

welcome students i am vinita desa from carmel college of arts science and commerce for women the name of my module is visceral arches part 2. the outline of my module is adaptive modifications in the visceral skeleton of tetrapods skeletal derivatives of visceral arches in tetrapods the learning outcome the student will be able to understand the adaptive modifications in the visceral skeleton of tetrapods and the student will be able to explain the derivatives of visceral arches and amphibia reptilia aves and mammalia with pulmonary respiration and life on land the ancestral visceral skeleton so necessary in the gill-bearing vertebrates underwent profound adaptive modifications some of the previously functional parts got deleted and those that persisted perform new and surprisingly new functions not only have the changes in the visceral skeleton taken place in the evolution of tetrapods but they also occur during the ontogeny of every gill-bearing amphibian that undergoes complete metamorphosis for example the metamorphosis seen in larval frogs there are six pairs of visceral cartilages in larval frogs the last four third to the sixth support gills the visceral cartilages 5 and 6 regress and disappear the hypobranchial the hypobranchial together with the first branchial becomes incorporated into the body of the hyoid the scerato heil of arch 2 gets reduced into a slender anterior cornua and the cartilage of arch 4 becomes the posterior cornua later on certain changes take place in the visceral skeleton so that this visceral skeleton which was initially adapted for branchial respiration becomes converted in a span of few short days in 201 which is suitable for life on land the perennial branchial amphibians that is neotenis retain the branchial skeleton throughout life there are modifications seen in the visceral skeleton of tetrapods in amphibia reptilia aves and mammalia these are the four classes of tetrapods coming to amphibia the mandibular arch forms the jaws the posterior end of the palatoquadrate cartilage forms the quadrate bone and this quadrate bone forms a joint with the articular bone of the lower jaw the jaw suspension here is auto styling jaw suspension the upper jaw is completely fused by its own processes to the bony skull and the lower jaw is suspended from the upper jaw it has been claimed that the annulus tympanicus is a derivative of the terigo quadrate cartilage the hyomandibular bone becomes the columella of the middle ear it does not take part in jaw suspension instead it goes in the surface of the middle the remaining hyoid arch and the third and the fourth arches form the hyoid apparatus in the buccal and the pharyngeal floor which supports the tongue the fifth arch forms the arytenoid and the cricoid cartilages this is the hyoid apparatus of frog the main body of the hyoid the anterior cornua or the anterior horn and the posterior cornua of the posterior horn in reptiles it is similar to that of amphibians the quadrate forms a joint with articular bone of the lower jaw the quadrate bone is not fixed firmly so that it has two movable joints this kind of jaw suspension is called as streptostylic the meckel's cartilage is very much reduced in reptiles and around it five dermal bones are formed coming to the second visceral arch the higher mandibular becomes the columella of the middle ear and the remaining hyoid arch and the third and the fourth arches form the hyoid apparatus the fifth visceral arch forms the cartilages of the larynx and the trachea in aves the quadrate of the upper jaw forms a joint with the articular bone of the lower jaw the higher mandibular of the hyoid arch forms the columella and the steps of the middle ear the rest of the hyoid arch together with the first branchial arch that is the third visceral arch forms the hyoid apparatus this is the hyoid apparatus of the bird coming to mammals the splanchnocranium does not contribute to the adult jaws or to their suspension the entire upper jaw is incorporated into the brain case and the lower jaw that is the dentary bone is suspended from the dermal squamosal bone of the brain case the quadrate bone of the upper jaw becomes the incus of the middle ear the articular portion of the lower jaw projects into the middle ear cavity to become the malleus this is the articular bone which becomes the malleus and the higher mandibular becomes the stapes the higher mandibular becomes the steps so these are the three-year ossicles that's why we say that mammals hear through the jaw bones of their ancestors this is the structure these are the structures of the ear and you can see the middle ear portion this is the external ear the middle ear portion and the inner

inner ear portion in the middle ear we have the stapes the incus and malleus quadrate becomes incus articular becomes malleus and hyomandibular becomes stapes hence we say that these were the original jaw bones so we say that mammals hear through the jaw bones of their ancestors the major part of the hyoid arch forms the hyoid apparatus and the remaining visceral arches form the thyroid epiglottis reticoid and cricoid cartilages of the larynx and also the rings of the trachea this is the throat front view here is the visceral skeleton of man showing the three ear ossicles which were originally the jaw bones the quadrate becomes the incus the higher mandibular becomes the stapes and the articular becomes the malleus the major part of hyoid arch becomes the hyoid apparatus and the remaining visceral arches form the thyroid epi cricoid reticoid cartilages as well as they contribute to the tracheal rings this is the position of the hyoid bone in the neck region so you see it is in conclusion it is evident that the visceral skeleton is an ancient mechanism associated at an earlier stage with feeding and branchial respiration from fishes to mammals it is variously modified to serve the adaptive demands of the organism of at that moment first as a support to the gill slits later on as a source of jaws later on to support the tongue and finally in the mammals as part of the middle ear the branchial arches get remodeled to serve a particular function at that moment evolution thus we say that evolution proceeds by remodeling and not by new construction these are the references thank you