



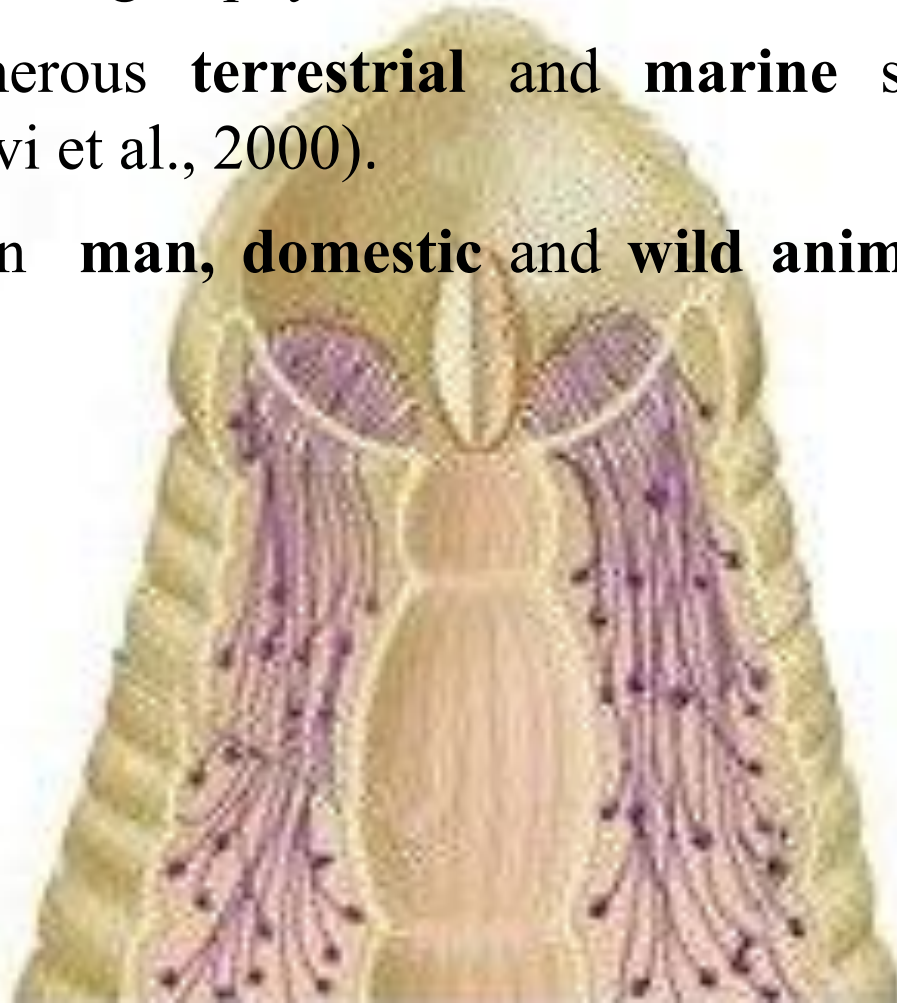
Comparative Ultrastructural Study of The Salivary Glands of Two Hematophagous Leeches (Annelida, Clitellata, Arhynchobdellida) in Iraq

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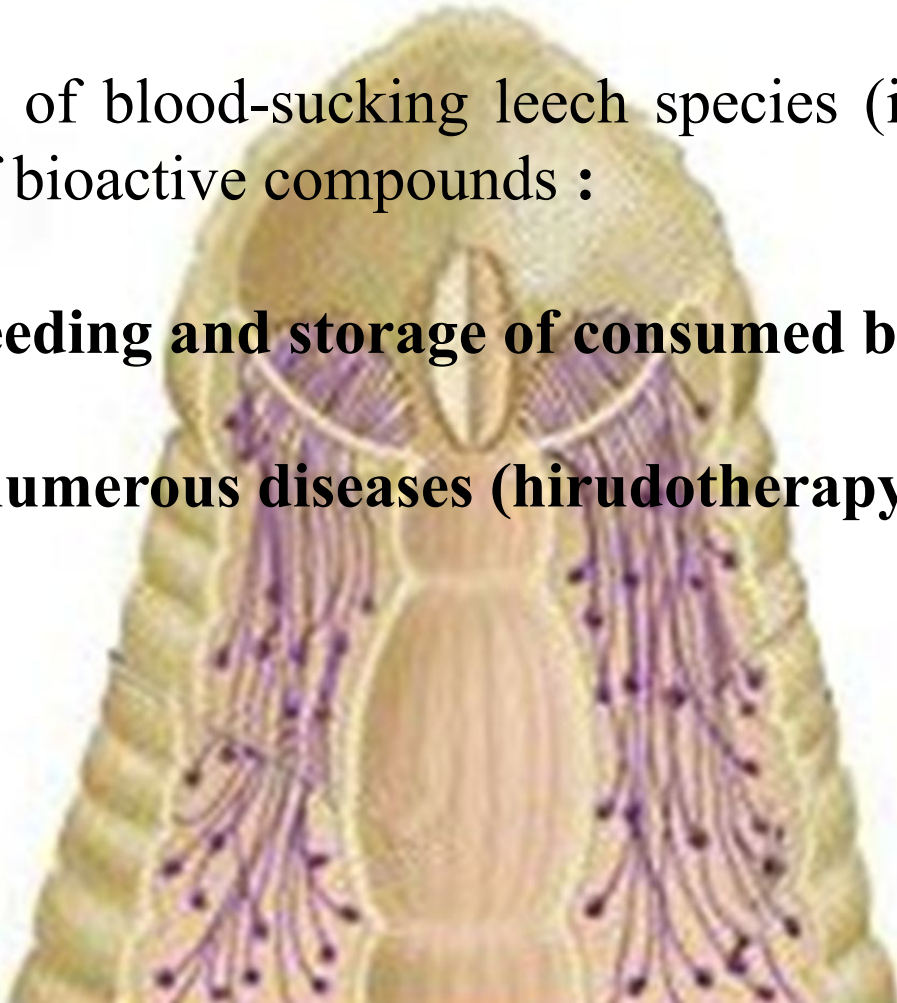
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Introduction

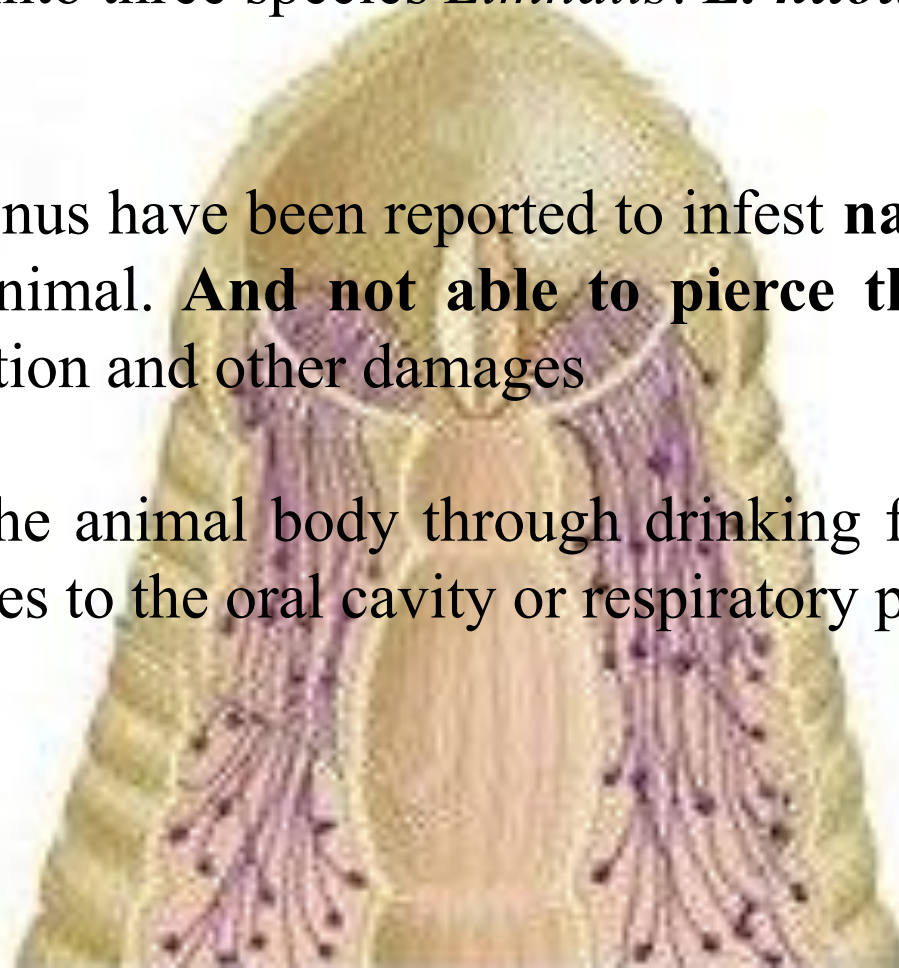
- Leeches are blood-sucking **ectoparasites, hermaphroditic**. They are cylindrical flattened worms belong to phylum Annelida, class Clitellata.
- Despite the numerous **terrestrial** and **marine** species, **freshwater** leeches predominate (Orevi et al., 2000).
- Feeding blood on **man, domestic** and **wild animals**, as well as **invertebrate creatures**.



- Each salivary cell extends a single duct from the cell body to the jaw, and the duct ends in a tiny opening between the calcified teeth of each jaw(Lemke et al., 2016).
- The saliva of blood-sucking leech species (i.e., *Hirudo* sp.) consists of bioactive compounds :
 - **permit feeding and storage of consumed blood**
 - **treating numerous diseases (hirudotherapy).**



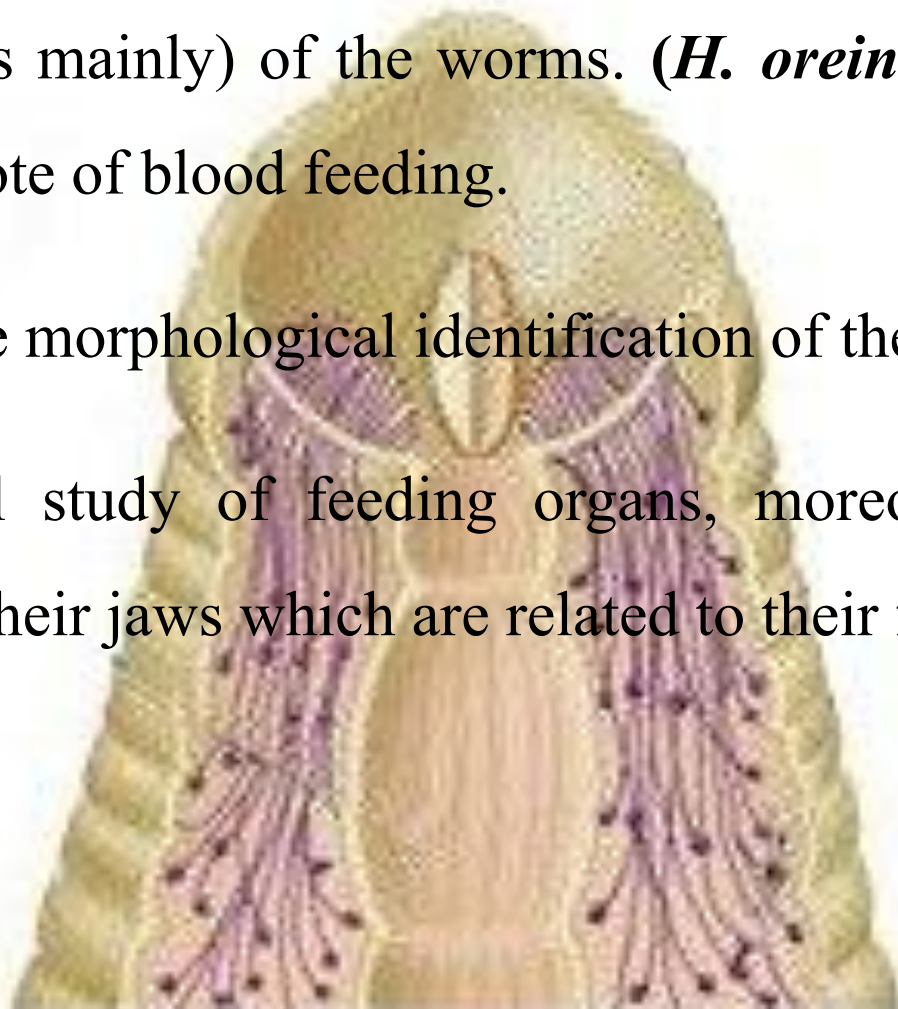
- The genus *Limnatis* is a well-known **nasal leeches**.
- Sawyer grouped into three species *Limnatis*: *L. nilotica*, *L. bacescui* and *L. paluda*.
- Leeches of this genus have been reported to infest **nasopharyngeal cavities** of humans and animal. **And not able to pierce the skin of mammals**, causing inflammation and other damages
- They may enter the animal body through drinking from contaminated water and usually attaches to the oral cavity or respiratory passages.



The main purpose of this study was to:



- Ultra-structural study with scanning electron microscope of feeding organs (salivary glands mainly) of the worms. (*H. oreintalis* and *L. paluda*) which are differ in their rote of blood feeding.
- Confirming the morphological identification of the worms.
- Morphological study of feeding organs, moreover discuss the structure and appearance of their jaws which are related to their feeding mode also.



Sample collection

- Many water bodies in Erbil Province and its suburbs were searched for samples collection, seventeen specimens of *Hirudo orientalis* were observed in springs in the Hassan Bag mountain. While fourteen specimens of *Limnatis paluda* were gained inside springs, streams, and small lakes in Debaga township.

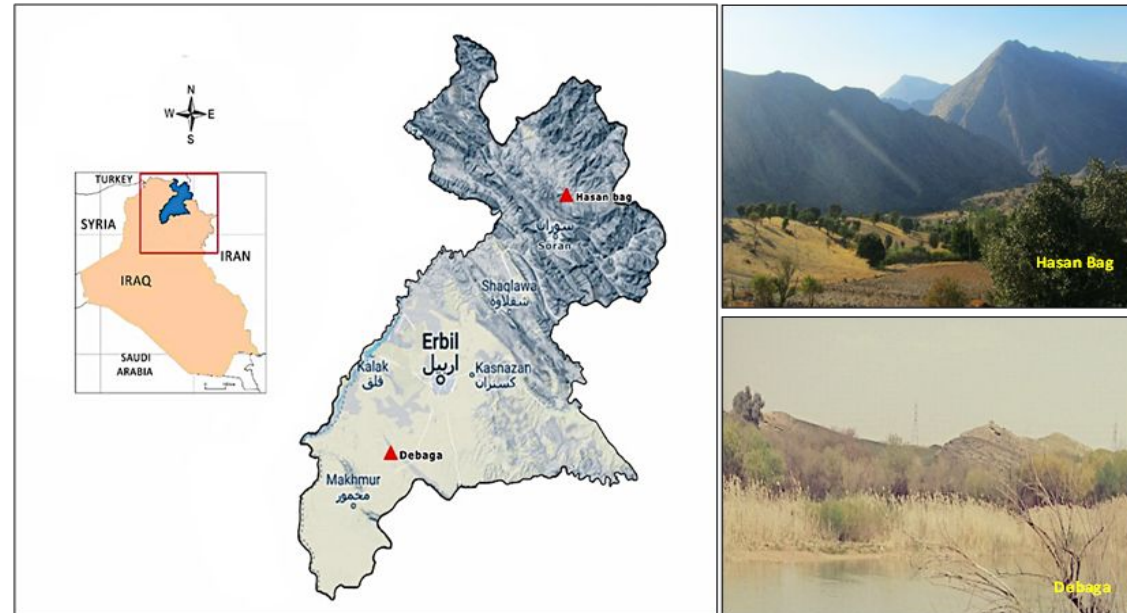
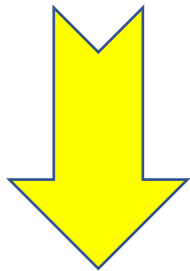


Figure 3.1. Map of Iraq presenting specimens' collection sites ▲

Research Design



Morphological
identification of
leeches



Scanning
Electron
Microscope

Maintenance of Leeches

- Adult active leeches were hand-collected and placed in glass jars, covered with a smooth minute porous cloth to prevent escape. Leeches were kept alive in the laboratory and transferred to a glass aquarium , filled with non-chlorinated water. The water was regularly maintained by replacing it every day (Govedich, 2001).

Morphological study

- Morphological identification of both leeches species rely on the external features, for this purpose numerous available identification keys used(articles).
- The specimens were photographed with digital camera.

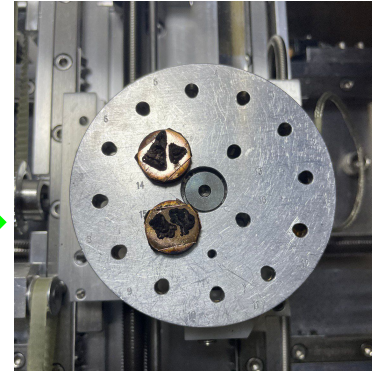
Specimens Identification

- The adult leeches were anesthetized in 10% ethanol for about 5 min. Identification of the worms done under an Olympus SM.
- For detecting their feeding organs including salivary glands four specimens of each species dissected and then cleaned with distilled water (Ayhan *et al.*, 2021).
- Dissection started from anterior to posterior along the ventral side on paraffin wax blocks, exposing one dorsomedial, and two ventrolateral jaw and salivary glands. The salivary gland cells was cleared from cerebral ganglia, crop, overlying muscle, and connective tissues.

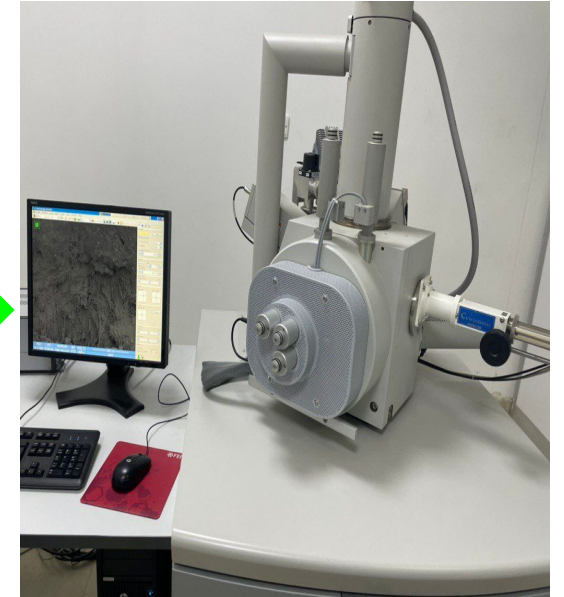
Scanning Electron Microscope



Sputter
coater



SEM
stump



Quanta
SEM

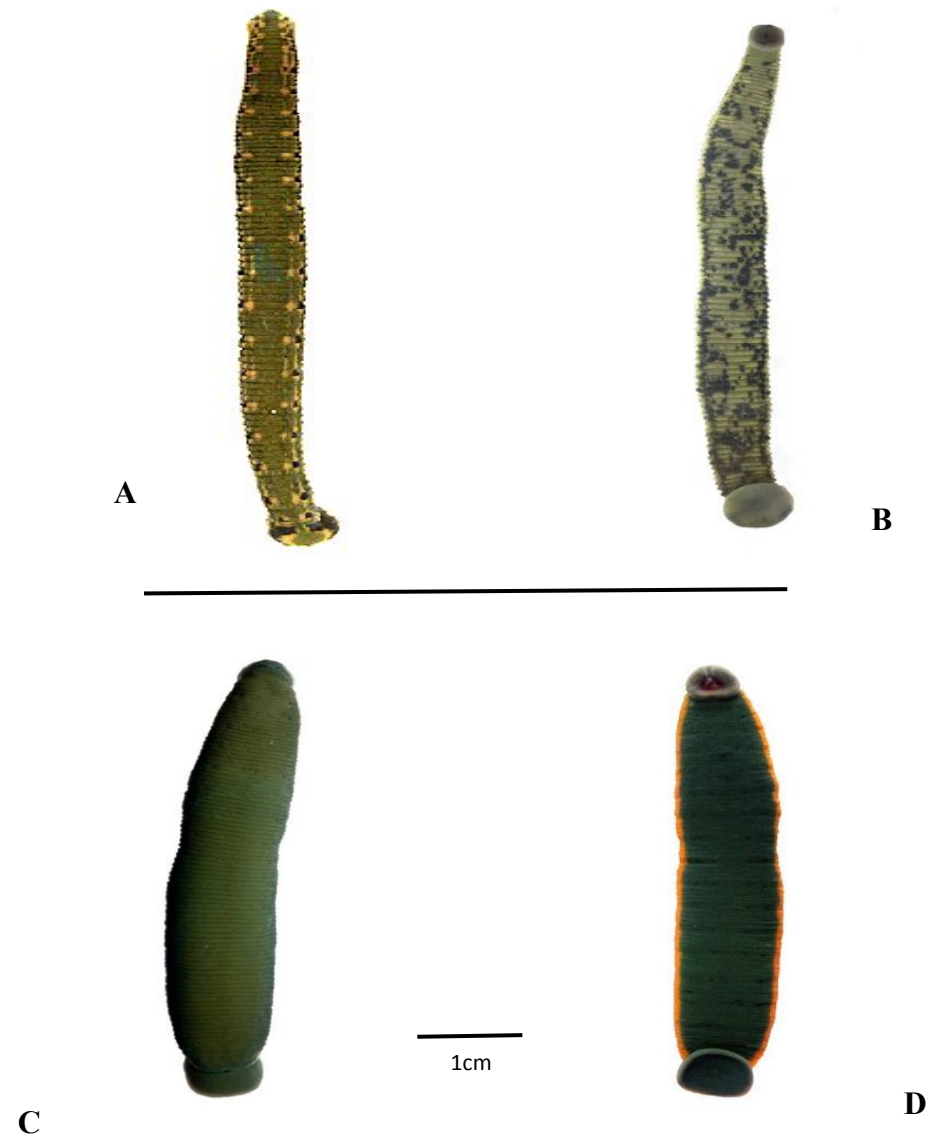


Figure 1. Adult leeches, Dorsal view; (A)*H. orientalis* ,(C) *L. paluda*. Ventral view;(B) *H.orientalis*, (D)*L. paluda*.

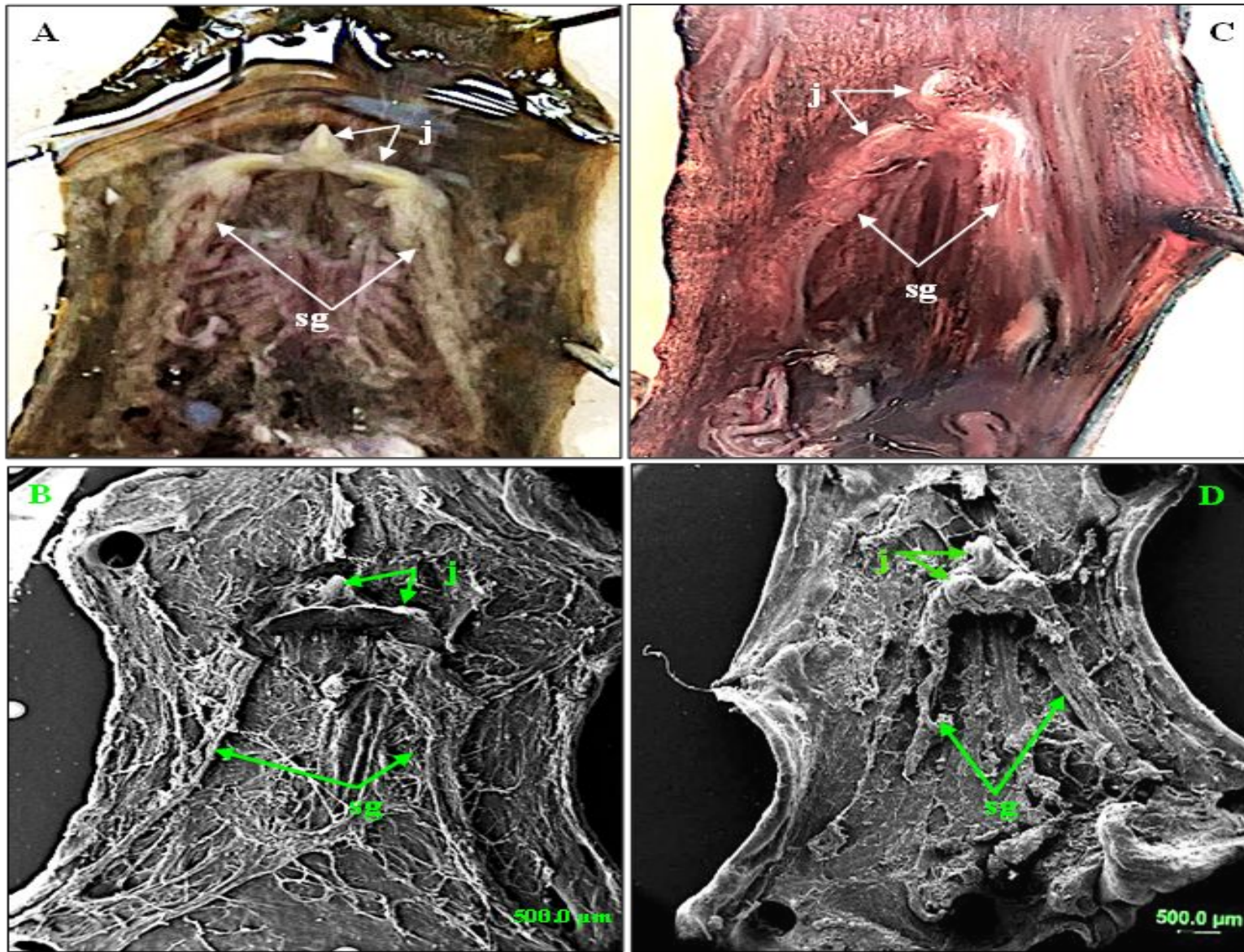


Figure 3. Dissected leeches showing (j) jaws and (sg) salivary glands of (A, B) *H. orientalis* and (C,D) *L. paluda*. (B,D) SEM

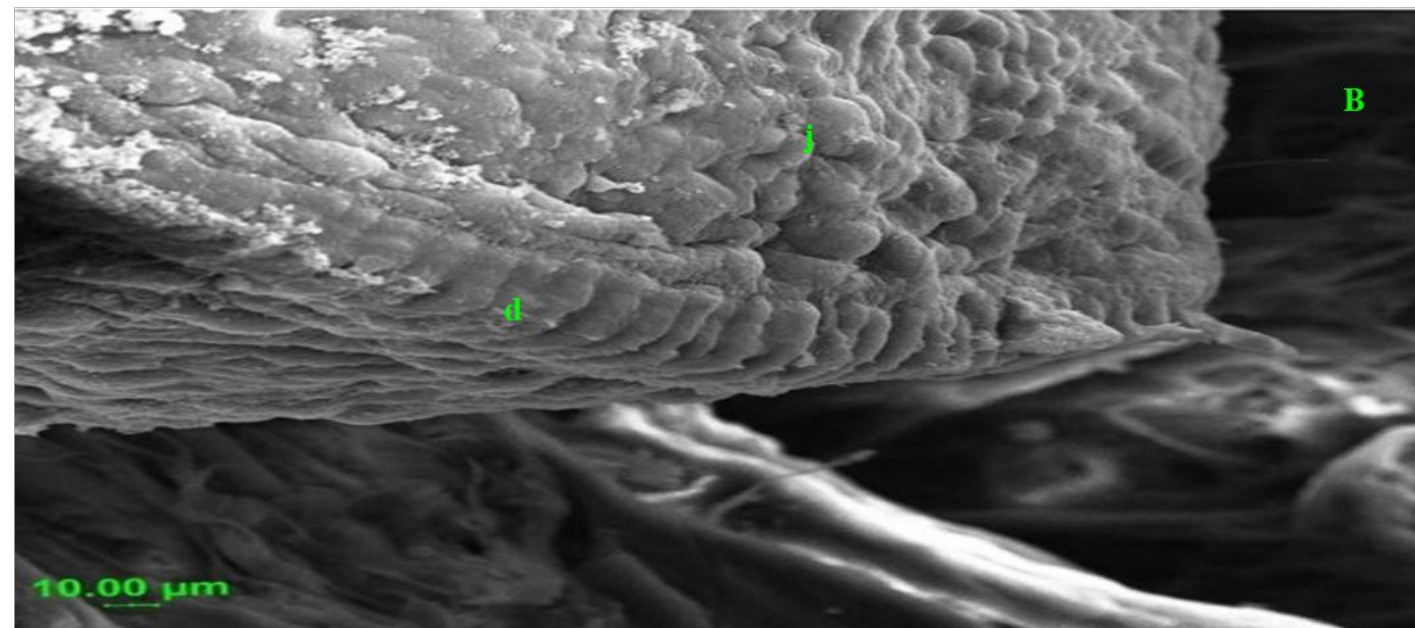
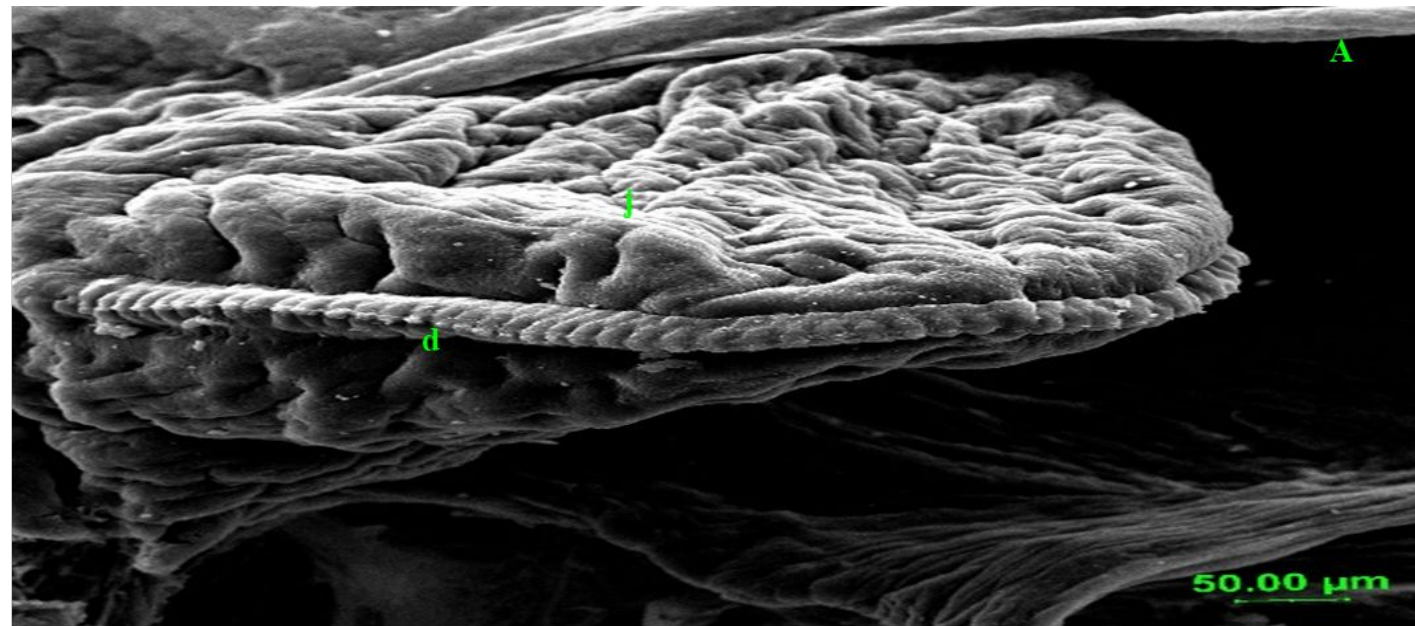


Figure 6. Scanning Electron Microscope images of jaw and denticles; (A) *H. orientalis* and (B) *L. paluda*. (j) jaw, (d) denticles.

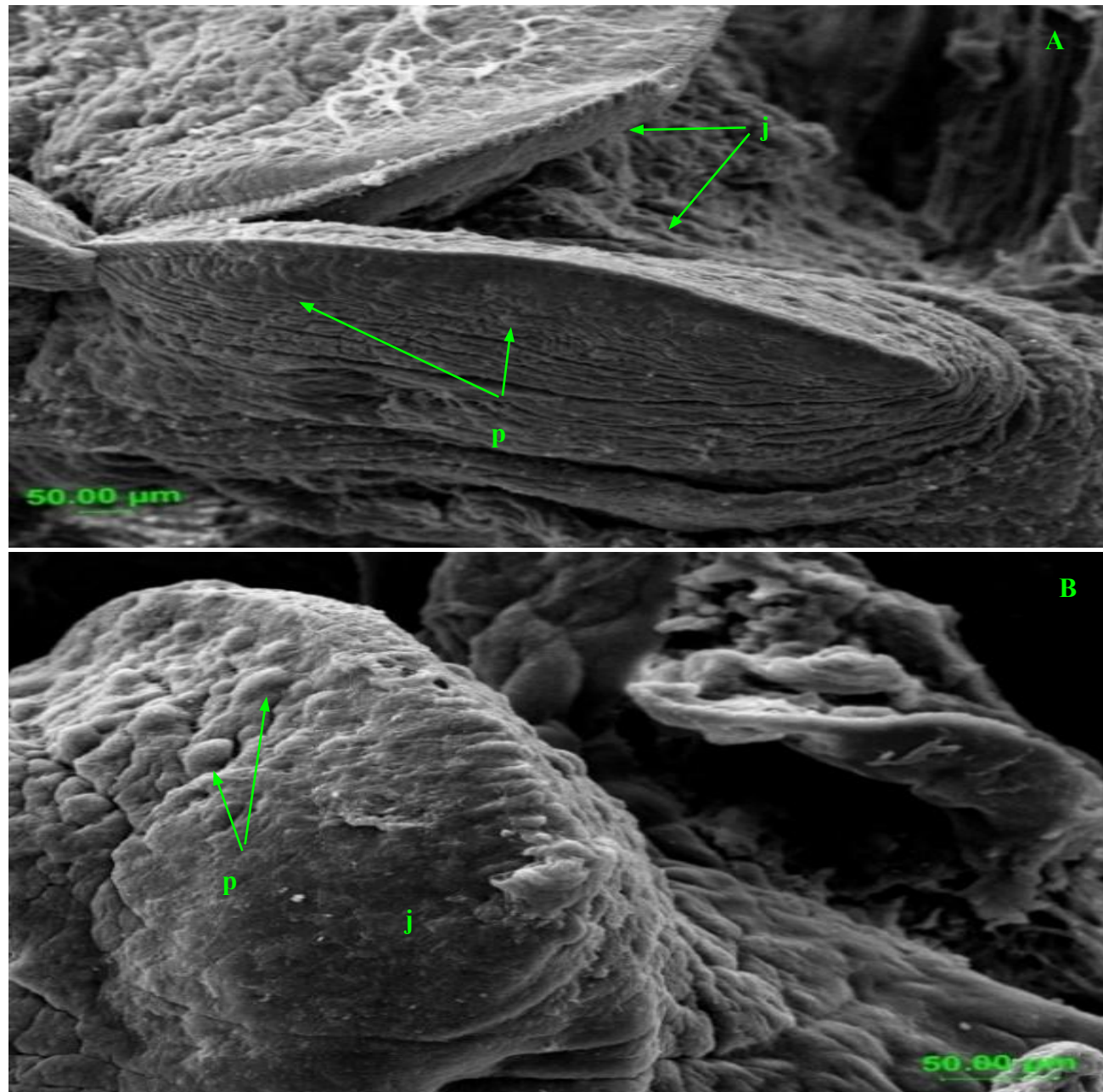


Figure 5. Scanning Electron Microscope images of jaw and papillae; (j) jaw, (p) papillae. (A) *H. orientalis*, (B) *L. paluda*.

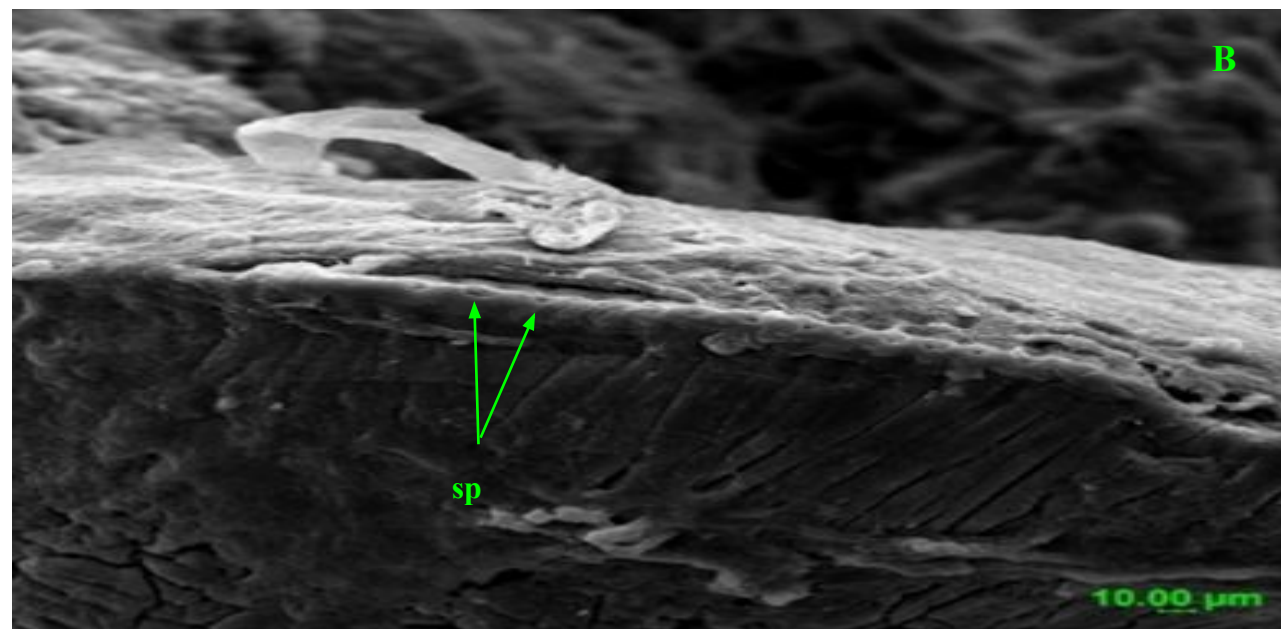
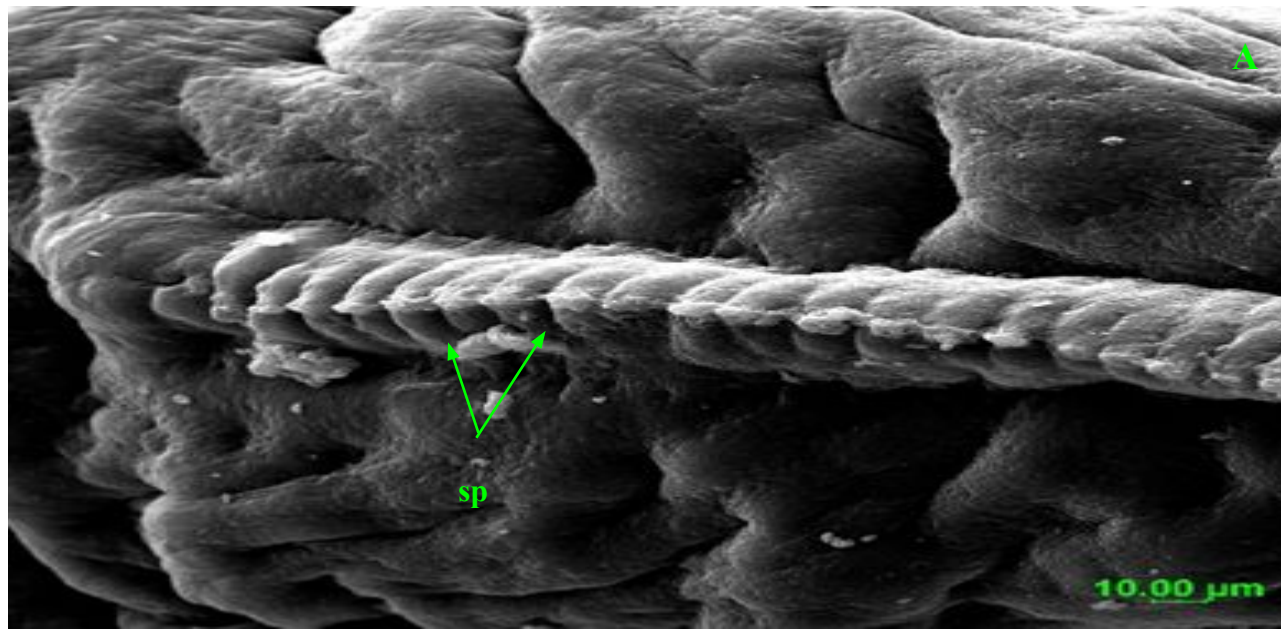


Figure 7. Scanning Electron Microscope images of jaw and salivary gland pores; (A) *H. orientalis*, (B) *L. paluda*. (sp) salivary gland pores.

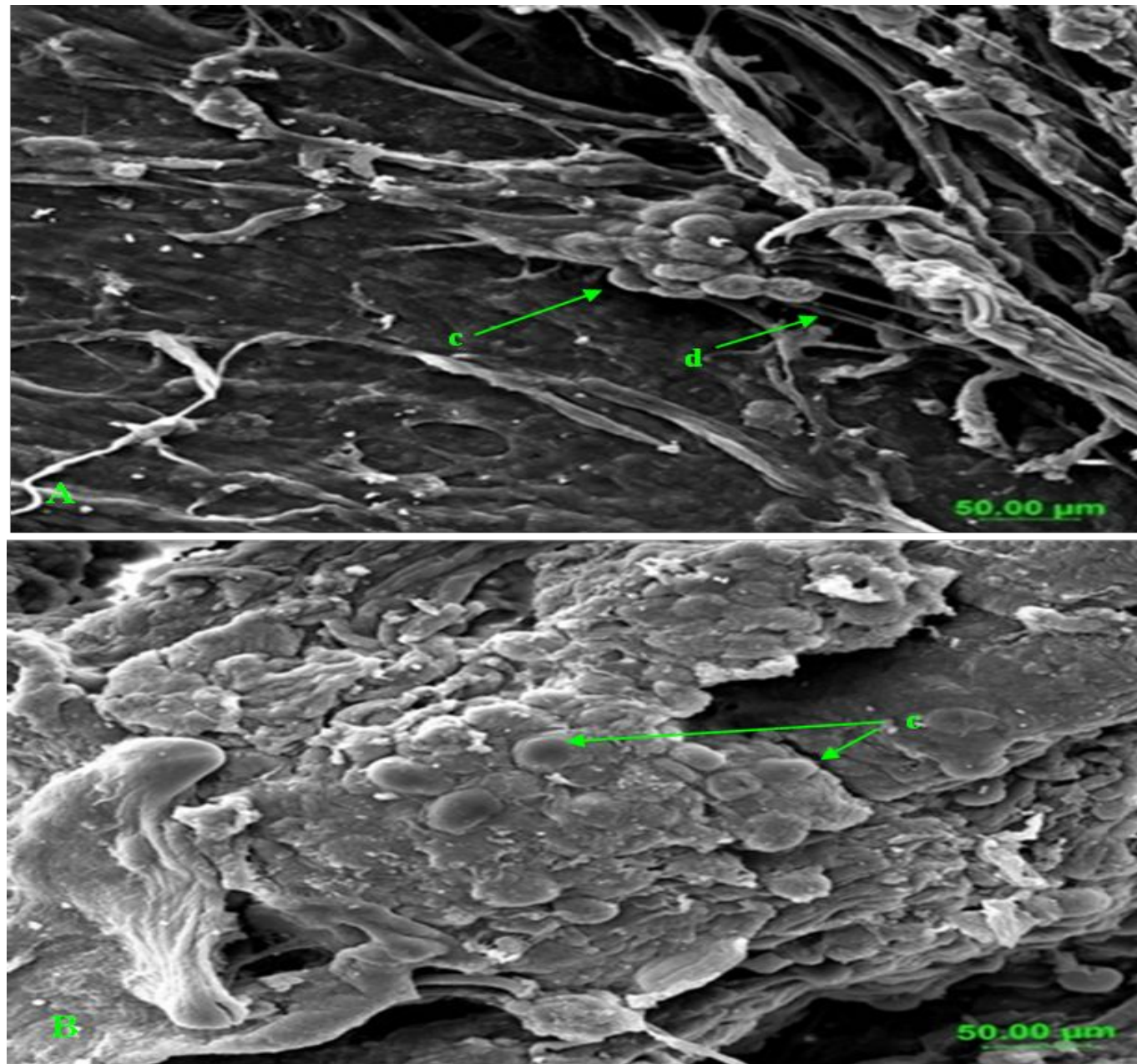


Figure 10. SEM of salivary gland cells; *H. orientalis* and *L. paluda*. (c) cells, (d) duct.

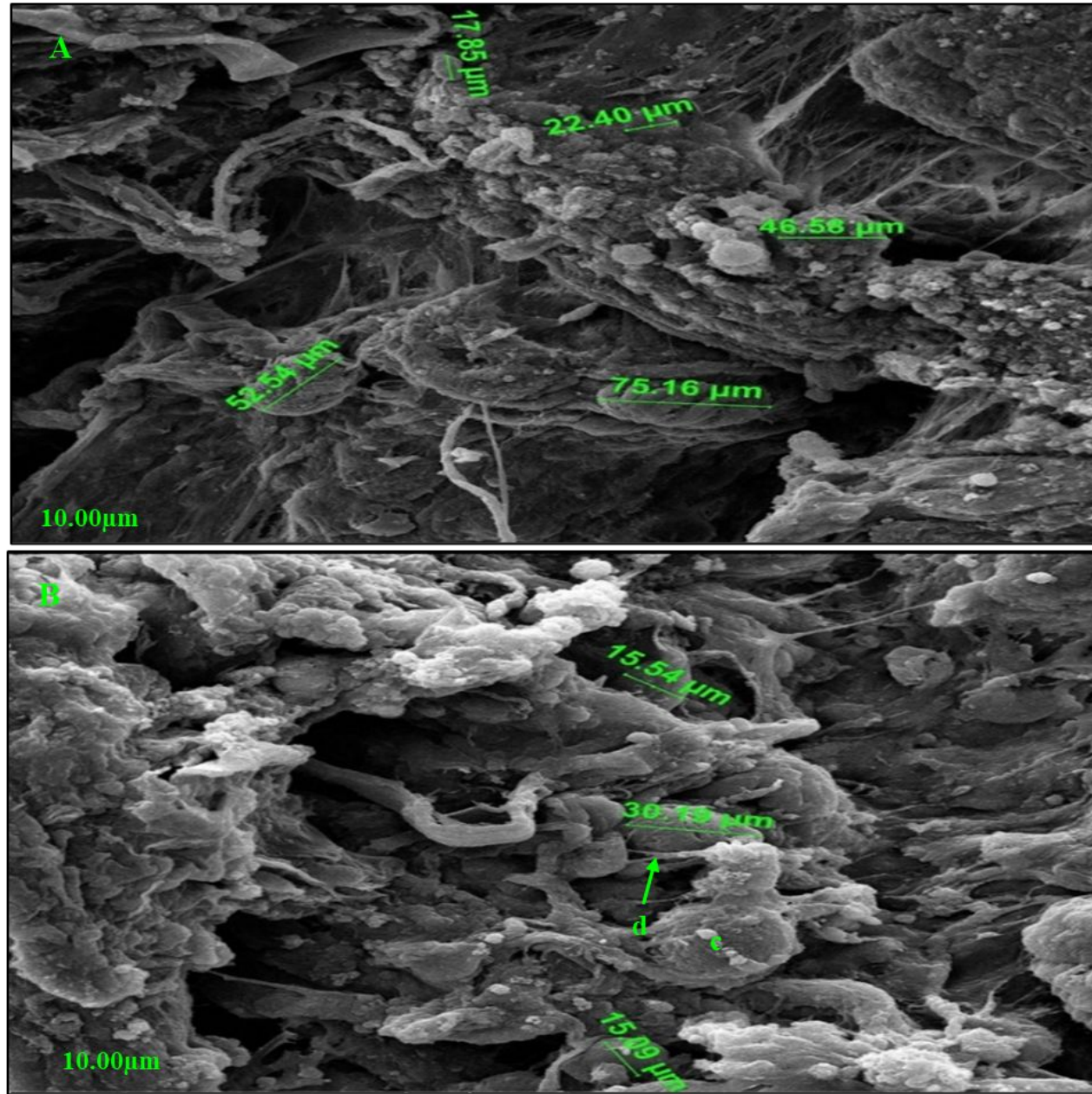


Figure 12. Scanning Electron Microscope images of different size salivary gland cells; *H. orientalis* (A) and *L. paluda* (B). (c) cell, (d) duct.

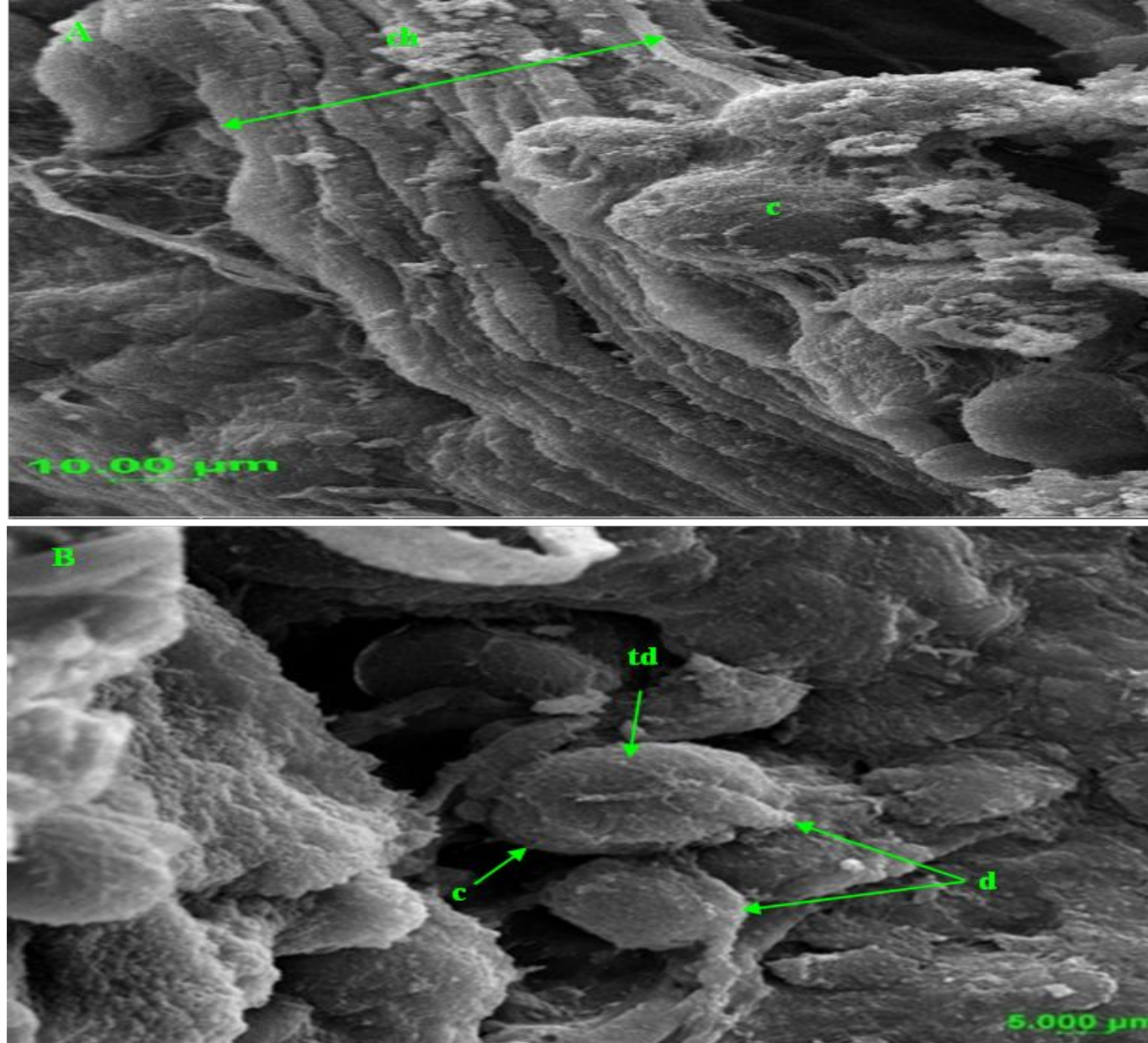


Figure 11. SEM of salivary gland cells; (A) *H.orientalis* (B) *L. paluda*. Thin duct (td).

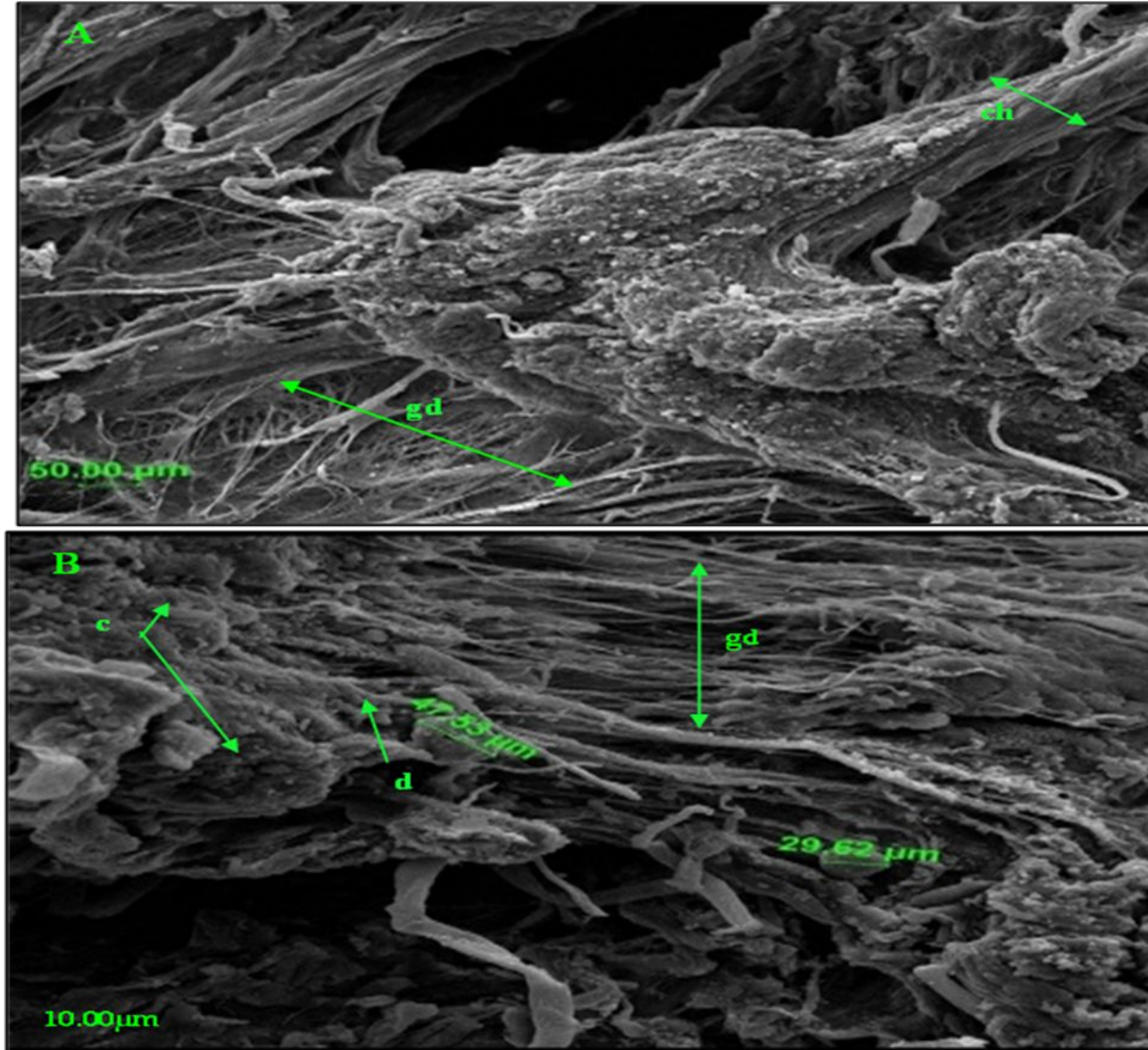


Figure 15. SEM of salivary gland cells and network of duct;
(A) *H. orientalis* and (B) *L. paluda* (gd) group of ducts.

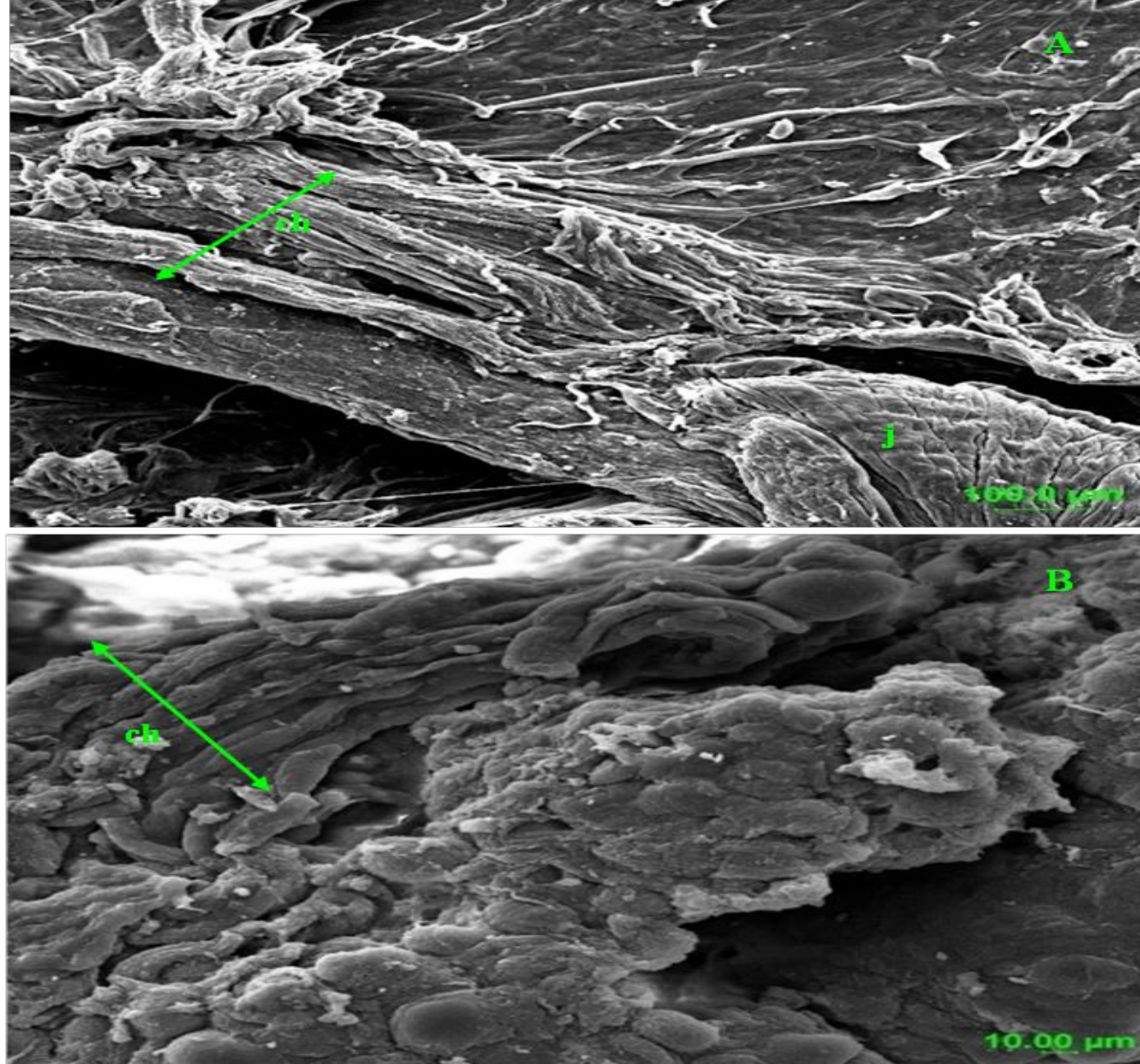


Figure 14 SEM of salivary gland cells ;(A)*H.Orientalis* and (B)*L.paluda*.
(ch)bundle channels, (j)jaw.

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Any Question?



Thank you!

