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Title: Dissection of the Platana and the Frog

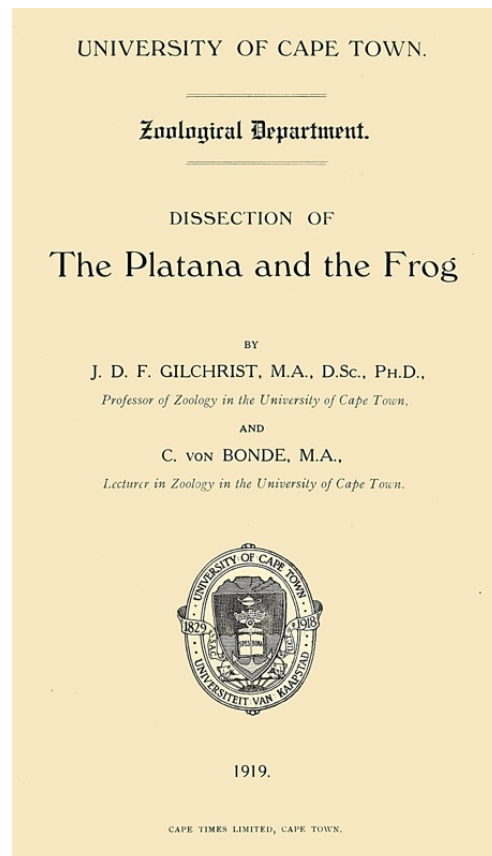
Author: Cecil von Bonde
Author: J. D. F. Gilchrist

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*** START OF THE PROJECT GUTENBERG EBOOK DISSECTION OF THE PLATANA AND THE
FROG ***



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UNIVERSITY OF CAPE TOWN.

Zoological Department.

DISSECTION OF The Platana and the Frog

BY

J. D. F. GILCHRIST, M.A., D.Sc., Ph.D.,
Professor of Zoology in the University of Cape Town,

AND

C. VON BONDE, M.A.,
Lecturer in Zoology in the University of Cape Town.



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PREFACE AND INSTRUCTIONS.

Owing to the fact that some of the types of animals available for the study of Zoology in South Africa differ from those described in text books for students in other countries, it has been found necessary to draw up special directions and diagrams for laboratory use in this country. These are now put in the more convenient form of a text book, which, though intended primarily for the use of the students of the University of Cape Town, may, it is hoped, prove useful to others engaged in the teaching and study of Zoology in South Africa.

The general plan of the course intended to be followed is first an introductory study of a type of vertebrate. The Platana or Clawed Toad, *Xenopus laevis*, is the most convenient type for this in South Africa and in some respects is more instructive than the Frog.

Xenopus is therefore chiefly dealt with, but *Rana* can also be used, the differences in this type being indicated in italics. It is recommended that both types be studied where possible.

Only these two types are dealt with here, but may be followed by descriptions of other South African types, such as the South African Crawfish, Dogfish, Earthworm, etc.

It is intended that the student should make drawings of his dissections on the blank page. He should not copy the diagrams, but draw what he actually sees, and be prepared to demonstrate the parts to the teacher.

The instruments required are a large and a small pair of scissors, a large and a small scalpel, moderately fine forceps, a seeker, and pins.

We are indebted to Mr. W. von Bonde, M.A., for the drawing of Figs. 3-5, 7-10.

J. D. F. G.
C. v. B.

*Zoological Laboratory,
University of Cape Town,
June, 1919.*

THE PLATANA (*Xenopus laevis*).

THE FROG (*Rana fuscigula*).

First Day.

External Characters.

1. Make a drawing of the animal viewed from above, showing:—

- (a) The nostrils.
- (b) The eyes.
- (c) The nictitating membrane and a short tentacle beneath the eye. [*The tentacle is absent in the Frog.*]
- (d) The tympanic membrane, which is not shown in the Platana, but is well marked in the Frog.
- (e) The opening of the cloaca.
- (f) The limbs and their divisions.
- (g) The skin with tube-like lines round the body. [*In the Frog these lines are not present.*]

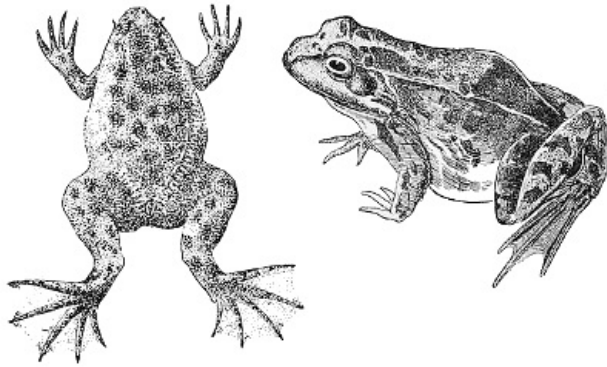


FIG. 1.—*Xenopus laevis* and *Rana fuscigula*.

2. Make an enlarged drawing, about twice the natural size, showing:—

- (a) The fore-limb with the digits.
- (b) The hind-limb with the digits. The inner three digits have claws. [*The claws are absent in the Frog.*]

Name the parts of these limbs, and number the digits from within outwards, noting that the first is absent in the fore-limb.

Mouth Cavity.

Open the mouth cavity widely, and make a sketch showing:—

- (a) The teeth on the upper jaw.
- (b) There are no teeth on the vomer. [*In the Frog each vomer is supplied with teeth.*]
- (c) The internal openings of the nostrils.
- (d) The single opening of the Eustachian tubes. [*In the Frog there is an opening on each side.*]
- (e) There is no tongue. [*A tongue is present in the Frog.*]
- (f) The glottis.
- (g) The gullet.

Owing to the complexity of the Eustachian tubes and the bony form of the ear cavity, it is not possible to pass a seeker from the Eustachian aperture through the tympanic membrane. [*In the Frog the Eustachian tubes are short and straight and permit of this being done.*]

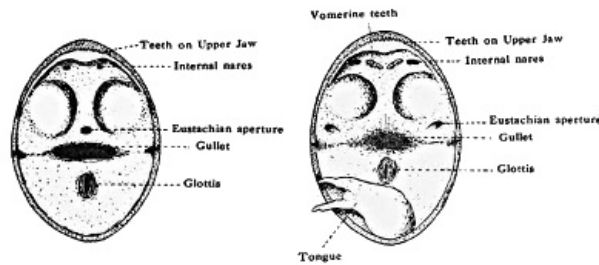


FIG. 2.—Mouth cavity of *Xenopus* and *Rana*.

Muscular System and Vascular System (*Part*).

1. Pin the *Platana* on its back in water, and cut through the skin with scissors along the middle line, throughout the whole length of the body. Pin back the skin on each side, and make a drawing showing:—

(a) The muscles:

(i) Two pectoralis muscles passing from the base of the arm, the one to the middle line of the body, and the other over the abdominal region to the posterior part of the body. Cut through this latter muscle at its anterior end, and fold it backwards to expose the underlying brachial vein.

(ii) The rectus-abdominis muscles passing along the mid-ventral line of the body, with the white line (*linea alba*) in the centre.

(iii) The deltoid muscle to the arm.

(iv) The mylo-hyoid muscle, on the underside of the mouth region.

(v) The obliquus-externus muscle, lying under the second pectoralis muscle noted above.

(b) The cutaneous and the muscular veins, lying under the pectoralis muscle, and arising independently from the subclavian vein. They supply the skin and muscles in the region of the arm. There is a second cutaneous vein arising from the abdominal vein and extending on to the skin of the abdomen. Two other small cutaneous veins are seen on the skin of the leg, and another on the skin under the mouth.

[*In the Frog a single musculo-cutaneous vein is seen lying under the pectoralis muscle and extends on to the skin.*]

(c) The abdominal vein, partly visible through the wall of the body, in the centre of the rectus-abdominis muscle.

(d) The brachial vein going to the arm, near which may often be seen the white brachial nerve. Endeavour to trace the point of origin of the brachial, muscular, and cutaneous veins (*or the brachial and musculo-cutaneous veins in the Frog*) as shown in the figures.

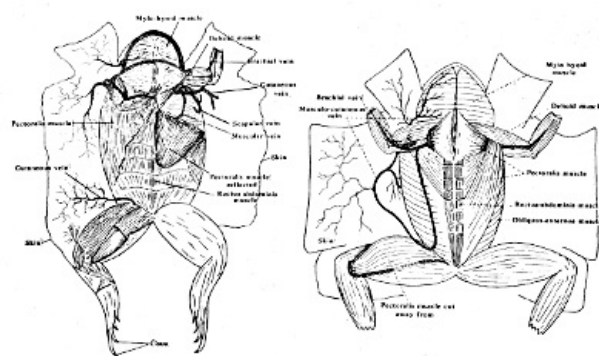


FIG. 3.—Muscular System and Vascular System (*part*) of *Xenopus* and *Rana*.

2. Make an incision in the body wall, slightly to the right side of the abdominal vein, which may now be seen clearly on the inner side of the body wall. Carefully detach this vein from the abdominal wall.

Second Day.

Skeletal System (Part).

1. Remove the pectoralis muscles covering the body between the arms to show the bones of the central part of the shoulder girdle and sternum, viz.:—

(a) The thick coracoids.

(b) The more slender clavicles anterior to them, both extending from the base of the arm on each side towards the centre of the body.

(c) The sternum, consisting of a median row of cartilages which are believed to be derived from the shoulder girdle. It does not, therefore, correspond to, or is not homologous with, the sternum of the Pigeon or the Rabbit, which is derived from the ribs. The sternum consists of the following parts:

(i) The two epicoracoids consisting of cartilage.

(ii) The metasternum which is broad and consists of cartilage only.

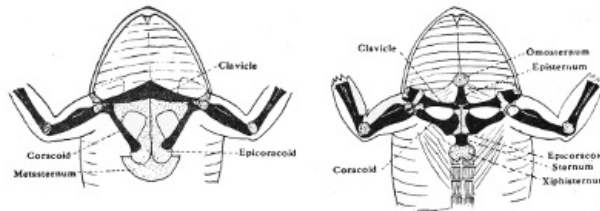


FIG. 4.—Pectoral Girdle of *Xenopus* and *Rana*.

[In the Frog the sternum is composed of the following parts:—

(i) The omosternum consisting of two parts, an anterior cartilaginous part (sometimes called the omosternum) and a posterior bony part (sometimes called the episternum).

(ii) The two epicoracoids consisting of cartilage.

(iii) The metasternum consisting of two parts, an anterior bony part (sometimes called the sternum) and a posterior cartilaginous part (sometimes called the xiphisternum).]

Make a sketch of the pectoral girdle.

2. Cut through the coracoids and clavicles on each side, close to the base of the arm, and carefully remove this part of the pectoral girdle and sternum so as to show the heart lying underneath.

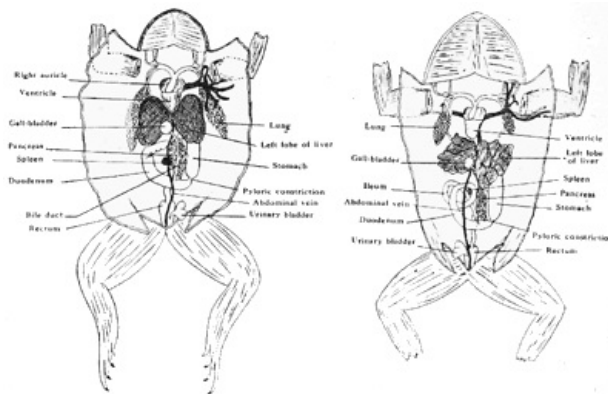


FIG. 5.—Dissection of *Xenopus* and *Rana* to show the Alimentary System, etc.

Alimentary System.

Make a sketch showing:—The heart, lungs, liver, gall bladder and bile duct going to the duodenum, exposed parts of the stomach, duodenum, small intestine (or ileum), large intestine, urinary bladder, pancreas, and spleen.

Third Day.

Vascular System (*continued*).

A. Venous System.

1. Note:—

(a) The heart lying in the thin pericardium, the two auricles, the single ventricle, the truncus arteriosus which divides into two branches.

Remove the pericardium from the heart, and tilt the apex of the heart forwards, noting the sinus venosus into which the right and the left superior venæ cavæ (or precavals) and the single inferior vena cava (or postcaval) open.

(b) The veins passing from each side of the sinus venosus. Each superior vena cava is joined by the following branches:—

(i) The external jugular vein from the region of the tongue and the mandible.

(ii) The internal jugular vein from the head and a thick subscapular vein from the shoulder. These veins join the superior vena cava independently of each other so that there is no innominate vein as in the Frog.

(iii) The subclavian vein, made up of a brachial vein from the arm, a cutaneous vein from the skin, and a muscular vein from the abdominal muscles. The cutaneous and the muscular veins are separate veins so that there is no single musculo-cutaneous vein.

[*In the Frog the superior vena cava is joined by the following branches:—*

(i) *The external jugular vein, formed by the union of a lingual vein from the tongue and a mandibular vein from the margin of the lower jaw.*

(ii) *The internal jugular vein from the head and the subscapular vein from the back of the arm and shoulder, both joining the superior vena cava by a common vein, the innominate.*

(iii) *The subclavian vein, formed by the brachial vein from the fore-limb and a musculo-cutaneous vein from the muscles of the body and from the skin.]*

(c) The hypoglossal and the glossopharyngeal nerves, both running alongside of the lingual artery.

Make an enlarged drawing showing the above parts (a) and (b).

2. Note the inferior vena cava, receiving the renal veins from the kidneys, the hepatic veins from the liver, and opening into the sinus venosus.

3. Trace back the abdominal vein, and note that it is formed by the union of the two pelvic veins, which pass along the bases of the legs. The pelvic veins occur deep down in the body under the posterior part of the pelvic girdle, which should be cut through in order to see them. At the union of the pelvic veins to form the abdominal vein a small rectal vein, passing along the ventral surface of the rectum, joins the abdominal vein.

In order to make out the femoral and the sciatic veins, turn the Platana over and remove the skin from the back of the leg. The femoral vein may then be seen lying on the surface of the leg, between two of the muscles. By carefully separating these muscles the whole of the femoral vein may be exposed. Deeper down in the muscles of the leg lies the sciatic vein, and, between the sciatic and the femoral veins, the internal iliac artery may be seen running alongside of the sciatic nerve.

Trace the femoral and the sciatic veins forward, and note that they join together at the point where they meet the pelvic veins and then run forward to the kidney as the renal portal vein on each side.

Turn the Platana over again on to its back and note the renal portal vein from the ventral side. Joining the renal portal vein is a large vein formed of two branches. The one branch arises in the abdominal wall, while the other passes along the base of the leg and joins the abdominal vein. On each side three dorso-lumbar veins join the renal portal vein.

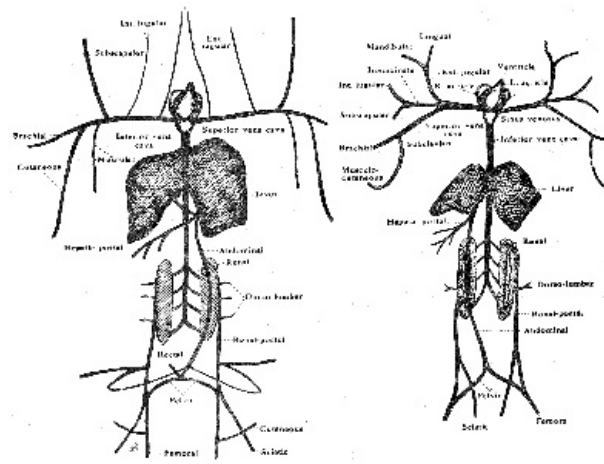


FIG. 6.—Venous System of Xenopus and Rana.

[In the Frog the abdominal vein is also formed by the union of the two pelvic veins. The pelvic veins, however, lie more superficially than in the Platana. The femoral vein which passes along the front of the thigh divides into two branches, the one branch forming the pelvic vein, the other, joined by the sciatic vein from the muscles and skin of the back of the thigh, forming the renal portal vein extending along the outer side of the kidney. The dorso-lumbar vein from the dorsal wall of the body joins the renal portal vein.]

Make a drawing showing the above parts.

B. Arterial System.

Distend the oesophagus with a piece of cotton wool or paper to show the blood vessels more clearly. Trace out the anterior part of the arterial system, made up of two branches of the truncus arteriosus each of which divides into:—

- (a) The carotid arch passing to the head region.
- (b) The systemic arch curving round the oesophagus.
- (c) The pulmo-cutaneous arch to the lungs and the skin.

Fourth day.

Arterial System (*continued*).

- Trace the carotid arch, which gives off:
 - Two lingual arteries having a common point of origin near the carotid gland.
 - A carotid artery passing to the head. At its origin it is slightly swollen into the carotid gland.
- Trace the systemic arches which run backwards on each side of the body, meeting posteriorly to form the dorsal aorta. Each systemic arch gives rise to an artery which branches into:—
 - A scapular artery to the pectoral girdle.
 - A cutaneous artery to the skin.
 - A brachial artery to the arm.

Trace the dorsal aorta backwards, and note that it gives rise to the coeliaco-mesenteric artery about midway between its origin and the origin of the first pair of renal arteries. The dorsal aorta then passes between the kidneys giving four renal arteries to each, and proceeds backwards and divides into an internal iliac artery to each leg. This artery lies between the femoral and the sciatic veins. From each of these arteries a branch is given off which divides into:

- An iliac artery to the muscles around the ilium.
 - A cutaneous artery to the skin of the body, just anterior to the leg.
 - A small artery to the anterior dorsal surface of the hind limb.
- Trace the pulmo-cutaneous arch, which gives off:—
 - A pulmonary artery, running along the outer side of the whole length of the lung.
 - A cutaneous artery, which at first runs forwards to the base of the arm, and becomes spread out on the skin of the back of the head.

[*In the Frog*

- The carotid arch gives off:—*
 - A lingual artery supplying the tongue.*
 - A carotid artery, running round the side of the oesophagus, and supplying the head. At its origin it is slightly swollen into the carotid gland.*
- The systemic arches run backwards on each side of the body, and meet posteriorly to form the dorsal aorta. Each systemic arch gives off:—*
 - A subclavian artery to the shoulder and fore-limb.*
 - An occipito-vertebral artery to the head and the vertebral column.*
 - An oesophageal artery to the dorsal wall of the oesophagus.*
 - A laryngeal artery to the larynx.*

At the point where the dorsal aorta is formed, note the origin of the coeliaco-mesenteric artery which sends branches to the stomach, liver, intestine, and spleen.

Trace the dorsal aorta backwards and note that it passes between the kidneys, to each of which it gives off four renal arteries and then it divides posteriorly into an iliac artery to each leg. The iliac artery is continued backwards as the femoral artery in the leg.

- The pulmo-cutaneous arch gives off:—*
 - A pulmonary artery, running along the outer side of the whole length of the lung.*
 - A cutaneous artery, which at first runs forwards and upwards, and then turns backwards, supplying the skin of the back and the sides of the head.]*

Make a complete sketch of the arterial system.

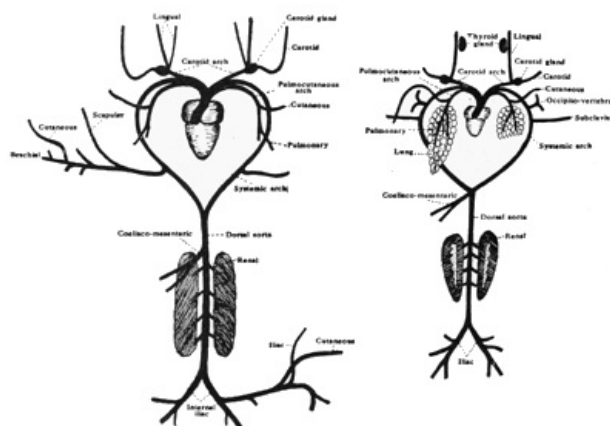


FIG. 7.—Arterial System of *Xenopus* and *Rana*.

Cut out the heart, leaving attached to it as much as possible of the large vessels.

Note the sinus venosus, truncus arteriosus, auricles, and ventricle.

Open the auricles and observe the division between them and the openings of the veins passing into them.

Make a section through the auricles and ventricle noting the thick muscular walls of the ventricle and the valves between it and the auricles.

Respiratory System and Alimentary System (*continued*).

1. Remove the mylo-hyoid muscles to expose the hyoid apparatus. Pass a seeker through the glottis to one of the lungs and slit it open with a pair of scissors. Examine the structure of the lung.

2. Remove the whole of the alimentary canal with the lungs, liver, pancreas, and spleen, by cutting through the oesophagus and the large intestine before it joins the cloaca, and detaching it from the roof of the body cavity without injuring the kidneys and the reproductive organs.

Draw the complete alimentary canal.

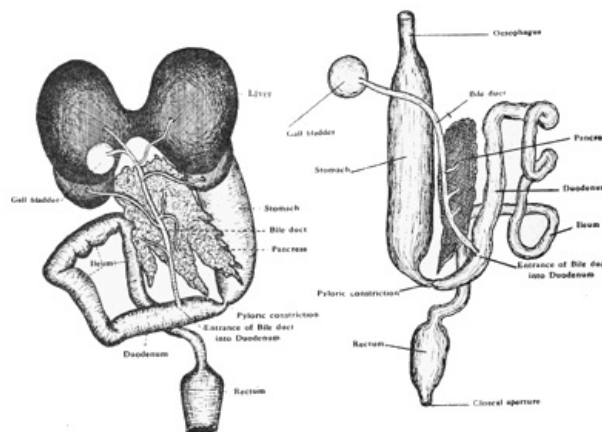


FIG. 8.—Alimentary Canal of *Xenopus* and *Rana*.

Urinogenital System.

Note the kidneys, two elongated, flattened, dark-red bodies lying one on each side of the vertebral column towards the posterior end of the abdominal cavity. From the outer edge of each kidney a ureter arises and runs backward, opening into the cloaca on the dorsal side, opposite the opening of the urinary bladder.

[*In the Frog the adrenal bodies may be seen on the ventral sides of the kidneys as small yellow patches.*]

In the male *Platana* note:—

(a) The testes, a pair of ovoid pale-yellow bodies attached to the dorsal wall of the body cavity by a fold of the peritoneum. They lie on the ventral sides of the kidneys and are connected to them by efferent vessels which pass into the kidneys.

(b) The corpora adiposa or fatty bodies lying in front of the kidneys.

(c) The ureters which run along the outside of the kidneys and unite posteriorly to form a single duct opening into the cloaca.

[*In the Frog the ureters do not join together but open separately into the cloaca. Each ureter has a slight swelling, the vesicula seminalis, on its outer side.*]

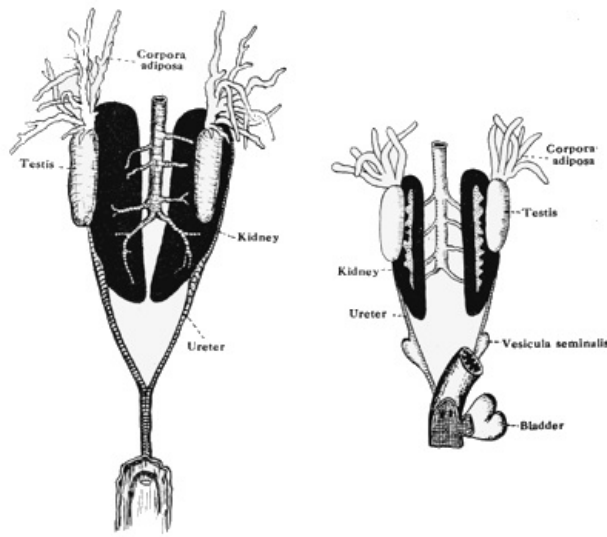


FIG. 9—Male Urinogenital System of Xenopus and Rana.

In the female Platana note:—

(a) The ovaries, a pair of irregularly-lobed organs usually consisting of a mass of rounded black and white bodies, the ova. The ovaries are attached to the dorsal wall of the body cavity by a fold of the peritoneum.

(b) The corpora adiposa lying in front of the kidneys.

(c) The long convoluted oviducts opening into the body cavity in front and into the cloaca behind.

The ureters open separately into the cloaca in the female.

Make a drawing of the urinogenital system.

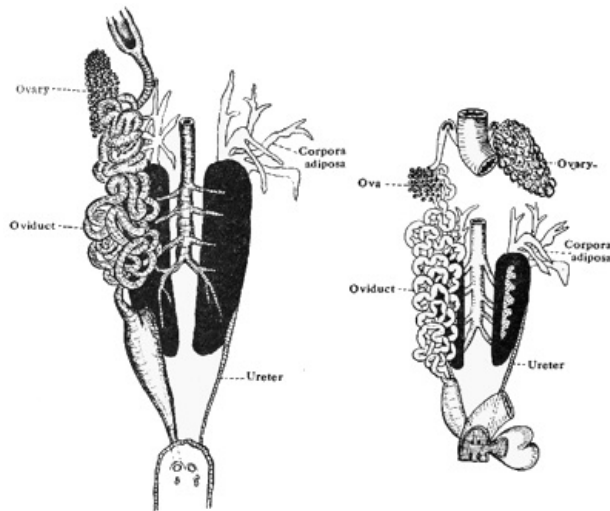


FIG. 10.—Female Urinogenital System of Xenopus and Rana.

Fifth Day.

Skeletal System (continued).

A. The Pectoral and Pelvic Girdles and Limbs.

1. Detach a fore-limb with the remaining parts of the pectoral girdle. Make a preparation showing these various parts:—

Supra-scapula, scapula, remainders of the clavicle and the coracoid, humerus, radio-ulna, carpal bones, and digits. Draw these parts.

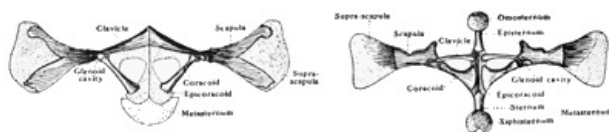


FIG. 11.—Pectoral Girdle of *Xenopus* and *Rana*.

2. Detach the pelvic girdle from the transverse processes of the 9th vertebra. Remove it with the hind-limbs from the body. Detach the femur from one side of the pelvic girdle, and make a sketch showing the following parts of the pelvic girdle:—Acetabulum, ilium, ischium, and pubis.

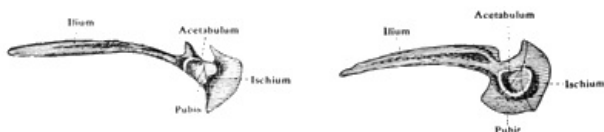


FIG. 12.—Pelvic Girdle of *Xenopus* and *Rana*.

Make a preparation and a sketch showing the femur, tibia-fibula, astragalus, calcaneum and the other bones of the tarsal region, five metatarsals, and digits. Number the digits from the inner side.

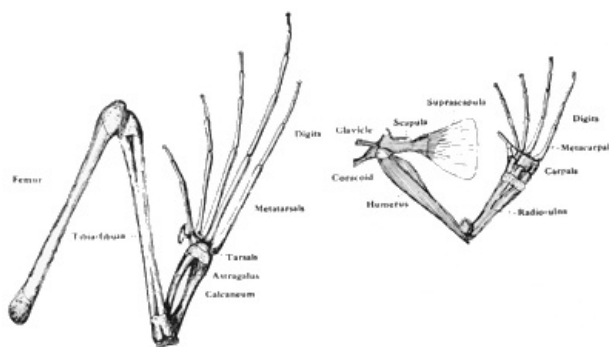


FIG. 13.—Hind and Fore Limbs of *Xenopus*.

B. The Vertebral Column.

1. Remove the skin and muscles from the dorsal surface of the back to show the nine vertebræ and the urostyle. Make a drawing showing the vertebræ with their transverse processes, and the urostyle attached to the posterior end of the 9th vertebra.

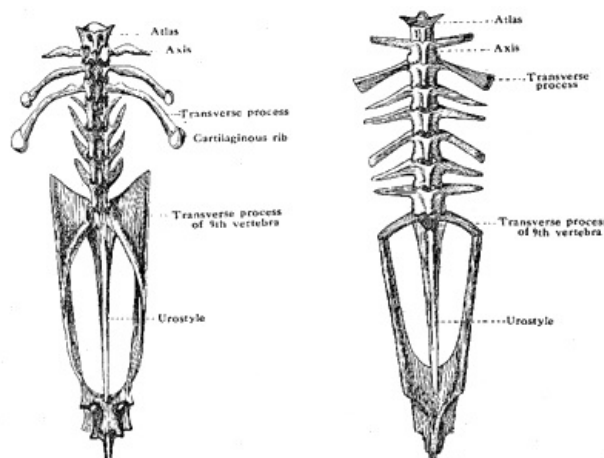


FIG. 14.—Vertebral Column of *Xenopus* and *Rana*.

The 2nd, 3rd and 4th vertebræ bear long transverse processes curved backwards, those of the 3rd and 4th being tipped with small cartilaginous ribs. The transverse processes of the 5th, 6th,

7th and 8th vertebræ are slender and project forwards and outwards. The 9th vertebra has long flat wing-like processes attached to which are the ilia of the pelvic girdle. The urostyle is fused to the 9th vertebra.

[In the Frog the transverse processes are produced outwards and they do not bear cartilaginous ribs. The urostyle is attached to the 9th vertebra by two facets.]

Note the intervertebral foramina for the exit of the nerves from the spinal cord, and the intervertebral discs.

2. Remove, examine, and draw the 1st or atlas vertebra, note its ring-like form, absence of transverse processes, the concave facets by which it articulates with the two occipital condyles of the skull.

3. Remove, examine, and draw the 3rd vertebra and note the opisthocœlous centrum, neural arch and neural spine, anterior and posterior zygapophyses, the transverse processes, and the cartilaginous ribs.

[The centrum is procœlous in the Frog and there are no ribs.]

4. Remove and examine the 8th vertebra and note that the centrum is opisthocœlous. Make a drawing of a section showing the centrum.

[In the Frog the centrum is amphicœlous.]

5. Remove and examine the 9th vertebra or sacrum, and note that the centrum is slightly convex on the anterior surface. The urostyle is fused to the posterior surface of the 9th vertebra. Note also the long flat wing-like transverse processes.

[In the Frog the centrum is also convex anteriorly and on the posterior surface there are two convex facets for the articulation of the urostyle.]

Sixth Day.

Skeletal System (*continued*).

C. The Skull.

1. Remove the skin and other tissues from the top of the skull and observe the large fronto-parietals, nasals, supra-ethmoid, premaxillæ, maxillæ, squamosals, exoccipitals, and pro-otics. The quadrato-jugals are very inconspicuous. The extrastapedial plate of cartilage is well marked and the bony columella may be seen lying underneath it. The sides of the skull are ossified and may represent the orbitosphenoids and alisphenoids of higher types. The supra-occipital consists of a piece of cartilage.

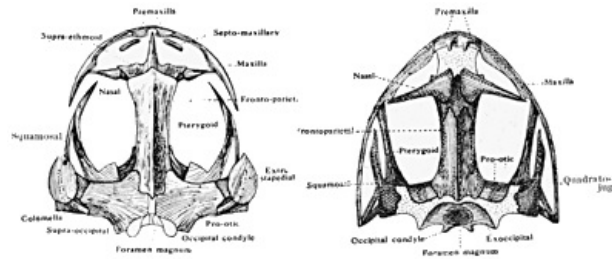


FIG. 15.—Dorsal view of Skull of *Xenopus* and *Rana*.

[*In the Frog there is no supra-ethmoid present, but a sphenethmoid closes the front of the cranial cavity. The sides of the skull are cartilaginous. A quadrato-jugal is well marked, but the quadrate consists of a piece of cartilage at the posterior end of the quadrato-jugal between the pterygoid and the squamosal. The lower jaw articulates with it. The columella is usually not well shown.*]

Make a drawing of the dorsal side of the skull.

2. Remove the skin from the roof of the mouth and note the parasphenoid and single vomer, pterygoids, which are large and send leaf-like processes towards the middle line covering the Eustachian passages, squamosals, quadrates, basi-occipital, ex-occipitals, premaxillæ, and maxillæ. The orbitosphenoid and alisphenoid are well marked. There are no palatines present.

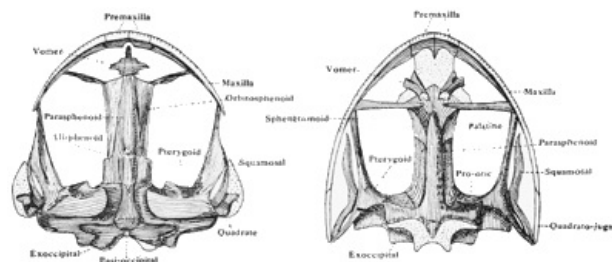


FIG. 16.—Ventral view of Skull of *Xenopus* and *Rana*.

[*In the Frog there are a pair of vomers bearing the vomerine teeth, palatines, and quadrato-jugals. The pro-otics, which are not seen in a ventral view of the skull in the Platana, being covered over by the pterygoids, are shown in the Frog.*]

Make a drawing of the ventral side of the skull.

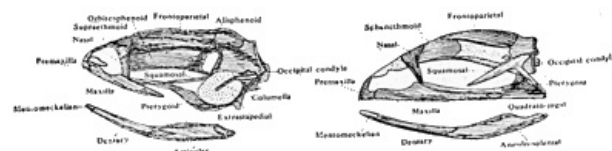


FIG. 17.—Side view of Skull of *Xenopus* and *Rana*.

3. Make a drawing of the bones of the skull viewed from the posterior end, showing the occipital condyle at each side of the foramen magnum, ex-occipitals, basi-occipital, supra-occipital, pro-otics, columella, and quadrate.

[*In the Frog the basi-occipital and supra-occipital are not developed.*]

4. Remove the skin from the lower jaw and make out the bones surrounding the original Meckel's cartilage, viz., the mento-meckelian, dentary, and articular.

[*In the Frog the lower jaw is composed of the mento-meckelian, dentary and angulo-splenial.*]

Make a drawing of the lower jaw.

Nervous System.

A. The Central Nervous System.

The Brain.

Carefully remove the fronto-parietals so as to expose the brain, and note the following parts:—

- (a) The olfactory lobes, forming the most anterior portion of the brain, united together in the middle line. Anteriorly the olfactory nerves are given off.
- (b) The cerebral hemispheres, a pair of smooth elongated bodies.
- (c) The thalamencephalon, lying immediately behind the cerebral hemispheres. It is covered by the choroid plexus, a thick vascular membrane, and gives rise dorsally to the stalk of the pineal body.
- (d) The optic lobes, a pair of oval bodies.
- (e) The cerebellum, a narrow transverse band immediately behind the optic lobes.
- (f) The medulla oblongata behind the cerebellum. It gradually tapers towards its posterior end, where it is continuous with the spinal cord. On its roof the pia mater forms a very vascular choroid plexus.

Make a sketch of the brain.

Seventh Day. (Revision.)

With a second specimen revise the second, third, and fourth days' work, paying particular attention to the vascular system.

Eighth Day.

Nervous System (*continued*).

B. The Peripheral Nervous System.

1. The Spinal Nerves.

Remove the abdominal viscera carefully so as to expose the spinal nerves which are seen as white cords on each side of the vertebral column as follows:—

(a) The first or hypoglossal nerve arising between the 1st and 2nd vertebræ. It runs forwards on the under surface of the head beneath the mylo-hyoid muscle and supplies the tongue. It was noted in the third day's work.

(b) The second and third nerves unite immediately after escaping from the spinal cord to form the brachial plexus, which supplies the muscles of the shoulder, and then extends along the arm.

(c) The fourth, fifth, and sixth nerves are small and supply the muscles and the skin of the body wall.

(d) The seventh, eighth, and ninth nerves run obliquely backwards, the eighth and ninth uniting to form the sciatic plexus, which gives rise to the large sciatic nerve which extends along the thigh, and down the leg. The sciatic plexus also receives a branch from the seventh nerve.

(e) The tenth or coccygeal nerve, which escapes through a small aperture in the side of the urostyle, and is distributed to the walls of the cloaca and urinary bladder. It is connected by a branch with the sciatic nerve. This nerve is frequently small or absent in the Platana.

[In the Frog, the seventh, eighth, and ninth nerves unite to form the sciatic plexus which gives rise to the large sciatic nerve extending along the thigh, and dividing above the knee into the tibial and peroneal nerves to the leg and the foot. The tenth nerve is present.]

2. The Sympathetic Nervous System.

This system consists of a cord on each side closely following the course of the systemic arches and the dorsal aorta. It has on it six ganglionic swellings, and there are connections between the ganglia and all the spinal nerves. Anteriorly each of the cords is joined to the vagus nerve; it ends posteriorly as a broad swelling on the ninth spinal nerve.

[In the Frog the system consists of a chain of ganglia on each side of the body closely following the course of the systemic arches and the dorsal aorta. The cords have connections with the spinal nerves. Anteriorly each cord ends in the Gasserian ganglion of the trigeminal nerve and posteriorly it is united with the coccygeal nerve by a varying number of branches.]

Make a complete sketch showing the spinal nerves and the sympathetic nervous system.

3. The Cranial Nerves.

Expose the brain and note the following cranial nerves:—

(a) The olfactory nerve, arising from the anterior end of the olfactory lobes, supplying the olfactory capsule.

(b) The optic nerve, arising from the ventral surface of the brain below the optic lobes, supplying the retina of the eye.

(c) The trigeminal nerve, arising just behind the optic nerve, giving rise to the following branches:—

(i) The ophthalmic nerve, which passes over the muscles of the eye and supplies the skin in the region of the olfactory capsule.

(ii) The maxillary nerve, which runs forward under the eyeball, and supplies the skin covering the upper jaw.

(iii) The mandibular nerve, which is at first continuous with the maxillary, and then bends round the inner surface of the upper jaw to extend along the outer surface of the mandible.

(d) The glossopharyngeal and the vagus (or pneumogastric) nerves, leaving the skull together, immediately behind the auditory capsule. The glossopharyngeal passes along in front of the hypoglossal nerve and proceeds along the base of the tongue. The vagus, after giving off branches to the dorsal muscles, reaches the walls of the pharynx and run obliquely backwards to supply the pharynx, heart, lungs and stomach.

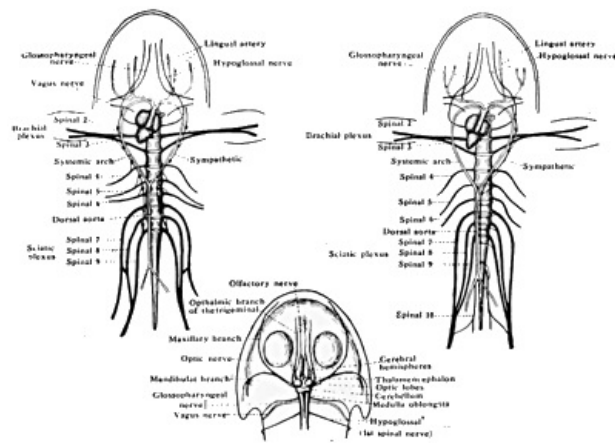


FIG. 18.—Brain, Cranial Nerves, Spinal Nerves, and Sympathetic Nervous System of *Xenopus* and *Rana*.

Make a complete sketch showing the brain and the above-mentioned cranial nerves.

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Every effort has been made to replicate this text as faithfully as possible, including inconsistencies in formatting. Both "exoccipitals" and "ex-occipitals" occur in original text, left as printed. Table of Contents not in original; added by transcriber.

*** END OF THE PROJECT GUTENBERG EBOOK DISSECTION OF THE PLATANA AND THE FROG ***

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