## l'm not a robot



## **Testes of a frog**

So you're digging into frog reproductive biology and wondering if frogs have testicles? If yes, this guide is for you. In this article, we'll delve deeper into the reproductive biology of frogs have testicles? Yes, frogs have testicles? Yes, frogs have testicles? Yes, frogs have testicles? If yes, this guide is for you. In this article, we'll delve deeper into the reproductive biology of frogs have testicles? responsible for sperm production, which male frogs release during mating to fertilize female eggs. Below, you'll discover full details about frog testicles structure and functions. We will also discuss if frogs can change their gender, whether frogs are hermaphrodites, how male and female reproductive systems differ, and more. Male frogs have two testicles that are usually located in ventral region of their kidneys, in the abdominal cavity. The testicles are responsible for producing sperm, making them a crucial part of the male frogs' reproductive system. The frogs' testicles are generally lobular-shaped. However, the shape is likely to vary among different species. For instance, Mexican leaf frog's testicles appear elongated and translucent most of the time but they appear thicker and milky in summer months. (Source). These coiled structures produce sperm cells through a process called spermatogenesis. The tubules feature specialized cells (spermatogonia) that divide and differentiate, forming sperm cells. These cells then undergo several developmental stages within these tubules—eventually maturing into fully developed sperm cells. These cells then undergo hormonal changes that trigger sperm production and reproductive behavior. When the frogs encounter receptive females, they clasp them in the amplexus mating position. They then go ahead and release sperm as the females release their eggs, thus fertilizing them externally. Interestingly, this study by the University of Western Australia scientists found that frog species living in wet environments feature bigger testicles than those in dry regions. Frogs are generally not hermaphrodites as they have separate sexes. It is uncommon to find a frog with both female and male reproductive organs. In all frog species, an individual can be either a male or a female. As we have just said above, male frogs feature testicles for sperm production. Females, on the other hand, have ovaries for eggs production. In simpler words, male and female reproductive systems feature completely different structures and functions. However, keep in mind that a study conducted on the effects of atrazine pesticide shows the capability of males becoming hermaphrodites—i.e., they develop both male (testes) and female (ovaries) sex organs. Biologists from University of California, Berkeley, conducted the study involving the African clawed frog. The aim was to uncover how hormonal effects of Atrazine, the most popular pesticide in the U.S., disrupt sexual development in amphibians. The results showed that tadpoles that were raised in atrazine-contaminated aquatic environments exhibited hermaphroditism. Adult males exposed to this pesticide also started exhibiting feminine characteristics. Yes, frogs are capable of changing their gender, whether in polluted water (as we've just discussed above) or in healthy frogs living in pristine conditions. This aspect of frogs changing from one gender to another is known as sex reversal and can be influenced by pollution, temperature, or weather. Sex reversal has been noted in different frogs, and African clawed frogs. The reason why frogs change their gender is still a mystery to scientists. Currently, only a few studies have been conducted on why frogs do so, with a focus on healthy environments. However, some speculations are that this may happen to ensure reproduction for survival. Here are the key differences between the frog and mammalian testis: Location: The testes in frogs are located near the kidneys within the abdominal cavity. In mammals, the testes occur in an external sac (scrotum) that hangs outside the body. Structure: The mammalian testes feature seminiferous tubules where sperm manufacturing occurs. Interstitial cells surround these tubules and help produce hormones like testosterone. Frog testes also feature these tubules but they are not surrounded by the interstitial cells. Sperm transportation: In mammalian testis, mature sperms are stored in epididymis, which are long and coiled tubes. During ejaculation, the sperms move from epididymis, through vas deferens and other structures. In frogs, mature sperms are stored in seminal vesicles until the mating season when they are released onto the female eggs. As we mentioned earlier, male and functions that set them apart. In this section, we will discuss how the two differ: Male frog reproductive system typically consists of paired testicles responsible for sperm production. Within the testicles lie the seminiferous tubules where sperm cells are manufactured. Sperms produced are usually temporarily stored in their abdominal cavity. The ovaries are tasked with producing eggs. The eggs during the mating period. Females also have cloaca that acts as the final passage for their eggs during the breeding season. If you're interested in learning more about the fascinating world of frogs, you might find our articles on frog croak and the reasons behind frogs screaming intriguing. Our article on the reasons behind frogs screaming explores the various factors that may trigger intense vocalizations in certain frog species. These articles provide valuable insights into the vocal communication and behaviors of frogs. Do all frogs have testicles? All male frogs have testicles, as they are a crucial part of their reproductive system and responsible for species. typically have two testicles, just like in many other animals. Can tree frogs generally cannot change gender? Tree frogs as well as those exposed to Atrazine pesticide may exhibit feminine characteristics. Conclusion Frogs bear a pair of testicles that are a crucial characteristics are a crucial characteristics. part of their reproductive system. The testicles are made up of seminiferous tubules where sperms are manufactured, and the seminal vesicle where sperms are manufactured, and the seminal vesicle where sperms are manufactured. While frogs do not generally exhibit hermaphroditism, some species exposed to pollution may exhibit feminine characteristics. In addition, many frog species have been observed to change their gender whether in polluted or in healthy conditions, a phenomenon that's still novel to scientists. Hopefully, you now have a clear picture of the male frog reproductive system structure and function. Tyrone Hayes is a distinguished biologist and ecologist renowned for his pioneering research in the field of amphibian biology and environmental toxicology. With over two decades of experience, he has illuminated the impacts of pesticides on amphibian biologist renowned for his pioneering research in the field of amphibian biology. ecological implications. Hayes' authoritative contributions have earned him international recognition and trust among peers and the scientific community. His unwavering dedication to advancing ecological understanding The Urogenital system or Urogenital system functionally, the excretory SystemReproductive system is concerned with producing progeny. In frogs, the reproductive organs are different in both sexes. Excretory System of Frog Frogs are ureotelic animals whose primary excretory product is Urea. The organs of excretion are common for both sexes. They are Paired KidneysUretersUrinary bladderCloaca Pic 1: Excretory system of Frog Both kidneys are reddish brown, elongated organs of almost semilunar shape enclosed in a fibrous capsule. They lie close to the dorsal wall on the right and left side of spinal column. Ventrally, they are covered with peritoneum. The outer border is smooth and inner border is smooth. Pic 2: Kidneys of frogImage source: i.pinimg.com The uriniferous tubules are the excretory units of kidneys and they originate on the posterior aspect of Malphigian corpuscles lie close to ventral surface than dorsal surface. The Malphigian corpuscle is composed of afferent arteriole, tuft of capillaries and efferent arteriole. The blood after getting filtered in the glomerulus reach the renal vein. The capillaries arising from the efferent arteriole supply the uriniferous tubules Pic 3: Light Microscopic view of kidney of FrogImage source: bszm.elte.hu Uriniferous tubules are the functional units of kidney. These tubules are divided as 4 parts. First part: After its origin, the tube widens and is lined with small ciliated cubical epithelium and it runs dorsally. This is known as the neck of tubuleSecond Part: The neck is followed by a very tortuous portion on the dorsal surface and is lined with ciliated columnar epithelium. It winds ventrally. Third Part: This corresponds to the wide limb of Henley's loop and it ascends dorsally and open into collecting duct. Pic 4: Diagrammatic representation of Uriniferous tubule of FrogImage Source: amazonaws.com Pic 5: Diagrammatic representation of excretory units of frog The collecting tubule takes a horizontal course and reach the dorsal surface of kidneys Ureters are a pair of tubes arising from the smooth outer surface of each kidneys by bifurcating branches which are in communication with the collecting ducts. On the upper two third, it lies dorsal and in the lower one third it winds to the outer aspect of kidney and continues dorsally and converge with the ureter of opposite side. aspect of cloaca through separate apertures. In male frogs, the part of ureters conduct sperms in the breeding season. Hence, they are called as urinogenital ducts or seminiferous duct. In females, the ureters are in close relation with the dilated oviducts and follow a course similar to that in male frogs. Fig 6: Male urogenital tractsource: brainkart.com Fig 7: Female urogenital tractsource: brainkart.com Fig cloaca and is guarded by a mucosal fold called sphincter to prevent the back flow. The bladder has an inner epithelial layer which rests on loose areolar tissue, middle smooth muscle layer. It stores urine before it is voided out through cloaca. The small sac like cloaca receives ureter, urinary bladder and rectum in the anterior part in male frogs. In females, in addition to the said apertures, a pair of oviduct opens in the posterior part. Cloaca opens to the excretory products and metabolic by products enter the kidney through via afferent arterioles in glomerulus which then drains into the portal veins of kidneys. The high renal blood pressure facilitates the glomerular filtrate contains plasma, urea, glucose and water and enters the uriniferous tubule through Bowman's capsule. The filtrate goes in to the renal vein via efferent arteriole. When the filtrate pass through the various segments of the uriniferous tubule through Bowman's capsule. tubule, selective reabsorption of substances like glucose and amino acids which are recycled as energy sources and protein synthesis and abundant water and chlorides to maintain the fluid balance. The remaining filtrate which is now concentrated with urea formed from amino acid metabolism and some salts and water pass through the ureter, stored in urinary bladder and is expelled via cloaca. Urea is an excretory product which is less toxic than ammonia and requires less water to get excreted. Therefore, the amphibians are ureotelic in nature i.e., the sexes are separate. The sex organs of male and female frogs are anatomically different Reproductive system of male frogs The reproductive system of male frogs consists of TestisVasa efferentiaUrogenital or Seminiferous duct They are located on the ventral aspect of the upper pole of kidneys and vary in shape and size based on species and season. It is spherical in its largest dimension and may be conical at times. The testis is a firm lobulated organ which presents as multiple convexities and the vessels and ducts enter and leave through the hilum of testis. Fig 8: Testis of frogImage Source: Slideplayer.com The testis is enclosed in a fibrous capsule that sends trabeculae within the organ and divides it as peritoneum which extends dorsally as the double layered mesorchium and is attached to the inner aspect of the posterior body wall. Multiple finger-like projections called the Fat bodies are attached on the ventral surface of the Testis which serve as energy house for development of sperms and in the cold winters when the frogs enter hibernation. Each testis has an outer fibrous covering which projects within the gland and divide it as lobules. Each lobule consist of numerous seminiferous tubules arise from an irregular sinus in the centre of the organ and runs to the periphery where they branch. The seminiferous tubules are lined by two types of cell. The cells in the periphery are large, round with distinct large nucleus and occur in groups while the spermatozoa are spindle shaped cells that appear to radiate from lumen to the periphery. Picture 9: Microscopic view of Frog Testis The connective tissues between the lobules contain blood vessels lymphatics and interstitial cells which secrete the androgen, Testosterone. It is a vital hormone which is responsible for sexual characteristics of male frogs like altering the contractile properties of the vocal muscles during the breeding season. The vasa efferentia are multiple tubules which arise from the hilum of testis. They run inwards in the mesorchium and run dorsally on reaching the kidney and lies between kidney and testes. Then its curves ventrally and lies on the inner surface and kidney and open into collecting duct via Bidders' canal while some of them end blindly in the mesorchium. The mature sperms enter the lumen of the vasa efferentia which then enters the ureter via Bidders canal. From ureter, it is stored in the Seminal vesical which is a sac like dilation on the upper part of ureter. In male frogs, the Ureter is a common conduit for both urine and mature sperms and both ureters open on the dorsal aspect of cloaca through separate apertures guarded by sphincters. Reproductive System of Female frogs The components of reproductive system in female frogs are Paired ovaries The oviducts The pair of ovaries are sac like structures which are divided to multiple lobules by thin walled septa. Similar to mesorchium of Testis in male frogs, each ovary is enclosed by a double layered peritoneal fold called the mesovarium which suspends it from the dorsal wall. They connected to oviduct and are not in communication with the Bidders canal. Hence, female frogs. Ovaries enlarge in size during the mating season. Image 10: Dissection of reproductive system of female frogSource: Springnature.com Both ovaries are enclosed in a layer of peritoneum lined with ciliated epithelium and a layer of connective tissue that extends inwards as the septa dividing the ovary. The egg cells or ova are attached on the inner aspect these septa. in the periphery of the organ. The connective tissue also contain blood vessels, lymphatics and nerves. Fig 11: Microscopic view of immature egg cells called ovarian follicle. Each ovarian follicle has a cell in the middle of the cluster which enlarges into the mature ovum while the remaining cells contribute to the formation of the follicular epithelium and are replaced by the vitelline membrane of the mature ovum. The cytoplasm. The eggs are round shaped with and animal pole and a vegetal pole. The upper portion of the eggs have a black pigments and is referred as the animal pole. It contains the nucleus which becomes the future embryo. It is surrounded by inner vitelline membrane and outer albumin coat. Fig 12: Unfertilized egg of frog In immature frogs, the oviducts are short tubes. In mature frogs, during the breeding season, they become highly convoluted tubes and covers the entire kidneys. The oviduct runs down towards cloaca and form a dilatation called ovisac. The ovisac opens into the cloaca through a narrow opening on a papillae placed in the cloaca. Both oviducts open through two separate, closely placed apertures guarded by mucosal fold on which birect the mature ovum into in to the ovisac where it is stored until fertilization. The middle layer is a thick glandular layer which contain Colloid granules which are capable of abundant water absorption and secretion of mucoid material to surround the egg before it reaches the cloaca. The outer layer is made of thin peritoneal membrane. In most of the frog species, fertilisation of egg occurs externally. During breeding season, the male frog makes the mating call and the female frog identifies it species and find the male partner. They take a common position called Amplexus in which the male frog lies on top of the female in such a way that the ovum released by the female in such a way that the ovum released by the female frog lies on top of the female frog lies on top of the female in such a way that the ovum released by the male. or wet environment. Fig 13: Amplexus position of frogImage source: wikipedia cc Fig 14: Frog eggs released for external fertilisation Image source: stackpathdns.com During a single mating, a female frog can release from thousands to tens of thousands to tens of thousands to tens of thousands to tens of thousands of eggs depending on the species. Male frog can release from thousands to tens of thousands of eggs depending on the species. Male frog can release from thousands to tens of tens the female frogs and female do not have a receiving organ for sperm deposition and fertilization. Thus a female frog cannot carry the embryos within its body. Hence the type of fertilization, there are many factors which results in the destruction of the eggs and embryos. Environmental conditions and predators are the important factors. To ensure the survival of the progeny and for the preservation of the species, laying abundant eggs is an evolutionary advantage of the frogs. References Tesler, P. (1999). "The amazing adaptable frog". Exploratorium:: The museum of science, art and human perception. The Anatomy of Frog - Alexander EckerA laboratory guide to Frog's Anatomy - Eli C.MinkoffThe Biology of Frog - Samuel J Holmes The scenario is a good illustration of the principle of overproduction in biological reproduction Amphibians like frogs possess fascinating and unique reproductive systems that are critical for their survival and evolutionary progress. We will look at the "What Reproductive Organs Does The Male Frog Bave That The Female Frog Does Not." We shall first discuss frog reproduce through external fertilization where, while laying eggs, the female has sperms released over them by the male. This process requires precise timing and specialized anatomical features to ensure successful fertilization occurs. Testes The testes are primary sex organs in male frogs. It is from here that sperm develops and this would be necessary if it is to succeed in its function of penetrating the female ovum's shell. The testes lie within the abdomen of a male frog while being connected to it by ducts linked with the cloaca. As opposed to mammals where they often hang outside, in frogs they reside inside reflecting very specific adaptations related to living close to water. Cloaca Both sexes have a cloaca, but its role differs between males and females. In males during reproduction, this organ serves as an outlet for sperm; also it acts as a place for passing out waste products from both digestive and urinary systems. In mating, however, a male climbs onto a female's back (known as cloacal vent directly onto eggs laid by her. Nuptial Pads Male frogs may develop some peculiar structures called nuptial pads- rough patches on the arms or thumbs' skin usually dark in coloration- that females lack. These features can help keep males attached during egg-laying when they mount on top of each other during copulation referred to as amplexus especially in aquatic habitats where staying power is crucial. Vocal Sacs The calls produced by males frogs are unique and distinctly different from females because they have vocal sacs. The sacs which are specialized expandable membranes located on the throat allow air to be pumped into them so that they can inflate thus producing sound. These calls serve to attract females and establish territory among competing males. Female frogs lack vocal sacs. emphasizing their role primarily in receiving and responding to the calls rather than producing them. Understanding the differences between male and female frog reproductive systems helps highlight the unique adaptations each sex has developed for successful reproductive. Testes you can be adapted as a set of the calls rather than produce adapt that mature in females. Cloaca Functions: The similarity is that both sexes use cloaca for exiting digestive, urinary and reproductive systems; however objective differs as males release sperm through it while in females it is an organ used for eqg-laying. Nuptial Pads: during copulation. Vocal Sacs: Males use vocal sacs when making mating calls towards attracting their mates or even driving away other male competitors. Females lack a voice sac at all times. Secondary Sexual Characteristics: In certain frog species, the males may display more vibrant hues or have a slightly dissimilar size from that of females during mating period. These features help the males to attract potential mates. In understanding frog reproductive organs as well as secondary sexual differentiation. The reproductive organs as well as secondary sexual differentiation. estrogen. Studies such as "Hormonal Control of Reproduction in Amphibians" give an overview of this intricate process. Moreover, genetic factors are crucial in determining sex in frogs. It is further explained how particular genes influence the formation of male and female reproductive systems in Frogs, while underscoring the importance of molecular and environmental factors through an article titled "Genetic and Developmental Basis for Sex Determination in Frogs." There is a range of interesting reproductive adaptations. Male frogs possess unique organs or structures such as testes vs cloaca or nuptial pads vs vocal sacs which are not present in females with each having an essential role in reproduction. Knowing about amphibian biology but also underscored on the need for their conservation. Whether you're a science teacher, biologist or just fascinated by amphibians knowing about complexities involved with frog reproduction will fuel research endeavours within this arena. Kay, the driving force behind Amphiguide.com, brings a unique blend of experienced webmaster and the creator of the popular blog. Kay's journey into the world of amphibians began with a profound interest in these remarkable creatures and their diverse habitats across the globe.