

**A Case Study of Cutaneous Myiasis Caused by
Dermatobia hominis (Linnaeus Jr., 1781)
(Diptera : Cuterebridae) Found in Hiroshima, Japan**

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ABSTRACT. An imported case of cutaneous myiasis caused by *Dermatobia hominis* found in Hiroshima City, Japan is reported. A patient was a 23-year-old Brazilian male who was employed by a Japanese enterprise. The patient returned to Brazil for several weeks and returned to Japan on January 22th, 2000. During his stay in Brazil, he suffered insect bite on the left lower thigh around January 10th. On January 27th, the patient noticed a furuncle-like inflammatory nodule on the bite site with strong pain. Then he consulted at dermatology clinic and was diagnosed as having bee stings. Following day the patient noticed a moving white body protruding through an orifice of the nodule, and he removed a larva (maggot) from the nodule by himself. The maggot was 12.5 mm in length and 6.0 mm in diameter with a pair of oral hooks at anterior end of the body, with 8 prominent double transverse rows of stout dark spines existed on the body surface. By insectological examination the present maggot is identified as a 2nd stage larva of *Dermatobia hominis* (Linnaeus Jr, 1781) based on morphological characteristics.

To our best knowledge, the present report is a 24th finding of imported cutaneous myiasis by *Dermatobia hominis* in Japan.

Key words : cutaneous myiasis — dermatobiasis — *Dermatobia hominis* — imported case — Diptera

Myiasis is common parasitic disease resulting from invasion to organs and tissues of human and other vertebrates by fly larvae (maggots) of the Order Diptera. *Dermatobia hominis* is the most consequential fly producing cutaneous myiasis in humans, although appearance is quite rare in Japan. The adult of *D. hominis* has been found so far only in damp forests, scrubs and valleys of tropical America from Mexico to Paraguay and northern Argentina.^{1,2)} Recently, human case of cutaneous myiasis by *D. hominis* seemed increasing in Japan. A majority of victims discovered in Japan were exclusively limited to people returned from Central and South Americas, and a small number were Japanese-Brazilian tourists. More Japanese-Brazilian workers and oversea tourists suggest more *D. hominis* myiasis in Japan.

In the present paper, an imported case of cutaneous myiasis caused by *D.*

hominis found in Hiroshima City, Japan is described together with bibliographical consideration.

CASE NOTE

The patient was a 23-year-old Brazilian male residing in Hiroshima City who was employed by a Japanese enterprise. He returned to his home town in São Paulo State, Brazil for a short stay for several weeks and returned to Japan on January 22th, 2000. He was bitten on the skin surface of left lower thigh by a blood-sucking insect during his stay in Brazil around January 10th, although he did not notice any symptoms at the time. On January 27th, the patient consulted at dermatology clinic in Hiroshima City because a bitten region was further aggravated rapidly with strong pain. The lesion of his left thigh was diagnosed as having bee stings. Although internal and external medications were prescribed, his condition did not improve.

On the following day, the patient felt unpleasant thing 'moving under the lesion' and noticed a moving white body protruding through an orifice of the nodule, and a maggot was removed from the lesion by his fingers. He then visited Department of Dermatology, Hiroshima University School of Medicine carrying the removed maggot. By the cutaneous findings, the lesion is confined at the left lower thigh (Fig 1) with erythematous swelling, size of a pigeon egg. And then an elastic, furuncle-like inflammatory nodule of about 12 mm in diameter was found in a middle portion of the swelling. The nodule had a small fistula of 1.5 mm in diameter on the tip (Fig 2), from which a small amount of bloody fluid was discharged intermittently. Any pus was not recognized in the fluid.

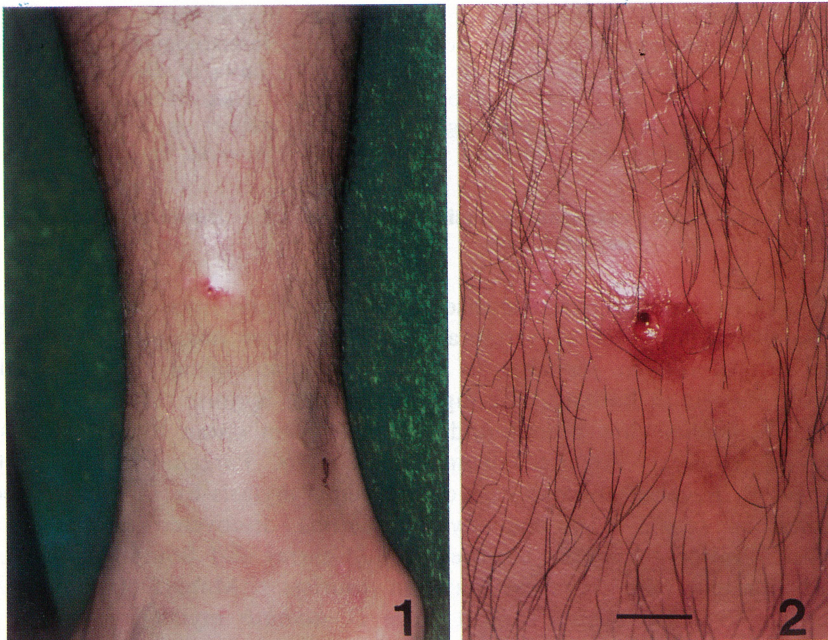


Fig 1. Clinical photograph showing the cutaneous lesion produced by *Dermatobia hominis* larva on the skin surface of left lower thigh of the patient.

Fig 2. High magnification of the cutaneous lesion in Fig 1 (scale bar=1.0 cm)

Examination of the maggot revealed that a segmented ovoid organism was small in size and cream-yellow in color. The maggot measured 12.5 mm in length and 6.0 mm in maximum diameter (Fig 3, 4). The caudal portion of the maggot was accidentally lost during the process of extirpation from the nodule, thus posterior spiracles were not examined. A pair of sickle-shaped oral hooks located at the most anterior end of cephalopharyngeal skeletons protruded from mouth opening (Fig 4), and 8 prominent double transverse rows of stout dark spines existed on the body surface of the maggot (Fig 3, 4). The spines of the maggot body were small in size, and their external appearance was subtly different from those of the mature 3rd stage larva of *D. hominis* (Fig 5).

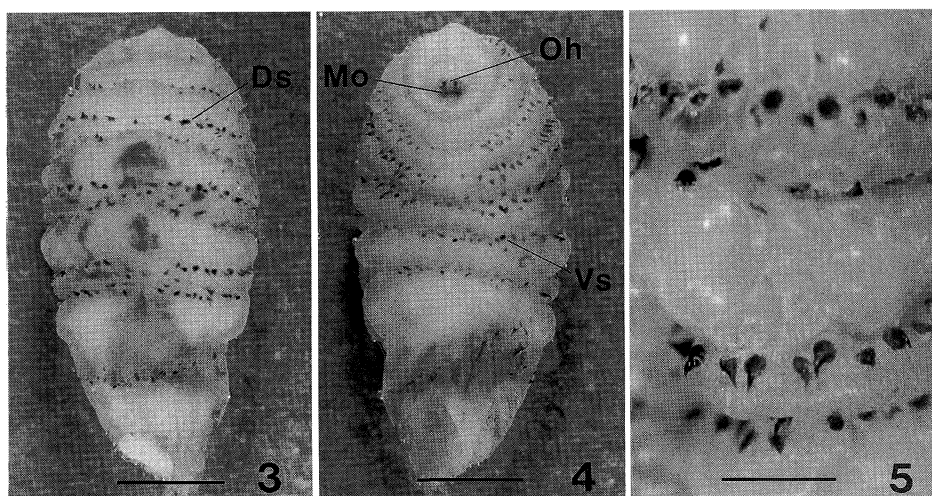


Fig 3, 4. Second instar larva of *D. hominis* removed from the cutaneous nodule of the patient, dorsal view (3) and ventral view (4) (scale bars=3.0 mm)

Ds: dorsal spines, Mo: mouth opening, Oh: oral hooks, Vs: ventral spines

Fig 5. High magnification of dorsal spines on the body surface of *D. hominis* larva (scale bar=1.0 mm)

Judging from the morphological features, the present maggot was identified as a 2nd stage larva of human botfly, *Dermatobia hominis* (Linnaeus Jr, 1781) belonging to the Family Cuterebridae. The patient had no significant abnormality in systemic symptoms except for the furuncle-like inflammatory nodule is present. The skin lesion of the patient completely healed within several days by usual drug treatment after removal of the maggot.

DISCUSSION

The term "myiasis" has in general been applied to invasion of live organs and tissues of man and other vertebrates by larvae of dipterous flies. The human myiasis can be divided clinically into 3 major categories according to the regions of body affected; (1) intestinal, (2) urinary and (3) cutaneous infestations.²⁾ As mentioned above, the larvae of *Dermatobia hominis* induce cutaneous myiasis in humans. Adult individuals of *D. hominis* are widely distributed in damp forests, scrubs and valleys of Central and South America,

TABLE 1. Human cases of infestation with *Dermatobia hominis* larvae reported in Japan

Cases	Patients		Localities infested	Lesion sites	Infested larvae		Authors (year)
	ages	sexes			stages	numbers	
1	70	M	Brazil	Left arm Left chest	3	1	Kagei <i>et al</i> (1974) ⁶⁾
2 [§]	71	M	Brazil	Head	3	1	Fujiwara <i>et al</i> (1977) ⁷⁾
3	26	F	Mexico	Right upper eyelid	1, 1, 1, 2	4	Ohtaki <i>et al</i> (1978) ⁸⁾
4	60	F	Paraguay	Left waist		1	Kato <i>et al</i> (1983) ⁹⁾
5 [§]	20	M	Mexico	Chest		1	Nakahara <i>et al</i> (1988) ¹⁰⁾
6	51	M	Paraguay	Shoulder Left upper arm		1	Taki <i>et al</i> (1989) ¹¹⁾
7	22	F	Brazil	Right toe	2	1	Maeda <i>et al</i> (1990) ¹²⁾
8	23	M	Brazil	Left thigh	3	1	Yamagami <i>et al</i> (1990) ¹³⁾
9	46	F	Honduras	Left lower abdomen	2	1	Harada <i>et al</i> (1991) ¹⁴⁾
10	36	M	Belize	Left thigh		1	Watanabe <i>et al</i> (1992) ¹⁵⁾
11	72	F	Costa Rica	Left thigh	2	1	Arai <i>et al</i> (1994) ¹⁶⁾
12 ^{§§}	21	M	Brazil	Right upper arm	2	1	Matsumura <i>et al</i> (1995) ¹⁷⁾
13	62	M	Brazil	Left axilla Chest	3	1	Nagaji <i>et al</i> (1995) ¹⁸⁾
14 [*]	1	M	Brazil	Head	2, 3	2] Shinonaga <i>et al</i> (1996) ¹⁹⁾
15 [*]	28	M	Brazil	Left foot	2	1	
16 ^{§§}	29	M	Brazil	Right calf	3	1	
17	29	M	Bolivia	Left wrist	2	1	Tamemasa <i>et al</i> (1998) ²¹⁾
18	29	M	Belize	Left upper arm		1	Kawano <i>et al</i> (1998) ²²⁾
19 [*]	63	M	Brazil	Left elbow		1	Sugiyama <i>et al</i> (1999) ²³⁾
20	34	F	Brazil	Right shoulder		1	Suzuki <i>et al</i> (2000) ²⁴⁾
21	38	M	Brazil	Head	2, 2, 2, 2, 3	5	Nishiura <i>et al</i> (2000) ²⁵⁾
22	7	F	Brazil	Left post auricula	3	1	Mamiya <i>et al</i> (2000) ²⁶⁾
23	36	M	Paraguay	Right thigh	3	1	Takeuchi <i>et al</i> (2000) ²⁷⁾
24 ^{**}	23	M	Brazil	Left lower thigh	2	1	Present report

* Japanese Brazilian tourists

** A Brazilian

§ Infested larva spontaneously crawled out of the nodule.

§§ Infested larva removed from the nodule by the patient.

M=male, F=female

where their larvae could cause cutaneous myiasis in many domestic, and certain wild animals namely cattle, swine, cat, dog, horse, mule, sheep, goat, monkey, and even avian. The human infestations with *D. hominis* larvae are common.^{2,3)}

Although *D. hominis* develops into adult by complete metamorphosis passing through 3 developing stages — those are, egg, larva and pupa within an extremely interesting life cycle. The adult fly is about 15 mm in length with a prominent triangular head, small antennae, a narrow thoracoabdominal junction, a bluish-black thorax, a diamond-shaped bluish abdomen and orange colored legs.²⁾ The fully grown adult female does not directly lay eggs on the host skin, but captures another blood-sucking insects, mainly day-flying

mosquitos or biting flies and glues 15 to 20 eggs on the exoskeletal surface of their abdomens.³⁾

The fully developed embryo within the egg hatches in response to elevated body temperature when a carrier insect feeds on warm-blooded animals. The club-shaped larva after hatching (1st instar) penetrates rapidly into the host skin through the puncture made by biting carrier or hair follicle using oral hooks within 5 to 10 minutes. The cutaneous penetration of the larva usually gives no pain to the victims. The larvae which did not immediately penetrate into the host skin can survive up to 20 days on the exposed skin.⁴⁾ With the progressive development, the infested larva forms a furunculoid nodule in the hypodermis in which the larva changes the form into flask-shape (2nd instar) and then fusiform (3rd instar) in a short period of time having with 2 moltings. The nodule communicates outside through a small opening situated on the tip.

During the cutaneous stage the most caudal end of the larva can be immediately contacted with air, and the larva breathes through its tail via posterior spiracles. The infested larva feeds on tissue exudate of the host and matures through 3 stages from 1st to 3rd instars within 5 to 12 weeks. The larva is known to never migrate within the host skin. The fully grown 3rd stage larva then ruptures the nodule by enlarging an aperture and falls onto the ground to pupate in the soil, and finally develops into an adult form. In general, pupal duration is 14 to 24 days and the adult fly survives for 8 to 9 days.⁵⁾

As shown in Table 1, first case of imported cutaneous myiasis caused by *D. hominis* in Japan was reported by Kagei *et al* (1974).⁶⁾ It was a 70-year-old male in Kanagawa Prefecture who had resided near the São Paulo, Brazil as a forest and farm worker from 1972 to 1974. Since then, 22 more imported cases have so far been recorded by several investigators.⁷⁻²⁷⁾ Hence, a total number of the patients infested with *D. hominis* larvae in Japan thus far is 24, including the present case.

All of the victims indicated in Table 1 were in ages in 1 to 72 years old, and the highest incidence occurred in 20th, followed by 30th, 60th, 70th, and children under 10. Regarding sex distribution, males were almost twice as many as females. The past 23 victims of *D. hominis* infestation in our country were Japanese who were returned from tropical regions except 3 cases of Japanese-Brazilian tourists.^{19,23)} Although the patients found in Japan resulted by brief stay in the endemic areas of tropical America, the infested localities of those 23 patients were: 13 in Brazil,^{6,7,12,13,17-20,23-26)} 3 in Paraguay,^{9,11,27)} 2 each in Mexico^{8,10)} and Belize,^{15,22)} one each in Honduras,¹⁴⁾ Costa Rica¹⁶⁾ and Bolivia²¹⁾ as shown in Table 1. Thus, it is safe to say that the patients were infested with *D. hominis* larvae in Brazil which was most agreeable to the present report.

It is well known that *D. hominis* larvae penetrate beneath the skin of various sites of human body, and the furunculoid lesion by infested larvae especially occurs on exposed sites of the skin.²⁾ Although the furunculoid nodule caused by *D. hominis* in the present patient was found on the skin surface of left lower thigh, the infested sites in the past 23 cases were everywhere of the body; namely arm,^{6,11,17,22,23)} thigh,^{13,15,16,27)} head,^{7,19,25)} chest,^{6,10,18)} shoulder,^{11,24)} and others in order of occurrence (Table 1).

While examining Table 1, numbers of the *D. hominis* larvae removed from

the 23 patients ranged from 1 to 5, and the infestation by single larva predominated. The developmental stages of the *D. hominis* larvae obtained from the past 16 patients were 1st to 3rd instars, however, 2nd instar larva was a majority including our case. Shinonaga *et al* (1996)¹⁹⁾ have stated that the infesting larvae were commonly removed at either 2nd or early stage of 3rd instar giving strong pain to the victims caused by activated larva in the nodule, although the infested larvae may grow to 3rd instar in Japanese cases. Therefore, the possibility exists that the individuals of early stage of 3rd instar can be included as 3rd stage larvae in the past 9 cases (Table 1). Shinonaga *et al* (1996)¹⁹⁾ have also emphasized that there were no morphological difference between 2nd and 3rd instar larvae except for the number of slits in the posterior spiracles, and mature 3rd instar larvae were more than 20 mm in length with the heavy spines somewhat reduced. The posterior spiracles of the present larva could not be examined. The body length of the present larva was 12.5 mm with smaller spines as compared with that of the mature 3rd instar larva (Fig 3, 5).

Usually recommended treatment for human dermatobiasis consists of removal of infested larva and systemic administration of antibiotics to control secondary infection.²⁸⁾ Otherwise, several methods for treatment for infested larva have been suggested. According to Gordon *et al* (1995),⁵⁾ toxic substances, such as tobacco juice²⁹⁾ or ash can be applied to the surface of the lesion to kill the larva.

Furthermore, several kinds of the substances, viz., pork fat, bacon,³⁰⁾ beeswax, chewing gum,³¹⁾ liquid paraffin and sticking plaster have been attempted on the lesion to asphyxiate the larva by occluding breathing apparatus. Pork fat is a substance most commonly used by South American natives.²⁸⁾ As indicated in Table 1, on the other hand, the infested larva crawled out of the nodule spontaneously^{7,10)} in 2 cases (Cases 2 and 5). The larva was removed from the nodule by the patient^{17,20)} in another 2 cases (Cases 12 and 16). These cases are common in Japanese.

Taking into account the increasing phenomena of returned people from Brazil and tourists from endemic areas of tropical America, continuous increase of infestation by *D. hominis* larvae is expected in Japan in the near future. The diagnosis of cutaneous nodule caused by *D. hominis* larva is extremely difficult to distinguish from other one, if Japanese physicians have no experience or knowledge on this disease. Therefore special attention should constantly be paid to this type of imported infestation from other regions.

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REFERENCES

- 1) James MT: The flies that cause myiasis in man. U S Dept Agr Misc Pub 631:1-175, 1947

- 2) Belding DL: Textbook of Parasitology. 3rd ed, New York, Appleton-Century-Crofts. 1965, pp 918-921
- 3) Hardwood RF, James MT: Entomology in Human and Animal Health. 7th ed, New York, Macmillan Publishing. 1979, pp 296-318
- 4) Hubler WR Jr, Rudolph AH, Dougherty EF: Dermal myiasis. Arch Dermatol **110**: 109-110, 1974
- 5) Gordon PM, Hepburn NC, Williams AE, Bunney MH: Cutaneous myiasis due to *Dermatobia hominis*: a report of six cases. Br J Dermatol **132**: 811-814, 1995
- 6) Kagei N, Hirama T, Ogawa Y, Toga N, Takaoka M, Kurahashi H: A cutaneous myiasis causing by *Dermatobia hominis* (Cuterebridae; Diptera) imported from Brazil. Jap J Trop Med Hyg **2**: 181-185, 1974
- 7) Fujiwara N, Ito Y, Yanagisawa T: Cutaneous myiasis due to *Dermatobia hominis*. Jpn J Trop Med Hyg **5**: 30, 1977 (in Japanese)
- 8) Ohtaki N, Kobayashi M, Sato Y, Kano R, Terada Y: A case of cutaneous myiasis due to *Dermatobia hominis* imported from Mexico. rinsho derma **20**: 461-464, 1978 (in Japanese)
- 9) Kato M, Kuroda M, Ishida O, Honma K, Imura H: A case of cutaneous myiasis due to *Dermatobia hominis*. rinsho derma **25**: 291-294, 1983 (in Japanese)
- 10) Nakahara R, Katagiri K, Nishi K, Shimazaki T: A case of cutaneous myiasis due to *Dermatobia hominis* diagnosed in Saitama-Nishi Kyodo Hospital. Byotai-Seiri **51**: 23-27, 1988 (in Japanese)
- 11) Taki J, Kubo K, Oguchi M: A case of cutaneous myiasis due to *Dermatobia hominis*. Jpn J Clin Dermatol **43**: 429-432, 1989 (in Japanese)
- 12) Maeda R, Makita E, Segawa M, Shibuya T, Ogino M: A case of myiasis caused by *Dermatobia hominis*. Jpn J Trop Med Hyg **18**: 197-201, 1990 (in Japanese)
- 13) Yamagami S, Segawa Y, Saeki M, Yamada H, Yoshida M, Tezuka T: A case of cutaneous myiasis due to *Dermatobia hominis*. Skin Res **32**: 136-137, 1990 (in Japanese)
- 14) Harada M, Hashimoto K, Yano K: A case of cutaneous myiasis due to *Dermatobia hominis*. (The eighth case in Japan). Skin Res **33**: 487, 1991 (in Japanese)
- 15) Watanabe M, Aiba S: A case of cutaneous myiasis due to *Dermatobia hominis*. Jpn J Clin Dermatol **46**: 1039-1041, 1992 (in Japanese)
- 16) Arai T, Kyoba S, Furukawa T, Takesaki S, Ito Y: A case of cutaneous myiasis due to *Dermatobia hominis*. Jpn J Dermatol **104**: 152, 1994 (in Japanese)
- 17) Matsumura T, Nishioka E, Nagahama M, Washio F, Funasaka Y, Ichihashi M, Kato S: A case of cutaneous myiasis due to *Dermatobia hominis*. Clinical Parasitol **6**: 80-82, 1995 (in Japanese)
- 18) Nagaji J, Tsuda S, Kurose K, Karashima M, Nakama T, Miyasato M, Sasai Y, Yoneda Y: Furuncular cutaneous myiasis caused by *Dermatobia hominis* larvae following travel to Brazil. Jpn J Dermatol **105**: 486, 1995 (in Japanese)
- 19) Shinonaga S, Kawamoto F, Mizuno S, Akutagawa A, Hiraoka Y: Two cases of cutaneous myiasis due to *Dermatobia hominis* (Diptera, Cuterebridae) imported into Japan. Jpn J Parasitol **45**: 147-151, 1996
- 20) Taniguchi Y, Yamazaki S, Ando K, Shimizu M: Cutaneous myiasis due to *Dermatobia hominis* in Japan. J Dermatol **23**: 125-128, 1996
- 21) Tamemasa D, Kawai S, Yoshimura C, Horio T, Iseki M: A case of cutaneous myiasis due to *Dermatobia hominis* during travel to South America. Jpn J Dermatol **108**: 881-882, 1998 (in Japanese)
- 22) Kawano S, Otsuka Y, Etoh T: A case of cutaneous myiasis due to *Dermatobia hominis*. Hifubyo-Shinryo **20**: 707-710, 1988 (in Japanese)
- 23) Sugiyama N, Kamimoto A, Shinho H, Murata M, Araki S, Shinonaga S: A case of cutaneous myiasis due to *Dermatobia hominis* imported from Brazil. J Jap Assoc Rural Med **48**: 428, 1999 (in Japanese)
- 24) Suzuki K, Shimizu H, Baba S: Cutaneous myiasis due to *Dermatobia hominis*. rinsho derma **42**: 696-697, 2000 (in Japanese)
- 25) Nishiura S, Fukumoto S, Kando M: A case of cutaneous myiasis due to *Dermatobia hominis*. Nishinihon J Dermatol **62**: 414, 2000 (in Japanese)
- 26) Mamiya S, Kumagai T, Yoshida A, Hashiba M, Hondo J, Ohta N: A case of cutaneous myiasis due to *Dermatobia hominis* in a patient who travelled Brazil. Med Entomol Zool **51** (suppl.): 44, 2000 (in Japanese)
- 27) Takeuchi T, Kobayashi S, Nanngi N, Shinonaga S, Nakamura K: A case report of cutaneous myiasis due to *Dermatobia hominis* imported into Japan. Clin Parasitol **11**: 22-23, 2000 (in Japanese)

- 28) Arosemena R, Booth SA, Daniel Su WP: Cutaneous myiasis. *J Am Acad Dermatol* **28**: 254-256, 1993
- 29) Keech JP: *Dermatobia hominis* in Brazil. *J R Army Med Corps* **127**: 131-133, 1981
- 30) Bernhard JD: Bringing on the bacon for myiasis. *Lancet* **342**: 1377-1378, 1993
- 31) Sweet RD: A clinical occasion provided by a larva of *Dermatobia hominis*. *Br J Dermatol* **74**: 141-143, 1962