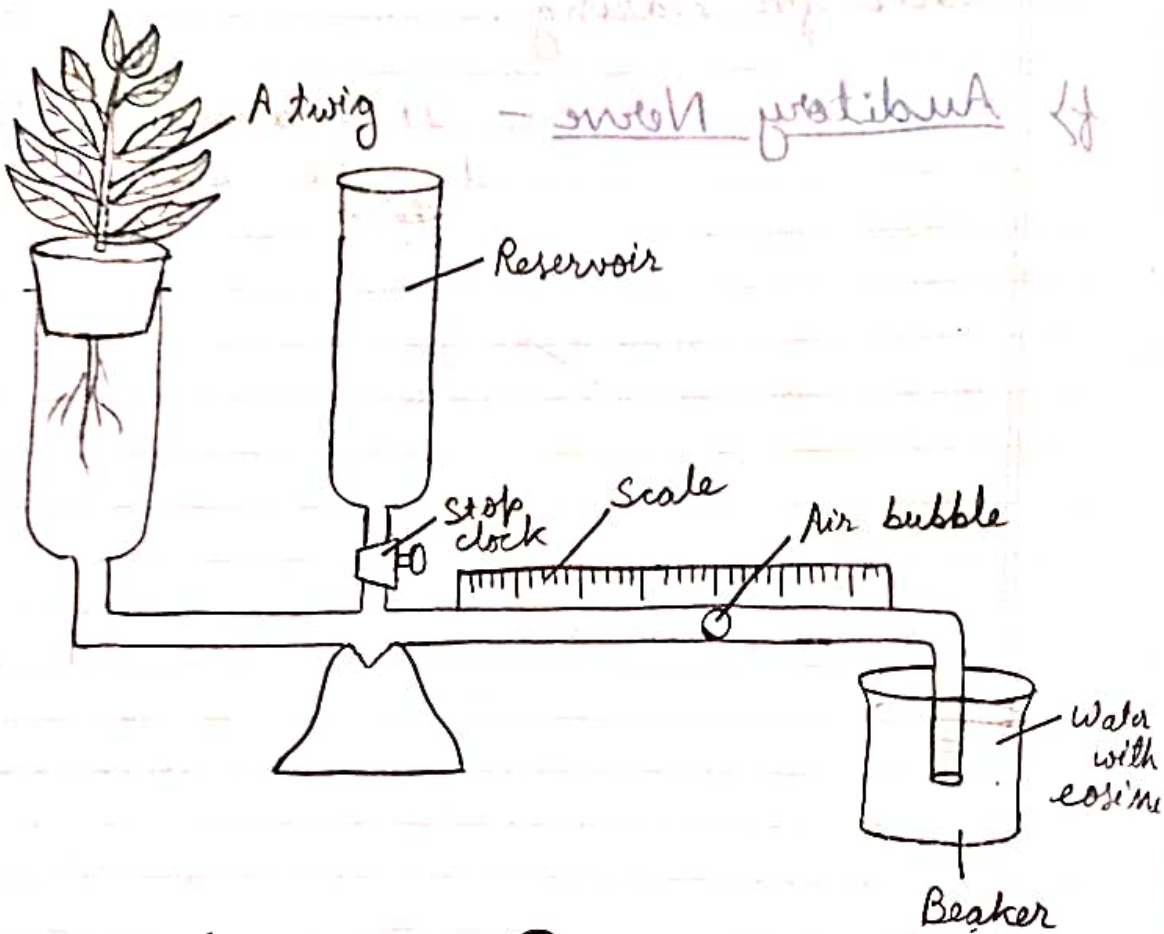


Expt. No. - 12
Date - 30/04/19



GANONG'S POTOMETER

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Expt. No. - 11
Date - 30/04/19

STUDY OF TRANSPIRATION BY GANONG'S POTOMETER

AIM :-

- a) To measure the rate of transpiration by Ganong's potometer and also explain its limitations.
- b) To compare the rate of transpiration from a leafy shoot in different environmental conditions.

MATERIALS REQUIRED - A leafy shoot, water, potometer, eosine dye, beaker, vaseline and a split cork.

PROCEDURE :

- A fresh leafy shoot is taken and is cut under water to prevent entry of air into the vessels of the cut stem.
- It is fixed in the upper wide tube of the Ganong's potometer filled with water using a split cork.
- The connections are made airtight by applying vaseline on the sides of the cork and the stem of shoot.
- Coloured water (eosin dissolved in water) is taken in a beaker and the lower end of the capillary tube is dipped in it. Being coloured, the movement of water through the narrow tube can be observed easily.
- Again the lower end of tube is dipped in the beaker.

- The movement of air bubble, and coloured water in the horizontal, narrow graduated tube the apparatus are observed.

- The rate of transpiration is compared by keeping the set-up in different environmental conditions, say in direct sunlight, in room or laboratory or under a fan.

OBSERVATIONS

- After some time, the air bubble moves in the horizontal tube towards shoot due to suction caused by transpiration taking place in the leaves of shoot.

- The rate of movement of air bubble indicates the rate of transpiration.

- Air bubble in Ganong's potometer moves fastest in direct sunlight than in room under a fan and it is slowest when kept in a room or laboratory.

- The readings are noted in each case.

INFERENCE

The rate of transpiration increases with temperature (sunlight) and is slowest in a room or laboratory with the still air.

PRECAUTIONS

1/ The leafy shoot should be freshly cut under water.

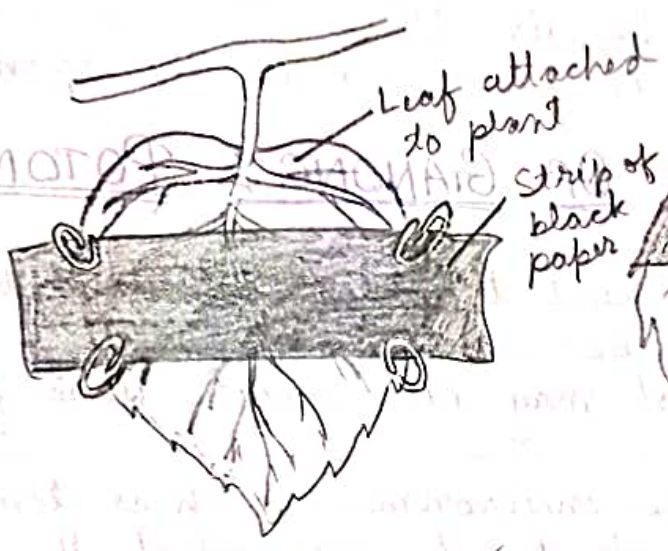
- 2) All the joints should be made airtight by applying vaseline.
- 3) The cut end of the leafy shoot is kept dipped in water while fitting the apparatus.
- 4) Water should be air free.
- 5) The experiment is performed in the open area.

LIMITATIONS OF GANONG'S POTOMETER

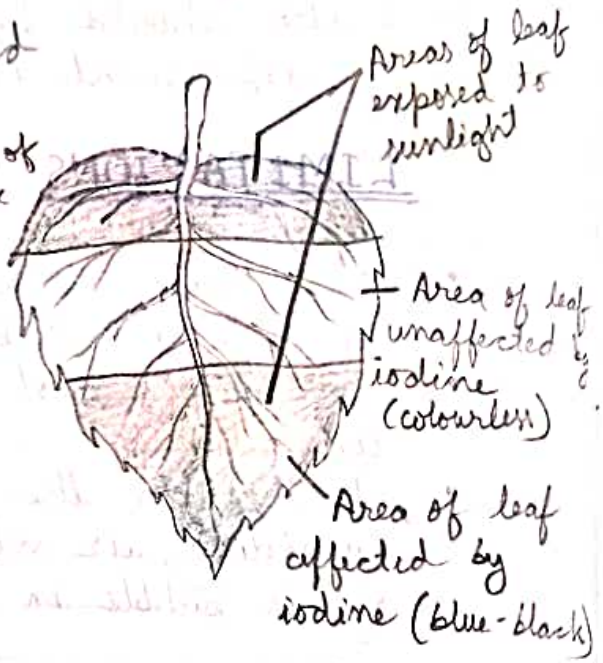
- It is quite difficult to introduce air bubble in the capillary tube.
- The leafy shoot may not remain alive for a long time.
- Changes in the environment, such as temperature, humidity, air velocity, etc may affect the position of air bubble in the capillary tube.

Expt. No. - 12
Date - 30/04/19

Start of experiment



End of experiment



Experimental set-up to show that light is necessary for photosynthesis

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Lab. No. - 12
Date - 30/04/19

STUDY OF STARCH IN LEAF [LIGHT IS NECESSARY]

AIM - To show that light ~~is~~ is necessary for photosynthesis.

MATERIALS REQUIRED - A potted plant with green leaves, strips of black paper, clips, iodine solution, a test tube, a beaker, methylated spirit and water.

PROCEDURE

- A potted plant is taken and its leaves are destarched by keeping it in dark for 48 hours.
- One of the leaves is tested by iodine test to ensure that it is destarched.
- Strips of black paper is taken and both the upper and lower surfaces of the leaf are covered. The strips are clipped tightly.
- The leaf is detached and black strips are removed. The presence of starch is now tested with iodine solution.

OBSERVATION

Only the part of the leaf that received light turns blue-black showing the presence of starch in it.

INFERENCE

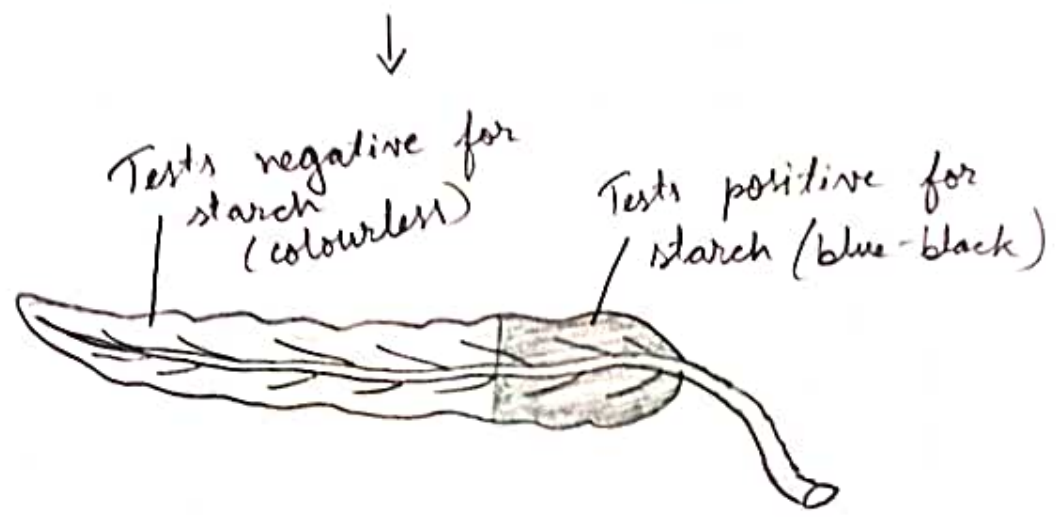
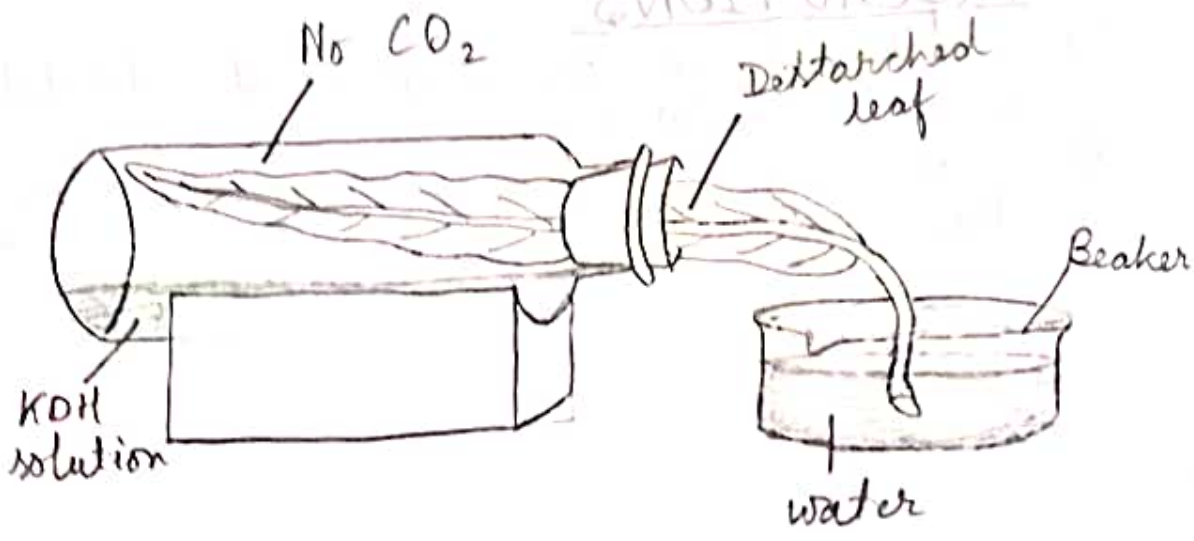
This shows that light is essential for photosynthesis.

PRECAUTIONS

- 1) Plant used in the experiment should be properly destarched.
- 2) Black paper should be fixed tightly on both the sides.

Expt. No. - 13
Date - 30/04/19

PRECAUTIONS



Moll's half-leaf experiment to show that CO_2 is necessary for photosynthesis

TEST FOR STARCH IN LEAF [CO_2 IS NECESSARY]

AIM - To show that carbon dioxide is necessary for photosynthesis.

MATERIALS REQUIRED - A green destarched plant, a wide-mouthed bottle, a split cork, caustic potash (KOH) solution, a clamp stand, iodine solution and water.

PROCEDURE :

- A potted plant is taken and its leaves are destarched by keeping it in dark for 48 hours.
- On one of its leaves iodine test is performed to ensure that the plant is destarched.
- One-half of a leaf is inserted through the split cork into the wide-mouthed bottle containing a little KOH solution.
- The leaf should be kept half inside the bottle and half outside the bottle.
- The connections are made air tight by applying vaseline.
- The set up is placed in the sunlight for 4-6 hours.
- The leaf is removed and iodine test for starch is performed with this leaf in usual manner.

OBSERVATIONS :

The part of leaf inside the wide-mouthed

bottle does not turn blue-black while the part of leaf that was outside shows positive starch test means it turns blue-black.

INFERENCE

This shows that carbon dioxide is necessary for photosynthesis.

EXPLANATION

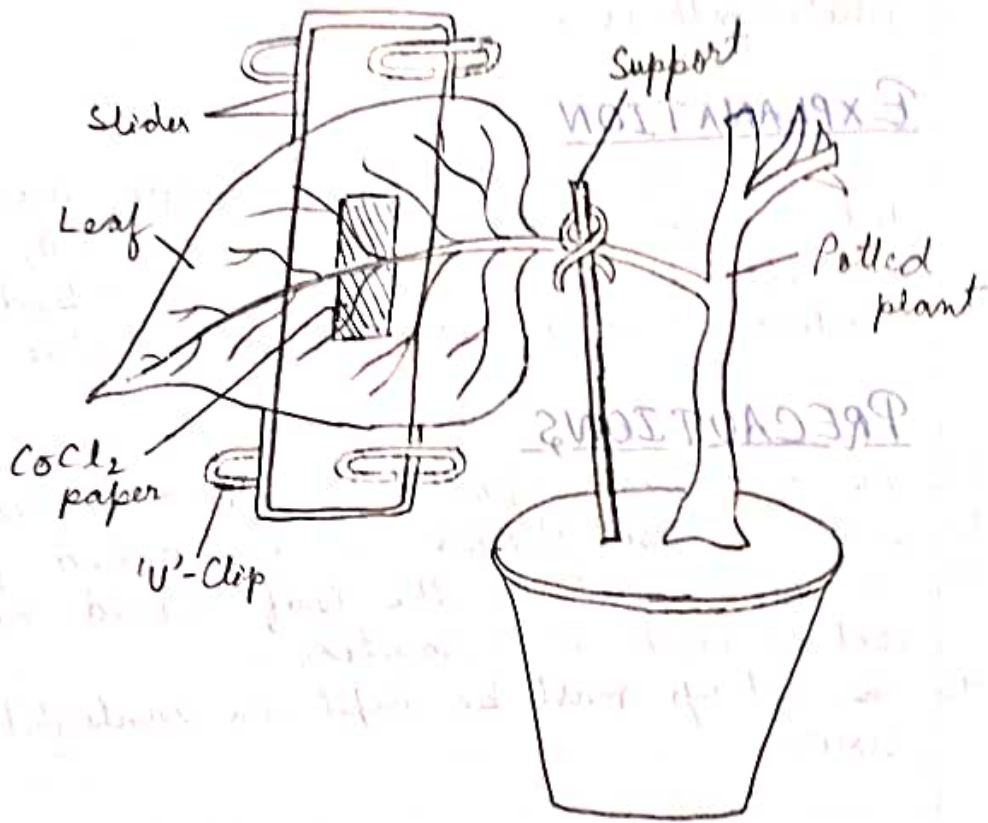
The part of leaf inside the wide-mouthed bottle did not form starch because no CO_2 was available to it (as CO_2 was absorbed by KOH solution). Thus, it does not turn blue-black.

PRECAUTIONS

- 1) The connections should be made airtight.
- 2) Leaf in use should be destarched properly.
- 3) The inner part of the leaf should not be in contact with KOH solution.
- 4) The set-up must be kept in sunlight for 4-6 hours.

Expt. No - 14
Date - 30/04/19

INFERENCE



Experiment to compare the rate of transpiration from the two surfaces of a leaf.

Expt. No. - 14
Date - 30/04/19

STUDY OF TRANSPIRATION [BY CoCl_2 PAPER]

AIM - To compare the rate of transpiration on the two surfaces of dorsiventral leaf using cobalt chloride paper.

MATERIALS REQUIRED - Potted plant, glass slides, rubber bands or clips, cotton, desiccator, vaseline, strips of filter paper and 5% cobalt chloride paper.

PROCEDURE :

- Small pieces of filter paper are taken and are dipped in 5% cobalt chloride solution.
- They are dried and are kept in a desiccator till needed. (Cobalt chloride paper is blue when dry and pink when moist).
- The upper and lower surfaces of a leaf are cleaned with dry cotton.
- Dry cobalt chloride paper strips are placed on both the upper and lower surfaces of the leaf and are covered immediately with glass slides. The glass slides are held in position with the help of clips or rubber bands.
- Vaseline is applied on the edges of glass slides.
- The time taken by the filter paper strips to change colour from blue to pink is noted.

OBSERVATIONS

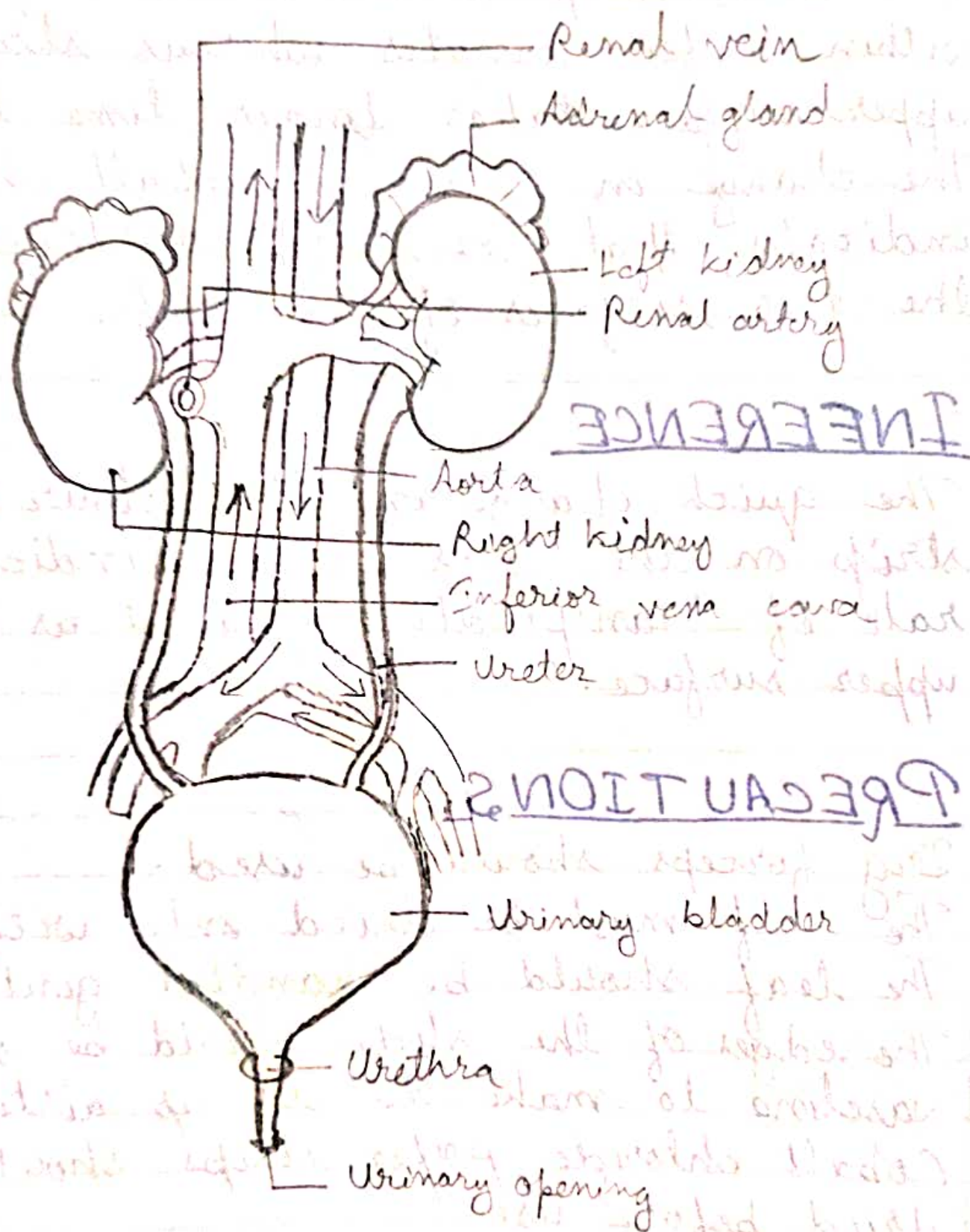
- The CoCl_2 strip on the lower surface turns pink within a few minutes whereas strip on the upper surface takes longer time to turn pink.
- The change in colour of cobalt chloride strip indicates that the strips have received water from the two surfaces of the leaf.

INFERENCE

The quick change in the colour of cobalt chloride strip on the lower surface indicates higher rate of transpiration from it as compared to the upper surface.

PRECAUTIONS

- 1) Dry forceps should be used.
- 2) The leaf must be dried only with dry cotton.
- 3) The leaf should be handled gently.
- 4) The edges of the slide should be sealed with vaseline to make the set-up airtight.
- 5) Cobalt chloride paper strips should be completely dried before use.



Excretory System of Human Beings

STUDY OF URINARY SYSTEM AND KIDNEY

AIM - To study the structure of urinary system

MATERIALS REQUIRED - Chart and model of kidney.

OBSERVATION :-

The urinary system consists of :-

- i) A pair of kidneys, for formation of urine.
- ii) A pair of ureters, for carrying urine from kidneys to urinary bladder. These are two thin, muscular tubes about 28 to 30 cm long. Each ureter arises from the notch of kidney at hilum. Its anterior part is funnel-shaped and is called pelvis or renal pelvis.
- iii) Urinary Bladder - It is a pear-shaped sac with muscular contractile wall. It lies in the pelvic region and stores urine till it is excreted. The neck of urinary bladder is surrounded by a sphincter. It closes the opening of urinary bladder until the time of urination.
- iv) Urethra - Urinary bladder opens outside through a thin-walled tube called urethra.

Pyramid in medulla

—: NOITAVRE

Cortex

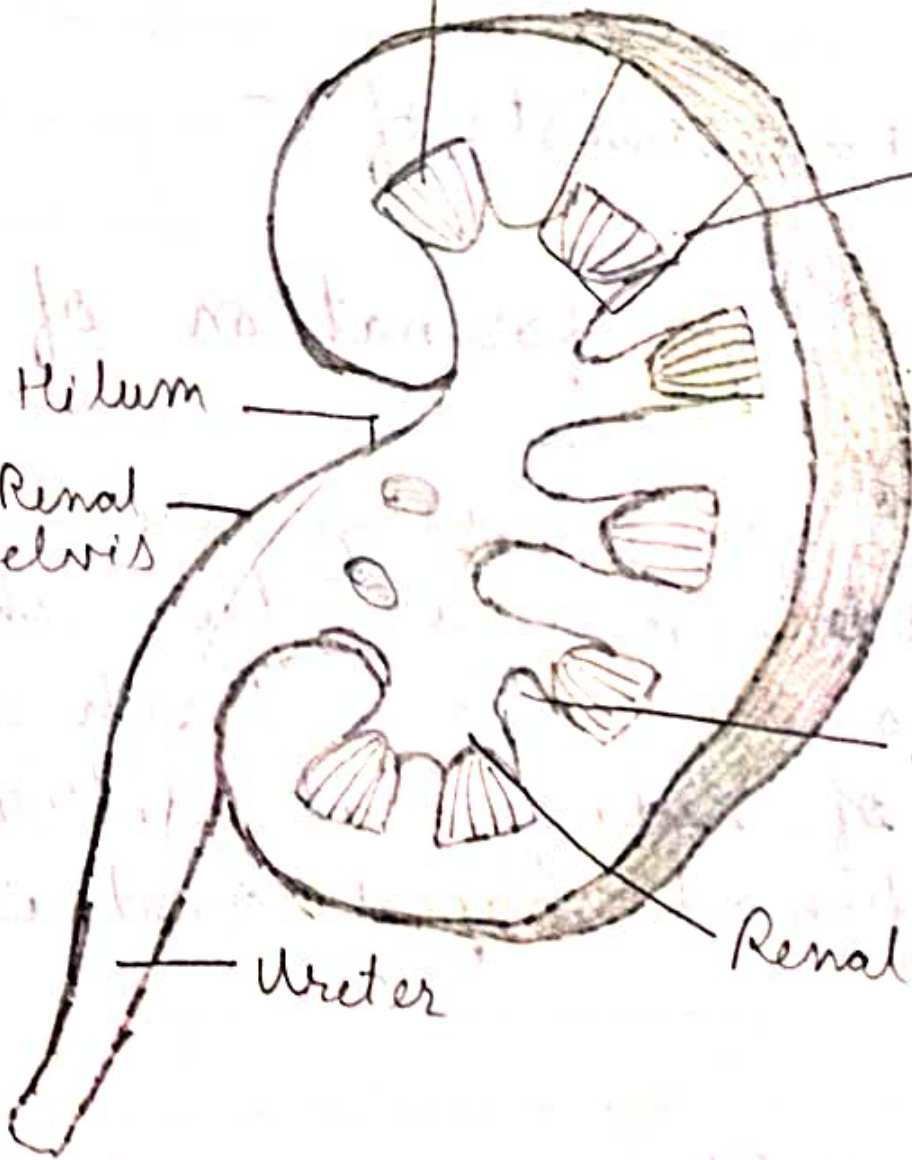
Hilum

Renal pelvis

Cortical column

Renal papilla

Ureter



Longitudinal section of kidney

KIDNEYS

Position - Kidneys are located in the abdominal cavity just beneath the diaphragm, one on either side of vertebral column. The left kidney is placed slightly higher than the right one because liver displaces the right kidney somewhat downward.

External Structure of Kidney - Kidneys are chocolate-brown, bean-shaped or reniform shaped structures. Each kidney is about 10cm long and 6cm broad. Each one is covered with a double fold of peritoneum. The inner margin of kidney is concave and has a notch, called hilum. It is the place from where ureter and renal vein come out of kidney and renal artery enters.

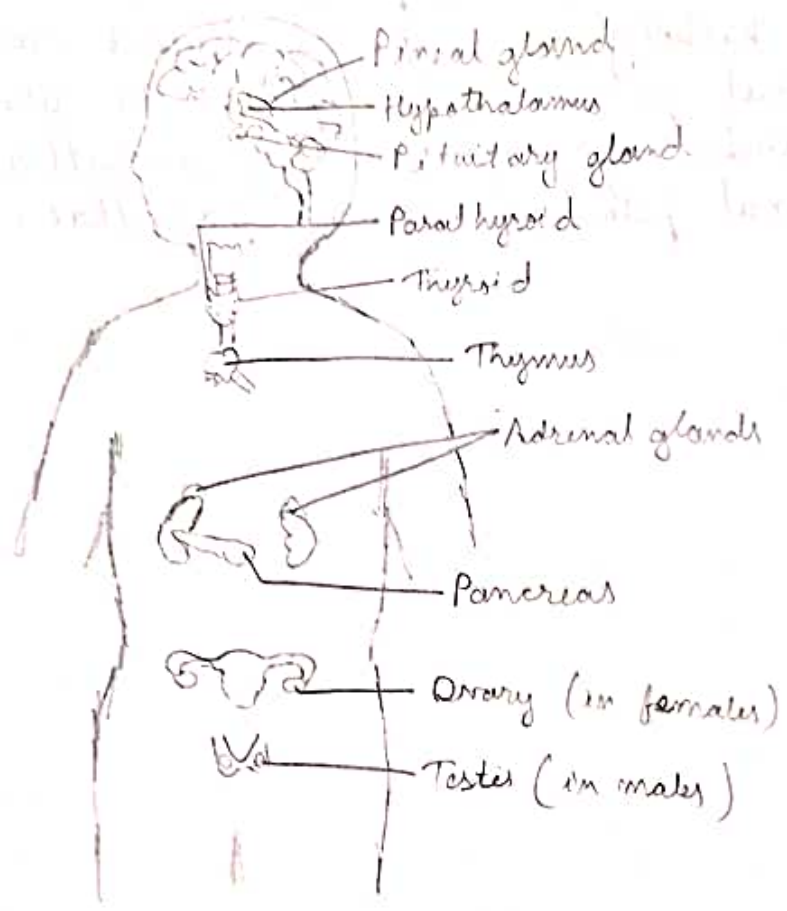
Internal Structure of Kidney - A kidney consists of two regions:- the cortex and the medulla

- i) Cortex - It is the outer dark region of kidney. It contains Bowman's capsule, and proximal and distal convoluted tubules of uriniferous tubules.
- ii) Medulla - It is inner lighter region of kidney. It is composed of Henle's loops of uriniferous tubules, and collecting ducts. They appear as fine strips. They are organised into several pyramids. The

apex of each pyramid projects into the pelvis.

iii) Pelvis or Renal pelvis - Towards the concave side of kidney is a funnel-shaped cavity called the renal pelvis, from where the ureters starts. A number of projections of medulla extend into renal pelvis as renal papillae.

Expt. No. - 16
Date - 30/04/19



Location of endocrine glands in humans

STUDY OF ENDOCRINE GLANDS [MODEL]

AIM - To identify and locate the endocrine glands.

MATERIALS REQUIRED - Model and charts of Adrenal glands, Pancreas, Thyroid gland and Pituitary gland.

OBSERVATION :-

- i) Pituitary Gland - It is a small rounded gland about the size of the pea seed. It is attached by a stalk to the hypothalamus. It is called the master gland because it regulates the functioning of almost all the other endocrine glands of the body. It comprises of :- Anterior lobe, Intermediate lobe and Posterior lobe. It secretes various hormones like STH, PRL, ACTH, etc.
- ii) PANCREAS - It is a heterocrine gland. It lies along the lower margin of stomach in the loop of duodenum. It is a light pink-coloured and leaf-like gland. Its exocrine part produces pancreatic juice which is carried by pancreatic duct into the duodenum. The endocrine part contains small groups of special endocrine cells, called islets of Langerhans. The islets of Langerhans have three

types of cells:-

- Alpha cells - glucagon hormone
- Beta cells - insulin hormone
- Delta cells - somatostatin hormone

iii) Thyroid Gland - It is a large bilobed gland located in the neck region at the base of larynx. It has two lobes - one on either side of the trachea. They are connected by a band of tissues called isthmus. Thyroid gland secretes - thyroxine and calcitonin hormones. Iodine is present in thyroxine.

iv) Adrenal Gland - A pair of adrenal gland is present in our body. They are located at the top of kidneys like a cap. Hence, they are also called supra-renal glands. Each gland consists of two parts:-

- An outer adrenal cortex
- An inner dark-red coloured adrenal medulla

Adrenal cortex secretes many hormones which are collectively called cortical hormones. These are of three types - Glucocorticoids, ~~And~~ Aldosterone, Adrenocorticoids.

Adrenal medulla secretes two hormones - adrenaline and nor-adrenaline

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27/11/19

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21/10/2019