

Chaetotaxy of three nymphal instars of an ischnoceran louse, *Aegypocercus perspicuus* (Phthiraptera: Insecta)

G. P. Agarwal¹, Aftab Ahmad², Gaurav Arya², Renu Saxena³, Arjumand Nisar² and A. K. Saxena^{2*}

¹Ex-Head, Department of Zoology, Banaras Hindu University, Banaras, (U.P.), INDIA

Present Address: 168, Deshbandhu Apartments, Kalkaji, New Delhi, INDIA

²Department of Zoology, Govt. Raza P. G. College, Rampur (U.P.), INDIA

³Department of Zoology, B.S.A. College, Mathura (U.P.), INDIA

*Correspondence author. E-mail: akscsir@rediffmail.com

Abstract : The present study on three nymphal instars of *Aegypocercus perspicuus* indicated that these differ from each other not only in size, abdominal segmentation, chitinization but also in the number of setae occurring on head, thorax and abdomen. The study also supplements information regarding the morphological features and chaetotaxy of three nymphal instars of *A. perspicuus*, occurring on *Neophron percnopterus*. The diagnostic features of three nymphal instars have also been discussed.

Keywords: *Aegypocercus*, Chaetotaxy, Chewing lice, Ischnocera, Phthiraptera

INTRODUCTION

Three nymphal instars of avian Phthiraptera resemble to each other to a considerable extent (except the size). Hence, the differentiation between the instars is a challenging task. Few workers have casually discussed the morphological features of the nymphal instars of certain species while describing their biology. However, Clay (1958), Modrejska and Zlotorzycza (1987) and Mey (1994) have made specific attempts to provide information on the nymphal chaetotaxy of few avian lice. Since then, few more phthirapterists (Lonc and Modrezweska, 1986, 1989; Page *et al.*, 1995; Price and Hallenthal, 1996; Saxena *et al.*, 1998 and 2000; Smith, 2000; Cicchino and Castro, 2002 and Slike *et al.*, 2006) have provided further information on the nymphal chaetotaxy. Present paper provides supplements regarding the chaetotaxy of three nymphal instars of *Aegypocercus perspicuus*, occurring on *Neophron percnopterus*.

MATERIALS AND METHODS

Nymphal instars of *A. perspicuus* were treated with 20% KOH "24 hrs", washed thrice (in water), passed through 10% acetic acid, dehydrated (ethanol series), cleared (clove oil) and mounted (Canada Balsom) and subjected to microscopy.

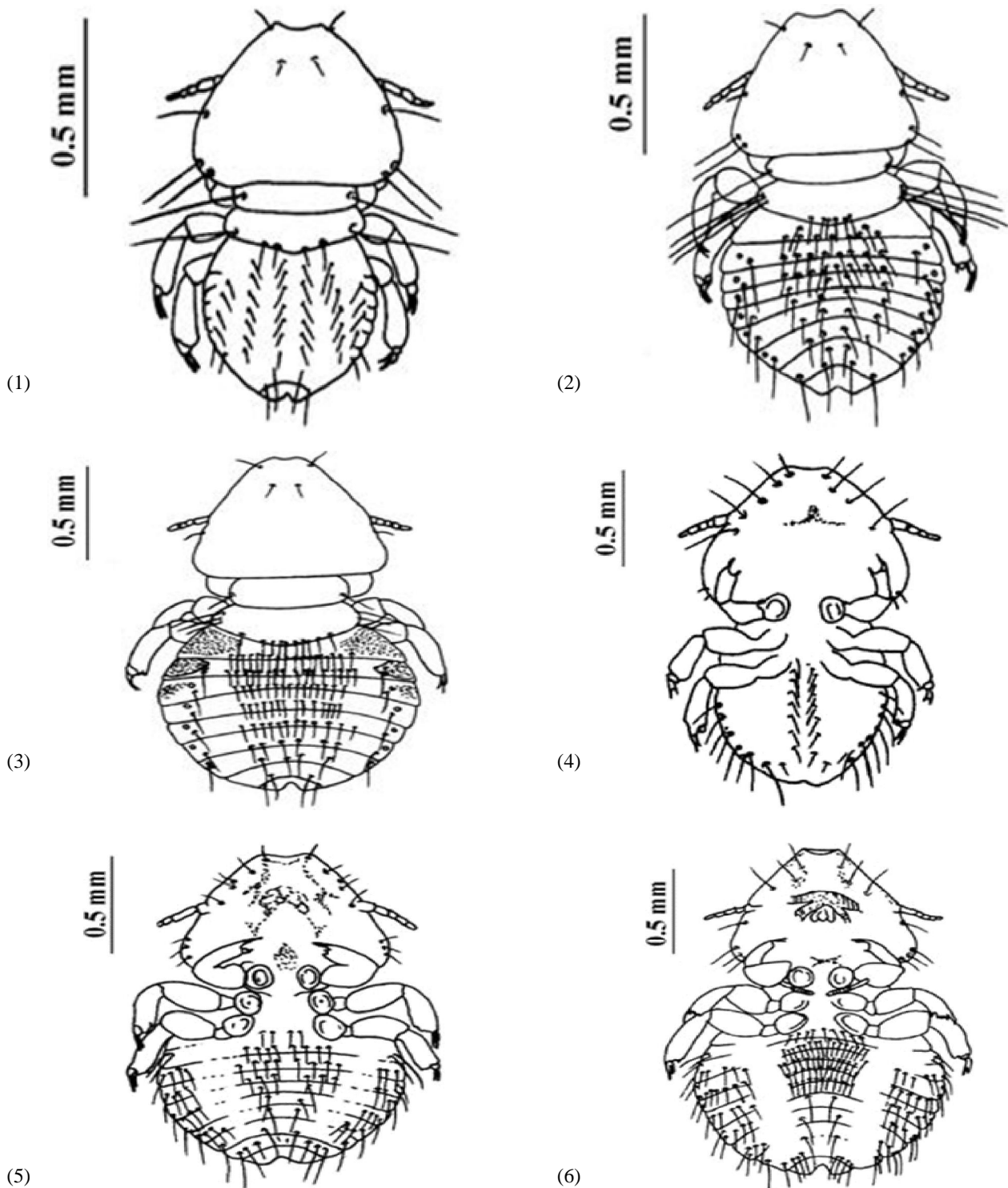
RESULTS

First instar nymph (Tables 1 and 2, Figs. 1 and 4): The first instar nymph is opaque white in colour and measures 1.1 mm in length and 0.6 mm in breadth. It possesses a prominent head, a short thorax and a relatively small

abdomen. The head is broader than long, somewhat triangular in shape, and its lateral margins are more rounded than in the succeeding instars. The pre-antennal region is shorter than the post-antennal region and is slightly concave at its anterior end. The small conic hardly project beyond the lateral margins. The post-antennal region is wider behind the eyes, but is rounded along the temporal margins. Each eye is provided with an ocular seta. The antennae are filiform, five segmented, in which the proximal segments are longer than the others. The cutting edges of the mandibles are brown and pigmented. Hypopharynx is poorly developed, and only a faint gular plate is distinguishable. The arrangement of setae on the head corresponds to that in the adult but the setae are comparatively longer.

The thorax is smaller than the head, both in length and breadth (Fig. 1). The pro-thorax is slightly smaller than the ptero-thorax and its posterior margin is almost straight, while the posterior margin of pterothorax is slightly concave. The legs consist of the three usual parts and are well developed, the first pair is smaller than the others.

The rounded abdomen is slightly smaller than the head (Figs 1 and 3). The abdomen appears to consist of ten segments only because the original eleven segmental conditions have been reduced to this number as a result of the fusion of segments I and II. Segmentation on the dorsal side is visible up to segment VIII, but the suture is present laterally only. There is no sign of segmentation between segments IX and X but there is clear indication of a terminal segment which has been interpreted as



Figs.1-3. Dorsal aspect of *A. perspicuus*: (1). First instar nymph, (2). Second instar nymph, (3). Third instar nymph.4-6. Ventral aspect of *A. perspicuus* (4). First instar nymph, (5). Second instar nymph, (6). Third instar nymph

Third instar nymph (Tables 1 and 2, Figs. 3 and 6): In general characters it resembles the second instar nymph and measures 1.90 mm in length and 1.1 mm in breadth. Pigmentation increases in the head and thorax is now clearly evident in the abdomen. The chaetotaxy of the nymph shows an increase (Figs. 3 and 6) The head has become triangular in shape the mandible

darker and prominent. The hypopharynx and gular plate are well differentiated. The prothorax remains the same in shape and chaetotaxy, but the pterothorax shows further increase in the concavity of its posterior margin and in the number of setae. The articulating sclerites of the first and second pairs of legs become darker and harder. The abdomen has become elliptical and dark brown areas

have appeared on the dorsal side along the lateral margin of segments II – IV. Segmentation is clearly visible. Segments IX and X is now completely fused as the suture present in the second instar nymph has disappeared (Fig. 3). The chaetotaxy and body measurements of third instar nymph are given in Table 1 and 2.

DISCUSSION

Survey of literature reveals that three nymphal instars of avian lice differ mainly in the dimension of body parts and number of setae (Clay, 1958; Lonc and Modrejewska 1986 and 1989; Page *et al.*, 1995; Saxena *et al.*, 1998; Smith, 2000; Cicchino and Castro, 2002 and Silke, 2006; Modrejewska and Złotorzycka, 1987). In few species the nymphal instars can be identified by the modification of setae. Gradual appearance of new setae and darkening of sclerites in nymphs have been noted by the workers. The diagnosis of nymphal instar through the progression of chaetotaxy has been recommended by Clay (1958). The second instar nymph of *A. perspicuus* can be differentiated from first instar on the basis of nature of head (lateral margins straighter, hypopharynx darker and discernible gular plate), thorax (posterior margins more concave), segmentation of abdomen (which is more clearer and a faint suture appears between segment IX and X) and increased number of tergal, sternal and pleural setae. Likewise, the third instar nymph of *A. perspicuus* can be separated from second instar on account of nature of head (more triangular, prominent mandibles, well differentiated gular plate and hypopharynx), prothorax (increased concavity of posterior margin), abdominal segmentation (segment IX and X fused) and increased number of tergal, sternal and pleural setae.

ACKNOWLEDGMENTS

The authors are thankful to the Principal, Govt. Raza P. G. College, Rampur for providing laboratory facilities.

REFERENCES

- Cicchino, A.C. and Castro, D. C. (2002). Nymphal stages of *Abrocomophaga hellenthalii* (Phthiraptera: Gyropidae), a parasite of *Octodon degus* (Rodentia, Octodontidae). *Iheringia, Serie Zoologia Porto Alegre*, 92(4): 19-24.
- Clay, T. (1958). Revisions of Mallophaga genera *Degeeriella* from the Falconiformes. *Bulletin of British Museum Natural History on Entomology (London)*, 7: 123-207.
- Lonc, E. and Modrejewska, M. (1986). An attempt to identification of nymphal instars of biting lice (Mallophaga) using discriminant function. *Bulletin entomologique de pologne. Tom*, 56:631-640.
- Lonc, E. and Modrejewska, M. (1989). Growth rules applied to the stage identification of nymphal instars of some mallophagan species (Phthiraptera). *Deutsch Entomology*, 36:121-126.
- Mey, E. (1994). Beziehungen Zwischen larvemorphologie und systematik der adulti bei den vogel-Ischnozeren (Insecta, Phthiraptera, Ischnocera). *Mitteilungen aus dem Zoologischen Museum, Berlin*, 70: 3-84.
- Modrejewska, M. and Złotorzycka, J. (1987). Studies on morphology of nymphs of selected Amblycera and Ischnocera (Mallophaga). *Polskie Pismo Entomologiczne*, 57:657-672.
- Page, R. D. M., Price, R.D. and Hallenthal, R.A. (1995). Phylogeny of *Geomydoecus* and *Thomodoecus* pocket gopher lice (Phthiraptera : Trichodectidae) inferred from cladistic analysis of adult first instar morphology. *Systematic Entomology*, 20: 129-143.
- Price, R. D. and Hellenthal, R. A. (1996). Taxonomic importance of first instar chewing lice (Phthiraptera: Philoterpidae) from neotropical antbirds and Giant eaters (Aves: Passeriformes). *Journal of Kansas Entomological Society*, 69: 346-356.
- Saxena, A. K., Surman, Singh, S. K. and Kumar, A. (1998). Description of life history stages of poultry shaft louse, *Menopon gallinae* (Phthiraptera: Amblycera, Menoponidae). *Rudolstadter naturhistorische Schriften*, 9: 81-85.
- Saxena, A. K., Singh, S.K., Surman, Kumar, A. and Badola, S. (2000). SEM studies on the microtopography of eggs of four pigeon lice (Phthiraptera, Insecta). *Rivista di Parasitologia*, XVII (LX1) N3: 351-358.
- Silke, K., Michael, O. and Ragnar, K. (2006). Identification of larval instars of the Phthiraptera Ectoparasite *Campanulotes bidentatus compar.* (Burmeister, 1838) by the setal patterns. *Deutsch entomology Z*, 53: 86-90.
- Smith, V.S. (2000). Basal ischnoceran louse phylogeny (Phthiraptera: Ischnocera: Goniodidae and Heptapsogasteridae). *Systematic Entomology*, 25: 73-94.