

A Case Study of Body Louse *Pediculus humanus corporis* (Anoplura: Pediculidae) Infestation Found on a Homeless Person in Okayama, Japan

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ABSTRACT. A human case of body louse (Anoplura: Pediculidae) infestation found in Okayama City, Japan is reported. The patient was a 44-year-old male, a homeless person around Okayama Railroad Station. On February 9th, 1998, the patient suddenly fell down senseless on the ground nearby the west gate of the Station, and was sent to Kawasaki Hospital Division of our school. The patient was diagnosed as having splenolysis and immediately admitted to the hospital.

The following day of admission, a numerous number of crawling minute insects were found in underwears of the patient. The minute insects were identified as adult and nymphal stages of human body louse, *Pediculus humanus corporis* De Geer, 1778 from morphological features and behavioral characteristics. The body lice were not found on head hair of the patient, and neither dermatological damage nor conspicuous change of systemic symptom caused by the body louse infestation was recognized. The body lice found on the patient were completely controlled by incineration of the clothes.

Key words: body louse infestation — *Pediculus humanus corporis* — homeless person — Anoplura — Okayama City

The human body louse (*Pediculus humanus corporis* De Geer, 1778), once a great vogue in Japan around the Second World War, had almost disappeared within several years of postwar period by use of insecticides, DDT and γ -BHC.¹⁻³⁾ The body louse infestation has however been again occurring among homeless persons frequently in recent years. This problem now becomes momentous from medical and public health points of view, because of the body louse is still existed nearly everywhere in the world and often communicates various kinds of microbial diseases to man.

In this paper, a human case of the infestation with body louse found on a homeless person in Okayama City, Japan is described together with some photomicrographs of the species.

CASE NOTE

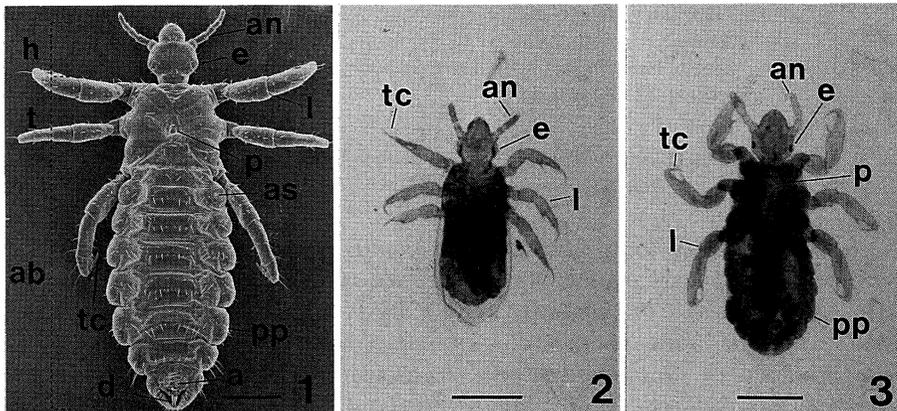
The patient (T. F.) was a 44-year-old male, a homeless person around Okayama JR Railroad Station, Japan. On February 9th, 1998, the patient suddenly fell down senseless on the ground nearby the west gate of the Station

for some unaccountable reason, and he was hastily sent to Kawasaki Hospital Division of our school. The patient was diagnosed as having splenolysis and immediately admitted to Department of Surgery of the hospital. The following day of admission, a numerous number of crawling creatures, minute insects, were incidentally discovered in underwears of the patient. The minute insects were then collected from his clothes and sent to our laboratory for taxonomical examination. The received insects seemed to be the parasitic lice to man from external appearances.

On gross inspection of the patient, neither dermatological damage nor conspicuous change of systemic symptom derived principally from the louse infestation was recognized on his body. The crawling lice were not found on head hair of the patient.

MORPHOLOGICAL ASPECTS OF THE LICE

A number of lice were mounted in a Gum-chloral solution as whole mount preparation and studied in detail with a light microscope. The adult lice were also studied with a Hitachi S-570 scanning electron microscope (SEM) after prepared by an ordinary technique. On light microscopic and SEM observations the specimens were identified as adult and nymphal stages of human body louse, *Pediculus humanus corporis* De Geer, 1778 based on morphological features of head, thorax and abdomen, and behavioral characteristics.



Figs 1-3. Whole body of the adult and nymphal stages of *Pediculus humanus corporis* removed from underwears of the patient, dorsal view (bars=0.5 mm)

Fig 1. SEM picture of an adult male

Fig 2. A 1st-instar nymph soon after hatching from egg, mounted specimen

Fig 3. A 2nd-instar nymph, mounted specimen

a : anus, ad : abdomen, an : antenna, as : abdominal spiracle, d : dilator, e : eye, h : head, l : leg, p : pit, pp : paratergal plate, t : thorax, tc : tarsal claw

Three developing stages (both sexes of the adult, the 1st- and the 2nd-instar nymphs) of the louse were found. Whole body of the adult male and nymphal stages are shown in Figs 1-3. The male body studied measured about 3.0 mm in length except antenna and 1.0 mm in maximum width (Fig 1). The female body was slightly bigger than the male. The head segment was almost angular

in form and had a pair of short 5-jointed antennae, and a pair of simple lateral eyes which situated just behind the antennae. Three fused thoracic segments (prothorax, mesothorax and metathorax) were trapezoidal in form, and each segment bore a pair of short legs with a single tarsal claw on the tip. The abdomen is elliptical in form and divided into 9 segments. The paratergal plates were present on each lateral side of the abdominal segments, and 6 pairs of abdominal spiracles existed on segment 3 to 8. Terminal segment of the abdomen differed significantly in male and female. The terminal segment of male appeared to be roundly protruded with a dilator (penile organ) on its dorsal surface (Fig 1), while that of the female appeared to be branched.

The 1st-instar nymphs immediately after hatching from the eggs measured about 1.3 mm in length excluding antenna and 0.5 mm in maximum width (Fig 2). The 1st-instar nymphs had a pair of 3-jointed antennae on the head segment. Segmentation of the abdomen was still not found, and consequently the paratergal plates were not existed on both lateral sides of the abdominal segments.

The 2nd-instar nymphs, on the other hand, measured about 1.8 mm in length and 0.7 mm in maximum width (Fig 3). The external morphological features of the 2nd-instar nymphs were very similar to that of the adult except for a pair of 3-jointed antennae on the head segment, and the development of abdominal spiracles was not completed. The 3rd-instar nymph and egg stages were not identified.

The body lice found on the patient were completely controlled by incineration of the infested clothes, and the patient was discharged from the hospital 2 months after admission.

DISCUSSION

The louse is a wingless insect and a blood-sucking ectoparasites of mammals having characteristic of host specificity. Over 3000 species have been recorded in the world, of which a greater number are mallophagan parasites of birds.⁴⁾ The parasitic louse found on humans belonging to the Order Anoplura (sucking lice) are known in 3 species, i. e., *Pediculus humanus capitis* De Geer, 1778 (head louse), *Pediculus humanus corporis* De Geer, 1778 (body or clothing louse) and *Phthirus pubis* Linnaeus, 1758 (crab or pubic louse).⁵⁾ The genus name of the last species has often been spelt *Phthirus*, but the original spelling as *Pthirus* is correct.^{5,6)}

In general, the individuals of both head and body louse are extremely difficult to distinguish each other by their external appearance, although some differences in morphological aspect between these 2 species have been described by Kaneko (1989)²⁾ and Busvine (1978,³⁾ 1980⁷⁾). One of the principal differences between head and body lice are in the number of aeropyles (air holes) on operculum of the egg. Kadosaka and Kaneko (1985)⁸⁾ and Kaneko(1989)²⁾ have mentioned that the number of aeropyles on the operculum is 7 to 11 (av. 8.7) in head louse eggs, and 12 to 21 (av. 15.4) in body louse eggs. The external appearance of adult male of body louse by SEM (Fig 1) showed strong resemblance to that of the head louse, *Pediculus humanus capitis* reported by Hatsushika et al(1983)⁹⁾, and almost no morphological differences between both head and body lice was found externally.

It is well known fact that the most important difference between those 2 species lies in their habits on the host body. The head louse is found only in head hair of man and cements its eggs on head hair shafts whereas the body louse lives on clothing of the infested host and lays its eggs on the clothing fibers and visits the body only to feed.^{5,10} The crab louse, also known as the agent of sexually transmitted disease (STD), infests on pubic areas particularly but also the armpits and more rarely other hairy parts of the body, such as mustache, beard and eyelashes.¹¹ The crab louse is usually transmitted by sexual contact. The above 3 species of human louse are still distributed widely in the world, and the body louse infestation is limited to unhygienic people unable to change their clothes, usually because of possessing only one set.⁵

The body louse develops into adult form by incomplete metamorphosis passing through 4 developing stages: egg, 1st- to 3rd-instar nymphs as illustrated by Keilin and Nuttall (1930).¹² All stages of body louse live most of their time on the clothing, especially on the inside of the underwears next to the skin.⁷ The average duration of each developing individual is 7 to 10 days at 29-30°C in the egg stage, 8 to 9 days in the 3 nymphal stages when kept on the skin all day, and an average life of adult is 34 ± 13 days in females and 31 ± 12 days in males, respectively. A female of body louse lays 270 to 300 eggs on average during whole life at a rate of 9 to 10 eggs per day.⁴ As noted above, the individuals of both sexes of the adult and all nymphal stages suck blood of infested patient. The body louse is not only a blood sucker but a transmitter of microbial diseases to man, namely classical epidemic typhus by rickettsial infection (*Rickettsia prowazekii*), louse-borne relapsing fever by spirochaetal infection (*Borrelia recurrentis*), trench fever by rickettsial infection (*Rochalimaea quintana*), and other infectious diseases by bacteria and viruses.^{4,5,11}

Fortunately, the infectious diseases mentioned above have so far not been recognized in Japan. In recent years, however, the number of homeless persons has been increasing under the influence of economic recession. Majority of homeless persons now reside around buildings of railway station, public facility and park, and persons infested with body louse are definitely increasing among them. More recently, human cases of the body louse infestation found in Kanto District in Japan have been reported by Baba and Suzuki (1999a, b).^{13,14} They have reported one case of pediculosis corporis found from an adult male tramp living around a railway station. Shinonaga (1999)¹⁵ has also demonstrated another case of *Pediculus humanus corporis* infestation found from a man who has been visiting a hospital regularly for further schizophrenia therapy. According to their description, there are no clinical signs relating to body louse-borne disease in these patients, although a large number of crawling individuals, fecal masses and eggs of body louse were found on underwears. On the skin examination of these patients, however, many vestiges of the sever scratch and body louse bite were present nearly everywhere on their body surface.¹³⁻¹⁵

In Okayama Prefecture besides the present report one case has recently been reported by Masuda (1998)¹⁶ of a homeless 60-year-old male. According to his abstract, the patient did not take a bath for 2 months, and there existed a large number of erythematous papules, scales, crusts, exanthemata and

pigmentations on skin surface of the entire body.

No marked dermatological change was observed in the patient of our present study. As mentioned above, the body louse infestation is much in vogue among homeless persons in the recent years in Japan. Assuming that the human infestation with *Pediculus humanus corporis* is now usually found only on homeless persons in developed countries,⁵⁾ the prevalence of body louse infestation in Japan will undoubtedly become more stronger, together with increase of homeless persons in near future.

At present, epidemic typhus and louse-borne relapsing fever caused by the body louse infestation are still a considerable problem in Africa, Central Asia and South America.¹⁷⁾ Therefore, it is conceivable that those diseases may have a high prevalence potential in Japan. Accordingly, the authors would like to stress that the particular attention should constantly be paid to the louse-borne disease. In addition, we urge establishment of the health care system to homeless persons in our country.

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