ASSOCIATION OF BIOLOGY EDUCATORS

★A.B.E★

A PRESENTATION AT THE BIOLOGY TEACHERS' WORKSHOP ON BUILDING CAPACITY IN SETTING AND EXAMINING SKILLS AT KING'S COLLEGE BUDO

THEME:

HOW TO TEACH BIOLOGY PRACTICALS SO THAT THE LEARNERS CAN EXCELL

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CURRENT TRENDS OF SETTING OF DISSECTION

- Question should not demand too many answers or too few answer e.g. give two adaptations when they are only two
- It should be based on biology principals (real life)
- Use of simple terminologies /don't use ambiguous terminology.
- Set and do practical's that cover the entire syllabus
- Avoid unnecessary and destructing details e.g. S.1 cut open a flower or a female student Martha carried out and experiment
- There should be safe use of specimen e.g. don't not use the specimen that is going to irritate learners e.g. kamyu /smelly specimen

FUNCTIONAL WORDS USED

- EXCRETORY ORGANS- *Must be involved in formation of the wastes*
- e.g: kidney, lungs, skin (its external), Liver., malpighian tubules(cockroach)
- PASSAGE e.g gullet
- STORAGE e.g stomach, crop, gizzard, ileum duodenum
- DIGESTION (CHEMICAL OR PHYSICAL) e.g stomach, ileum, duodenum, mid gut
- REPRODUCTION e.g gonads like testis and ovaries, mushroom shaped gland
- SECRETION e.g some parts of the Alimentary anal, gonads, adrenal gland,
- REMOVAL/ELIMINATION OF UNWANTED MATERIALS e.g: kidneys, colon ,rectum etc
- VENTILATION –E.G diaphragm, trachea, intercostal muscles, rib cage, lungs

KEY WORDS USED IN SETTING

- Posterior to or anterior to
- Excluding –leaving out
- Exclusively- limited only to
- Blood circulation –both veins and arteries
- Promicity-near by
- Mesentery –connective tissue associated with parts of alimentary canal
- Trunk region –chest/thoracic and abdominal

- Situ/viscera-undisplaced/undisturbed state
- Carrying blood to/supplying- arteries
- Carrying blood from/draining-veins

ORGAN DISPLACEMENT (bounce marks)

- Liver – anteriorly -to expose the hepatic portal vein
- Alimentary canal to the left –to expose the veins draining the alimentary canal
- Alimentary canal to the right-to expose arteries supplying alimentary canal
- Stomach(rat) to the right- to expose structures previously covered e.g kidney
- Duodenal loop to the right- to expose original of bile duct
- Ileum to the left –to expose tributaries of hepatic portal vein
- Caecum down wards- to expose chain of lymph nodes
- Cut and remove the alimentary canal

CURRENT TRENDS IN MARKING

- Fairness in judging students work. Award students efforts. E.g bounce marks for displacement of organs
- Avoid double penalty e.g. N/A , IRR
- Proof of observation to perform a particular function (how to state adaptation)
- Some Questions may tie answers to different section
- Mark what the question is asking, not what the setter intended.

ACCURACY MARKS

- Number of organ
- Shape of organs/structures
- Size of organs
- Position of the organs within the animal's body
- Relationship with neighboring structures
- Length of the structure under study
- Major/main marks awarded,
- Not the following words like discard/cut out. e.g alimentary canal is cut and remove –don't display that part.
- Excluding a particular part- don't expose it in the drawing
- Cut and remove- to expose structures that were previously covered

Tittle marks are awarded according to the following

- Drawing showing
- Parts drawn in the specimen/
- Body of the question
- Any key instruction e.g
- Displacement of the part at the end

Drawing showing ……parts drawn……specimen K …..displaced part

INTERNAL STRUCTURES

TOAD AND A RAT

Blood vessels- Read them according to the network

Toad network 1 (CARRY BLOOD TO AND FROM HEAD &CHEST REGION)

Veins

Anterior venacava branching into vessels

To head,

Fore limbs, pulmonary vein (chest/thoracic)

Musculo-cutaneous-skin

Network 2

Posterior venacava

Organs

Liver, Gonads (ovaries and testis), Kidneys and Spleen

Network 3 -abdominal region

(Alimentary canal, spleen, pancreas and the liver)

Hepatic portal /coeliac .A

Alimentary canal and associated organs

Liver

Pancreas

Spleen –splenic vein/artery-common trap

Network 4- pelvic region and hind limb

Renal portal vein

Pelvic vein

Femoral and sciatic-hind limbs

PHYSIOLOGY –HIDDEN THEORY

STEPS

Table 1

Discover the unknown-make critical observations

Table 2

Investigate the physiological process

Confirm –if the process has occurred or not under a given experiment and conditions

Explanation depending on the results obtained

Discover the theory topic or sub topic

Aim of the investigation

QUESTION 3-Anatomy

Microscopy stained tissues using phloroglucinol and iodine

Stem

Root

• **Plant anatomy**

Inflorescence and floret

Stems of monocots and dicots

Fruits

Stems with modifications

Root system e.g.Tap root and fibrous and adventitious

ANIMAL ANATOMY

a) **Animal parts**

Insects, arachnids earth worms and millipedes

Taxonomy

Structures of small sized parts

b) Lower organisms

Spirogyra

Fungus

Lichens-leaf like type /foliated type

Mosses

Ferns –reproductive structures

c) Simple experiments on Mendel 1st law

Genetics principals. White beans=beakers and Black beakers
i)Mendel's 1st law- 40 black, 40 white 20BB, 40BW, 20WW
ii)Natural selection.
15black, WW-Increases, WB-Increases, BB-decreases
Speciation
iii)Extinction
5black, WB-Low, WW-increases, BB-decreases=0

d) Calculation of magnification like 2009 paper

Diameter of field of view (F.O.V)

FLOWERS/ FLORET AND INFLORESCENCE

INFLORESCENCE

a) KEY AREAS WHEN DESCRIBING INFLORESCENCE

- *Number of florets – which can be numerous/5/3/10 or of numerous of two types*
- *Floret stalked/ asessile or unstalked /sessile*
- *Attachment of floret -e.g. on the tip of the expanded peduncle or alternately attached along the peduncle*
- *Arrangement of the floret - circular pattern/closely packed/ alternately /whorly /oppositely*
- *Floret being unisexual or bisexual*
- *Grouping of the florets*
- *Presence of bracts*
- *Actinomorphic or zygomorphic florets*

b) Extra questions on arrangement of floret

- Advantages of arrangement of florets
- Disadvantages of arrangement of florets

c) Extra questions on attachment of florets Advantages of attachment of florets
Disadvantages of attachment of florets

d) d) Advantages of presence of bracts

FLORET/FLOWER

DESCRIPTION OF A FLORET/FLOWER

A) Stamens /androecium

- **Number of stamens-** numerous/8/5/9/10
- **Attachment of stamens**
- Staminal tube/filament tube
- Corolla tube/fused with the petals
- Free- if originating from the receptacle
- **Anthers** e.g. Bilobed, elongated/long, circular/spherical in shape
- **Filament** e.g. hairy, smooth, long or short, thin or thick, slender e.t.c

B) PISTIL /GYNOECIUM Number of carpels e.g. 1/2/3/5/4

- **Stigma** e.g. hairy, lobed , fused, sticky(using the finger tips),
- **Style** e.g. long, short, thin , slender, hairy
- **Ovary** e.g. superior or inferior, broad base, hairy,
- Shape ovary e.g. oval, round, elongated/long, ***Advantages to being pollinated basing on the stigma*** c) **Petals/corolla**

Large/broad, veined, thin or thick, smooth, hairy, fused or free d) **Sepals/calyx**

Free or fused veined, hairy, smooth, tapering e.t.c

Dichotomous key for flowers

- Basing on the gynoecium and androecium
- Basing on the order (starting with **A ending with F**)
- Basing on the non- essential parts

Microscopic observations

- **Pollen grains**
- **Cross section of the ovary**
- **Very Small florets from the inflorescence**

CHALLENGES OF P530/3

WEAKNESS OF CANDIDATES

- Poor drawing skills
- Failure to follow instructions
- Failure to dissect specimen.

- Failure to follow guidelines for making good biological drawings e g. Frames, label lines in ink etc.
- Spotting of the specimen by learners
- Practice from wrong sources
- Lack of practice in all the specimens
- Failure to use technical terms
- Failure to interpret questions
- Failure to use mathematical skills
- Inability to construct the dichotomous key.

ADVICE TO TEACHERS

- Ensure specimens are available for enough practice by rearing rats/rabbits Students should be discouraged from making drawings without dissection.
- Expose students to dissection early (S.5)
- Teachers should do practicals using different practical apparatus and data manipulation skills
- Train learners to make accurate measurements.
- Do practicals that cover the entire syllabus.
- Teachers should expose students to microscopy more often to make them more familiar with its usage.
- Emphasize observation and drawing skills especially from original specimens.
- Practice on dichotomous Key construction.

"Transforming Biology Education"