

## Scanning Electron Microscopic Study of Nymph and Adult Stages of *Haematopinus Quadripertusus*

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### Abstract

*Haematopinus quadripertusus* is one of the ectoparasites that can affect cattle. Entire life cycle of *Haematopinus quadripertusus* occur in the host's body. This study was conducted to determine the differences in ultrastructural characters between nymph and adult stage of *Haematopinus quadripertusus*. Samples were identified based on their morphology using Scanning Electron Microscope (SEM). Results were analyzed descriptively. *Haematopinus quadripertusus* adult stage has fully developed gonopod whereas nymph has undeveloped gonopod.

**Key words:** cattle, haematopinus, parasite, SEM.

*Haematopinus quadripertusus* was reported as a parasite in cattle in tropical and sub-tropical regions (Scofield *et al.*, 2012). *Haematopinus quadripertusus* is the sucking louse species that affect cattle. Infestation of *Haematopinus quadripertusus* in large number of livestock causes itching, weight loss, irritation, discomfort, decreased milk production and decreased quality of livestock production (Lasisi *et al.*, 2010).

### Materials and Methods

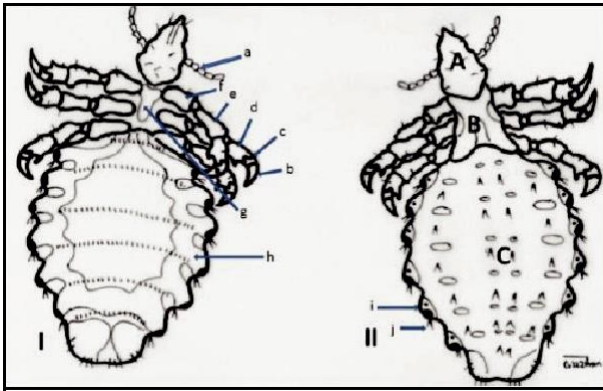
Nymph and adult stage samples of *Haematopinus quadripertusus* were put into 2 ml microtubes containing absolute ethanol separately and labeled. Morphological identification with macroscopic observations using binocular microscop (4 x 10), fitted with Lucida camera

drawing the shadow of sample objects using pencil on HVS paper which was then moved to tracing paper. Identification of the ultrastructural morphology with SEM method was carried out at the ventral anterior end, pleural, and ventral posterior end. The SEM process at the Zoology Research Center, Indonesian Institute of Sciences (LIPI), Cibinong, observed using SEM JEOL JSM-5310LV.

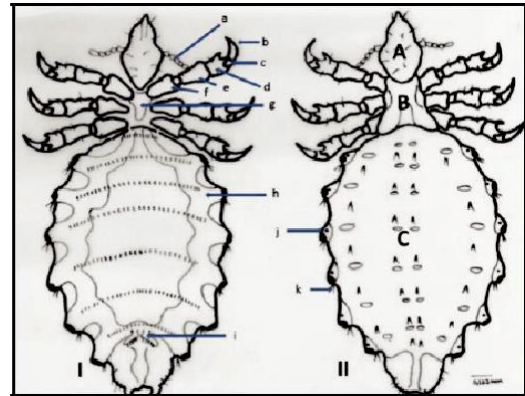
### Results and Discussion

Nymphs and adult stage of *Haematopinus quadripertusus* samples were found in cattle suffering from pediculosis (phthiriasis). Infestation of *Haematopinus quadripertusus* was found in hairy tail tip, around the ear, and perineum and the eggs were found attached to the hairs. The nymph stage has black color characteristics, divided into 3 parts (head, thorax, and abdomen), flat shaped dorsoventral, thorax is not segmented, the mouth is located in the anterior part of the head with a piercing sucking appendages, flat antenna comprising 5 segments, without eyes, and wings, segmented abdomen, rounded paratergite with spiraculum, and 2 setae on the posterior part, the respiratory tract (abdominal trachea trunks) is clearly observed. It has 3 pairs of legs, each leg is divided into 4 segments (coxa, femur, tibia, tarsus) with claws (Fig 1). Adult stage has almost similar characteristics as the nymph stage, greyish in color, the head is smaller than thorax with a narrow and tapered shape and has long narrow gonopods (Fig 2). Nymph stage has an average body length of 2.86 mm whereas adult has an average body length of 4.37 mm. The differences of gonopod form

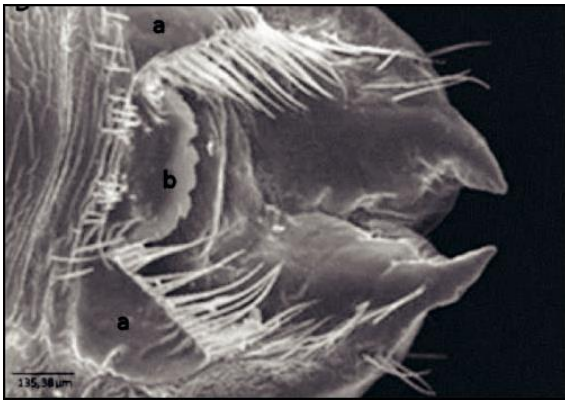
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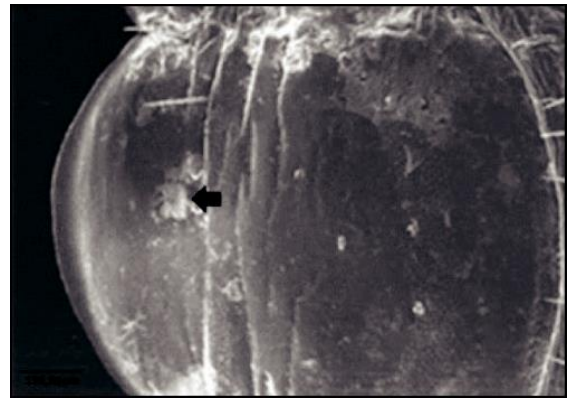
**Fig 1.** Nymph of *Haematopinus quadripertusus* : I. Ventral (a. antenna, b. claw, c. tarsus, d. tibia, e. femur, f. coxa, g. sterna plate, h. abdominal tracheae trunks, i. gonopod); II. Dorsal (A. caput, B. thorax, C. abdomen, i. paratergite, j. setae). Scale bar: 0.222 mm.



**Fig 2.** The adult of *Haematopinus quadripertusus* : I. Ventral (a. antenna, b. claw, c. tarsus, d. tibia, e. femur, f. coxa, g. sterna plate, h. abdominal tracheae trunks, i. gonopod); II. Dorsal (A. Caput, B. Thorax, C. Abdomen, j. paratergite, k. setae). Scale Bar: 0.222 mm.



**Fig 3.** Ultrastructure of posterior ventral adult stage of *Haematopinus quadripertusus*: a. developed gonopod b. subgenital plate median. Scale bar: 135.38  $\mu$ m.



**Fig 4.** Ultrastructure of ventral posterior nymph of *Haematopinus quadripertusus*: undeveloped gonopod (arrow). Scale bar: 135.38  $\mu$ m.

was very clear in the nymph and adult stage. Gonopod is an external part of the reproductive organs of *Haematopinus quadripertusus*. The nymph has undeveloped gonopod, hence their sex could not be identified.

Abdomen ultrastructure of pleural disk part of nymph and adult stage has rounded paratergite with spiraculum in the end part of each segment. Two setae hairs in the lateral part of abdominal segment. Adult females have an elongated and constricted gonopod. Posterior ventral part of adult lice has gonopod and subrectangular subgenital plate is medianly located with hollow in the central part (Fig 3), whereas ultrastructure of nymph stage undeveloped gonopod shapes (Fig 4). According to Meleney and Kim (1974), *Haematopinus quadripertusus* has long narrow gonopod and

subrectangular subgenital plate in the median plane.

Meleney and Kim (loc.cit), reported that the adult *Haematopinus quadripertusus* consists a suction tube, para tergite rounding with 2 setae hairs in the posterior part, long constricted shape of gonopod and subrectangular subgenital plate was in the median. A previous study using SEM measure the whole length of different instars were ranged from 150 - 350  $\mu$ m  $\pm$  0.7, but the genitalia was smaller than an adult on *Haematopinus asini* (Attia et al., 2018). *H. tuberculatus* was diagnosed by thorax plate which was rectangular with the presence of anterior process on either side. The length of the male was 3.5-4 mm and the female was 4.5-5 mm (Al-Lahaibi and Al-Tae, 2019). SEM study in this research revealed that adult stage

of *Haematopinus quadripertusus* has developed gonopod in the posterior ventral part, whereas nymph has undeveloped gonopod.

### Summary

Scanning Electron Microscope (SEM) method can be used to determine *Haematopinus quadripertusus* nymph and adult stage based on the ultrastructure of gonopod.

### References

Al-Lahaibi, B. Y., and Al-Tae, A. F. (2019) Detection of some species of lice and ticks infestation on local buffalo in Mosul city. *Iraqi J. Vet. Sci.* **32**(2): 43-50.  
Attia, M. M. (2018) Micromorphological studies of adult stages of *Haematopinus asini* (Equine sucking lice; Phthiraptera:

Haematopiniidae) with its eggs from donkeys *Equus asinus*. *J. Entomol. Zool. Stud.* **6**(2): 3062-3068.

Lasisi, O. T., Eyarefe, O. D., dan Adejinmi, J. O. (2010) Anaemia and Mortality in Calves Caused by the Short-Nosed Sucking Louse (*Haematopinus eurysternus*) (Nitzsch) in Ibadan. *Niger. Vet. J.* **31** (4): 295-299.

Meleney, W.P. and Kim K. C. (1974) A Comparative study of cattle-infesting *Haematopinus* with redescription of *H. quadripertusus* Fahrenholz, 1916 (Anoplura: Haematopiniidae)\*. *J. Parasitol.* **60** (3): 507-522.

Scofield, A, Campos, K. F, Melo da Silva A, M, Oliveira C, H, S, Barbosa, J. D, and Goes-Cavalcante G. (2012) Infestation by *Haematopinus quadripertusus* on cattle in São Domingos do Capim, state of Pará, Brazil. *Rev. Bras. Parasitol. Vet, Jaboticabal.* **21**(3): 315-318.

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## Effect of Tadpole Serum on Thyroid Hormones and Cytotoxic T-Cell Activity in Wistar Rats: A Model of Skin Cancer

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### Abstract

A total of 20 male Wistar rats were used in this study and randomly divided into five treatment groups i.e. (C-) were injected subcutaneously with saline solution; (C+; D1; D2; D3) groups were injected subcutaneously with 20 mg/Kg BW *Dimethylbenz(a)anthracene* (DMBA) and tadpole serum (0; 0.27; 0.71; 1.06 ml/rats/day), respectively. Treatments were continued for a month. Serum samples were quantified with IMMULITE® 2000 kit and skin organ analyzed by immunohistochemistry staining. The results showed that the dose of D2 effective for triiodo-

thyronine (T<sub>3</sub>) and cytotoxic T-cell expression; and the dose of D3 effective for thyroxine (T<sub>4</sub>) and thyroid-stimulating hormone (TSH).

**Key words:** Tadpole serum, thyroid hormones, cytotoxic T-cell, skin cancer.

Cancer can be triggered by an imbalance between pro-apoptotic, anti-apoptotic and caspase (Wong, 2011). Apoptosis is mediated by cytotoxic T-cell stimulated by interferon- $\gamma$  (IFN- $\gamma$ ) through the perforin or granzyme pathway (Elmore, 2007) and thyroxine (T<sub>4</sub>) (Alamino *et al.*, 2015). Apoptosis occurs in tadpole (*Rana catesbeiana*) to induce a complete metamorphosis mediated by the T<sub>4</sub> and triiodo-

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