed on the dentary bone and in a long row on the palatine and pterygoid (Edmund 1970). Most boids possess a moderately large number of teeth on all bones (Edmund 1970). Most snakes seen in clinical practice have two mandibular rows of teeth and four maxillary rows (Fig 9) (Clayton 2014, Finch 2010, O'Malley 2005, Mehler 2003, Edmund 1970).

Figure 9. Snakes have a second upper row of teeth on the palatine and pterygoid bones. Photo credit: Jerry Cates via Bugs in the News. *Click image to enlarge*.

Fangs

Although many snakes are aglyphous or “fang-less”, some species possess specialized, cone-shaped, tapered maxillary teeth or fangs, which inject venom into prey (Durso 2013, Edmund 1970). Venom is transported to the base of the fangs from modified salivary glands or postorbital venom glands (Durso 2013). Venomous species are classified based on their venom delivery system (O’Malley 2005).

PROTEROGLYPHOUS

Proteroglyphous snakes possess simple fangs connected by a venom duct to large glands in the temporal region of the head (Johnson 2010). Short, hollow fangs sit at the front of the maxilla and remain erect when the mouth is closed (Fig 4) (O’Malley 2005, Mehler 2003). Proteroglyph or “front-fanged” snakes include rattlesnakes and elapids, such as cobras, mambas, death adders, and coral snakes (O’Malley 2005). These species typically strike their prey and then hang on until venom has taken effect. Some elapids also constrict and envenomate their prey at the same time (O’Malley 2005).

OPISTHOGLYPHOUS

The fangs of opisthoglyphous species sit at the end of the maxillary tooth row at the rear of the mouth. Venom travels along a simple groove on the back of the tooth to the tip of the fang (Durso 2013). One or two grooved fangs are found in several groups of colubrids, including hognose and vine snakes. These species typically must chew on prey to bring the fangs into a biting position (Durso 2013).

As a general rule, bites by most “rear-fanged” snakes are not particularly harmful to humans, causing relatively mild, transient, local symptoms (Durso 2013). Exceptions to this rule of thumb include two members of subfamily Colubrinae: boomslangs (Dispholidus typus) and twig snakes (genus *Thelotornis*). Bites from these species have caused several human fatalities because the fangs are relatively close to the front of mouth and their venom is quite potent (Durso 2013).

In members of family Viperidae (vipers and pit vipers), the maxilla bears a single, highly modified fang. This long, tubular or needle-like fang has a hollow core (Fig 10) (Durso 2013). Venom is injected from a slit-like opening near, but not at, the tip of the fang. The fangs are so long that when the mouth is closed these specialized teeth fold back into a sheath along the roof of the mouth covered by a membranous flap (Fig 11) (O'Malley 2005, Mehler 2003).

Figure 10. Lateral view of a diamondback rattlesnake (*Crotalus atrox*) skull, illustrating the fangs of this proteroglyphic species Photo credit: Joey Williams, Museum of Osteology courtesy of Dr. Cornelia Ketz-Riley. *Click image to enlarge*.

Figure 11. Fangs in another solenoglyph, the Gaboon viper (*Bitis gabonica*). Photo credit: By Brimac the 2nd via Wikimedia Commons. *Click image to enlarge*.

Fangs are shed regularly to be replaced by reserve teeth (O'Malley 2005). Vipers shed their fangs approximately every 2 months (Durso 2013).

For additional information on fangs and venom delivery systems, go to Snake Venoms and Envenomation by Sherman Minton or visit "Life is Short, but Snakes are Long"

Crocodilians

All crocodilians possess thecodont dentition. The teeth are used to grasp prey, but not chew, as most prey is swallowed whole after being tossed into the back of the pharynx. Larger prey is torn apart by firmly grasping the food item with teeth while shaking the head from side to side or rolling the entire body (Mehler 2003). Teeth are conical in shape and arranged in two rows in many crocodilians (Fig 12). Teeth are replaced throughout life however the number of replacements is limited and slows with age (Mehler 2003, Edmund 1970).

Figure 12. Close-up of the undifferentiated, cone-shaped teeth of a Siamese crocodile (*Crocodylus siamensis*). Photo credit: Justin Jensen via Flickr Creative Commons. *Click image to enlarge*.

CLINICAL TIP: The replacement tooth can initially come in at a strange angle in crocodilians, however the tooth generally straightens after a short period of time (Klaphake 2015).

There are differences between the anatomy of the maxillary and mandibular bones in crocodiles and alligators that can affect the visual examination (Mehler 2003). For example, the alligator maxilla is wider than the mandible creating an overbite (Fig 13).

Alligators	Crocodiles
Upper jaw is wider than the lower jaw causing an overbite	Upper and lower jaw are approximately the same width

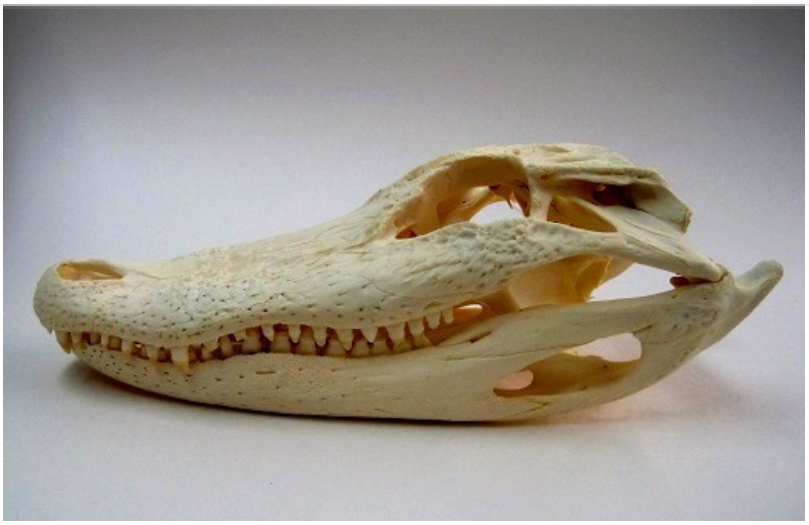

Figure 13. Lateral view of an American alligator (*Alligator mississippiensis*) skull. The maxilla is wider than the mandible causing an overbite. Photo credit: Joey Williams, Museum of Osteology courtesy of Dr. Dr. Cornelia Ketz-Riley. *Click image to enlarge*.

Additionally, crocodiles can be differentiated from alligators and caimans by a fourth mandibular tooth that is visible on each side of the mouth when the mouth is closed (Fig 14) (Mehler 2003).

Alligators	**Crocodiles**
The large fourth mandibular tooth fits into a socket in the upper jaw and cannot be observed when the snout is closed	The fourth mandibular tooth projects outside the snout when the mouth is closed

Figure 14. The fourth mandibular tooth projects outside the snout when the crocodile mouth is closed. Photo credit: Rusty Clark via Flickr Creative Commons. *Click image to*

Chelonians

Chelonians have no teeth (Klaphake 2015, O'Malley 2005). Like birds, teeth have been replaced by a keratinized horny beak or rhamphotheca, which overlies the bone (Fig 15) (Klaphake 2015, Clayton 2014, O'Malley 2005, Mehler 2003). Most chelonians depend on the scissor-like action of the rhamphotheca for prehension and cutting food, which is then swallowed whole (Boyer 2006). Snapping turtles also possess extremely sharp cutting edges or tomia on the beak. Chelonians will also rip off pieces of food by retracting their neck muscles. Captive chelonians have been observed putting a foot on food items before pulling back (Chitty 2013). Some species possess a pronounced, rostrally located secondary palate or crushing plate and most herbivorous species also have a row of tough chewing ridges on the palate to allow more precise chewing of fibrous food items (Clayton 2014) (O'Malley 2005).

Figure 15. Chelonians possess a horny beak or rhamphotheca. *Shown here*, a Hermann's tortoise (*Testudo hermanni boettgeri*). Photo credit: Dominik Muller. *Click image to enlarge*.

Egg tooth

Most newly hatched oviparous squamates (snakes and lizards) have a functional egg tooth (Fig 16) (O'Malley 2005, Edmund 1970). This highly modified premaxillary tooth serves to rupture the embryonic membranes and eggshell during hatch (O'Malley 2005, Edmund 1970). Many geckos have a double egg tooth or an egg tooth at the mesial (anterior) margin of each premaxilla. (Edmund 1970).Viviparous squamates generally show marked reduction of the egg tooth. The egg tooth is lost during first few days of life or after the first shed (Mehler 2003). There is often a midline tooth, which may be the successor to the egg tooth (Edmund 1970).

Figure 16. Borneo short-tailed python (Python breitensteini) hatching with egg tooth visible (arrow). Photo credit: Dawson via Wikimedia Commons.

In chelonians, crocodilians, and tuatara the analogous structure is the egg caruncle, a horny epidermal point which bears no relation to true dentition (Fig 17) (Edmund 1970).

Figure 17. Egg caruncle (*arrow*) in a juvenile green turtle (*Chelonia mydas*) illustrating. Photo credit: Ras_al-Jinz_ via Wikimedia Commons. *Click image to enlarge*.

Examine the mouth for evidence of fractured teeth, cheilitis, periodontal disease, and stomatitis. Evaluation of the oral cavity can be safely accomplished for most reptiles commonly seen in clinical practice, however some species must be examined under sedation or general anesthesia because they are venomous or can cause serious damage with their powerful bites and razor-sharp teeth (Mehler 2003). Clayton (2014) recommends midazolam (0.3–1.0 mg/kg intranasal, IM, or SC) with sedative effects observed within 10–20 minutes. Venomous species should only be evaluated by experienced individuals and only after clinic liability coverage has been confirmed.

> CLINICAL TIP: Reptiles typically object to manipulation of the mouth so leave evaluation of the oral cavity until the end of the physical exam (Finch 2010, Mehler 2003)

Many reptiles will gape when restrained so use this opportunity to get a cursory look at the mouth (Clayton 2014). Fortunately, squamates have a kinetic joint between the maxillary jaw and skull, which allows a relatively wide mouth gape (Fig 18) (Clayton 2014, O'Malley 2005).

Lizards

Although lizards have a large gape, the fused mandibular symphysis means they cannot open their mouths as widely as snakes. Lizards compensate by having stronger jaws with extremely strong adductor muscles (O'Malley 2005).

Figure 18. Lizards have a large gape however they cannot open their mouths as widely as snakes. Photo credit: Yawning iguana Graham C99 via Flickr Creative Commons. *Click image to enlarge*.

> CLINICAL TIP: Always use a mouth gag when examining the mouths of large healthy lizards as the jaw can close like a trapdoor causing considerable pain and injury (O'Malley 2005)

OPENING THE MOUTH

A quick evaluation of lizard teeth can be performed by gently grasping the dewlap in species like the iguana and bearded dragon (Fig 19, Fig 20). Mehler (2003) recommends applying gentle pressure to the eyes with

Figure 19. Gently grasping the dewlap of a bearded dragon (*Pogona vitticeps*). Photo credit: Erica Mede, CVT. *Click image to enlarge*.

Figure 20. Opening the mouth of green iguana (*Iguana iguana*) by gently grasping the dewlap. *Click image to enlarge*.

ORAL SPECULA

After the mouth is open, a more detailed exam can be performed using an oral speculum. Many items can serve as mouth gags, such as soft, plastic spatulas or hemostats of appropriate size padded with porous tape or elastic bandage material (Table 2) (Mehler 2003). Hotel room key cards can work well in smaller lizards and are disposable (E. Klaphake, personal communication, February 27, 2018). Metal specula can be used, but use caution to avoid causing trauma to the mouth.

Table 2. Oral specula commonly used in lizards and snakes (Clayton 2014, Mehler 2003)

- Rubber spatula
- Padded hemostat
- Wooden applicator stick
- Tongue depressor
- Porous tape stirrups
- Guitar pick
- Hotel room key card

Edit

Teeth and oral soft tissue structures can be damaged by inappropriate handling technique, particularly in animals with acrodont teeth (Clayton 2014). Occasional breakage or tooth loss is not an issue with pleurodont dentition.

> Visit LafeberVet's Lizard Handling and Restraint for additional information and safety tips.

Snakes

There are no teeth in the rostral aspect of the snake mouth. To open the mouth, gently introduce the oral speculum on midline. As the mouth opens, advance the speculum further until a thorough evaluation can be performed (Fig 21) (Clayton 2014, Mehler 2003). The wide gape found in squamates is most pronounced in snakes because of a mobile mandibular symphysis and loose attachments between the quadrate bone and the rest of the skull (Clayton 2014).

> CLINICAL TIP: A light, gentle touch is necessary to evaluate snake teeth.

Figure 21. Oral speculum use in a ball python (*Python regius)*. Photo credit: Erica Mede, CVT. *Click image to enlarge*.

Visit Snake Handling and Restraint for additional information and safety tips.

Chelonians

In turtles and tortoises, the maxillary-skull joint is akinetic and the gape is relatively narrow when compared to snakes and lizards (Clayton 2014). Depending on the species and your patient's health status, the oral exam can be incredibly challenging in the chelonian. Large, uncooperative, and more dangerous chelonians require anesthesia for a thorough oral exam. Visit Chelonian Handling and Restraint for detailed information.

Crocodilians

Gently tapping the nose can often elicit a gape response in the crocodilian, however evaluation of the teeth often requires experienced handlers and heavy manual restraint.

Periodontal disease

Primary and secondary oral disease is common in reptiles (Clayton 2014). Periodontal disease is a significant cause of morbidity in captive agamid lizards and chameleons (Fig 22) (Clayton 2014, McCracken 1999). Important underlying causes of disease in captive animals include infection, trauma, and inappropriate nutrition (Clayton 2014). Also assess the patient for underlying facial deformities secondary to chronic trauma, like hitting glass, or secondary hyperparathyroidism that could cause improper alignment and exposure or irritation of tissues. When soft foods are regularly fed to captive lizards, these food items can accumulate around tooth roots promoting the formation of plaque (Mehler 2006). As plaque builds up on teeth, bacteria begin to colonize and a reversible inflammatory response develops within marginal gingiva leading to periodontal disease (Clayton 2014, Mehler 2006, Mehler 2003, McCracken 1999). Gram-positive aerobic cocci predominate in reptiles with excessive plaque buildup. As plaque matures, anaerobes, Gram-negative bacteria, and spirochetes are seen (Mehler 2006).

CLINICAL TIP: Feeding a natural diet provides the required texture and consistency to prevent dental plaque from developing (Mehler 2006, Mehler 2003).

Figure 22. Gingivitis and dental calculus in a bearded dragon (*Pogona vitticeps*). Photo credit: Dr. Shane Simpson. *Click image to enlarge*.

Clinical signs of dental disease include gingival erythema and dental calculus. As periodontal disease progresses and calculus builds, gingiva first becomes swollen and gingival margins begin to recede, exposing underlying mandibular and maxillary bone (Mehler 2003, McCracken 1999). In advanced disease, the gingiva becomes hyperplastic and gingival pockets form. Suppurative gingivitis, subcutaneous abscessation, and focal or multifocal osteomyelitis can develop. In the most severe cases of periodontal disease, pathologic fractures occur as well as fatal systemic infections (Table 3) (Mehler 2003, McCracken 1999).

Table 3. Clinical signs of dental disease in lizards (Mehler 2006, Mehler 2003)

• Gingival erythema	• Gingival hyperplasia
• Dental calculus	• Periodontal pockets
• Gingival swelling	• Loosening, loss of teeth
• Gingival recession	

Edit

CLINICAL TIP: Many reptiles often continue to eat with early dental disease. Plaque formation and gingival erythema are usually only recognized during oral examination (Clayton 2014, Mehler 2003). The owner may not detect a problem until disease is quite advanced (Mehler 2003).

Management of periodontal disease in lizards should begin with a thorough oral exam under general anesthesia (Mehler 2006). The goals of dental care in lizards are the same as for other taxa. After calculus is removed and gingival sulci are cleaned under general anesthesia, the oral cavity is irrigated with 0.05%

Summary

Reptile teeth tend to be relatively uniform with a simple, conical shape and most reptile teeth are loosely attached with the dental attachment most superficial in acrodontic species. Tooth loss and replacement is a normal occurrence in reptile species with pleurodont dentition, which includes snakes, and many lizards. Take special care when handling reptiles with acrodont dentition as teeth will not be replaced when infected or fractured. Additionally, periodontal disease is common in captive lizards with acrodont dentition such as bearded dragons and chameleons. Periodontal disease is an insidious condition. As plaque formation builds and gingivitis worsens, many reptiles will continue to eat. The owner may not observe problems until disease is quite advanced. Feeding lizards an unnatural, soft diet is believed to promote plaque development and the development of periodontal disease.

Glossary

- **Acrodont:** dentition attached to crest of bone, present in some lizards (e.g. agamids, chameleons)
- **Aglyphous:** “fang-less” snake
- **Apex:** root or basal portion of a tooth
- **Cement, cementum:** a thin layer of specialized calcified material that covers the base of the tooth and fixes the tooth to the jaw
- **Cultriform:** knife-life or fairly sharp tips (e.g. family Varanidae)
- **Denticulate:** having small teeth or toothlike projections; finely toothed (e.g. family Iguanidae)
- **Dentin:** hard, dense, bony tissue forming the bulk of a tooth beneath the enamel
- **Distal:** Per Edmund 1970, this term is preferred to “anterior” because of the curved shape of the dental arcade
- **Enamel:** mineralized surface of the tooth
- **Heterodont** dentition occurs (primarily) in mammals in which there are four functionally different types of teeth: incisors, canines, premolars and molars
- **Homodont** dentition is found in the majority of vertebrates including reptiles in which all teeth are functionally and anatomically the same type, although their size can vary depending on location
- **Isodont** dentition is another term for homodonty
- **Labial:** The side of a tooth that is adjacent to (or the direction towards) the inside of the lip (labium); the term ‘buccal’ is usually reserved for mammals
- **Lingual:** the side of a tooth adjacent to (or facing) the tongue
- **Mesial:** directed towards the midline of the body; preferred to “posterior” because of the curved shape of the dental arcade
- **Occlusal:** crown or tip of a tooth
- **Opisthoglyphous:** rear-fanged venomous snake
- **Pleurodont** dentition attach to labial wall; present in snakes, some lizards; regularly replaced throughout life
- **Polyphyodont** dentition involves replacement of teeth over several times in a lifetime so that the jaws are never left without teeth
- **Premaxilla:** the teeth-bearing bone at the front of the upper jaw

- **Solenoglyphous:** venomous snakes possessing long, tubular or needle-like fangs
- **Thecodont:** dentition attached to jaw securely in deep bony socket

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