

# Electronic Atlas Morphological and Anatomical Structure of Little Egret's Cervical Bones as A Biology Learning Media

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**Abstract:** Electronic Atlas (*E-Atlas*) is a biology learning media product that utilizes technology and information developments to support the biology learning process. The purpose of this research is to find out the quality of *E-atlas* Morphological and Anatomical of Little Egret's Cervica Bones as a biology learning media. This research is Research and Development. To find out the morphological and anatomical structure of little egret's neck, meat on the neck were cleaned. Then each bone segment were cut and sanded on the ventral and lateral part until the structure of little egret's neck is visible. Then, to develop the *e-atlas*, uses the ADDIE method. To make the *e-atlas*, there is 5 steps. Step 1 is design concept, cover, ribbon, and another supporting elements in CorelDRAW 2022 Grapich Suites. Step 2 is finishing the *e-atlas* at Articulate Storyline 3 to fill the content. Step 3 is validation test to material and media expert. Step 4 is field trials to biology teacher and students. Step 5 is evaluate the result of validation test and field trials. Based on the research result, it was found that the *e-atlas* could be used as a proper biology learning media.

**Keywords:** Electronic Atlas, Morphology, Anatomy, Little Egret, *Egretta garzetta*, Learning Media.

## Introduction

Education is a process that has a systems, strategies, and goals, so that teaching and learning activities are events directed. Bound to goals and carried out to achieve the goals of education it self. In an education system, there are activites carried out by the entire educational community namely teachers, students, and other education.

School is an institution where educational activities are carried out formally following the rules and curriculum that's applied. School as places where education is held, aim to prepare students to develope it's knowledge and skills in solving life problems in the present and the future. Therefore school must organize the teaching and learning process properly.

As the results of observations obtained by researches regarding the fundamental problem experienced by students and teachers when carrying out the biology learning process. The current biology learning process tends to be

monotonous. School want an increase in student learning outcomes in learning study ojects. But due to the lack of adequate learning media, this goal has not achieved.

One of the biology content that studied at school is Aves that belongs to the sub phylum of vertebrates. Various types of birds, ranging from small birds to large birds can be distinguished based on several characteristics such as the shape of the beak, the shapes of the legs, the shapes of the wings, and the shape of the neck.

Little Egret (*Egretta garzetta*) is a type of bird that spends half the time in water area. Little egret (*Egretta garzetta*) belongs to the order Ciconiiformes and the Ardeidae family is spread all over the world, including Indonesia, especially in Sumatera, Kalimantan, Bali, and Java.

Out of a total of 24 species in the Ardeidae family, almost half are species protected by the government thought Government Regulation no. 7 of 1999 concerning Preservation of Plant and Animal Species.

In studying Aves, students do not only study it using learning media which tends to make students feel bored and reluctant to read the media. An ideal learning media is needed, so that it can support student's needs and be motivate to learning Aves.

*E-Atlas* can be used as a biology learning media that discusses Aves. Because uses *E-Atlas*, theachers and students do not have to go to outside the school to observe and learning Aves. The process of learning Aves can be done in the classroom by using *E-Atlas* as a biology learning media which contains pictures and explanations in detail and is easy to use. Thus, the objective of the biology learning process can be achieved.

**Materials and Methods**

**Study Area**

The observation of Little Egret has been held at Ketingan Tourism Vilage, then the observation of morfological and anatomical structure of little egret's neck has been held at Gatén, Condongcatur, Depok, Sleman, and the field test has been held at Sewon Senior High School, Bantul, Special Region of Yogyakarta.

**Procedures**

1. Little Egrets are blanched in boiling water to make it easier to separate it body from it feathers.
2. The little egrets neck are separated from it body, and all cervical bones are cut one by one and put them into a flakon bottle.
3. The C2, C6, and C12 bone segments are taken to measured.
4. The three bones are sanded on the ventral and lateral part using soft sandpaper.

**Data Analysis**

Observational data were analyzed by observing the three cervical bones. The morphological and anatomical structure of the three vertebrae were observed. In addition, an analysis was also carried out by means of a literature study related to relevant research to get conclusions from exiting problem formulation.

**Results and Discussion**

**Observation of Anatomical and Morphological Structure of Little Egret's Cervical Bones**

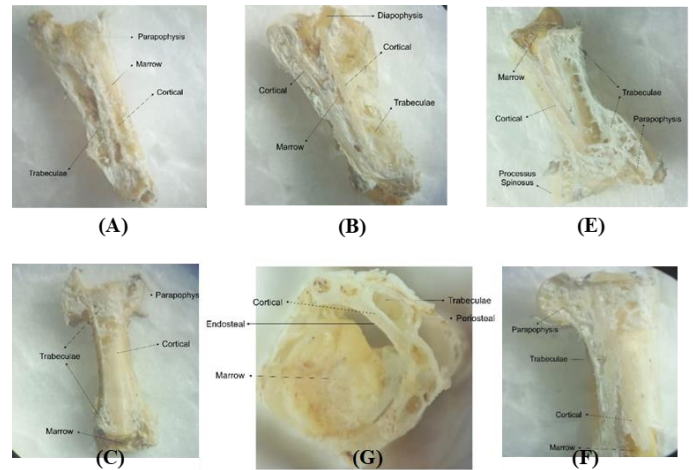


Figure 1. Observation result of three bone segments by lateral, ventral, and crossing section. (A) C2 Lateral, (B) C2 Ventral, (C) C6 Lateral, (D) C6 Ventral, (E) C12 Lateral, (F) C12 Ventral, (G) Crossing Section.

**Development of *E-Atlas* Anatomical and Morphological Structure of Little Egret's Cervical Bones**

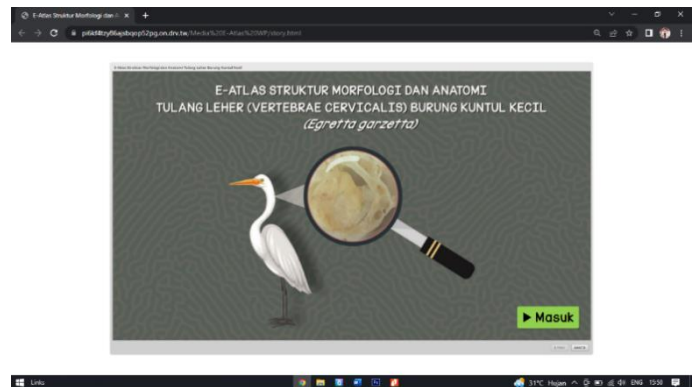
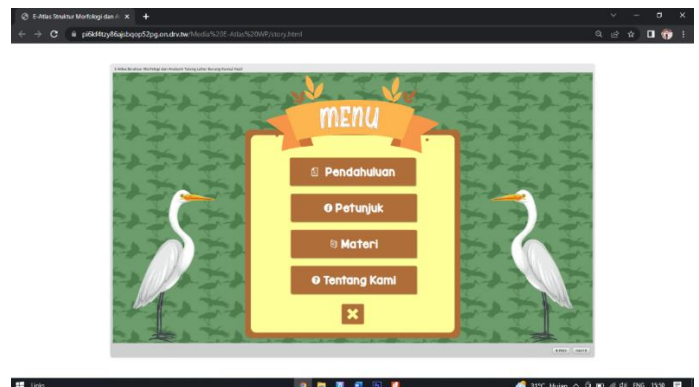


Figure 2. Cover page of *E-Atlas*



**Figure 3.** Menu page of *E-Atlas***Figure 5.** Anatomical structure page of *E-Atlas*

### Discussion

Based on the observations of the anatomical structure of little egret's cervical bones, there are cortical bone, trabecular bone, bone marrow, parapophysis, diapophysis, periosteum, endosteum, processus spinosus, and foramina transversaria.

Cortical bone has a low priority over trabecular bone, that is equal to 5-10%. This causes the tissue structure of the cortical bone to be dense and tough. This bone has a high elastic modulus. Bone marrow is inside the cortical bone, bone marrow is an organ that plays a role in the formation of blood cells in the body. Trabecular bone or commonly called cancellous bone is porous bone, so it can be called spongy bone. Spongy bone is found near the articular surfaces at the ends of the long bones and the inside of the short bones. The periosteum is a sheath of fibrous connective tissue that surrounds the outer cortical surface of the bone. Periosteum contains osteoblasts, osteoclasts blood vessels, and nerve fibers. Periosteum is also play a role in providing nutrition, protection, assisting the process of bone formation, and be the important role in the repair and growth of broken bones. Endosteum is a membranous structure that lines the inner surface of cortical bone, trabecular bone, and the vascular canal.

Based on the field test of *E-Atlas*, there are getting a percentage of 94% from material expert, it

means if classified into a Linkert Scale, is very feasible, getting a percentage of 78% from media expert, it means if classified into a Linkert Scale, is very feasible, getting a percentage of 86% from biology teacher, it means if classified into a Linkert Scale, is very feasible, getting a percentage of 96% of biology students, it means if classified into a Linkert Scale, is very feasible.

### Conclusions

The research result show that the length of the bones is 1,1 until 1,3 cm, the width of the bones is 0,7 until 1 cm, and the height of the bones is 0,5 until 1 cm. The result about the anatomical structure of little egret's servical bones show that servical bones are composed of cortical bone, trabecular bone, marrow, parapophysis, diapophysis, foramina transversaria, processus spinosus, periosteum, and endosteum.

Based on the result of validation test to material and media expert, and field trials to biology teacher and students. it was found that the *E-atlas* could be used as a proper biology learning media.

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