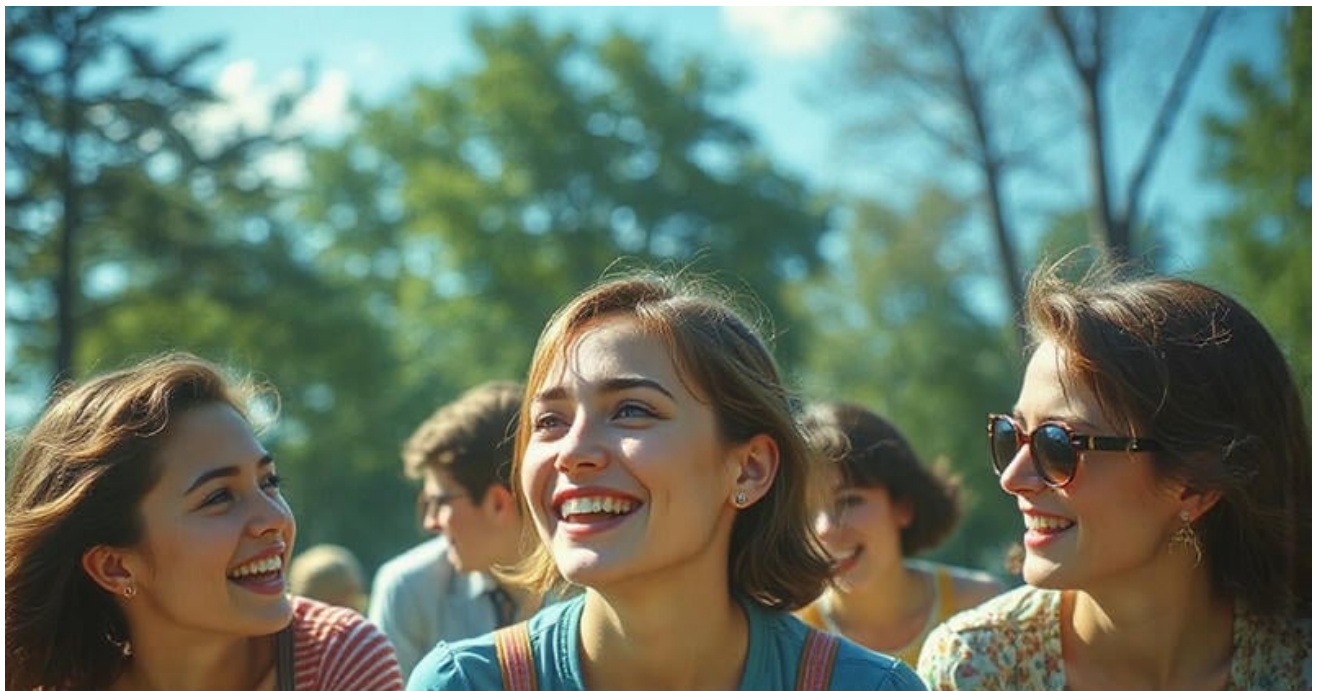




- **Reasons for Wearing Retainers After Treatment**
Reasons for Wearing Retainers After Treatment Differences Between Removable and Fixed Retention Establishing a Routine to Prevent Tooth Shifting Oral Hygiene Tips for Retainer Care Monitoring Changes After Active Orthodontic Phase Factors That Influence Retention Duration Communicating the Value of Long Term Follow Ups How Retainers Support Jaw Positioning Over Time Signs That Signal the Need for Retainer Adjustments Materials Used in Crafting Effective Retainers Incorporating Retainer Wear Into Daily Habits Assessing Compliance and Its Impact on Stability
- **Basics of Brushing With Braces or Aligners**
Basics of Brushing With Braces or Aligners Practical Tips for Flossing Around Orthodontic Wires Understanding the Role of Mouthwash in Oral Care Techniques to Prevent White Spots on Enamel Avoiding Common Foods That Damage Orthodontic Appliances Solutions for Managing Gum Irritation and Inflammation Tools That Simplify Cleaning With Orthodontic Hardware Importance of Regular Dental Checkups During Treatment Risk Factors for Plaque Buildup With Braces Adapting Hygiene Routines for Clear Aligner Users Balancing Oral Care With Busy Lifestyles Early Intervention for Minor Issues That Escalate
- **About Us**



So, your kiddo just got their braces off! Big moment, right? All that hard work, all those appointments, and now – a dazzling smile. But here's the thing: the job isn't quite done. Retainers are often needed after braces to maintain alignment **Pediatric orthodontic care** dentist. That retainer they just got? It's not just a souvenir. It's the key to keeping that beautiful smile straight.

Think of it this way: braces are like construction workers, carefully shifting teeth into their perfect spots. But teeth are a bit like toddlers; they have a mind of their own and might wander back to their old habits if left unsupervised. That's where the retainer comes in. It's the supervisor, gently reminding those teeth to stay put.

Consistent retainer wear, especially right after braces come off, is super important. The bone and tissues around the teeth need time to solidify in their new positions. The retainer acts as a support system, preventing relapse and ensuring all that orthodontic treatment wasn't for nothing.

Imagine skipping retainer wear for a week... or a month. Those teeth can start to shift, often subtly at first. But before you know it, you might be facing a need for more treatment down the line. That's extra time, extra money, and extra hassle – nobody wants that.

For kids, it can be tough to remember. That's where you, as the awesome parent, come in. Make retainer wear a part of the daily routine, like brushing their teeth or packing their lunch. Use a timer, a chart, or even a little reward system to help them stay on track. Remind them that wearing their retainer is an investment in their smile – a smile they worked so hard to achieve! It's a small effort that makes a huge difference in the long run. Think of it as the final, crucial step in the braces journey, ensuring a lifetime of confident smiles.

*** Preventing teeth from shifting back to their original positions as the jawbone**

settles. —

- *** Maintaining the corrected tooth alignment achieved during braces.**
- *** Preventing teeth from shifting back to their original positions as the jawbone settles.**
- *** Protecting the investment made in orthodontic treatment.**
- *** Ensuring the long-term stability of the bite and smile.**
- *** Supporting proper jaw growth and development in younger children.**
- *** Avoiding the need for future, potentially more extensive, orthodontic intervention.**
- *** Contributing to overall oral health by preventing crowding and misalignment.**

Retainers, those trusty guardians of your straightened smile, need a little TLC to stay in tip-top shape. But harsh cleaning can actually do more harm than good. Think of it like washing a delicate silk scarf – you wouldn't throw it in the washing machine, right? The same principle applies here.

Gentle cleaning methods are key to avoiding damage. Forget abrasive toothpastes, as they can scratch the surface of your retainer, creating tiny crevices where bacteria love to hide. Instead, opt for a mild dish soap or a retainer-specific cleaning solution. Think about it – these solutions are designed to cut through grime without being overly aggressive.

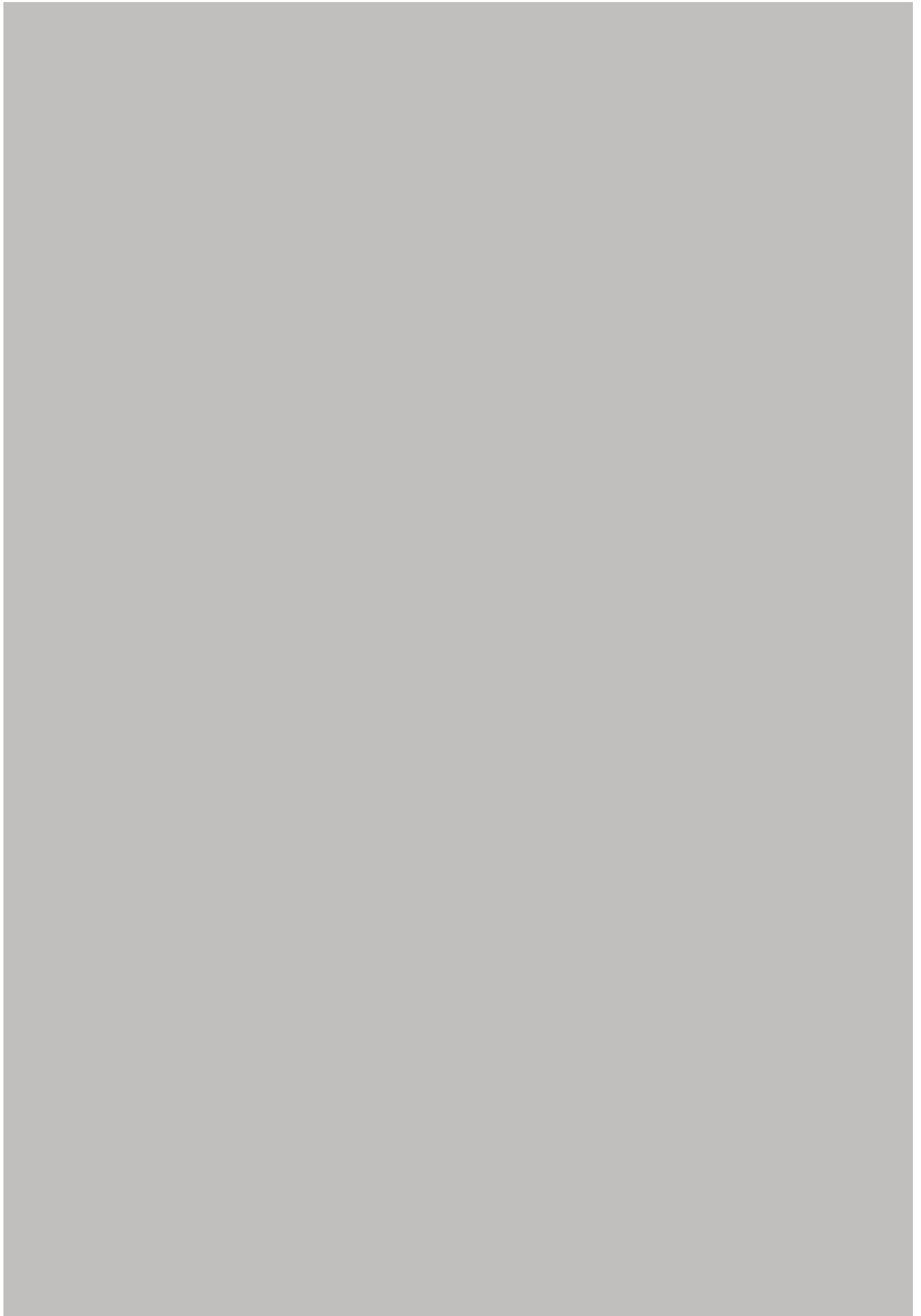
When you're cleaning, use a soft-bristled toothbrush, the kind you'd use on your own teeth. Gently scrub all surfaces of the retainer, paying special attention to the nooks and crannies. Rinse thoroughly with cool or lukewarm water – hot water can warp the plastic.

And here's a pro tip: soaking your retainer in a denture cleaner solution once or twice a week can help to keep it fresh and sparkling. Just be sure to follow the instructions on the product label. With a little gentle care, your retainer will stay clean, comfortable, and ready to protect your beautiful smile.

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*** Protecting the investment made in orthodontic treatment.**

Okay, let's talk about keeping your retainer safe and sound. You've invested time, effort, and probably a little bit of discomfort in straightening your teeth, and your retainer is what keeps them in line now. So, treating it right is super important. Think of it like this: your retainer is a tiny, clear guardian of your smile, and it deserves a secure little home when it's not on duty.

One of the biggest mistakes people make is wrapping their retainer in a napkin while they're eating. We've all been there – out at a restaurant, popping the retainer out quickly, and then...poof! It ends up accidentally tossed in the trash. Or, worse, someone unknowingly crushes it under a plate. Avoid this retainer tragedy by ALWAYS using its case. It's specifically designed to protect it from pressure and damage.

Speaking of cases, make sure you actually USE it! Don't just toss your retainer in your purse, backpack, or pocket. All those loose items can scratch, bend, or even break it. The case is your retainer's personal bodyguard, shielding it from the harsh realities of the outside world.

Beyond the case, think about where you're storing it. Keep it away from pets. They have a knack for finding and chewing on things, and your retainer, with its smooth, plastic texture, can be particularly tempting (and definitely not safe for them either!). Also, avoid leaving it in direct sunlight or hot cars. The heat can warp the plastic and change its shape, rendering it useless. Ideally, a cool, dry place is best.

Basically, safe storage is all about being mindful. Take a few extra seconds to protect your retainer, and you'll be saving yourself a lot of headaches (and potentially expensive replacement costs) down the road. A little bit of care goes a long way in keeping that smile perfect!



*** Ensuring the long-term stability of the bite and smile.**

Alright, let's talk about grub. You just got your retainer, congrats! But now you gotta be a little more mindful of what you're shoving in your mouth. Think of it like this: your retainer is a delicate little flower, and certain foods are like weed killer. You wouldn't want to accidentally poison your pretty flower, would you?

First up, and this should be obvious, anything super sticky is a big no-no. Think caramels, gummy bears, taffy – basically anything that clings for dear life. These guys will latch onto your retainer and be a nightmare to clean off. Plus, they can actually warp the plastic or pull your retainer out of shape. Not good.

Next, hard candies are definitely off the table. You might think you can just suck on them, but the temptation to bite down is too real. And trying to crunch down on a hard candy with your retainer in is a recipe for disaster. Say goodbye to a cracked retainer, and hello to an emergency orthodontist visit.

Sugary drinks are also sneaky culprits. Soda, juice, even sweetened coffee or tea can bathe your teeth (and your retainer!) in sugar, creating a breeding ground for bacteria. That bacteria then gets trapped under your retainer, leading to cavities and bad breath. Stick to water, folks. It's your best friend.

Finally, be cautious with anything that could stain. We're talking red wine, coffee, tea, and brightly colored berries. Your retainer can pick up those stains, and suddenly you're sporting a yellowish-tinged appliance. Not the most attractive look.

Basically, use your common sense. If something feels like it could get stuck, be difficult to clean, or damage your retainer, it's probably best to avoid it. Your retainer (and your teeth) will thank you!

*** Supporting proper jaw growth and development in younger children.**

Okay, so we've talked about cleaning your retainer, storing it properly, and avoiding the urge to chew on it like it's a piece of gum (seriously, don't!). But there's another really important piece of the retainer puzzle: seeing your orthodontist regularly. Think of it like this: your retainer is doing a job, a really important job, holding your teeth in their new positions. But sometimes, things shift, or the retainer

might need a little tweaking to keep up.

That's where those regular check-ups come in. Your orthodontist will take a look at your retainer, make sure it's fitting correctly, and if necessary, make some adjustments. Maybe it needs tightening, maybe it's rubbing in a certain spot, or maybe it needs a full-on replacement. Catching these things early can prevent bigger problems down the road. It's like getting your car serviced – you do it to keep it running smoothly and to avoid expensive repairs later.

Plus, your orthodontist is also a great resource for any questions or concerns you might have about your retainer. Don't be afraid to ask them anything! They're there to help you keep your smile looking its best. So, yeah, don't skip those appointments. They're a crucial part of keeping your teeth happy and your retainer working its magic.



*** Avoiding the need for future, potentially more extensive, orthodontic intervention.**

Okay, so the retainers are in, the braces are off, and everyone's happy, right? Wrong! Suddenly, the real challenge begins: getting your kids to actually *wear* those retainers. It's like winning the marathon and then being told you have to run a 5k cool-down. It can be a drag, but it's absolutely crucial. Think of it this way: all that time, money, and discomfort getting their teeth straightened? All for naught if those retainers end up gathering dust in a case.

So, how do you motivate a kid who's already feeling like they've done their time in ortho-jail? First, ditch the nagging. Seriously. It just creates resentment. Instead, focus on positive reinforcement. A reward system can be incredibly effective, especially with younger kids. Maybe it's extra screen time, a small toy, or a special outing. The key is to make it consistent and tied directly to retainer compliance.

Another approach is to emphasize the "why." Explain, in age-appropriate terms, that the retainers are preventing their teeth from shifting back. Show them pictures of what can happen if they don't wear them – sometimes a visual aid hits home harder than any lecture. Talk about the cost of needing braces again, and how much easier and comfortable retainers are in the long run.

Make it a routine, too. Just like brushing their teeth, wearing retainers should be a non-negotiable part of their daily schedule. Link it to something else they already do, like putting them in after dinner or before bed. The more automatic it becomes, the less likely they are to forget.

Finally, involve them in the care of their retainers. Let them choose their cleaning tablets or a fun retainer case. The more ownership they feel, the more responsible they'll be. And remember, a little empathy goes a long way. Acknowledge that retainers can be uncomfortable or annoying, but remind them of the beautiful, healthy smile they worked so hard to achieve. It's a team effort, and with a little

patience and creativity, you can help them keep that smile shining bright.

*** Contributing to overall oral health by preventing crowding and misalignment.**

Okay, so you're rocking a retainer – congrats on finishing your orthodontic treatment! But here's the thing: that little piece of plastic or wire is working hard to keep your teeth in line, and it's not invincible. Recognizing when your retainer is on its way out, or already damaged, is key to preventing a teeth-shifting disaster.

Think of your retainer like your favorite pair of shoes. You use them every day (or night), they get put through their paces, and eventually, they show wear and tear. With retainers, that wear and tear might look like cracks in the plastic, especially around where the wires are embedded. Maybe the wires themselves are bent, loose, or even broken. A clear sign something's up is if the retainer suddenly doesn't fit as snugly as it used to, or if it starts to feel uncomfortable in certain spots. You might even notice a sharp edge digging into your gums or tongue.

Now, a tiny scratch or a slight discoloration might not be a huge deal, but any of the things I just mentioned? Those are red flags. Trying to soldier on with a damaged retainer can actually do more harm than good. A cracked retainer can harbor bacteria (yuck!), and a loose wire can irritate your mouth, or worse, come completely unattached and become a choking hazard. Plus, a retainer that doesn't fit properly isn't doing its job, which means your teeth might start to drift back to their old positions. We definitely don't want that after all that time and effort!

So, when should you call your orthodontist? Basically, if anything seems off, err on the side of caution. If you see significant cracks, bent or broken wires, or if the retainer just doesn't feel right, give them a

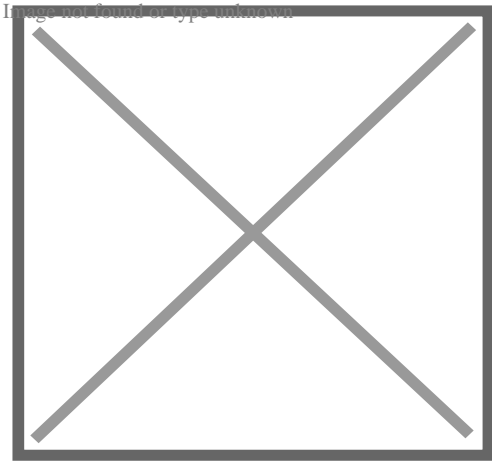
call. They can assess the damage, determine if a repair is possible (sometimes minor tweaks can be made), or if you need a completely new retainer. It's always better to be proactive and get it checked out than to risk your teeth shifting and having to go through more orthodontic treatment down the line. Think of it as preventative maintenance for your beautiful smile!



About tooth

This article is about teeth in general. For specifically human teeth, see [Human tooth](#). For other uses, see [Tooth \(disambiguation\)](#).

Tooth



A chimpanzee displaying his teeth

| Details | |
|---|-------------|
| Identifiers | |
| Latin | <i>dens</i> |
| MeSH | D014070 |
| FMA | 12516 |
| Anatomical terminology | |
| [edit on Wikidata] | |

A **tooth** (pl.: **teeth**) is a hard, calcified structure found in the jaws (or mouths) of many vertebrates and used to break down food. Some animals, particularly carnivores and omnivores, also use teeth to help with capturing or wounding prey, tearing food, for defensive purposes, to intimidate other animals often including their own, or to carry prey or their young. The roots of teeth are covered by gums. Teeth are not made of bone, but rather of multiple tissues of varying density and hardness that originate from the outermost embryonic germ layer, the ectoderm.

The general structure of teeth is similar across the vertebrates, although there is considerable variation in their form and position. The teeth of mammals have deep roots, and this pattern is also found in some fish, and in crocodilians. In most teleost fish, however, the teeth are attached to the outer surface of the bone, while in lizards they are attached to the inner surface of the jaw by one side. In cartilaginous fish, such as sharks, the teeth are attached by tough ligaments to the hoops of cartilage that form the jaw.^[1]

Monophyodonts are animals that develop only one set of teeth, while diphyodonts grow an early set of deciduous teeth and a later set of permanent or "adult" teeth. Polyphyodonts grow many sets of teeth. For example, sharks, grow a new set of teeth every two weeks to replace worn teeth. Most extant mammals including humans are diphyodonts, but there are exceptions including elephants, kangaroos, and manatees, all of which are polyphyodonts.

Rodent incisors grow and wear away continually through gnawing, which helps maintain relatively constant length. The industry of the beaver is due in part to this qualification. Some

rodents, such as voles and guinea pigs (but not mice), as well as lagomorpha (rabbits, hares and pikas), have continuously growing molars in addition to incisors.^{[2][3]} Also, tusks (in tusked mammals) grow almost throughout life.^[4]

Teeth are not always attached to the jaw, as they are in mammals. In many reptiles and fish, teeth are attached to the palate or to the floor of the mouth, forming additional rows inside those on the jaws proper. Some teleosts even have teeth in the pharynx. While not true teeth in the usual sense, the dermal denticles of sharks are almost identical in structure and are likely to have the same evolutionary origin. Indeed, teeth appear to have first evolved in sharks, and are not found in the more primitive jawless fish – while lampreys do have tooth-like structures on the tongue, these are in fact, composed of keratin, not of dentine or enamel, and bear no relationship to true teeth.^[1] Though "modern" teeth-like structures with dentine and enamel have been found in late conodonts, they are now supposed to have evolved independently of later vertebrates' teeth.^{[5][6]}

Living amphibians typically have small teeth, or none at all, since they commonly feed only on soft foods. In reptiles, teeth are generally simple and conical in shape, although there is some variation between species, most notably the venom-injecting fangs of snakes. The pattern of incisors, canines, premolars and molars is found only in mammals, and to varying extents, in their evolutionary ancestors. The numbers of these types of teeth vary greatly between species; zoologists use a standardised dental formula to describe the precise pattern in any given group.^[1]

Etymology

[edit]

The word *tooth* comes from Proto-Germanic **tanþs*, derived from the Proto-Indo-European **h₂dent-* which was composed of the root **h₂ed-* 'to eat' plus the active participle suffix **-nt*, therefore literally meaning 'that which eats'.^[7]

The irregular plural form *teeth* is the result of Germanic umlaut whereby vowels immediately preceding a high vocalic in the following syllable were raised. As the nominative plural ending of the Proto-Germanic consonant stems (to which **tanþs* belonged) was **-iz*, the root vowel in the plural form **tanþiz* (changed by this point to **t^{ai}z* via unrelated phonological processes) was raised to /e^{ai}/, and later unrounded to /eⁱ/, resulting in the *t^{ai}...^{ai}p/t^{ai}...^{ai}p* alternation attested from Old English. Cf. also Old English *b^{ai}...^{ai}c/b^{ai}...^{ai}œ* 'book/books' and *m^{ai}...^{ai}s/m^{ai}...^{ai}s* 'mouse/mice', from Proto-Germanic **b^{ai}...^{ai}ks/b^{ai}...^{ai}kiz* and **m^{ai}...^{ai}s/m^{ai}...^{ai}siz* respectively.

Cognate with Latin *d^{ai}...^{ai}œns*, Greek *ἰσχυρός* (*ischyros*), and Sanskrit *dāt*.

Origin

[edit]

Teeth are assumed to have evolved either from ectoderm denticles (scales, much like those on the skin of sharks) that folded and integrated into the mouth (called the "outside–in" theory), or from endoderm pharyngeal teeth (primarily formed in the pharynx of jawless vertebrates) (the "inside–out" theory). In addition, there is another theory stating that neural crest gene regulatory network, and neural crest-derived ectomesenchyme are the key to generate teeth (with any epithelium, either ectoderm or endoderm).[⁴][⁸]

The genes governing tooth development in mammals are homologous to those involved in the development of fish scales.[⁹] Study of a tooth plate of a fossil of the extinct fish *Romundina stellina* showed that the teeth and scales were made of the same tissues, also found in mammal teeth, lending support to the theory that teeth evolved as a modification of scales.[¹⁰]

Mammals

[edit]

Main article: Mammal tooth

Teeth are among the most distinctive (and long-lasting) features of mammal species. Paleontologists use teeth to identify fossil species and determine their relationships. The shape of the animal's teeth are related to its diet. For example, plant matter is hard to digest, so herbivores have many molars for chewing and grinding. Carnivores, on the other hand, have canine teeth to kill prey and to tear meat.

Mammals, in general, are diphyodont, meaning that they develop two sets of teeth. In humans, the first set (the "baby", "milk", "primary" or "deciduous" set) normally starts to appear at about six months of age, although some babies are born with one or more visible teeth, known as neonatal teeth. Normal tooth eruption at about six months is known as teething and can be painful. Kangaroos, elephants, and manatees are unusual among mammals because they are polyphyodonts.

Aardvark

[edit]

In aardvarks, teeth lack enamel and have many pulp tubules, hence the name of the order Tubulidentata.[¹¹]

Canines

[edit]

In dogs, the teeth are less likely than humans to form dental cavities because of the very high pH of dog saliva, which prevents enamel from demineralizing.^[12] Sometimes called cuspids, these teeth are shaped like points (cusps) and are used for tearing and grasping food.^[13]

Cetaceans

[edit]

Main article: Baleen

Like human teeth, whale teeth have polyp-like protrusions located on the root surface of the tooth. These polyps are made of cementum in both species, but in human teeth, the protrusions are located on the outside of the root, while in whales the nodule is located on the inside of the pulp chamber. While the roots of human teeth are made of cementum on the outer surface, whales have cementum on the entire surface of the tooth with a very small layer of enamel at the tip. This small enamel layer is only seen in older whales where the cementum has been worn away to show the underlying enamel.^[14]

The toothed whale is a parvorder of the cetaceans characterized by having teeth. The teeth differ considerably among the species. They may be numerous, with some dolphins bearing over 100 teeth in their jaws. On the other hand, the narwhals have a giant unicorn-like tusk, which is a tooth containing millions of sensory pathways and used for sensing during feeding, navigation, and mating. It is the most neurologically complex tooth known. Beaked whales are almost toothless, with only bizarre teeth found in males. These teeth may be used for feeding but also for demonstrating aggression and showmanship.

Primates

[edit]

Main articles: Human tooth and Dental anatomy

In humans (and most other primates), there are usually 20 primary (also "baby" or "milk") teeth, and later up to 32 permanent teeth. Four of these 32 may be third molars or wisdom teeth, although these are not present in all adults, and may be removed surgically later in life.[]

Among primary teeth, 10 of them are usually found in the maxilla (i.e. upper jaw) and the other 10 in the mandible (i.e. lower jaw). Among permanent teeth, 16 are found in the maxilla and the other 16 in the mandible. Most of the teeth have uniquely distinguishing features.

Horse

[edit]

Main article: Horse teeth

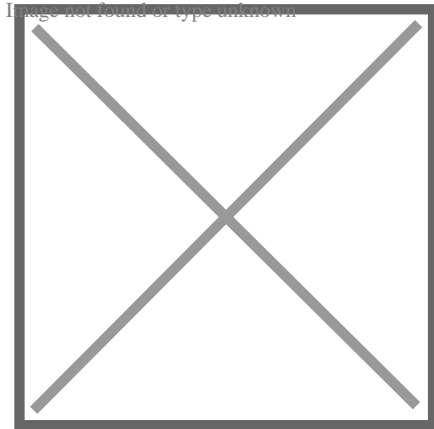
An adult horse has between 36 and 44 teeth. The enamel and dentin layers of horse teeth are intertwined.^[16] All horses have 12 premolars, 12 molars, and 12 incisors.^[17] Generally, all male equines also have four canine teeth (called tushes) between the molars and incisors. However, few female horses (less than 28%) have canines, and those that do usually have only one or two, which many times are only partially erupted.^[18] A few horses have one to four wolf teeth, which are vestigial premolars, with most of those having only one or two. They are equally common in male and female horses and much more likely to be on the upper jaw. If present these can cause problems as they can interfere with the horse's bit contact. Therefore, wolf teeth are commonly removed.^[17]

Horse teeth can be used to estimate the animal's age. Between birth and five years, age can be closely estimated by observing the eruption pattern on milk teeth and then permanent teeth. By age five, all permanent teeth have usually erupted. The horse is then said to have a "full" mouth. After the age of five, age can only be conjectured by studying the wear patterns on the incisors, shape, the angle at which the incisors meet, and other factors. The wear of teeth may also be affected by diet, natural abnormalities, and cribbing. Two horses of the same age may have different wear patterns.

A horse's incisors, premolars, and molars, once fully developed, continue to erupt as the grinding surface is worn down through chewing. A young adult horse will have teeth, which are 110–130 mm (4.5–5 inches) long, with the majority of the crown remaining below the gumline in the dental socket. The rest of the tooth will slowly emerge from the jaw, erupting about 3 mm (1⁄8 in) each year, as the horse ages. When the animal reaches old age, the crowns of the teeth are very short and the teeth are often lost altogether. Very old horses, if lacking molars, may need to have their fodder ground up and soaked in water to create a soft mush for them to eat in order to obtain adequate nutrition.

Proboscideans

[edit]



Section through the ivory tusk of a mammoth

Main article: Elephant ivory

Elephants' tusks are specialized incisors for digging food up and fighting. Some elephant teeth are similar to those in manatees, and elephants are believed to have undergone an aquatic phase in their evolution.

At birth, elephants have a total of 28 molar plate-like grinding teeth not including the tusks. These are organized into four sets of seven successively larger teeth which the elephant will slowly wear through during its lifetime of chewing rough plant material. Only four teeth are used for chewing at a given time, and as each tooth wears out, another tooth moves forward to take its place in a process similar to a conveyor belt. The last and largest of these teeth usually becomes exposed when the animal is around 40 years of age, and will often last for an additional 20 years. When the last of these teeth has fallen out, regardless of the elephant's age, the animal will no longer be able to chew food and will die of starvation.^[19]^[20]

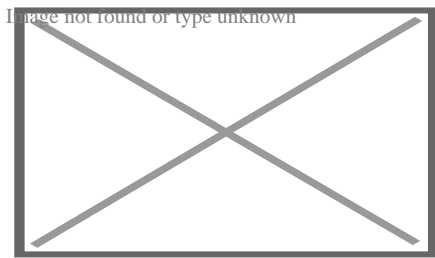
Rabbit

[edit]

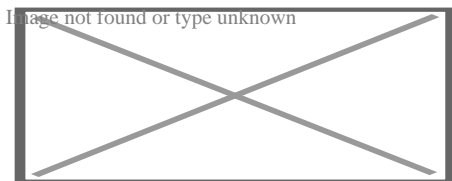
Rabbits and other lagomorphs usually shed their deciduous teeth before (or very shortly after) their birth, and are usually born with their permanent teeth.^[21] The teeth of rabbits complement their diet, which consists of a wide range of vegetation. Since many of the foods are abrasive enough to cause attrition, rabbit teeth grow continuously throughout life.^[22]

Rabbits have a total of six incisors, three upper premolars, three upper molars, two lower premolars, and two lower molars on each side. There are no canines. Dental formula is $\frac{2.0.3.3}{1.0.2.3} = 28$. Three to four millimeters of the tooth is worn away by incisors every week, whereas the cheek teeth require a month to wear away the same amount.^[23]

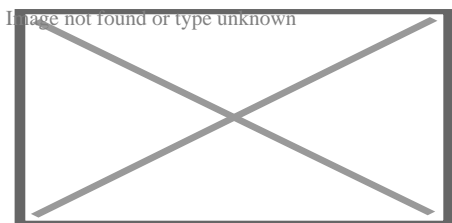
The incisors and cheek teeth of rabbits are called aradicular hypsodont teeth. This is sometimes referred to as an elodont dentition. These teeth grow or erupt continuously. The growth or eruption is held in balance by dental abrasion from chewing a diet high in fiber.



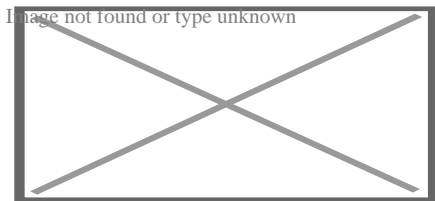
Buccal view of top incisor from *Rattus rattus*. Top incisor outlined in yellow. Molars circled in blue.



Buccal view of the lower incisor from the right dentary of a *Rattus rattus*



Lingual view of the lower incisor from the right dentary of a *Rattus rattus*

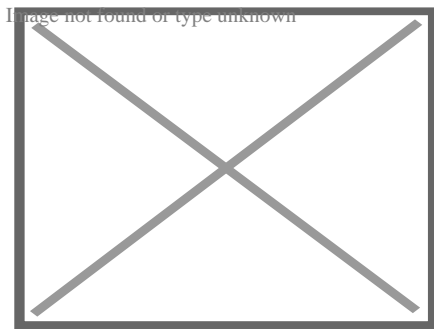


Midsagittal view of top incisor from *Rattus rattus*. Top incisor outlined in yellow. Molars circled in blue.

Rodents

[edit]

Rodents have upper and lower hypselodont incisors that can continuously grow enamel throughout its life without having properly formed roots.^[24] These teeth are also known as aradicular teeth, and unlike humans whose ameloblasts die after tooth development, rodents continually produce enamel, they must wear down their teeth by gnawing on various materials.^[25] Enamel and dentin are produced by the enamel organ, and growth is dependent on the presence of stem cells, cellular amplification, and cellular maturation structures in the odontogenic region.^[26] Rodent incisors are used for cutting wood, biting through the skin of fruit, or for defense. This allows for the rate of wear and tooth growth to be at equilibrium.^[24] The microstructure of rodent incisor enamel has shown to be useful in studying the phylogeny and systematics of rodents because of its independent evolution from the other dental traits. The enamel on rodent incisors are composed of two layers: the inner portio interna (PI) with Hunter-Schreger bands (HSB) and an outer portio externa (PE) with radial enamel (RE).^[27] It usually involves the differential regulation of the epithelial stem cell niche in the tooth of two rodent species, such as guinea pigs.^{[28][29]}



Lingual view of top incisor from *Rattus rattus*. Top incisor outlined in yellow. Molars circled in blue.

The teeth have enamel on the outside and exposed dentin on the inside, so they self-sharpen during gnawing. On the other hand, continually growing molars are found in some rodent species, such as the sibling vole and the guinea pig.^{[28][29]} There is variation in the dentition of the rodents, but generally, rodents lack canines and premolars, and have a space between their incisors and molars, called the diastema region.

Manatee

[edit]

Manatees are polyphyodont with mandibular molars developing separately from the jaw and are encased in a bony shell separated by soft tissue.^{[30][31]}

Walrus

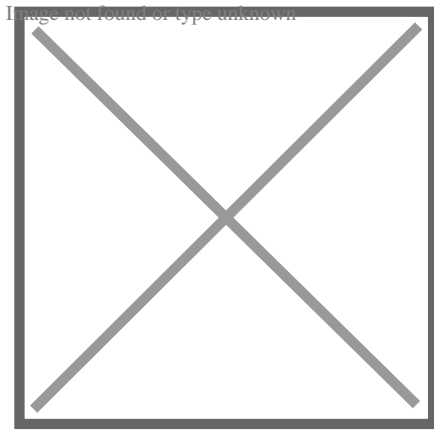
[edit]

Main article: Walrus ivory

Walrus tusks are canine teeth that grow continuously throughout life.^[32]

Fish

[edit]



Teeth of a great white shark

See also: Pharyngeal teeth and Shark tooth

Fish, such as sharks, may go through many teeth in their lifetime. The replacement of multiple teeth is known as polyphyodontia.

A class of prehistoric shark are called cladodonts for their strange forked teeth.

Unlike the continuous shedding of functional teeth seen in modern sharks,^[33]^[34] the majority of stem chondrichthyan lineages retained all tooth generations developed throughout the life of the animal.^[35] This replacement mechanism is exemplified by the tooth whorl-based dentitions of acanthodians,^[36] which include the oldest known toothed vertebrate, *Qianodus duplicis*^[37].

Amphibians

[edit]

All amphibians have pedicellate teeth, which are modified to be flexible due to connective tissue and uncalcified dentine that separates the crown from the base of the tooth.^[38]

Most amphibians exhibit teeth that have a slight attachment to the jaw or acrodont teeth. Acrodont teeth exhibit limited connection to the dentary and have little enervation.^[39] This is ideal for organisms who mostly use their teeth for grasping, but not for crushing and allows for rapid regeneration of teeth at a low energy cost. Teeth are usually lost in the course of feeding if the prey is struggling. Additionally, amphibians that undergo a metamorphosis develop bicuspid shaped teeth.^[40]

Reptiles

[edit]

The teeth of reptiles are replaced constantly throughout their lives. Crocodilian juveniles replace teeth with larger ones at a rate as high as one new tooth per socket every month. Once mature, tooth replacement rates can slow to two years and even longer. Overall, crocodilians may use 3,000 teeth from birth to death. New teeth are created within old teeth.^[41]

Birds

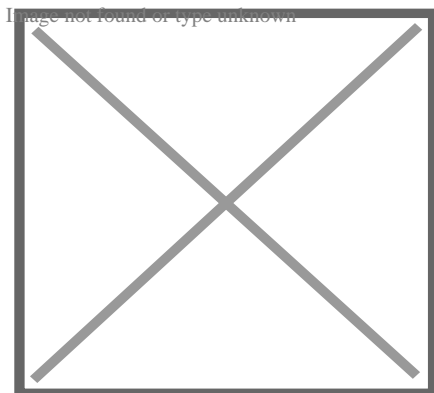
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Main article: Ichthyornis

A skull of Ichthyornis discovered in 2014 suggests that the beak of birds may have evolved from teeth to allow chicks to escape their shells earlier, and thus avoid predators and also to penetrate protective covers such as hard earth to access underlying food.^[42]^[43]

Invertebrates

[edit]

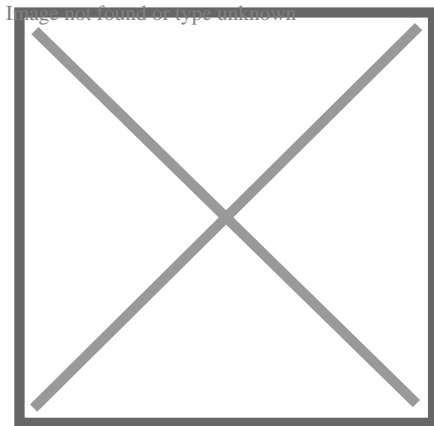


The European medicinal leech has three jaws with numerous sharp teeth which function like little saws for incising a host.

True teeth are unique to vertebrates,[⁴⁴] although many invertebrates have analogous structures often referred to as teeth. The organisms with the simplest genome bearing such tooth-like structures are perhaps the parasitic worms of the family Ancylostomatidae.[⁴⁵] For example, the hookworm *Necator americanus* has two dorsal and two ventral cutting plates or teeth around the anterior margin of the buccal capsule. It also has a pair of subdorsal and a pair of subventral teeth located close to the rear.[⁴⁶]

Historically, the European medicinal leech, another invertebrate parasite, has been used in medicine to remove blood from patients.[⁴⁷] They have three jaws (tripartite) that resemble saws in both appearance and function, and on them are about 100 sharp teeth used to incise the host. The incision leaves a mark that is an inverted Y inside of a circle. After piercing the skin and injecting anticoagulants (hirudin) and anaesthetics, they suck out blood, consuming up to ten times their body weight in a single meal.[⁴⁸]

In some species of Bryozoa, the first part of the stomach forms a muscular gizzard lined with chitinous teeth that crush armoured prey such as diatoms. Wave-like peristaltic contractions then move the food through the stomach for digestion.[⁴⁹]



The limpet rasps algae from rocks using teeth with the strongest known tensile strength of any biological material.

Molluscs have a structure called a radula, which bears a ribbon of chitinous teeth. However, these teeth are histologically and developmentally different from vertebrate teeth and are unlikely to be homologous. For example, vertebrate teeth develop from a neural crest mesenchyme-derived dental papilla, and the neural crest is specific to vertebrates, as are tissues such as enamel.[⁴⁴]

The radula is used by molluscs for feeding and is sometimes compared rather inaccurately to a tongue. It is a minutely toothed, chitinous ribbon, typically used for scraping or cutting food before the food enters the oesophagus. The radula is unique to molluscs, and is found in every class of mollusc apart from bivalves.

Within the gastropods, the radula is used in feeding by both herbivorous and carnivorous snails and slugs. The arrangement of teeth (also known as denticles) on the radula ribbon

varies considerably from one group to another as shown in the diagram on the left.

Predatory marine snails such as the Naticidae use the radula plus an acidic secretion to bore through the shell of other molluscs. Other predatory marine snails, such as the Conidae, use a specialized radula tooth as a poisoned harpoon. Predatory pulmonate land slugs, such as the ghost slug, use elongated razor-sharp teeth on the radula to seize and devour earthworms. Predatory cephalopods, such as squid, use the radula for cutting prey.

In most of the more ancient lineages of gastropods, the radula is used to graze by scraping diatoms and other microscopic algae off rock surfaces and other substrates. Limpets scrape algae from rocks using radula equipped with exceptionally hard rasping teeth.^[50] These teeth have the strongest known tensile strength of any biological material, outperforming spider silk.^[50] The mineral protein of the limpet teeth can withstand a tensile stress of 4.9 GPa, compared to 4 GPa of spider silk and 0.5 GPa of human teeth.^[51]

Fossilization and taphonomy

[edit]

Because teeth are very resistant, often preserved when bones are not,^[52] and reflect the diet of the host organism, they are very valuable to archaeologists and palaeontologists.^[53] Early fish such as the thelodonts had scales composed of dentine and an enamel-like compound, suggesting that the origin of teeth was from scales which were retained in the mouth. Fish as early as the late Cambrian had dentine in their exoskeletons, which may have functioned in defense or for sensing their environments.^[54] Dentine can be as hard as the rest of teeth and is composed of collagen fibres, reinforced with hydroxyapatite.^[54]

Though teeth are very resistant, they also can be brittle and highly susceptible to cracking.^[55] However, cracking of the tooth can be used as a diagnostic tool for predicting bite force. Additionally, enamel fractures can also give valuable insight into the diet and behaviour of archaeological and fossil samples.

Decalcification removes the enamel from teeth and leaves only the organic interior intact, which comprises dentine and cementine.^[56] Enamel is quickly decalcified in acids,^[57] perhaps by dissolution by plant acids or via diagenetic solutions, or in the stomachs of vertebrate predators.^[56] Enamel can be lost by abrasion or spalling,^[56] and is lost before dentine or bone are destroyed by the fossilisation process.^[57] In such a case, the 'skeleton' of the teeth would consist of the dentine, with a hollow pulp cavity.^[56] The organic part of dentine, conversely, is destroyed by alkalis.^[57]

See also

[edit]

- Animal tooth development
- Dragon's teeth (mythology)

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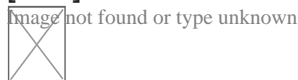
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