STANDARD OPERATING PROCEDURE:

Performing a chicken wing dissection

Note: To be undertaken only by trained personnel in conjunction with a current Safety Data Sheet (SDS) and site-specific risk assessment.

---

1. Introduction

Chicken wing dissections are conducted to explore the structure and function of muscles, bones and joints, which are comparable to that of a human arm, they have many of the same structures due to their shared evolutionary history as vertebrates.

Skeletal muscles are attached to bones, give shape to the body, generate heat, and make movement possible. Skeletal muscles cannot function without the bones of the skeletal system. Muscles pull on the bones in specific ways and with the guidance of ligaments allow joints to flex or extend in a specific direction. The skeletal system is a network of various living tissues, which provide protection for organs and give the human body its structure. It is also the site of blood formation.

Whole chicken wings suitable for dissection can be purchased fresh from most supermarkets and butchers or poultry suppliers that have passed relevant health inspections. The chicken wings can be obtained some weeks beforehand and stored in a freezer.

2. Context

- These instructions are for the use of experienced science teachers and technicians only and students under close supervision.
- When planning a class dissection activity, it is best to discuss beforehand the type of dissection to be undertaken, and warn of the possibility that there may be some blood and odours present during the dissection.
- Demonstrating the dissection to students before they begin is helpful, not only for correct procedure but allows them to adjust to the appearance of the material, and any blood that may be present after the dissection material has been washed.
- Let students know they don't have to participate in the dissection and can be excused from the class. Alternative arrangements can be made for students who don't wish to participate, by giving them worksheets to complete and relocating them to a private study area.

3. Safety notes

- A site-specific risk assessment should take into consideration the maturity of students carrying out the dissection and address risks associated with students using scalpels and other dissection equipment.
- Before the dissection it is recommended the teacher or laboratory technician trial the dissecting instruments (scalpels, scissors and pointed forceps) to establish that they are sufficiently sharp enough and to determine the most appropriate equipment for the task considering the student behaviour.

Fainting: signs and symptoms:

- Fainting may occur during this type of activity. Please read the first aid information in section 7 before conducting the dissection.
- Fainting is caused by a sudden drop in blood pressure. Common causes include heat, pain or distress and the sight of blood.
- The possible symptoms include the following.
    - 'Dizziness
    - Light-headedness
    - A pale face
    - Perspiration
    - Heightened anxiety and restlessness
    - Nausea
    - Collapse
    - Unconsciousness, for a few seconds
    - Full recovery after a few minutes'[i]

Handling specimens:

- If using frozen chicken wings defrost overnight in a refrigerator and use within 24 hours. Consistent with safe food handling procedures, all meat products should be stored below 5°C prior to dissections.
- Good hygiene practices should be observed at all times: Keep hands away from the mouth, nose, eyes and face during and after dissection and wash hands immediately after handling dissection material.

Safety with scalpels and dissecting instruments:

- Store all dissecting instruments securely.
- Care should be taken with sharps such as scalpel blades and scissors. Some school science departments restrict the use of scalpels unless specifically requested by a teacher, and prefer to only issue scissors, probes and forceps to students for dissections.
- Ensure students demonstrate responsible behaviour while using scalpels and other dissecting instruments.
- Scalpels should be provided in and returned to a lined container, blade end down
- Students should not walk around the lab with the dissecting instruments, in particular with a scalpel or pointed scissors, forceps or probes.
- To reduce the possibility of stab wounds or cuts from slippage always point sharp instruments such as scalpels and scissors away from yourself and others.
- Hold the instruments so that any sharp points or exposed sharp edges point down onto the dissection board or tray. If there is any slippage when using the instrument, the point/exposed edge will be absorbed by the board/foam or wax tray.

Scalpel blades:

- Only staff should carefully attach and remove scalpel blades using pliers, forceps or a commercial blade remover.
- The scalpel blade size and handle must be compatible e.g. number 4 handle and number 23 blades.
- Keep the blade in the foil wrapper and attach to the handle with the sharp side of the blade pointing away from the body.
- An alternative is to use disposable scalpels.

4. Regulations, licences and permits

Offal and animal body parts that have passed a health inspection by a meat inspector or obtained from a butcher's shop, abattoir or biological supplier is suitable for dissection. In some jurisdictions, all dissections need to be reported to the school animal ethics committee.

5. Equipment

- PPE – lab coat/apron (it is recommended to use plastic disposable aprons), safety glasses and gloves)
- Scalpels (optional subject to a site specific risk assessment)
- Scissors, forceps, probes
- Dissecting boards covered in newspaper or disposable foam tray
- Newspaper to protect bench and for wrapping biological materials after dissection
- Paper towel
- Disinfectant – hospital grade general-purpose disinfectant (the label on the front of the pack must state 'hospital grade', which is a general purpose hard surface disinfectant which will kill micro-organisms).
- 70% v/v ethanol

6. Operating procedure

Preparation

- If any blood is associated with the chicken wings rinse them in cold running water.
- Prepare disinfectant solution according to manufacturer's instructions. Place disinfectant in a container ready for instruments to be placed at the end of the dissection.
- Ensure students have appropriate PPE.
- Distribute the instruments to students. Scalpels, scissors, forceps and probes should be counted out, and counted in when returned.

(Operating procedure cont.)

Examining and dissecting the chicken wing:

1. Place the chicken wing on the dissecting board or tray. Study the external appearance and structure of the wing. Feel the skin that is covering the bones and look for places where the feathers were attached.
2. Identify the upper wing, the lower wing, and the wing tip. See Figure 1.
3. Feel for the bones through the flesh, the upper wing consists of one long bone called the humerus; the lower wing consists of two bones, the radius and the ulna. The wing tip consists of modified hand bones, the metacarpals and phalanges. The phalanges are fused in birds to allow for the attachment of feathers.
4. Feel for the muscle and tendons, there are two big muscles on the front, and on the back, of the upper wing that bend and straighten, known as the biceps muscle and triceps muscle. Tendons attach these muscles to the bone in the shoulder and the bones in the forearm of the lower wing.
5. Examine the wing at the shoulder joint where it was removed from the body. You should be able to see the slippery shiny white cartilage covering the end of the bone, and the tough, shiny white ligaments that connected the bone to the joint.
6. Carefully cut the skin of the wing down its length using dissecting scissors.
7. Use the forceps to gently peel back the skin without damaging the underlying tissues, starting with the cut end and working down towards the wing tip. Cut and gently scrape the skin free from the muscle underneath using the dissecting scissors. See Figure 2.
8. Look for the fatty tissue on the underside of the skin. The fat is yellow in colour and feels greasy. Notice the capillaries and muscles that are surrounded by connective tissue, which appears as a thin film or membrane.
9. Examine the exposed skeletal muscles of the wing. They appear as pink bundles of fibre. These muscles are attached to the bones, and cause movement of the bones when they contract and relax.
10. Flex the wing and observe what happens when you pull on the triceps muscle and the biceps muscle. Observe how the muscles work in opposing pairs to move bones.
11. Look for the shiny white strands of tissue that attaches the muscles to the bones. These tissues are called tendons. See figure 3a and 3b.
12. Move the wing again and explore how the muscles, tendons, ligaments, and cartilage play roles in the wings movement.
13. Cut the muscle and fat off the wing to expose the bone. Observe how the different bones of the wing work together. See figures 4a and 4b
14. Observe the cartilage that covers the bones where they meet forming the joints, and locate the ligaments binding the joints together. See figure 5
15. Remove the cartilage from the surface of the bone OR try to break one of the bones in the middle, you will see it is hollow and filled with a pinkish red jelly-like material known as marrow. See figure 6.

(Operating procedure cont.)

Clean up:

- Make sure all instruments are returned.
- All parts of the chicken wing as well as the disposable foam tray (if used) must be wrapped in newspaper and placed in a dedicated plastic garbage bag along with gloves and disposable aprons (if used). When all waste material has been collected, double bag for disposal. Freeze material if unable to dispose of immediately.
- If blood is present on dissecting boards, scissors, forceps, probes and scalpels they must be immediately soaked in disinfectant. Otherwise wash equipment in hot soapy water, and rinse or place in a dishwasher to minimise handling.
- After washing, dissecting instruments can be soaked in 70% v/v alcohol for 20 minutes as an optional additional disinfectant and to avoid rusting.
- Dry all equipment thoroughly.
- Disinfect workplace and wash hands thoroughly.

7. Trouble shooting/emergencies

- **If fainting occurs:** If students start to feel faint, dizzy or nauseous during the dissection lie them down (if possible) and elevate their feet. They can get up slowly after ten minutes. Sending them outside for some fresh air can also help. If they don't recover quickly, always seek urgent medical attention. '***Do not sit the patient on a chair with head between knees***[ii]
- First Aid: See latest SDS of any chemicals used for more detailed information.
    - **If swallowed:** Do not induce vomiting. Rinse mouth with water, and then give water to drink. Seek urgent medical attention.
    - **If in eyes:** Hold open and irrigate with copious quantity of water for at least 15 minutes. Seek medical attention.
    - **If on skin/clothes:** If spilt on skin or clothes quickly wipe off with a dry cloth to absorb as much liquid as possible. Remove contaminated clothes and drench the area with excess water under a safety shower. Seek medical attention.
    - **If inhaled:** Remove to fresh air and seek medical attention if symptoms persist.
    - For further advice contact the Poisons Information Centre on 131126.
- First aid: cuts and lacerations should be washed under running water, in the first instance and referred to the school first aid officer for assessment.
- Any health concerns should be referred to the school first aid officer for assessment, accompanied by the relevant latest SDS if applicable. Follow your school's accident and incident policy and reporting procedures.
- See safety notes if it is necessary to remove broken or used scalpel blades

8. Waste disposal

- Used and damaged scalpel blades must be placed in an approved sharps container after use.
- Biological material must be wrapped in newspaper, placed in a double plastic garbage bag and sealed for immediate disposal in the industrial bins.

9. Related material

- Risk Assessment.
- Manufacturer's Safety Data Sheet for disinfectant

References:

[i] 'Fainting', Better Health Channel website, State Government of Victoria https://www.betterhealth.vic.gov.au/health/conditionsandtreatments/fainting (August 2014)

[ii] St John Ambulance Australia. 2011. *Australian First Aid. Barton, ACT*

Chemwatch Gold. 2013. *Safety Data Sheet: Hospital grade disinfectant*. Chemwatch website http://jr.chemwatch.net/chemwatch.web (Subscription required. Accessed December 2017).

CLEAPSS. 2014. *G268 Dissection: a guide to safe practice*. Uxbridge UK http://science.cleapss.org.uk/Resource-Info/G268-Dissection-a-guide-to-safe-practice.aspx (Subscription required.)

'Dissection Safety: Policy and Procedures', Flinn Scientific website, https://www.flinnsci.com/api/library/Download/ff283257b11d41b4944af99241258cd7 (16 June 2016)

Pearson Australia, 2011. *Pearson Science 8 Student Book Australian Curriculum,* Pearson Australia: Port Melbourne, Vic.

Figures

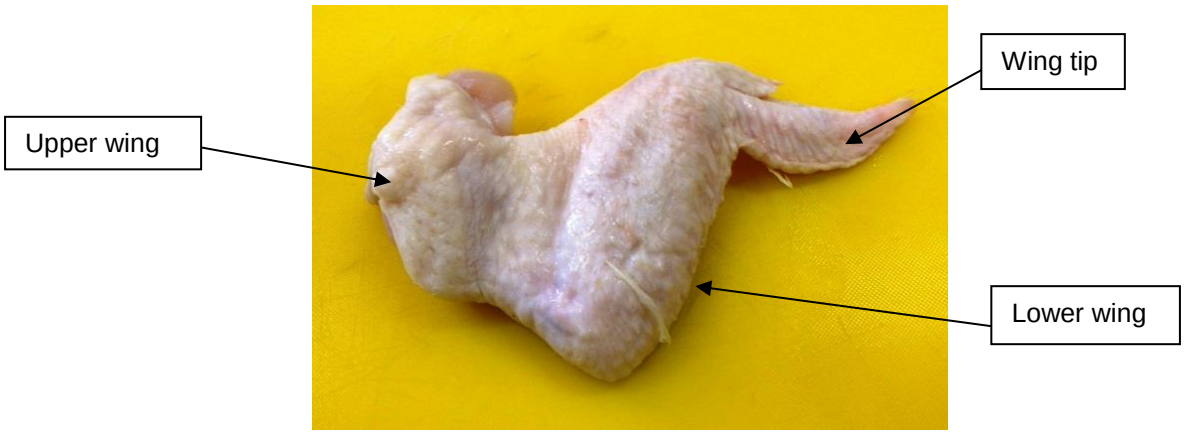

Figure 1: The external structures visible of the chicken wing. (Image by K. Szalai, 2017)

Figure 2: Shows the skin being carefully cut and peeled back from the wing to expose the muscles and underlying tissues. (Image by K. Szalai, 2017)

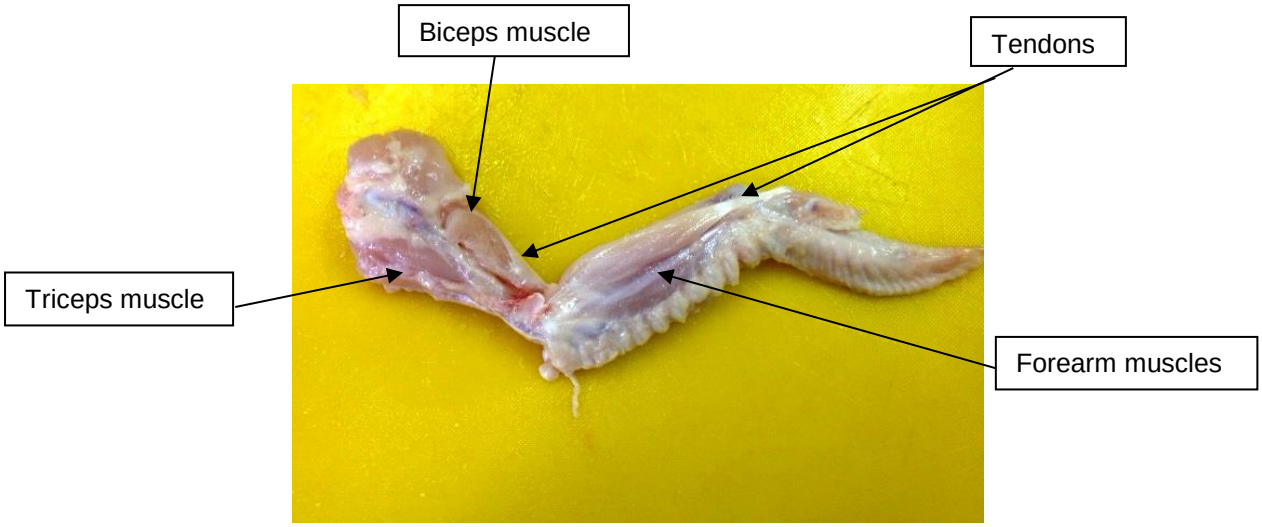

Figure 3a: Shows the muscle groups of the chicken wing. (Image by K. Szalai, 2017)

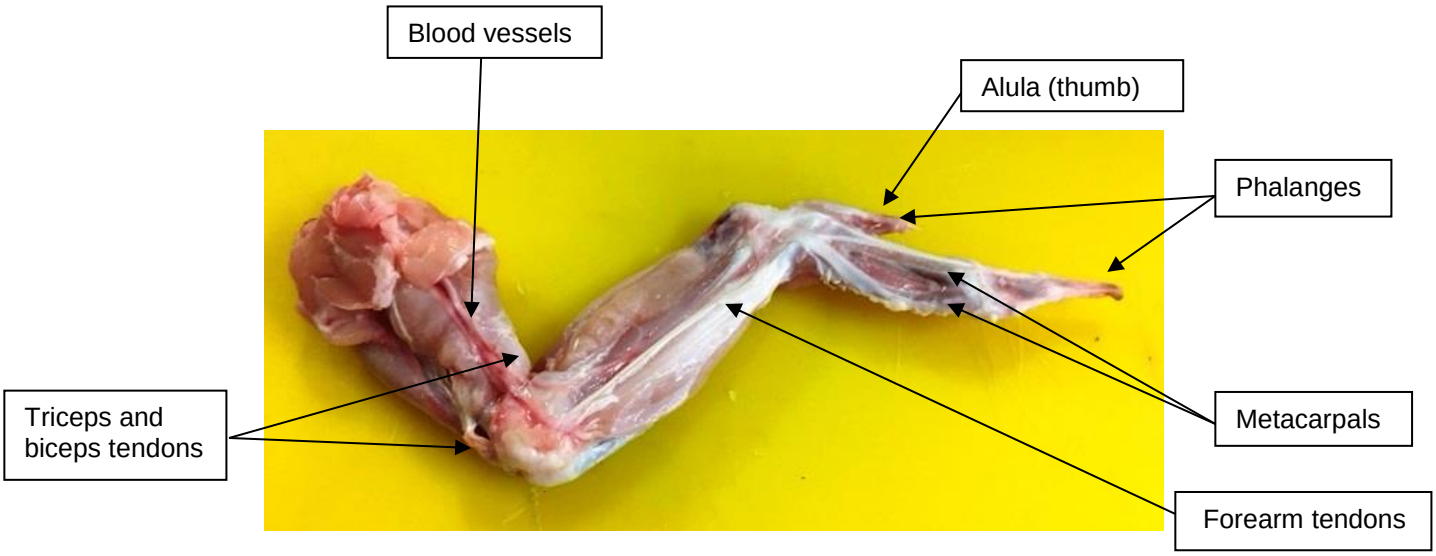

Figure 3b: Shows the tendons connecting the muscle to the bone in several muscle groups, and the rest of the wing tip which composed of modified hand bones. (Image by K. Szalai, 2017)

Figure 4a: The muscles dissected away from the bones showing tendons attached (Image by K. Szalai, 2017)

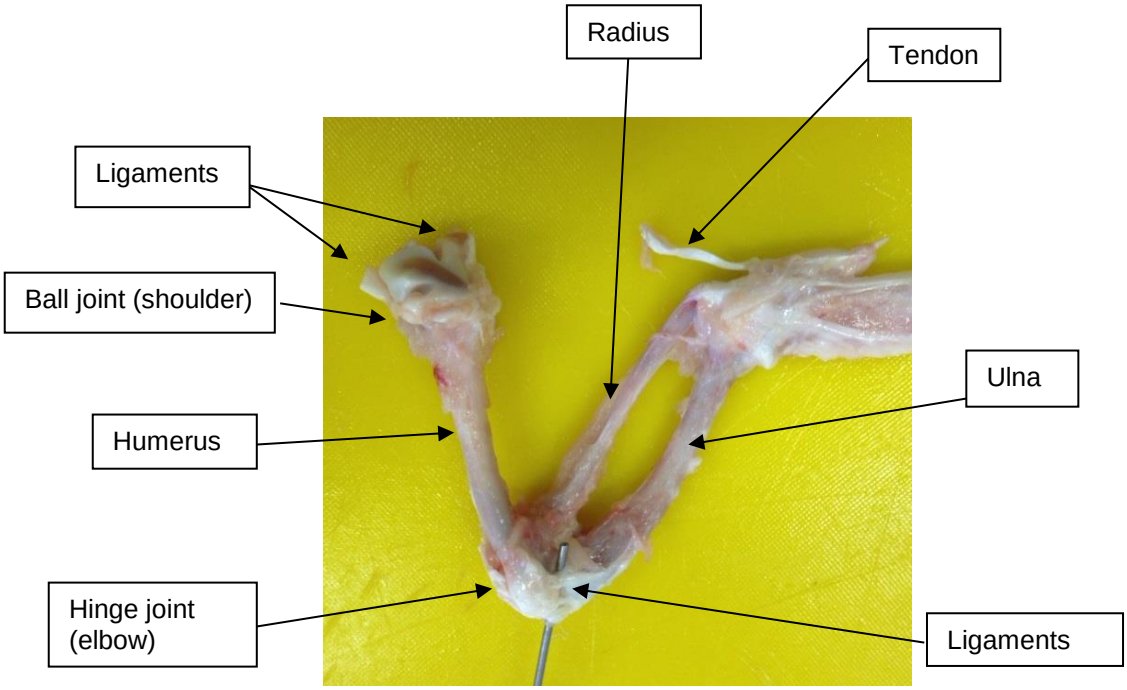

Figure 4b: The muscles removed to expose the bones, joints and ligaments of the wing. (Image by K. Szalai, 2017)

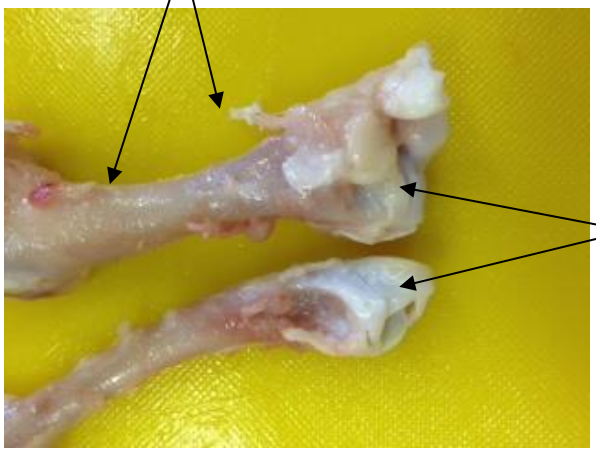

Figure 5: Shows protective cartilage at the surface of the bones forming the elbow joint. (Image by K. Szalai, 2017)

Figure 6: Cartilage removed from the surface of the bone showing pink bone marrow. (Image by K. Szalai, 2017)

Glossary

Biceps muscle – a two-headed muscle which is one of the chief flexors of the forearm that lies on the upper arm between the shoulder and the elbow.

Bone marrow – the soft blood-forming tissue that fills the cavities of large bones containing fat and blood cells

Bones – the main material that forms a vertebrate skeleton, principally collagen fibre and calcium phosphate.

Capillaries – small blood vessels located within the body tissues.

Cartilage – thick, slippery tissue that coats the ends of long bones where they meet to form a joint.

Connective tissue - supports and binds other tissues of the body

Humerus – the long bone of the human upper arm or of a forelimb in other animals

Joints – part of the body where bones are connected

Ligaments – bands of fibrous tissue that hold bones together in a joint.

Metacarpals – bones of the hand can be grouped into three categories: Carpal Bones, Metacarpals and Phalanges. The metacarpals and phalanges of birds are very heavily modified

Muscles – tissue that can undergo repeated contraction and relaxation, so that it is able to produce movement of body parts

Phalanges – bones of the fingers and toes, phalanges of birds are very heavily modified

Radius – one of the two large bones of the forearm, the other being the ulna

Tendons – elastic tissue that attaches muscles to the bones

Triceps muscle – large muscle on the back of the upper limb of many vertebrates responsible for extension of the elbow joint (straightening of the arm).

Ulna – the long bone found in the forearm that stretches from the elbow to the smallest finger or phalanges

Vertebrates – an animal that has a backbone or spinal column.