

Notes on Athericidae (Diptera)

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Abstract

Additional notes on the male genitalia of Athericidae are given. The status of the genera of Athericidae is discussed. *Atherix*- and *Suragina* species from North America and Mexico are also discussed. A new *Suragina* from Okinawa and Amami Oshima is described.

Introduction

This paper forms a sequel to NAGATOMI (1979a). Some comments are given to NAGATOMI (1979a, 1984a) on the male genitalia, to STUCKENBERG (1960, 1966, 1973, 1974, 1980) on the status of the genera of Athericidae, and to WEBB (1977, 1981) on *Atherix*- and *Suragina* species from North America and Mexico. There is a species of *Suragina* collected in Okinawa-hontô and Amami Oshima. It seems to be distinct from *Suragina yaeyamana* NAGATOMI, 1979 of the Yaeyama Islands (Ishigaki-jima and Iriomote-jima) and is here described as new to science.

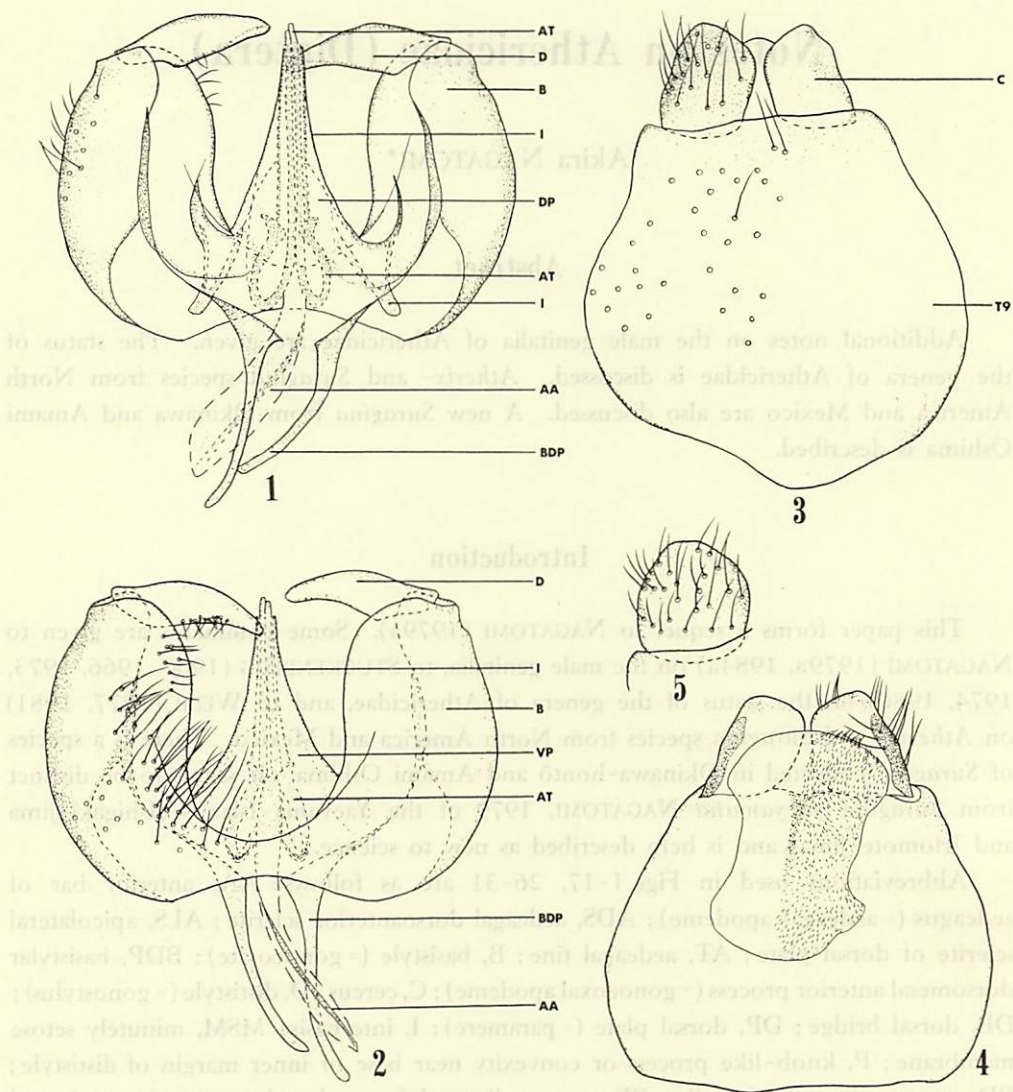
Abbreviations used in Figs. 1-17, 26-31 are as follows: AA, anterior bar of aedeagus (= aedeagal apodeme); ADS, aedeagal dorsoanterior sclerite; ALS, apicolateral sclerite of dorsal plate; AT, aedeagal tine; B, basistyle (= gonocoxite); BDP, basistylar dorsomesal anterior process (= gonocoxal apodeme); C, cercus; D, dististyle (= gonostylus); DB, dorsal bridge; DP, dorsal plate (= paramere); I, interbasis; MSM, minutely setose membrane; P, knob-like process or convexity near base of inner margin of dististyle; PD, process directed dorsally; PF, process directed forward and apparently originated from interbasis; PV, process directed ventrally and forming apex of interbasis; S10, sternum 10; T9, tergum 9; VP, ventral plate (= aedeagal guide).

I. Male genitalia of Athericidae

NAGATOMI (1979a, 1984a) described and illustrated the male genitalia of Athericidae based on *Atherix*, *Suragina*, *Atrichops*, and *Dasyomma*. Some misinterpretations must be corrected. The new material examined is as follows: *Dasyomma maculipennis* HARDY, 1920 from Tasmania; *Pachybates incompleta* (BEZZI, 1926) from South Africa; "*Atherix*" *kar* STUCKENBERG, 1960 from South Africa; *Ibisia marginata* (FABRICIUS, 1781) from

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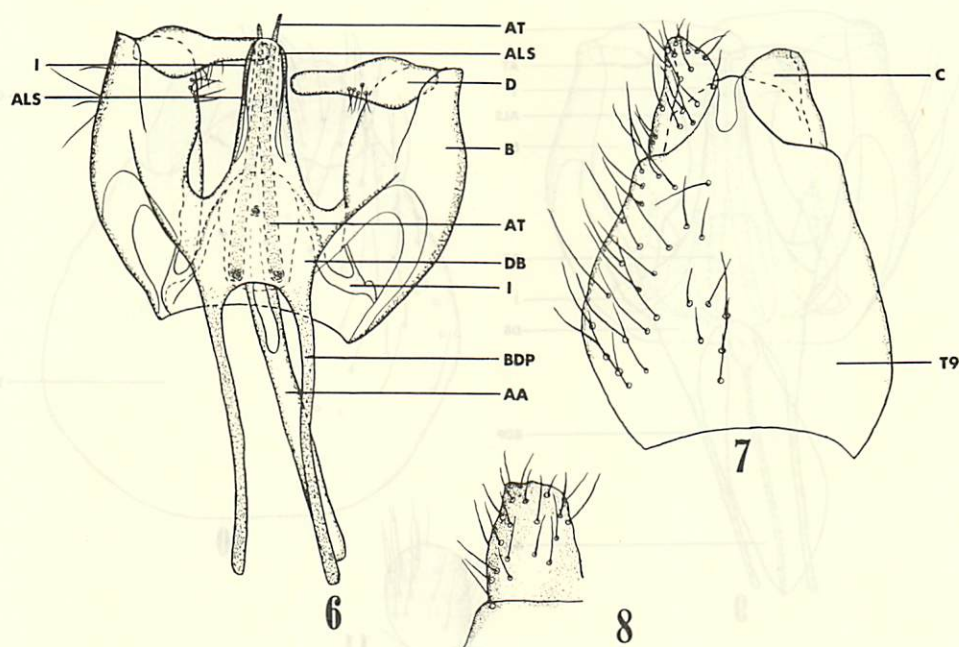


Figs. 1-5. Male genitalia of *Dasyomma maculipennis* HARDY, 1920.

1, 3, 5. Dorsal view. 2, 4. Ventral view. 5. Cercus.

Europe; *Suragina uruma* sp. n. from Japan (Okinawa and Amami Oshima). It must be noted that *kar* is unplaced in any known genus by STUCKENBERG (1980).

In *Atherix*, *Pachybates*, *Ibisia*, *Suragina*, "*Atherix*" *kar*, and *Atrichops*, there is a pair of elongate sclerites each of which is located behind or along the interbasis. This sclerite forms the apicolateral part of the dorsal plate (=paramere) (not the aedeagus in a strict sense). The dorsal and ventral plates (=paramere and aedeagal guide) are independent of the interbasis and their apical parts are narrower than the area between the interbases. It must be noted that the dorsal plate (except the apicolateral sclerite) is transparent and difficult to recognize. The ventral plate is easy to discriminate in *Atherix ibis* (Fig. 12), possible to discriminate in *Atherix basilica* (Fig. 13), but not



Figs. 6-8. Male genitalia of *Pachybates incompleta* (BEZZI, 1926), dorsal view.
8. Cercus.

possible to determine its outline (if present) in *Pachybates*, *Ibisia*, *Suragina*, "*Atherix*" *kar*, and *Atrichops* unless a minutely setose membrane (Fig. 28) is homologous with the ventral plate.

As to *Atherix ibis*, NAGATOMI (1979a: 166) wrote, "it is probable that.... and of the 3 elongate acute processes, 2 directed dorsally are also the part of aedeagus [=correctly dorsal plate]." But it is still uncertain whether 2 processes in question originate from dorsal plate or interbasis.

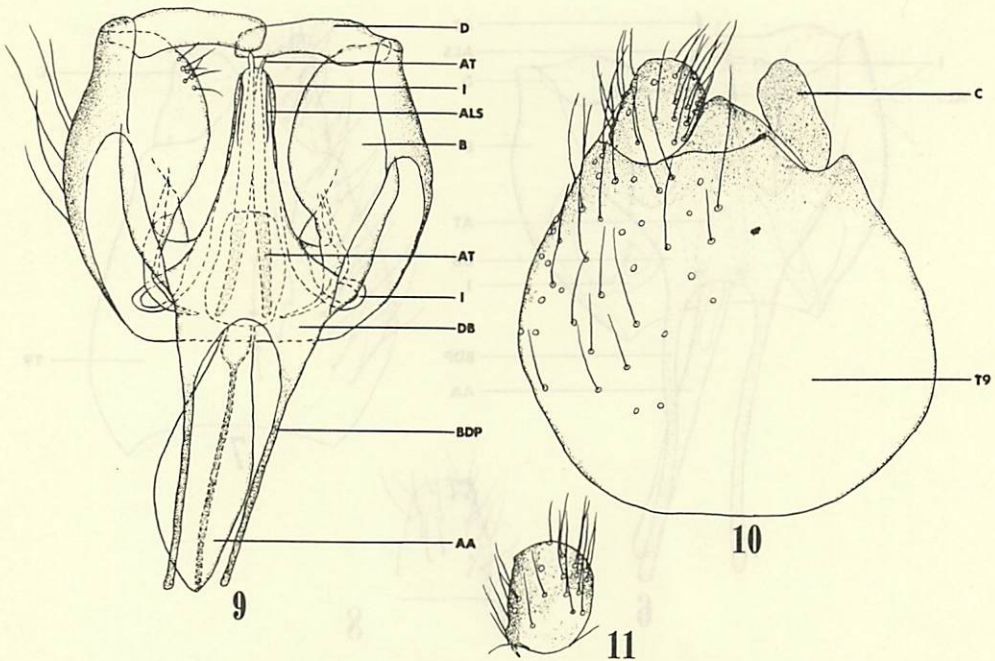
Whereas in *Dasyomma*, the dorsal and ventral plates are fused with the interbasis at the lateral margin and cover all over the area between interbases (as in *Tabanidae*). This state may be plesiomorphic.

A key is prepared in the forthcoming chapter in order to distinguish the genera of *Athericidae* based on male genitalia.

There may be a swelling on inner margin of dististyle in "*Atherix*" *kar* and *Pachybates braunsi* (see Fig. 71 in Stuckenberg, 1960) but this appears to be not homologous with those in *Ibisia* and *Suragina*. Further study may be necessary to ascertain this point.

The male genitalia of *Xeritha* is similar to *Pachybates* but may easily be distinguished from the latter by having the anterior bar of aedeagus and pair of basistylar dorsomesal anterior processes short (judging from Figs. 6-7 in STUCKENBERG, 1966).

The male genitalia of *Trichacantha* appears to be almost identical or very similar to those of *Pachybates* judging from Figs. 79-80 in STUCKENBERG (1960: 282). *Trichacantha* is "structurally very remarkable genus" (after OLDROYD, 1964: 113).



Figs. 9-11. Male genitalia of "*Atherix*" *kar* STUCKENBERG (1960), dorsal view. 11. Cercus.

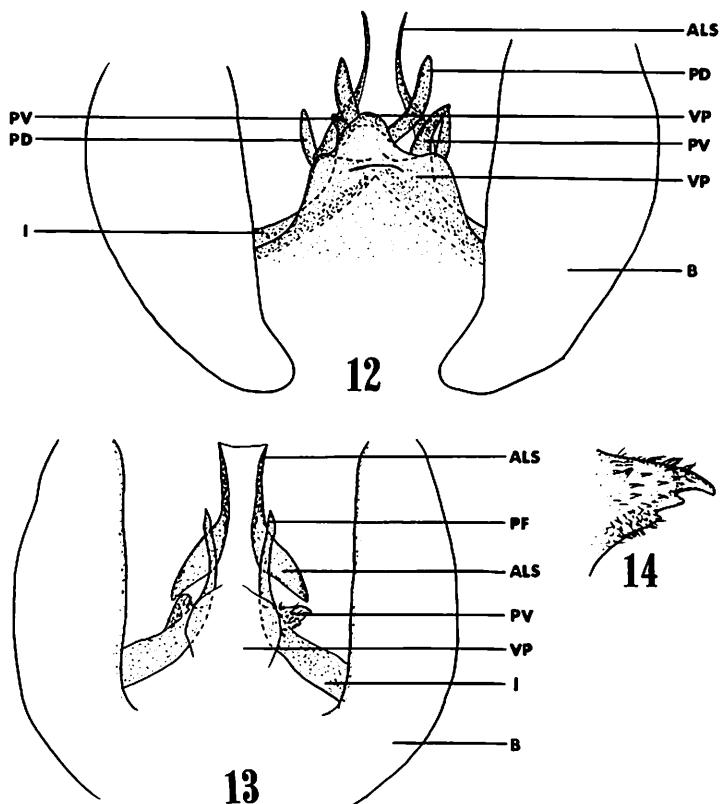
Among the genera in the couplets 3-6 of the key, the male genitalia are most specialized in *Atherix* and apparently most generalized or plesiomorphic in *Pachybates*.

Dasyomma maculipennis (Figs. 1-5) is distinguished from *Dasyomma flava* HARDY, 1933 (see Figs. 128-131 in NAGATOMI, 1984a) in male genitalia by having a rather conical dististyle [in *flava*, apical part flattened more sharply anteroposteriorly (=inner-outerly)], basistyle widest behind middle (in *flava*, widest before middle), area corresponding to sternum 9 and base of basistyle with hairs (in *flava*, bare), and cercus as wide as long (in *flava*, wider than long).

The male genitalia of *Pachybates incompleta* (Figs. 6-8) are distinguished from those of "*Atherix*" *kar* (Figs. 9-11) by having a parallel-sided basistyle (in *kar*, expanded apically), dististyle widest near base and rounded at apex (in *kar*, rectangular), and cercus widest at base (in *kar*, widest at middle).

The male genitalia of "*Atherix*" *kar* (Figs. 9-11) is distinguished from those of "*Suragina*" *caerulescens* (BRUNETTI, 1912) (=kodamai NAGATOMI, 1953) (see Fig. 7 in NAGATOMI, 1979a) by having a dististyle that is gentle at outer apex (in *caerulescens*, angulate) and tergum 9 as wide as long (in *caerulescens*, longer than wide). As mentioned above, a knob-like process on the inner margin of the dististyle is present in *Ibisia*, *Suragina*, and "*Suragina*" *caerulescens*, but it has been judged that this process is absent in "*Atherix*" *kar*.

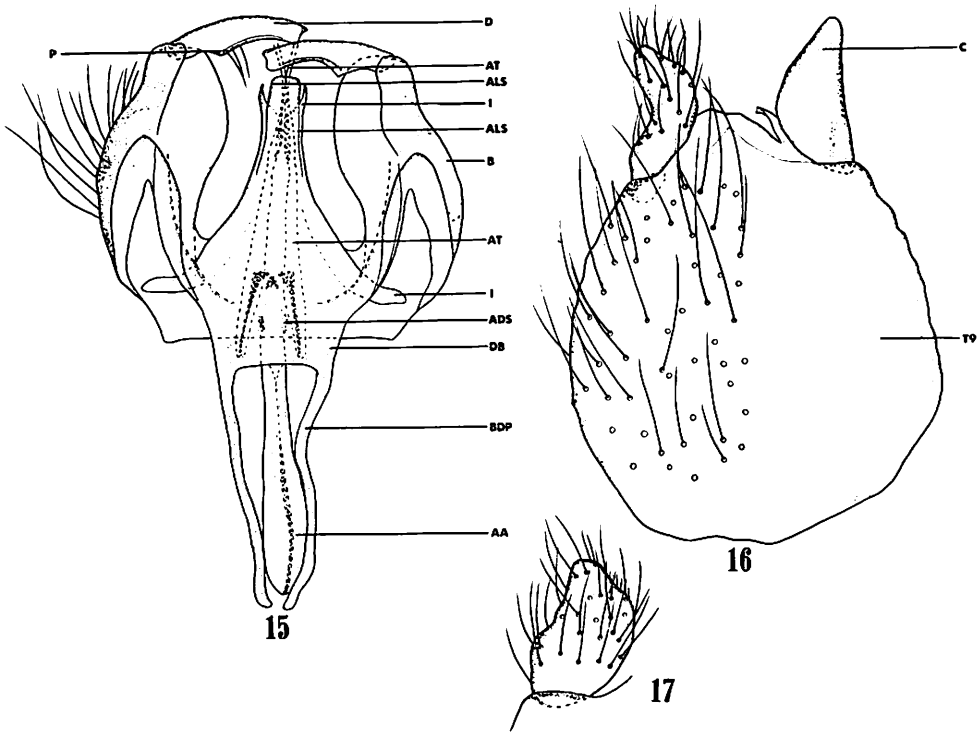
Between the closely related species of *Suragina*, i. e. *satsumana* and *uruma*, several minor but significant differences are present in male genitalia (see the description of *uruma*, p. 104).



Figs. 12-14. Part of male genitalia (excluding pair of aedeagal tines), ventral view. 12. *Atherix ibis* (FABRICIUS, 1798) (from Japan). 13-14. *Atherix basilica* NAGATOMI, 1958. 14. Process directed ventrally and forming apex of inter-basis (=PV).

Among the *Atrichops* species, the posterior margin of the cercus has a deep concavity in *chotei* and the mid-posterior convexity of tergum 9 is long and acute in *fontinalis* and each of them is useful for diagnostic purposes (see the figures in NAGATOMI, 1979a, b, 1984b).

Specimens dissected: *Dasyomma maculipennis*: 2 ♂♂, Mt. Field Nat. Park, Dobson Lake, 1000 m, Tasmania, 25. XII. 1960, J. L. GRESSITT. *Pachybates incompleta*: 1 ♂, Wit River Valley, Bain's Kloof, South-Western Cape Province, South Africa, XII. 1949. "*Atherix*" *kar*: 1 ♂, Karkloof, Natal, South Africa, 8. I. 1957, B. R. STUCKENBERG. *Ibisia marginata*: 1 ♂, Czechoslovakia, 10. VI. 1961, R. ROZKOŠNÝ. *Suragina uruma*: 1 ♂, Fu-ku, Okinawa I., 10. X. 1975, S. AZUMA.



Figs. 15-17. Male genitalia of *Ibisia marginata* (FABRICIUS, 1781), dorsal view.
17. Cercus.

II. Distinction between *Ibisia* and *Suragina*

Ibisia RONDANI, 1856 (Dipterol. Ital. prodr., 1: 154; type-species: *Bibio marginata* FABRICIUS, 1781 from Europe by monotypy).

Suragina WALKER, 1859 (J. Linn. Soc. London 4: 110; type-species: *Suragina illucens* WALKER, 1859 from Celebes by monotypy).

It is now clear that *Ibisia* is definitely more similar to *Suragina* than to *Atherix* (i. e. *ibis* and *basilica*), because in *Ibisia marginata* the ventral apex of the hind coxa is acutely pointed and the male genitalia agree very well in structure with those of *Suragina*. An attempt is here made to distinguish *Ibisia* from *Suragina*.

STUCKENBERG (1974: 280-281) states, "I have seen only four of the eight known species of that genus (*marginata*, *maroccana*, *apollinis*, and *dispar*); however, published accounts of the other four (*apfelbecki*, *dalmatica*, *erythraspis*, and *vicina*) indicate that all of them probably are congeneric with *marginata*", and "Apart from *marginata* which has a wide range in Europe, the species of *Ibisia* are restricted to montane regions bordering the Mediterranean (*apollinis* also on Sicily),...."

On the other hand, *Suragina* is distributed as follows: the Oriental region (including the Moluccas**) and Japan: 20 (or so) (NAGATOMI, 1975, 1979a): the Afrotropical

region: 13 (STUCKENBERG, 1980); Central America and Texas: 3 (WEBB, 1977, 1981).

I have examined 2♂♂, 3♀♀ of *Ibisia marginata* (from Czechoslovakia; collected and determined by R. ROZKOŠNÝ) and the following species of *Suragina*: *satsumana*, *uruma*, and *yaeyamana* (from Japan), *longipes* (from Mexico), *bivittata* and *monogramma* (South Africa and Mozambique; collected and determined by B. R. STUCKENBERG), and a number of undetermined species from South East Asia.

After all, the generic discrimination between *Ibisia marginata* and *Suragina* species above is ascribable to the arrangement of pile on front. In *Ibisia marginata*, the male front (except just above antennae) is entirely covered with long erect hairs and "the frons (in female) widens below and is haired over its entire extent except in the middle where there is a longitudinal groove,...." (after STUCKENBERG, 1974: 280). Whereas in *Suragina* species examined, the pile on front (in male) and lower front (in female) is fine and confined to the extreme side.

In general, the front, face, side of face (=parafacials) are wider and the hind basitarsus (in relation to last 3 tarsal segments) (Figs. 18-21) is shorter in both sexes of *Ibisia marginata* than in *Suragina*. But the former two (possibly as well as the latter two) become wider in *Suragina pauliani* (from Madagascar) (see Figs. 5-6 in STUCKENBERG, 1965).

The male genitalia of *Ibisia marginata* (Figs. 15-17) are very similar to those of *Suragina uruma* (Figs. 26-31) with the following minor differences: dististyle angulate at outer apex (as in *Suragina satsumana*), apical thin part of interbasis longer than in *uruma* (but shorter than in *satsumana*), anterior bar of aedeagus narrower than in *uruma*, and tergum 9 and apical part of cercus more robust than in *uruma*.

Judging from THOMAS (1974a, b), who described and illustrated the mature larva and pupa of *Ibisia marginata*, and NAGATOMI (1961a, b) on *Suragina caerulescens* (=kodamai) (a nontypical form of *Suragina*) and *S. satsumana* (a typical form), the following are derived. In mature larva, *marginata* is easily distinguished from *satsumana* by the last abdominal segment and pair of terminal projection with a horizontal row of long hairs at each side (as in *caerulescens*) and from *caerulescens* by the abdominal segments 2-5 with pair of dorsal projections long and conspicuous (but shorter than in *satsumana*). In pupa, *marginata* is distinguished from *satsumana* and *caerulescens* by having the abdominal terga 5-7 (or 5-6) with 8 projections, of which the outmost but one and the inmost pairs are short (in *satsumana*, with 6 projections, of which only the inmost pair is short; in *caerulescens*, with 8 projections, of which only the outmost pair is long and the other 6 projections are short) and by having the middle of mesothoracic dorsum with posterior 2 bristles situated far behind anterior 4 (in *satsumana* and *caerulescens*, 6 bristles in a transverse row).

It is not possible to assess now whether or not the distinguishing characters above in the immature stages afford a generic value.

It is possible that *Ibisia* is identical generically with *Suragina*, that is to say, the latter becomes a synonym of the former. But I hesitate to synonymize, because the

* * There are 3 recorded species from the Moluccas (Amboina, Buru, and Halmahera), all of which probably belong to *Suragina*. For "the Australasian, 1 sp. from Buru" (in NAGATOMI, 1982: p. 143, line 13), read "3 spp. from the Moluccas."

typical *Suragina* contains so many species which are well grouped. More species of *Ibisia*, *Suragina*, and other genera of Athericidae must be studied, before a final decision is made.

III. Genera of Athericidae

Owing to the paucity of material, it is not possible to discuss fully the genera of Athericidae from the world standpoint. But I venture to express my impressions on their status. The following 2 subfamilies, 1 fossil and 10 living genera may be recognized (after STUCKENBERG, 1960, 1966, 1973, 1974, 1980). For sources of the number of species see NAGATOMI (1982, 1984b).

Subfamily Dasyomminae. (1) Genus *Dasyomma* MACQUART, 1840 (Mém. Soc. Roy. Sci., Agric. Arts Lille, 1840, p. 31; type-species: *Dasyomma caerulea* MACQUART, 1840 from Chile by monotypy): 11 spp. from Australia and Tasmania and 17 spp. from Argentina and Chile.

Subfamily Athericinae. (2) Genus *Atherix* MEIGEN, 1803 (Mag. f. Insektenkunde 2: 271; type-species: *Atherix ibis* (FABRICIUS, 1798) from Europe by general acceptance): 6 spp. from the Palearctic region and 3 spp. from N. America.

(3) Genus *Atrichops* VERRALL, 1909 (British Flies 5; 291; type-species: *Atherix crassipes* MEIGEN, 1820 from Europe by monotypy): 11 spp. from the Oriental region, Africa (Kenya), Europe, and Japan.

(4) Genus *Ibisia*: see the preceding chapter.

(5) Genus *Pachybates* BEZZI, 1926 (Ann. S. Afr. Mus. 23: 316; type-species: *Atherix braunsi* BEQUAERT, 1921 from South Africa by original designation): 2 spp. and 1 subsp. from South Africa (Cape Province).

(6) Genus *Succinatherix* STUCKENBERG, 1974 (Ann. Natal Mus. 22: 281; type-species: *Succinatherix setifera* STUCKENBERG, 1974 in Baltic Amber by original designation): 2 fossil spp. in Baltic Amber.

(7) Genus *Suragina*: see the preceding chapter.

(8) Genus *Trichacantha* STUCKENBERG, 1955 (J. ent. Soc. S. Afr. 18: 256; type-species: *Trichacantha atranupta* STUCKENBERG, 1955 from South Africa by original designation): 1 sp. from South Africa (Cape Province).

(9) Genus *Xeritha* STUCKENBERG, 1966 (Proc. R. Ent. Soc. London (B) 35: 57; type-species: *Xeritha plaumanni* STUCKENBERG, 1966 from southern Brazil by original designation): 1 sp. from southern Brazil.

(10) A genus (or some genera) representing the South African "Atherix": STUCKENBERG (1980) unplaced 5 species (i.e. *adamastor*, *androgyna*, *barnardi*, *kar*, and *peringueyi*) from South Africa in any known genus. These 5 species may form a genus (or some genera).

(11) A genus representing "*Suragina*" *caerulescens* (BRUNETTI, 1912) (Rec. Ind. Mus. 7: 463) from India (W. Bengal) (= *kodamai* NAGATOMI, 1953 from Japan): 1 sp. from Burma, Nepal, India (W. Bengal), and Japan.

The diagnosis of each genus is seen in the following literature.

NAGATOMI (1958: 48, 55-56): (2) *Atherix* and (7) "*Suragina*" *caerulescens* (=kodamai).

NAGATOMI (1979b: 281-282): (3) *Atrichops*.

STUCKENBERG (1960: 217-218 [couplets 6-8 of the key]): (10) South African "*Atherix*", (5) *Pachybates*, (7) *Suragina*, and (8) *Trichacantha*.

STUCKENBERG (1966: 57): (9) *Xeritha*.

STUCKENBERG (1973: 671): (1) *Dasyomma*.

STUCKENBERG (1974: 280-281): (4) *Ibisia* and (6) *Succinatherix*.

A key to the genera is here prepared and a supposed phylogenetic relationship is proposed in Fig. 22 for future discussion or determination.

Contrary to Fig. 22, it is possible that (A) *Pachybates* (possibly plus *Trichacantha*) is intermediate in position between *Atherix* and *Suragina*, (B) *Xeritha* and South African "*Atherix*" are more similar phylogenetically to *Atherix* than to *Suragina*, and (C) *Ibisia* is more similar phylogenetically to *Suragina* than to *Succinatherix*. It may be better that some genera are reduced to subgenera of *Atherix* s. lat. or *Ibisia* s. lat., if the relationship shown in Fig. 22 is correct.

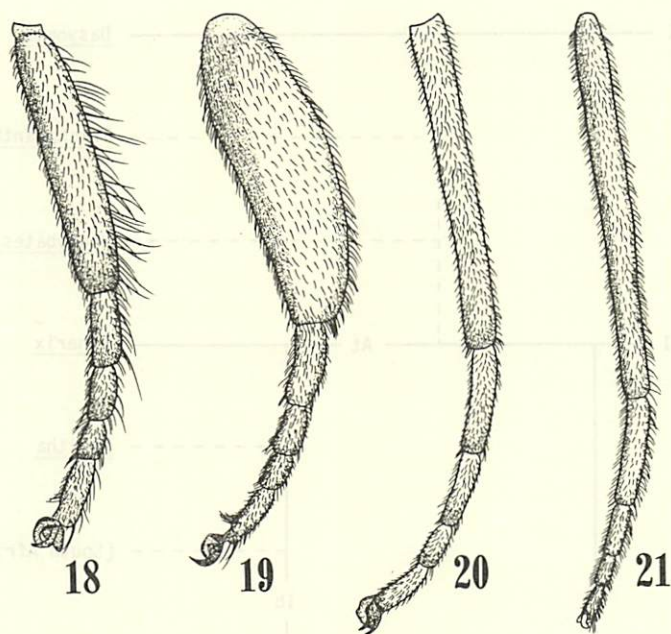
Succinatherix, a fossil genus in Baltic Amber, is not included in the key. According to STUCKENBERG (1974: 279-282), the female abdomen is elongate-subovoid in *Succinatherix*, *Xeritha*, various South African "*Atherix*", and "*Suragina*" *caerulescens*, but "does not taper posteriorly because the tergites in the apical half of the abdomen are flattened and project laterally (see Figs. 1-2)" in *Ibisia* and *Suragina*. In *Succinatherix*, "hairs on [female] frons arranged in two sublateral series, one on each side of bare or very sparsely haired median strip;; tibial spurs 1. 2. 2."

The tibial spurs are 0 : 2 : 2 in *Ibisia* and 0 : 2 : 2 or 0 : 1 : 2 in *Suragina*, but it is newly found that *Suragina bivittata* (BEZZI, 1926) (from South Africa) has the tibial spurs 1 : 2 : 2 at least in some specimens of male.

**Key (a) to genera of Athericidae (except fossil genus
Succinatherix) (generic characters are learned chiefly
from STUCKENBERG, 1960, 1966, 1973, 1974)**

1. Antennal segment 3 reniform with dorsal arista; hypopleura with a pit just above hind coxa..... 2
- Antennal segment 3 not reniform but conical or nearly so and with an apical arista; lower part of hypopleura without any pit; tibial spurs 1 : 2 : 2.....
..... *Dasyomma*
- 2(1) Space between antennae wide; sclerite, between anterior spiracle and fore coxa, without knob-like process; in female, face wider than front which is wider toward antennae or parallel-sided (rarely wider toward vertex)..... 3
- Antennae almost contiguous with each other; sclerite, between anterior spiracle and fore coxa, with 1 (or 2) knob-like process (which is rarely atrophied) at lower margin; in female, front wider toward vertex, face narrower than front, and parafacials very narrow (often hardly visible); front just above antennae distinctly narrower than one eye; parafacials of both sexes and male front bare;

- female front fairly long, scattered, rather stout haired; tibial spurs 0 : 1 : 2; ventral apex of hind coxa projecting as in *Ibisia* and *Suragina*. *Atrichops*
- 3 (2). "Tibial spurs of normal or small size present on middle and hind legs in both sexes. Anal cell narrowly open or closed. Bristles on head and mouthparts not spine-like. . . ." (after STUCKENBERG, 1960: 217). 4
- "Spurs lacking except on hind leg of male where there is a very large single spur. Anal cell widely open. Head and mouthparts with stout, spine-like bristles. Dichoptic in both sexes. A single, sexually dimorphic species, the male yellowish-orange with long abdomen, enormously large back legs and very broad, yellowish wings, the female smaller, brownish, rather like an *Atherix*" (after STUCKENBERG, 1960: 217). *Trichacantha*
- 4 (3). "Legs of normal proportions, apex of 1st tarsomere of all legs transversely terminated. Tarsi of fore legs often very elongate. . . . Eyes holoptic or very close in male" (after STUCKENBERG, 1960: 218). 5
- "Legs proportionately short and thick, femora of middle and hind legs thickened, hind coxae very large, apex of 1st tarsomere of at least hind legs obliquely terminated. Body short, compact and hairy. Eyes of male widely separated, frons broad in both sexes. (A species lacking vein M_3 comes here)" (after STUCKENBERG, 1960: 218). *Pachybates*
- 5 (4). Parafacials as wide as or wider than upper margin of clypeus; female front just above antennae wider than one eye; male front except just above antennae and female front except sides with erect, dense hairs; ventral apex of hind coxa not projecting as in *Dasyomma*, *Trichacantha*, and *Pachybates*; male fore tarsal claws and pulvilli nearly symmetrical (at least in *Atherix*). 6
- Parafacials narrower than upper margin of clypeus; female front just above antennae narrower than one eye. 7
- 6 (5). Fourth posterior cell open (the diagnosis of *Atherix* given in couplets 5-6 is based on *ibis* and *basilica*). *Atherix*
- Fourth posterior cell closed. *Xeritha*
- 7 (5). Ventral apex of hind coxa projecting into an acute process; male fore tarsal claws and pulvilli very asymmetrical. 8
- Ventral apex of hind coxa not projecting into an acute process; male fore tarsal claws and pulvilli nearly symmetrical. South African "*Atherix*"
- 8 (6). Male front and female lower front with pile which is fine and confined to extreme side (sometimes entirely bare). 9
- Male front except just above antennae and female front except along a mid-longitudinal groove densely clothed with long and erect hairs. *Ibisia*
- 9 (8). Parafacials somewhat raised and its lower portion sharply distinguished from cheek; female occiput just behind upper margin of each eye swollen and visible from in front; female front just above antennae over 1/2 width of one eye. "*Suragina*" *caerulescens*
- Parafacials not raised and its lower portion not distinguished from cheek; female occiput just behind upper margin of each eye not swollen; female front just above antennae usually less than 1/2 width of one eye. *Suragina*



Figs. 18-21. Male hind tarsus, anterior view. 18. *Atherix ibis* (FABRICIUS, 1798) (from Japan). 19. *Atherix basilica* NAGATOMI, 1958. 20. *Ibisia marginata* (FABRICIUS, 1781). 21. *Suragina uruma* sp. n.

Key (b) to genera of Athericidae (excluding *Trichacantha* and *Xeritha*) based on male genitalia

1. Dorsal and ventral plates (=paramere and aedeagal guide) independent of interbasis and their apical parts narrower than area between interbases [dorsal plate (except apicolateral part) transparent and difficult to recognize and ventral plate easy or possible to discriminate only in *Atherix*]..... 2
- Dorsal and ventral plates fused with interbasis at lateral margin and covering all over the area between interbases (as in Tabanidae)..... *Dasyomma*
- 2(1). Dististyle situated at apex of basistyle; dorsal bridge broad and trapezoid or rectangular; interbasis without apical portion which is long and strongly curved inward..... 3
- Dististyle situated not at apex but dorsal surface of basistyle; dorsal bridge narrow and Y-shaped; interbasis long and simple and with apical portion which is long and strongly curved inward..... *Atrichops*
- 3(2). Apicolateral sclerite of dorsal plate located along interbasis..... 4
- Apicolateral sclerite of dorsal plate located behind interbasis which is short and has apical acute process directed ventrally; a pair of processes on dorsal bridge shorter than basistyle; dististyle without knob-like process or convexity near base of inner margin; cercus as long as or shorter than wide..... *Atherix*

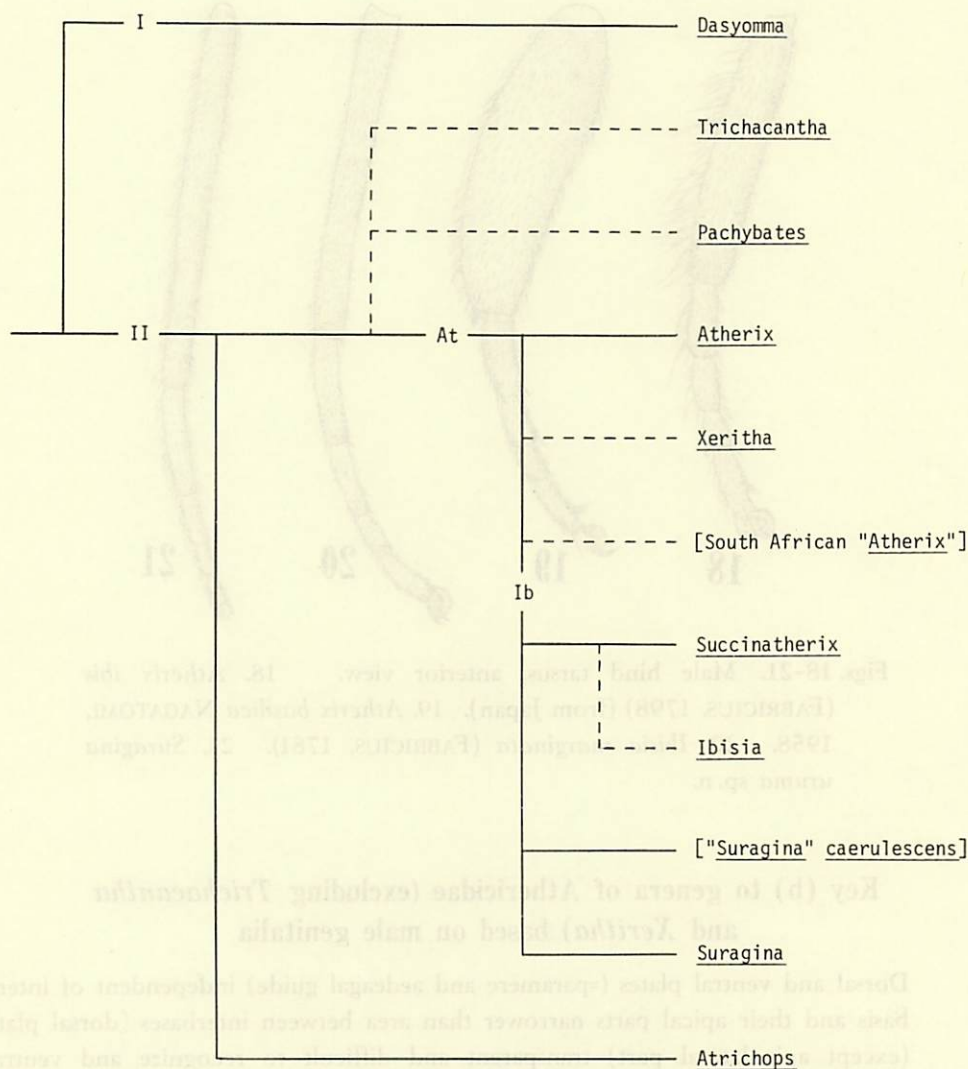


Fig. 22. Supposed phylogenetic relationship in genera of Athericidae.

Notes: I, Dasyomminae; II, Athericinae; At, *Atherix* s. lat.; Ib, *Ibisia*, s. lat.

- 4(3). Dististyle without process near base of inner margin; cercus scarcely longer than wide..... 5
 — Dististyle with a knob-like process or convexity near base of inner margin 6
 5(4). Basistyle parallel-sided or nearly so..... *Pachybates*
 — Basistyle expanded apically..... "*Atherix*" *kar*
 6(4). Cercus wider than long; basistyle expanded apically..... "*Suragina*" *caerulea*
 — Cercus longer than wide; basistyle parallel-sided or so..... *Ibisia* and *Suragina*

IV. Athericidae from North America and Mexico

There are 1♂ of *Atherix variegata* and 1♂, 3♀♀ of *Suragina longipes* before me, upon which I cannot draw any conclusion on the North American and Mexican species at present. But some comments are given below.

WEBB (1977) recognized 3 species of *Atherix* in North America, i. e. *lantha* WEBB, 1977 (Eastern species; type-locality: Quebec, Knowlton), *pachypus* BIGOT, 1887 (Western species; type-locality: Washington Territory), and *variegata* WALKER, 1848 (North Central species; type-locality: Ontario, Hudson's Bay, Albany River, St. Martin's Falls). These 3 species, which are segregated in distribution (see Fig. 1 in WEBB, 1977: 476), are very closely related to one another and to *ibis* FABRICIUS, 1798 of Europe, Siberia, and Japan.

LEONARD (1930: 84) states, "Among the specimens from which the above distribution is compiled there may be present in the Western forms some referable to *A. pachypus* BIGOT; if so I fail to recognize them as such, nor can I see any appreciable differences between Western and Eastern specimens."

As to the 3 species in question, the following are learned from WEBB (1977). No significant difference is detected in the larval and pupal stages. In female, spermatheca and genital furca vary somewhat in shape with species. In male, distance between eyes (at narrowest point) and the thickness of hind tibia and basitarsus differ somewhat according to species. In male genitalia, at or around the apex of interbasis there are 2-3 processes in *lantha*, 3 in *pachypus*, and 2 in *variegata*. At any rate the differences above are not conspicuous.

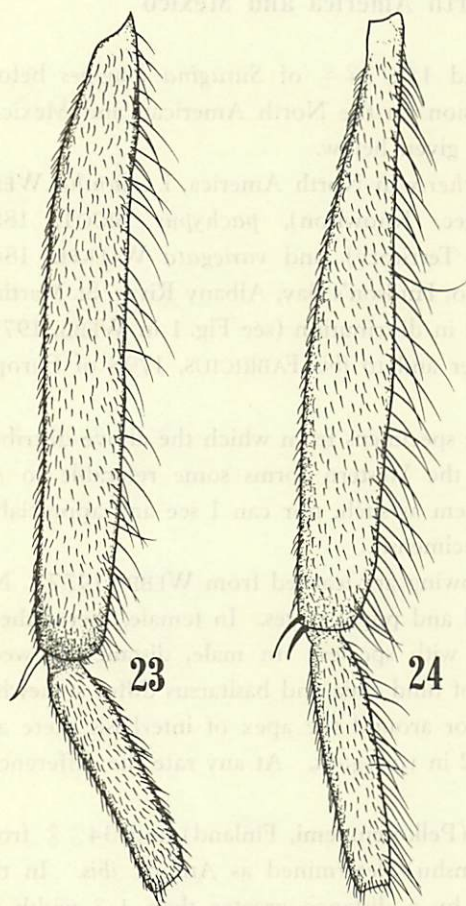
Before me, there are 1♂ from Europe (Pelkosenniemi, Finland) and 34♂♂ from Japan (Sasayama, Tamba, Hyogo Pref., Honshu) determined as *Atherix ibis*. In the European form, (1) the eyes are separated by a distance greater than 1/2 width of median ocellus (as in *variegata*) and (2) the hind tibia and basitarsus are "linear and cylindrical" (as in *lantha*) (Fig. 23). Whereas in the Japanese form, (1) the eyes are separated by less than 1/2 width of median ocellus (sometimes eyes are contiguous) (as in *lantha* and *pachypus*) and (2) the hind tibia and basitarsus are swollen (probably as in *pachypus*) (Fig. 24).

It is necessary to elucidate the geographical variation of *ibis* or *ibis* complex even within Europe and within Japan. It is not necessarily established that *lantha*, *pachypus*, and *variegata* are distinct specifically from one another nor even from *ibis*.

MALLOCH (1932) and WEBB (1977) prepared a key to the 3 species of *Suragina* from Mexico.

Suragina latipennis (BELLARDI, 1861) may easily be separated from *concinna* (WILLISTON, 1901) and *longipes* (BELLARDI, 1861) by the legs (in both sexes) entirely black and the genital furca (in female) "with anterior margin of cephalic apodeme broad, convex (Fig. 40)" (after WEBB, 1977).

It is not necessarily certain that the characteristics shown in the key by MALLOCH and by WEBB are significant between *concinna* and *longipes*, because the width of darkened band across stigma and the presence or absence of yellow patches on abdominal segments 1-2 are liable to vary with individual. It is necessary to find



Figs. 23-24. Male hind tibia and basitarsus of *Atherix ibis* (FABRICIUS, 1798), anterior view. 23. Specimen from Europe (Finland). 24. Specimen from Japan (Sasayama, Hyogo Pref.).

half of wing tinged with brown to dark brown and with several more distinct paler parts as follows: 1st submarginal cell at base and often area below apical portion of stigma, 2nd submarginal cell at base, and discal cell except base; in female, median black (not pollinose) spots of terga 2-3 are less distinct than in *yaeyamana* because pollen is not as thick as in *yaeyamana* on terga 2-3; in both sexes (or at least in female), body smaller (wing length of *uruma* 5.4-6.5 mm in female and 5.6-6.4 mm in male and that of *yaeyamana* 7-8 mm in female and 6.5 mm in male), front and face wider and antennal segment 3 narrower than in *yaeyamana*, although these 3 points may not be clear cut in some individuals.

The differences above may be slight but some of them seem to be fully significant.

Female. Head: dark brown to black and whitish gray pollinose; upper lesser half of front velvety black; antennal segment 3 except arista often brown rather than

more reliable distinguishing character unless the minor difference is clear cut in the shape of genital furca (Figs. 38 and 39 in WEBB, 1977).

Suragina concinna may possibly be identical with *longipes*.

Specimens examined: *Atherix ibis*:

1 ♂, Pelkosenniemi, Finland, R. FREY; 34 ♂♂, Sasayama, Tamba, Hyogo Pref., IV-V, 1954-56, A. NAGATOMI. *Atherix variegata*: 1 ♂, Smoky Falls, Kapuskasing, Ontario, 2. VII. 1935, R. V. WHELAN. *Suragina longipes*: 1 ♂, 1 ♀, Chiapas (732-762 m), Mexico, 6-10. X. 1974, D. E. BREEDLOVE & J. A. BREEDLOVE; 1 ♀, no data; 1 ♀, Sinaloa (1930 m), Mexico, 12. IX. 1977, E. I. SCHLINGER.

V. A new *Suragina* from Okinawa and Amami Oshima

Suragina uruma sp. n.

(Figs. 21, 25-31)

This species is very similar to *yaeyamana* NAGATOMI, 1979 from the Yaeyama Islands (Ishigaki-jima and Iriomote-jima), but may be distinguished from the latter in the following points: in both sexes, apical

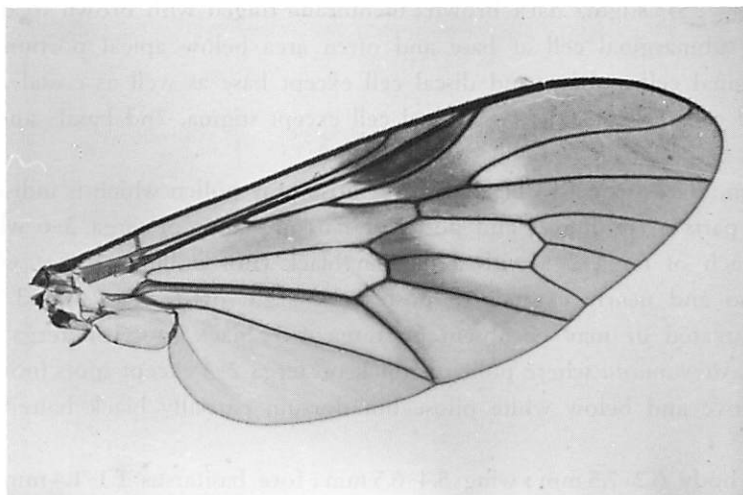


Fig. 25. Wing of *Suragina uruma* sp. n., female.

dark brown; hairs on head and appendages black but pile on lower occiput except cheek and side of face white; antennal segment 3 short, white pilose; structural characters of head almost fit the description of *yaeyamana* (NAGATOMI, 1979: 171-172), but width of one eye on a mid line from a direct frontal view 0.7-0.8 times distance from antenna to median ocellus, 1.3-1.5 times width of front just above antenna and 0.9-1.0 times width of face at lowest portion from a direct frontal view (in *yaeyamana* 0.8-0.9, 1.5-1.7, and 1.0-1.1 times respectively), and antennal segment 3, 1.4-1.8 times as wide as segment 2 (in *yaeyamana* 1.8-2.0 times); [relative lengths of antennal segments 1-3 may be different between *uruma* and *yaeyamana* but the length may vary considerably with measuring point and this is true of the width of facial swelling].

Thorax: dark brown to black and whitish gray pollinose; posterior part of scutellum often yellowish (or reddish) brown; mesonotum and scutellum with black hairs which are intermixed with white pile on scutellum, posterior part of mesonotum, etc.; pronotum and pleura with white pile; halter with stem yellowish brown and knob dark brown to black.

Legs: dark brown to black; fore femur yellowish brown but with a dark brown tinge at base and apex; mid and hind femora often with a yellowish brown tinge at bases and apices; coxa whitish gray pollinose; hairs on legs black but those on coxa largely and on femur partly white; relative lengths of segments (excluding coxa and trochanter) of fore leg 119 (111-130): 182 (174-194): 100: 52 (48-56): 38 (32-42): 26 (21-29): 21 (18-24), of mid leg 125 (117-139): 178 (168-197): 104 (100-109): 31 (29-34): 16 (15-18): 9 (9-10): 12 (10-14), of hind leg 186 (169-203): 207 (197-221): 119 (116-121): 35 (31-38): 18 (17-19): 10 (9-12): 13 (12-15) and in hind leg viewed from the side relative widths of femur, tibia, and tarsal segments 1-3, 23 (20-26): 14 (11-16): 9 (9-10): 7 (6-8): 6 (6-7) (tarsal segment 1, 0.07-0.09, segment 2, 0.15-0.25, segment 3, 0.29-0.4 times as wide as long) (N=10).

Wing (Fig. 25): stigma dark brown; membrane tinged with brown to dark brown, paler at 1st submarginal cell at base and often area below apical portion of stigma, 2nd submarginal cell at base, and discal cell except base as well as costal-, subcostal-, and 1st basal cells except apices, marginal cell except stigma, 2nd basal- and anal cells, and axillary.

Abdomen: dark brown to black; with whitish gray pollen which is indistinct except large lateral parts of tergum 1 and posterior narrow bands of terga 3-6 where pollen is distinct; each of terga 2-5 with a median black (not pollinose) spot which is triangular or so and nearly extends to posterior margin on terga 2-3 and which may not be demarcated or may be absent on terga 4-5; black spots on terga 2-3 not as distinct as in *yaeyamana* where pollen is thick on terga 2-3 except spots (not pollinose); abdomen above and below white pilose but dorsum partially black haired (terga 7-8 wholly so).

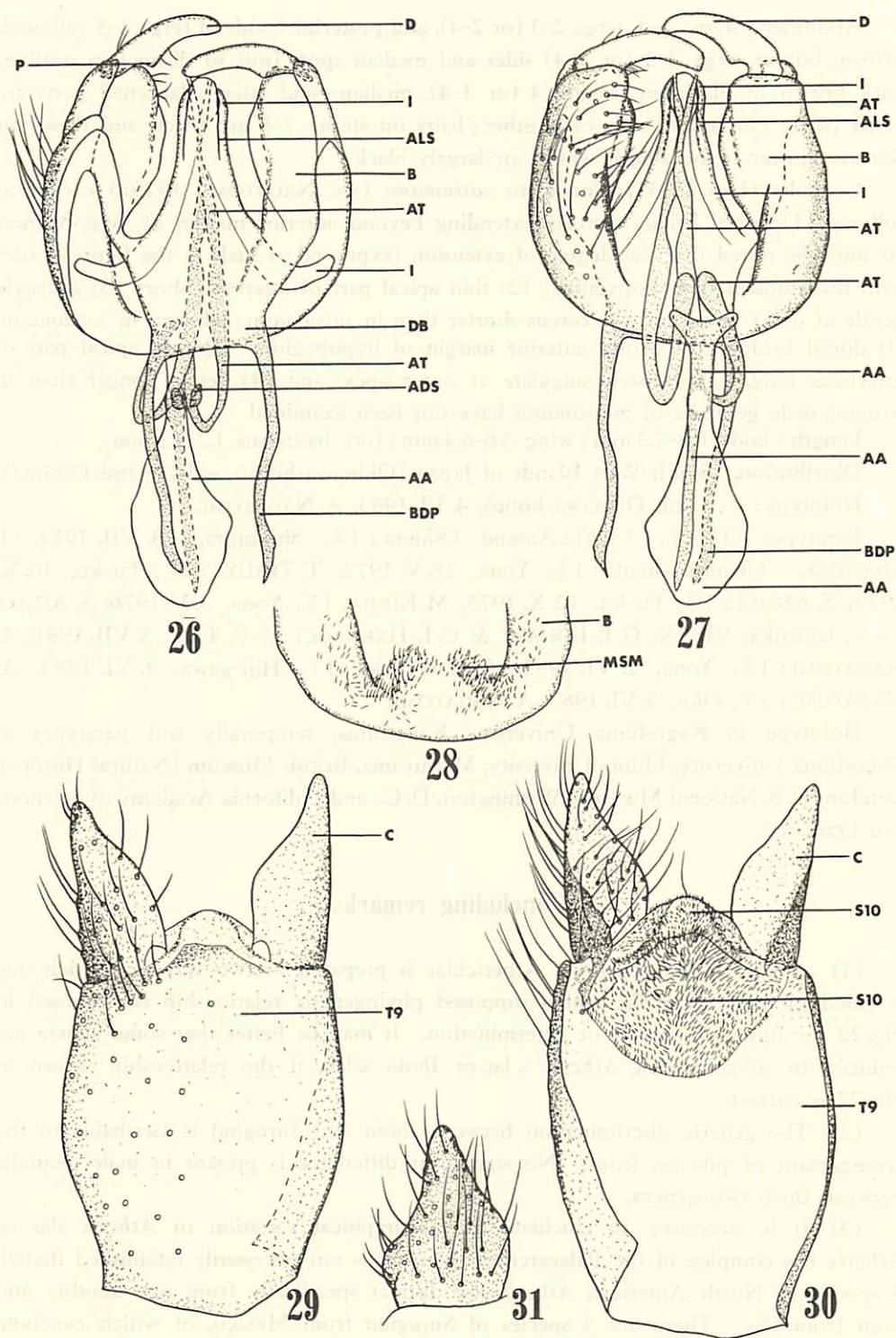
Length: body 6.2-7.5 mm; wing 5.4-6.5 mm; fore basitarsus 1.1-1.4 mm.

Male. Similar to female except as follows. Head: in 2 specimens measured, combined lengths of 2 largest facets 1.0-1.5 times width of median ocellus; contiguous portion of eyes 1.0-1.6 times as long as ocellar triangle; width of one eye on a mid line from a direct frontal view 0.8-0.9 times distance from antenna to median ocellus, 2.0 times width of front just above antenna, and 1.2-1.3 times width of face at lowest portion from a direct frontal view (in female, 0.7-0.8, 1.3-1.5, and 0.9-1.0 times respectively); width of front just above antenna 0.4 times distance from antenna to median ocellus (in female 0.5-0.6 times); distance from proboscis to antenna 0.4 times that from antenna to median ocellus (in female 0.5-0.6 times); facial swelling 3-4 times as wide as side of face on a mid line (in female 4-6 times); space between antennae 0.7 times width of ocellar triangle (in female 0.8-1.2 times); distance between uppermost corner of each eye 1.3-1.5 times that from lateral ocelli to line drawn between uppermost corner of each eye (in female 1.7-2.4 times) which is 0.6 times length of ocellar triangle (in female 0.8-1.2 times); structural characters almost fit those of the single specimen of *yaeyamana* (on hand) except as follows: contiguous portion of eyes 1.0-1.6 times as long as ocellar triangle (in *yaeyamana* 2.6 times); width of one eye on a mid line from a direct frontal view 2.0 times width of front just above antenna (in *yaeyamana* 2.4 times); antennal segment 3, 1.4-1.5 times as wide as segment 2 (in *yaeyamana* 1.6 times).

Thorax: as in female (presence of white pile is not confirmed on mesonotum and scutellum in specimens before me).

Legs: mid tibia brown rather than dark brown (this may be so in male); relative lengths of segments of fore leg 128(127-129):204(200-210):100:47(45-50):33(30-35):26(24-27):22(21-23), of mid leg 125(123-129):190(185-193):112(106-117):34(33-35):17(17-18):10(9-12):14(13-15), of hind leg 199(197-203):221(218-226):131(129-133):39(38-40):20(18-21):11(10-12):14(13-15) and in hind leg viewed from the side relative widths of femur, tibia, and tarsal segments 1-3, 24(23-24):16(15-17):12(11-12):8(8-9):6(6-7) (tarsal segment 1, 0.08-0.09, segment 2, 0.19-0.23, segment 3, 0.29-0.33 times as wide as long) (N=3).

Wing: as in female.



Figs. 26-31. Male genitalia of *Suragina uruma* sp. n.. 26, 29, 31. Dorsal view. 27, 28, 30. Ventral view. 31. Cercus. It must be noted that a minutely setose membrane (MSM in Fig. 28) is excluded in Fig. 27.

Abdomen: sterna 1-4, terga 2-3 (or 2-4), and posterior bands of terga 4-5 yellowish brown, but in terga 2-3 (or 2-4) sides and median spots (not so distinct in outline) dark brown to black; in tergum 4 (or 3-4), median- and lateral darkened parts are often partly connected with each other; hairs on sterna 7-8 are black and those on dorsum appear to be almost wholly or largely black.

Genitalia (Figs. 26-31): similar to *satsumana* (see NAGATOMI, 1979a) except as follows: (1) dorsal bridge scarcely extending beyond anterior margin of hypopygium [it must be noted that the degree of extension (expressed as such in the figure) varies with the gradient of hypopygium], (2) thin apical part of interbasis short, (3) dististyle gentle at outer apex, and (4) cercus shorter than in *satsumana*; whereas in *satsumana*, (1) dorsal bridge far beyond anterior margin of hypopygium, (2) thin apical part of interbasis long, (3) dististyle angulate at outer apex, and (4) cercus longer than in *uruma*; male genitalia of *yaeyamana* have not been examined.

Length: body 6.8-7.3 mm; wing 5.6-6.4 mm; fore basitarsus 1.2-1.3 mm.

Distribution. South-West Islands of Japan (Okinawa-hontô and Amami Oshima).

Holotype: ♀, Oku, Okinawa-hontô, 4. VI. 1983, A. NAGATOMI.

Paratypes (12♀♀, 3♂♂): Amami Oshima: 1♀, Shinmura, 23. VII. 1954, T. EDASHIGE. Okinawa-hontô: 1♂, Yona, 28. V. 1972, T. TERUYA; 1♂, Fu-ku, 10. X. 1975, S. AZUMA; 1♀, Fu-ku, 10. X. 1975, M. KINJO; 1♂, Yona, 3. V. 1976, S. AZUMA; 2♀♀, Chizuka, VII-IX, G. E. BOHART & C. L. HARNAGE; 5♀♀, Oku, 5. VII. 1981, A. NAGATOMI; 1♀, Yona, 2. VI. 1983, A. NAGATOMI; 1♀, Hiji-gawa, 3. VI. 1983, A. NAGATOMI; 1♀, Oku, 5. VI. 1983, A. NAGATOMI.

Holotype in Kagoshima University, Kagoshima, temporally and paratypes in Kagoshima University, Ehime University, Matsuyama, British Museum (Natural History), London, U. S. National Museum, Washington, D. C., and California Academy of Sciences, San Francisco.

Concluding remarks

(1) A key to the genera of Athericidae is prepared in two ways, of which one is based on male genitalia, and a supposed phylogenetic relationship is proposed in Fig. 22 for future discussion or determination. It may be better that some genera are reduced to subgenera of *Atherix* s. lat. or *Ibisia* s. lat., if the relationship shown in Fig. 22 is correct.

(2) The generic discrimination between *Ibisia* and *Suragina* is ascribable to the arrangement of pile on front. No significant difference is present in male genitalia between these two genera.

(3) It is necessary to elucidate the geographical variation of *Atherix ibis* or *Atherix ibis* complex of the Palearctic region. It is not necessarily established that the 3 species of North American *Atherix* are distinct specifically from one another and even from *ibis*. There are 3 species of *Suragina* from Mexico, of which *concinna* may possibly be identical with *longipes*. Further study is still needed in these two points.

(4) A new *Suragina* from Okinawa and Amami Oshima is described and named

as *uruma*. This species is closely related to *yaeyamana*.

Acknowledgements

This paper is dedicated to Dr. B. R. STUCKENBERG (Natal Museum, Pietermaritzburg, South Africa) for his contributions to Athericidae.

Thanks are due to Dr. W. A. STEFFAN and Mr. Neal L. EVENHUIS (Bishop Museum, Honolulu), Dr. R. ROZKOŠNÝ (J. E. Purkyně University, Brno), Dr. Paul H. ARNAUD, Jr. (California Academy of Sciences, San Francisco), Professor Seizi AZUMA (University of the Ryukyus, Naha), and Mr. Mutsuo MIYATAKE (Ehime University, Matsuyama) for the gift or loan of material.

Indebtedness is also expressed to Dr. Kanetosi KUSIGEMATI (Kagoshima University) for his help in many ways and to Miss Yoshiko IKESHIMA (Kagoshima University) for making the drawings.

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