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https://doi.org/10.15017/7344053

出版情報：Sieboldia : acta biologica . 4 (3), pp.161-166, 1973-07-31. 九州大学教養部生物学教室
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THE BRACHYCEROUS FAMILY HILARIMORPHIDAE NEWLY RECORDED FROM JAPAN (Diptera)

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The Hilarimorphidae, a small brachycerous family, have a unique combination of morphological characters, and consist of only the type-genus, *Hilarimorpha* Shiner. This genus is distributed in Europe (two species) and North America (three species) but it is hitherto unrecorded from Japan.*

Recently I had a good opportunity to examine the insect collection of the Entomological Institute of Hokkaido University, and there I found a female specimen of *Hilarimorpha* which was collected at Yakushima, south of Kyushu, by Dr. T. Kumata. This specimen represents a distinct new species which is easily separable from the known species by its large size of body and entirely black coloration. The purpose of the present paper is to describe this new species, but it is desirable to give the generic diagnosis of *Hilarimorpha* because the Japanese dipterologists are not familiar with this genus. The morphological characters of this genus are as follows.

Much short-haired, brown or black flies superficially resembling small rhagionids, like *Ptiolina* and *Bolbomyia*. The new Japanese species looks like a dark-winged *Hilara*. Head: Compound eyes touching for a considerable distance on frons in male, widely separated in female; ocellar tubercle prominent and with 3 ocelli; face broad with shallow facial grooves running from anterior tentorial pits to near antennal sockets. Proboscis short, subequal in length to palpus, which is short-setose and 2-segmented. Antenna 3-segmented, 2 basal segments short, 3rd segment laterally compressed, moderately long and thick, thickest at middle; *style short, distinctly 2-segmented.* Thorax more or less humpbacked; mesoscutum sparsely short-

* *Hilarimorpha maculata* Matsumura, 1916 (Thousand insects of Japan, additamenta II: 356–357) was described from Honshu, Japan. This species belongs to the genus *Syneches* of Empididae. According to Dr. D. W. Webb, *Hilarimorpha orientalis* Frey, 1954 (Notulae entomologicae XXXIIII: 25) described from the Philippines does not belong to *Hilarimorpha*. Therefore true *Hilarimorpha* species has never been recorded from the Eastern Palaearctic and Oriental Regions.

haired; prothoracic basisternum separated from episternum (no precoxal bridge). Legs moderately long, slender, only short-haired and without strong bristles; tibiae without spurs; *empodium much degenerated, almost atrophied,* Wing moderately broad, alula more or less developed, axillary angle nearly 90°; C continuously around wing margin; Sc complete and ending in C, R_{4+5} long, so that R_4 and R_5 short, r-m crossvein (tip of 1st basal cell) lying close to forking point of M_{1+2}; M_{1+2} shorter than R_{4+5}, so forking point of M_1 and M_2 more basad than that of R_4 and R_5, *M_3 absent, discal cell absent* (no m-crossvein), cubital (anal) cell closed at or slightly before wing margin. Abdomen moderately long and clothed with very short hairs. Male genitalia having most of basic structures of Orthorrhaphous Brachycera; epandrium rather elongate, with flattened cerci; subanal plate developed; hypandrium disappearing, gonocoxites separated from each other by a midventral suture, posterior extremity of gonocoxite projecting, *gonostylus flexibly articulated with gonocoxite* much proximad of the projected portion; phallobase not much complicated. Female terminalia gradually tapering apically; 8th sternum incised posteriorly; cerci short and simple.

Because of its unique combination of the morphological characters the genus *Hilarimorpha* was belonged variously to Rhagionidae, Therevidae, Empididae, Bombyliidae and Hilarimorphidae by itself. Recently J. G. Chillcott (1963) assigned this genus to Rhagionidae, and proposed a group composed of *Hilarimorpha*, *Litoleptis*, *Austroleptis* and *Archicera* which he had inclined to consider as a natural group. His main reasons to propose the new group were the absence of M_3 (or entire coalescence of M_3 and M_4) and the two- or three-segmented antennal sryle which attaches at the tip of unringed third antennal segment. These two characters resulted from very simple degeneration from the plesiomorphic condition which is seen in Coenomyiidae and other genera of lower Brachycera, and similar degeneration is often seen in other related families, like Empididae, Bombyliidae, etc. On the other hand, there are considerable but important differences among the male genitalia of at least *Bolbomyia*, *Litoleptis* and *Hilarimorpha*. I consider that the resemblance of the two characters in these genera pointed out by Chillcott is not synapomorphy but a result of convergence and that the proposed group is not originated monophyletically from an ancestral group in lower Brachycera. Except for the absence of M_4 almost all the basic morphological characters of *Bolbomyia* are same as in Coenomyiidae or the most generalized rhagionid genera. This genus seems to be one of the offshoots from the ancestral group, from which the coenomyiid genera *Pseudoerinna*, *Glutops* and *Arthroceras*,* and at

* *Arthroceras* Williston is treated as a rhagionid genus by many authors. There is no fundamental difference between Rhagionidae and coenomyiid *Glutops* and *Pseudoerinna* except for the antennal flagellum. The antennae of *Arthroceras* are very similar to those of the above-mentioned two genera.

least Rhagionidae were derived. The genus *Litoleptis* is rather similar to *Ptiolina* in many characters including the male genitalia. *Hilarimorpha* seems to have no close relationships to either Coenomyiidae or *Ptiolina* and consequently has no direct relationship to *Bolbomyia* and *Litoleptis*. Concerning with Empididae, the male genitalia of this family devoid of such gonostylus of plesiomorphic condition as is movably articulated with gonocoxite retained in *Hilarimorpha* and many other lower Brachycera like Rhagionidae and Coenomyiidae. This character seems to be a sufficient reason to deny close relationship between Empididae and *Hilarimorpha*. As indicated by Bährmann (1960) and Collin (1961), if there is a living group which has the nearest kinship to *Hilarimorpha*, it is possibly found out in Bombyliidae.

Hilarimorpha nigra Saigusa, sp. nov.

(Fig. 1. Head; Fig. 2. Wing)

Large-sized black species easily distinguished from the known species by its entirely opaque black colour of body and legs, strongly infuscated wing and exceedingly large size of body. Known only from a unique female specimen collected at Yakushima.

♀. *Head* black in integument; its pollinosity blackish brown on frons and occiput, dark greyish brown on face, deep black on ocellar tubercle; compound eye black. Head 1.5 × as high as long and 1.5 × as broad as high. Vertex broad, deeply concave at dorsomedian portion, 1-2 minute hairs on lateral swellings of vertex; ocellar tubercle much raised, only slightly lower than wide and clothed with a few short hairs; frons broad, gradually narrowing towards antennal sockets, 3 × as wide as head at a level of the sockets, with a very shallow dorsomedian grooves and a pair of weak swellings outside antennal sockets, a row of minute black hairs along eye-margin. Face broad, widening ventrally, weakly concave on the whole except for the median portion which is weakly convex; anterior tentorial pit prominent, but no distinct epicranial suture running from it towards antennal sockets; face entirely bare. Occiput almost flat on dorsal 1/2, but very weakly concave on dorsomedian portion, slightly convex on ventral 1/2; area surrounding posterior tentorial pit concaved; occiput with minute hairs arranged in a row running close to eye-margin on dorsal portion of occiput, then gradually being apart from it on ventral 1/2. Compound eye rounded, somewhat narrower on ventral 1/2 than on dorsal 1/2. Cheeks well developed, only slightly lower than 1/3 of eye-height, and clothed with short hairs. Antenna 0.8 × as long as head, black except for yellow style; relative lengths of 3 antennal segments and 2 style segments 5:6:26:5:4. Both 1st and 2nd segments short but cylindrical, the latter with a few setulae above and beneath; 3rd segment strongly laterally compressed, thickest before middle, more gradually tapered api-

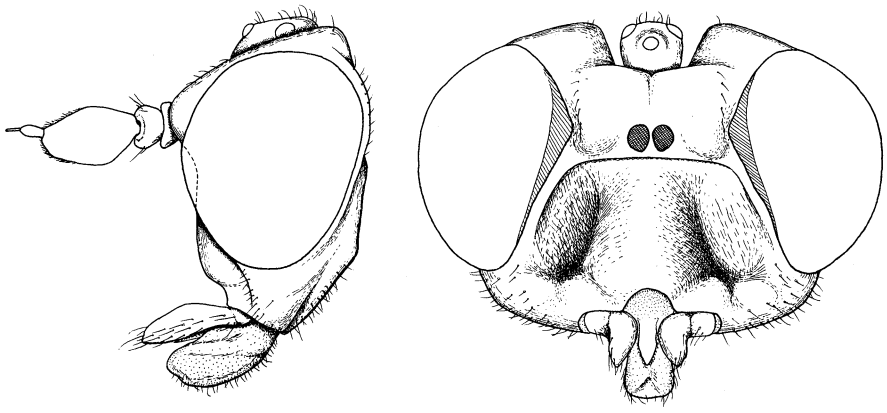

Fig. 1. Head of *Hilarimorpha nigra* Saigusa, sp. nov. A: Lateral aspect. B: Frontal aspect.

cally than basally, with its dorsal margin curved at the middle, and ventral margin almost evenly rounded, but most strongly produced ventrally before middle, pile on apical portion of the segment longish; antennal style 1/3 × as long as 3rd antennal segment, its basal segment much thicker than the apical one which has not a hair-like projection seen in many empidid genera. Proboscis black, 1.8 × as long as depth of cheek; labrum polished black, labella blackish and with short black hairs; palpus black, almost as long as proboscis, seemingly 2-segmented, basal segment short and short-haired apically, apical segment elongate fusiform, sparsely clothed with short black hairs.

Thorax much humpbacked and black. Mesonotum densely blackish brown pollinose, in some lights a pair of very faint, narrow, greyish stripes appearing on anterior 1/3 of mesoscutum; mesoscutum and scutellum evenly but rather sparsely covered with minute black hairs which are not arranged in rows; prescutellar portion almost bare. Thoracic pleura densely pollinose, its pollinosity more brownish than on notum; no hairs on pleura.

Legs moderately long and slender, entirely blackish brown including basal portions of tibiae ("knees" not paled), thinly blackish pollinose, only short black-haired. Front femur more or less thickened, middle

Table 1. Relative lengths of leg segments.

	Femur	Tibia	Tarsus				
			1	2	3	4	5
Front leg	50	61	30	10	8	6	10
Middle leg	57	71	31	11	9	6	10
Hind leg	68	81	35	14	10	7	10

femur evenly slender, hind femur weakly thickened towards tip; femora short-haired above, almost bare beneath except an anteroventral row of short setulae which are much shorter on middle 2/3. Tibiae and tarsi evenly slender and almost straight, with ventral pubescence weaker and shorter than dorsal pubescence; empodium degenerated. Relative lengths of leg segments (coxae and trochanters excluded) as in table 1.

Wing moderately broad, 2.7 × as long as broad (120 : 44), widest at middle, alula with rounded margin, axillary incision slightly acuter than 90°, axillary lobe well developed; wing strongly infuscated dark brown, basal 2/3 of cell Sc, central portions of cell M_2, M_4 and A_1 (axillary lobe) slightly paled, narrow area surrounded by a line connecting base of R_{4+5} and tip of Sc and that connecting base of R_{4+5} and tip of R_1 much strongly pigmented; veins dark brown. *Venation*: C surrounding entire wing margin; Sc ending middle of wing (63 : 120); Rs 1/3 × as long as R_1 (19 : 53) and very weak; R_{2+3} almost as long as R_1 (55 : 53); basal section of R_{4+5} (proximad of r-m crossvein) very short, 0.16 × as long as Rs (3 : 19); apical section of R_{4+5} 0.8 × as long as R_{2+3} (42 : 55); R_4 short and almost straight, 0.45 × as long as apical section of R_{4+5} (19 : 42); R_5 1.3 × as long as R_4 (25 : 19), weakly curved posteriorly after middle; r-m crossvein perpendicular to apical section of R_{4+5}, slightly longer than basal section of R_{4+5} (4 : 3); 1st basal cell extending near middle of wing (53 : 120); 2nd basal cell ending slightly beyond tip of 1st basal cell; M-stem weak, basal section of M_{1+2} very short, 0.5 × as long as r-m crossvein (2 : 4); apical section of M_{1+2} 3/4 × as long as apical section of R_{4+5} (31 : 42); M-fork rather abruptly divergent basally, then very gently divergent; M_1 slightly longer than apical section of M_{1+2} (33 : 31), M_2 2/3 × as long as M_1 (22 : 33); basal section of M_4 3 × as long as basal section of M_{1+2} (7 : 2); apical section of M_4 strong; m-cu crossvein as long as basal section of M_4; apical section of Cu_1 1.7 × as long as m-cu crossvein (12 : 7), coalesced with A_1 for a considerable length, so cubital (anal) cell

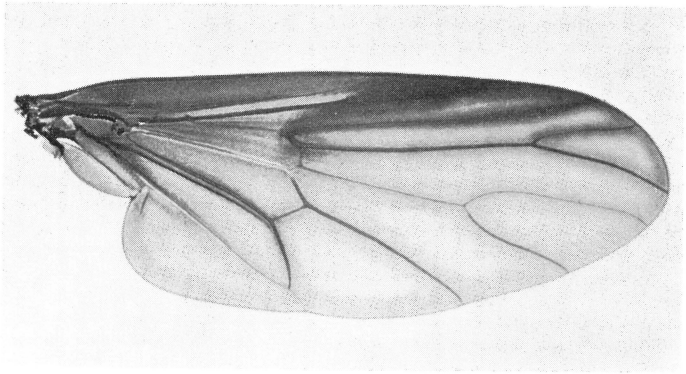

Fig. 2. Wing of *Hilarimorpha nigra* Saigusa, sp. nov.

ending before wing margin; Cu_1+A_1 0.4 × as long as apical section of Cu_1 (5 : 12). Halter blackish brown.

Abdomen blackish brown, covered with the pollinosity of same colour which is not so dense as on thorax, and clothed with very short, fine, black hairs; terga with polished black spots and short stripes which may be muscle-attachment. Apical abdominal segments gradually tapering posteriorly; 8th abdominal sternum slightly shorter than 7th sternum, strongly narrowing posteriorly beyond the middle, with its posterior portion 1/2 × as wide as anterior portion, and with a ventromedian slit 1/4 × as long as 8th sternum. Cercus very small, 1/3 × as long as 8th sternum, almost as long as broad, short-haired.

Length: Body 7.2 mm; wing 7.5 mm.

Distribution: Japan (Yakushima, south of Kyushu).

Holotype: ♀, Kosugidani, Yakushima (or Yaku Island), Kyushu, 7-10. vi. 1965 (T. Kumata), left wing mounted on a slide with balsam (preserved in the collection of the Entomological Institute, Hokkaido University, Sapporo, Japan).

Acknowledgements: I wish to express my cordial thanks to Professor C. Watanabe, Dr. S. Takagi and Dr. T. Kumata of Hokkaido University for their generosity giving me an opportunity to examine the dipteran collection of Hokkaido University. My thanks are also much due to Dr. D. W. Webb of Illinois Natural History Survey, U. S. A. who gave me some suggestions on this genus and lend me some specimens of the North American species of *Hilarimorpha*.