Techniques for Preparation of Osteological Specimens & Types of Osteological Specimens- 1

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Osteologic(al) Specimens

- Os / Osteon ➔ Bone / bonny (osseous) tissue
- Osteology ➔ Briefly, science field focused on bones and bonny structures
- Osteological specimens➔ Main issue is bones of course and surrounding structures.
- Joints and some related muscles can also be demonstrated.
- Entire skeleton, parts of the skeleton, single or multiple bones can be prepared.

Stage 1 ➔ Obtaining the Material

- Appropriate carcasses, cadavers and bodies or body parts obtained from necropsy units, abbatoirs, experimental animal institutes, national zoos, reservation areas.
- Samples which were examined in terms of toxicity, zoonotic infections etc.
- Samples on which the ethical consent obtained.
- First, first, firstly ➔ Think and plan meticulously about the final appereance shape and size of the specimen.
- What the final specimen will be?
- Only bone, bone-joints, or bone-joint-muscle combined specimens.
- Whole body, regional preparates or single bone specimens??

Stage 1 ➔ Obtaining the Material

- **We've obtained a whole body. What is the procedure for the preparation of anatomic specimen?**
- First ➔ Skin should be removed (dissected), by proper surgical or anatomical instruments. (scalpel, medical scissors, meat knife or saw)
- Body should be fixed in recumbency position and should be cut out from the median line ventrally. All inner organs should be taken out.
- Forelimb and hindlimbs should be removed from the carcass.
- Don't forget ➔ Forelimbs attach to body by muscles and hindlimbs by coxafemoral joint.
- All unnecessary surrounding tissues (muscles, connective tissue, adipose tissue) should be removed with scalpel or knife. Be careful not to harm or damage the surface of bones.

Stage 1 ➔ Obtaining the Material

- Dissect out and clean the vertebral column. Use a wire and pass it through the entire vertebral canal from atlas to sacrum and then bind the two yarn ends. Accurate order of all vertebrae in the vertebral column is very important to build it further.
- Dissect out and clean the ribs. The order of theleft and right costal series are very important. Tie down all the rib series orderly with a heat resistant rope from the level of collum costae. Accurate order of all ribs in the costal series are very important to build it further.
- Sternum should be cut apart from ribs with a costatom meticulously.
- All the multiple bones (carpal and tarsal bones, digital bones) should be wrapped with a rag to avoid of losing the small bones.

Stage 2 ➔ Maceration of Bones

- What is Bone Maceration➔ Removing of all unnecessary surrounding tissues such as adipose, connective etc. on the bones and cleaning the bone with specified chemical, physical and biomechanical techniques.
- Basic aim ➔ To eliminate the unnecessary organic parts which can probably cause putrefaction, decolorization or bad smell and purify the bones.
- Various kind of maceration techniques.
- Convenient maceration technique should be decided according to the size, age and species of the sample.
- Single or multiple maceration techniques could be used together.
- Wrong maceration can cause a serious and irreversible damages to your bones.

Stage 2 ➔ Maceration of Bones

- Boiling Technique ➔ Boiling of osseous structures inside a pressure tank or container. (imagine a huge pressure cooker)
- Entire vertebral column binded with a wire, tied ribs and wrapped small bones and rest of the skeleton should put inside the tank.
- The species, size, age of the animal and the age of the bones should be considered.
- Large Animals (horse, ox etc.) ➔ Pressured system especially for old and adult animals. First check, 4-8 hours after the boiling starts.
- Large dogs, Old-Adult small ruminants ➔ Pressured tank not recommended. Fisrt check 2-4 hours after the boiling starts.
- Ingredients for the Boiling Solution ➔ Water, enzyme based detergents, bleach or soda, fat solvent solutions.
- Boiling technique is not recomended for species smaller than dogs and small ruminants. Or frequent check and non-pressured system during boiling process.

Stage 2 ➔ Maceration of Bones

- Putrification or Decaying Technique ➔ Main aim is to immerse the sample inside of a water based solution and to provide an anaerobic bacterial activity and decaying period. Therefore, unnecessary parts will be removed .
- Samples should be fully embeded into the water inside an insultaed container.
- Water temperature should be in 27 -35 °C (max 50 °C). Use an aquarium heater or put the container into an etuve to provide this temperature.
- This technique can generally be used for small species.
- Solution➔ Water, enzyme based detergent, soda, emulgators, sugar.
- The lid should be closed and insulated to provide an-aerobic activity.
- Large animal skull or single bone ➔ 8-10 days. Check once a day.
- Small size cat –dogs ➔ 5-10 days. Check once a day.
- Birds, rodents ➔ 3-7 days. Check twice a day.

Stage 2 ➔ Maceration of Bones

- Burying Technique ➔ Burying of whole body or a part of a body to the natural soil to eliminate the organic parts with the help of saphrophtic bugs, bacteria, rain, humidity, heat etc.
- Preferably rich forest soil or peat based areas. Bury the sample min 50 cm. depth.
- Place a net under the sample to avoid of bone loss. Place an indicator on the sample to avoid of bone damage. Net – Soil – Sample –Soil – Indicator - Soil
- Wait for 2-4 rainy seasons before taking out. If the sample is placed well cleaned, the waiting period will decrease.
- Risks ➔ Stealing of bones by forest creatures, losing of small bones in the nature.

Stage 2 ➔ Maceration of Bones

- Saphrophytic Bug Technique ➔ It is the technique of removing the organic tissues by insect colonies showing saphrophytic activity on the bones in laboratory conditions.
- Ideal for small animal bones with risk of loss.
- *Dermestes lardarius, Dermestes dimidiatus, Dermestes maculatus*.
- Laboratory conditions are easy to make, but the colony needs to be fed and fed regularly.

Stage 2 ➔ Maceration of Bones

- Various Mechanical Techniques ➔ After application of various maceration techniques, mechanical methods can be used to remove unwanted fat, muscle and connective tissue residues if still remained on the bone.
- Degreasing and bleaching detergents are added to the hot water (high temperature if possible) for 2 to 8 hours in a controlled manner. The purpose of this process is to tenderise the undesirable fat tissue, connective tissue residues.
- Afterwards, brush, dish wire and sponges can be used for mechanical effects by scrubbing in the hot water.
- Use a toothbrush for small animals, avian species or rodents.
- If there is still organic residue , use an old type of scalpel, knife, etc. that are not very sharp and gently scrape with these equipment.
- Hot water is important for the dissolution of fats.

Stage 2 ➔ Maceration of Bones

- Various Chemical Techniques ➔ After application of various maceration techniques, chemical techniques can be used to dissolve residual undesirable fat tissue residues or to bleach bones.
- For fat or fatty residues, bones can be left in 10% ammonium hydroxide solution for 2-10 days .
- If there is a heavy fat, small holes can be opened to the long bones and left in acetone, alcohol or xylol solution. It is a very powerful effective and explosive application. Be careful!!
- Some units in the faculties are equipped with negative pressure oil degreasing machines. Methylene chlorid is generally preferred chemical for these machines.
- For whitening or bleaching, bones can be left in 10 - 10% hydrogen peroxide solution for 12-72 hours. Regular and frequent checking is very important in this process. It could be cracking.

Stage 2 ➔ Maceration of Bones

- Drying ➔ After the techniques required for maceration, mechanical cleaning and whitening are performed, the bones are washed, rinsed thoroughly and left to dry.
- Wait for 5-10 days in the shade and at room temperature.
- Plastic, perforated containers, colorless paper or cloths.
- Check for oil leaks.
- Broken, lost parts should be repaired. If it is not possible to repair, a new bone should be prepared.

THANK YOU

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