Sarcophagidae of New England: Genus Sarcophaga

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SARCOPHAGIDAE OF NEW ENGLAND: GENUS SARCOPHAGA.

By

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Thesis Submitted for the Degree of Doctor of Philosophy.

Massachusetts Agricultural College

Amherst, Mass.

1915.
SARCOPHAGIDAE OF NEW ENGLAND: GENUS SARCOPHAga.

1. This paper is a contribution from the Entomological Laboratory of the Massachusetts Agricultural College and represents a portion of the writer's work for the degree of doctor of philosophy.

By RALPH R. PARKER, M. Sc.

Introduction.

This paper deals with the males and females of the genus Sarcophaga Meigen and is a continuation of one previously published in the Proceedings of the Boston Society of Natural History (Vol. 35, No. 1, Sept. 14, 1914) on the males of the genera Ravinia R.-Desvoidy and Boettcheria R. Parker. It was hoped that descriptions of the females of the last two genera could be given at this time. While this has proved impossible, some reference is made to them in the appendix. Other papers will be published from time to time as opportunity permits.

The same plan of numbering the species consecutively has been followed that was adopted in part one in which seven species were described or redescribed: the first species in this paper is, therefore, number 8. The practice of indicating relationships and species groups in a paragraph preceding any species, or in the case of species groups before the first species concerned, has also been continued, the number or numbers in parentheses before the paragraph indicating the species involved. The species names are also given.
In the bibliographies, reference to the original description and the description of synonyms, all references noted in American papers, and certain references in European literature not given in the Catalogue of Palearctic Diptera are given. It cannot be positively stated that all references actually refer to the species indicated.

There can be no question that certain species described in this paper as new have been previously described by Walker or others. This cannot be determined without an examination of types. One species previously described from New England, *Sarcophaga amblycorvinae* Coquillett, was described from the female. As the type is not available for study and the male is unknown, the original description is quoted.

Male and female types have been designated; but if, in any species, the female described should prove to be distinct, the male shall be the type.

In addition to acknowledgements made in part one, expression of thanks for the loan of material or other reasons, is due to C. W. Metz of the Station for Experimental Evolution, Cold Spring Harbor, Long Island, H. Banks of the United States National Museum, Dr. Felt of the New York State Museum, Dr. O. C. Bartlett of Arizona, R. H. Van Zwalenburg of Porto Rico, P. Cardin of the Agricultural Experiment Station, Santiago de las Vegas, Cuba, and many others.
Sarcophaga Meigen.


Genotype, Musca carnea Linnaeus.

1. By designation of Westwood, the sixth species, Intro., Vol. 2, synops., 1840, p. 140.

The thirty names which appear in Meigen's original section on the genus Sarcophaga are now found scattered among nine genera and subgenera and several of the species concerned have become genotypes. The exact standing of some of these derived genera is still an unsettled question, at least as to the extent to which they will be accepted by North American dipterologists. So far as the writer is concerned, those species which unmistakably belong to them are reserved for a future paper in the belief that the distinctions, for the most part, are well founded. Be that as it may, it is certain that Meigen's Sarcophaga was a heterogeneous group and the writer is of the opinion that this is still the case even in the restricted sense of this paper. Several of the species herein described or redescribed under the name Sarcophaga depart so far from characters of the genotype that it becomes difficult to discuss them under the same generic name. For this reason and also because so many species are unknown to the writer, no attempt is made to accurately define generic limits except that in the table of genera, characters are given which will separate all New England species now recognized from those of
other genera.

There are two characters which it seems safe to consider generic for Sarcophaga, -(1) vestiture of head never entirely black (metacephalon, at least, wholly or in part clothed with whitish or yellowish hair), and (2) the presence of four notopleural bristles. The species of Sarcophaga known to the writer also agree in having a single bristle on the middle line of the posterior face of the anterior tibia distal to the middle except that there are two in S. johnsoni n.sp.; certain other genera may also possess this character but in Wohlfartia there are at least two and sometimes others close to the median dorsal ridge, and the same character is found in S. pachyprocta n. sp., and in certain of our species that have been assigned to the genus Paraphyto which is placed among the Tachinidae. Those species of Sarcophaga having the vestiture of the third ventral plate short, so far as they are found in New England, have longer, though sometimes decumbent hair on the sides; this is in contradiction to the species of Ravinia which have the vestiture of the same length on all parts of the plate except that hairs on the posterior margin may be longer.

**Females.**

As it was not feasible at the time the first part of this paper was prepared to deal with females, a comparison of male and female characters of species of this genus is necessary at this
point. The comparison is distinctly a generalization and the writer wishes to emphasize the fact that there are exceptions.

Female characters which essentially differ from the corresponding characters in the males. Breadth of front water at its narrowest part; frontal vitta commonly broader and its sides more parallel; inner orbits of eye diverge downward from bicornex; third antennal segment not uncommonly slightly shorter and even stouter; vestiture of genu may be stronger or more profuse; vestiture of metatibia usually of short, recinate bristles which may or may not be replaced wholly or in part by erect hairs on the scutellum; lateral vertical and orbital (usually two) bristles present; vestiture of leg short; tarsal claws shorter; posterior trochanter without "brush"; anterior face of posterior femur with the intermediate row of bristles usually reduced or wanting; posterior face, in most species, with a set of several long, well separated bristles on proximal half or somewhat more; tibia not bearded; "comb" of middle femur often less distinct; submetatibia bristles always present, longer and stronger; mesostichals and

1. On page 48 of part one it was stated that "the occurrence of a submetatibia bristle is possibly coincident in males and females of the same species." While this is true in the majority of cases it happens that it is absent in the males of some species and furnishes a valuable specific character: I have never found it absent in females.

dorsocentrals shorter, stouter and more recinate in most species; apicale bristles absent; number of sternopleurals less constant, supernumeraries often present; abdomen oval or subcircular; abdominal macrochaetae shorter and less erect in most species, marginal of third segment absent in some species; vestiture of abdomen shorter and more recinate ventrally, usually briskly; ventral plates smaller and except the first, often partly or wholly concealed, vestiture
of short reclinate bristles, at least with posterior marginal bristles; characters of genital segments.

Female characters of specific taxonomic value which are the same as the corresponding character in malea of most or all species.

Cheek height compared to that of eye; plumosity of arista; number of rows of black cilia behind eyes; vestiture of metacephalon; vestiture of cheeks; point of insertion of vibrissae; color of spiracular hairs; color of epaulets; bristles on wing veings and characters of wing structure in general; presence or absence of anterior acrostichals and dorsocentrals; number and comparative strength of posterior dorsocentrals; presence or absence of prescutellar acrostichals; the absence of acutellar apicals in species in which they are absent in male; and the presence or absence of marginal bristles or the second abdominal segment.

In general the broad front, the presence of laterally vertical and orbital bristles, the shorter or shorter and more reclinate character of the vestiture of the metanotum, the oval or somewhat subcircular shape of the abdomen, and the lack of scutellar apicals may be considered as essential female characteristics.

In most species the character of the genital segments is specific for the female as are the penis and its accessory structures for the male. This is perhaps less true for some of the species with black genital segments. The notum of the first genital segment is commonly of one of two forms; either it is divided into two lateral lips or it is undivided and similar in form to the notum of the abdominal segments, though, of course, greatly reduced in size and altered in other ways. References in the descriptions to the "first genital segment" refer to its notum. This segment seems to represent the sixth abdominal segment (seventh morphological) as in the males and the spiracles of the
fifth segment may be seen in some species. In certain species the ventral plates of the genital segments, especially the sixth, offer valuable specific characters and should be figured. In species which are perhaps the more primitive forms the ventral plates decrease in size posteriorly with no differentiation between those of abdomen proper and those of the genital segments. In other species there is a marked differentiation beginning with the fifth plate, which may be larger than those preceding, and including the sixth, seventh, eighth, and ninth; the latter, however, is usually highly modified and retracted. In the species given under the haemorrhoidalis—group the fifth and sixth plates are fused, ordinarily well exposed, and the sixth of characteristic form. The edge of the notum of first genital segment sometimes conceals the ventral plates of the genital segments, habitually in some species; in others the fourth notum practically hides the whole genital structure.

In the descriptions of females only those characters are noted which differ essentially from those of the male of the same species and no reference is made to the lateral vertical, orbital bristles or other characters which may be considered as distinctly female though occasionally they occur in males as useful specific characters.

Variation.

The writer does not intend to enter upon any extended discussion of variable characters, but wishes merely to bring out the fact that the degree of variation varies within the several species. A character constant in some species may be extremely variable in others. It is impossible, therefore, to select any set of characters as continually constant within species limits in the genus and base all specific description upon them. Wherever possible variations
have been noted. An attempt has been made to render species recognizable by a fairly full description of external characters: it may be, that in seeking this end, an undue number of characters has been introduced but they are merely those which have been found useful.

Groups.

As brought out in Part One (pages 29 to 35) the species of Sarcophaga tend to fall into certain species groups and isolated forms. Some of these species groups within which our New England forms fall have been designated by European writers and the same names have been employed in this paper according to Böttcher’s usage of them. It must not be supposed, however, that the summary of like characters presented before the first species of the several groups is meant to define them; it merely gives the like characters for New England species of the group concerned. This plan has been followed because there are other species which will unquestionably come under any of the groups mentioned and an accurate definition of group limits should await more extended investigation of the sarcophagid fauna. Group names, then, are simply used as convenient designations, and in order to make the descriptions of value beyond the prescribed geographical limits group characters have been repeated in specific descriptions.

Generic Tables.

Males.

Due to new species which have come to my attention since the previous portion of this paper was written and to points found in further study it is necessary to present a revised table of genera.

Males of New England genera, the species of which possess any of the following characters or combinations of characters do not
belong to Ravinia, Boettcheria, or Sarcophaga: arista downy; third antennal segment pinkish; front at its narrowest part one fourth width of eye or less; vestiture of head black throughout; less than four notopleurals; first genital segment humpbacked and with two rows of bristles; accessory plates prolonged, appearing as if a division of the forceps, each prong apparently of two parts; front narrow, arista plumose (never shortly so), anterior acrostichals present, three posterior dorsocentrals, vestiture of legs short, posterior face of hind femur with ventral row of bristles, that are inconspicuous on distal third or there abouts, lower sternopleura with more than a single row of bristles, only third vein bristly, section III of costa practically same as section V, abdomen oval and rather short, vestiture of ventral plates erect, and second genital segment small, almost discoidal (females of males presenting this combination of characters have the seventh ventral plate modified to form a prominent, more or less elongated exerted, grooved, slender or stout, accessory organ (orguide) for depositing larvae, while the fifth, sixth and seventh ventral plates (sixth, seventh and eight morphological) fused.

It should be remembered in using the tables presented that when several characters are given in combination that it is not sufficient to use one alone but that all must exist in the same species to locate it within the genus concerned.

1. Bristles of the intermediate row or rows on anterior face of posterior femur longer and stouter (at least as long and stout) than those of upper and lower rows, and sides of ventral plates, as a whole, diverge posteriorly (each plate wider than the one preceding)... Boettcheria R. Parker.

Bristles of intermediate row or rows on anterior face of posterior
fems always shorter, usually just an inch, than those of upper and lower body, or else bent, and sides of ventral plates, as a whole, parallel or converging posteriorly (though not so marked, especially in some species of Raufina). ........................................... 2

2. Frontal bristles similar in color of vitella, the lower most one or two bristles may be slightly more distinct than those above; in case of same not extending below base of vitella, the rest themselves almost parallel in some species, in others their base part is slightly divergent, anterior acrostichal is present, spinules from calcar to spinous or only spines, and hairs more or less clothed with bristles only, .................................................. Raufina R.-Deveauxy.

Lower portions of rear of frontal bristle diverging more or less broadly toward eye orbits and may or may not extend below the base of vitella, especially dark, or if the frontal bristles are as in Raufina the spinules are dark, if spinules are as in Raufina the frontal are as above. Sarcoptes Melgar.

Females.

It has been by no means an easy task to prepare a generic table for females. In order to make it at all exact it has been necessary to run to species in several instances. The writer feels this table with due realization that it may be inconvenient for use, but it is sufficient to run down the species given in this paper and also other uninclosed species of Raufina and Sarcoptes found within New England limits.

Female specimens of New England genera, the species of which possess any of the following characters or combinations of characters do not belong to Raufina: Procellaria or Sarcoptes: antena downy; third antenmal segment pinkish; vestiture of head black throughout; less than four notopleurals; notum and ventral plate
of first genital segment form a ring within which are retracted
the remainder of the genital segments; fourth abdominal notum
without marginal macrochaetae; sixth ventral plate (seventh
morphological) \(^1\) narrow, elongate, directed diagonally upward.

- This ventral plate may be the fusion product of the sixth
  and seventh rather than the sixth alone.

- Grooved for larviposition and completely filling the opening of
  the first genital segment; seventh ventral plate modified to
  form a prominent, more or less elongate, exerted, grooved, slender
  or stout, accessory organ (or guide) for depositing larvae, while
  the fifth, sixth and seventh ventral plates (sixth, seventh and
  eight morphological) are fused.

\(^{1}\) This ventral plate may be the fusion product of the sixth and seventh rather than the sixth alone.

1. Three almost equally strong posterior dorsoventrals . . . . 3
   Four almost equally strong posterior dorsoventrals; two
   strong posterior pairs of posterior dorsoventrals with
   two, three, or more short, weak, or even vestigial
   pairs anterior to them; or a single strong pair of
   posterior dorsoventrals with or without several weaker
   pairs anterior to them..............................2

2. Rows of frontal bristles parallel to sides of vitta, the
   lowermost one or two bristles may be slightly more
   distant than those above, bases of rows not extending
   below base of vitta, the rows themselves practically
   parallel; anterior acrostichals present; and epaulets
   brown and light yellow or only yellowish...Ravinia R-Deavoidy.

Lower portions of rows of frontal bristles diverging more
or less broadly toward eye orbits and may or may not
extend below base of vitta, or in some species one or
more bristles below base of vitta but these not more
distant from inner edge of genae than those above from
sides of vitta; or if frontal bristles are as in Ravinia
the epaulets are dark, if epaulets are as in Ravinia
frontal bristles are as above; anterior acrostichals
present or absent; and epaulets dark...Sarcophaga Meigen.

3. Ground color of genital segments dull orange..............
Ground color of genital segments black or blackish......
Sarcophaga simiata Meigen.

4. Rows of frontal bristles parallel to sides of vitta, the
lowermost one or two bristles may be slightly more distant
than those above, bases of rows not extending below base
of vitta, the rows themselves practically parallel; and
epaulets brown and light yellow or only yellowish......
Ravinia peniculata R. Parker.

One or more bristles of frontal rows extending below base
of vitta but these not more distant from inner edges of
genae than those above from sides of vitta; and epaulets
dark.............................Sarcophaga helicia Townsend.

Bases of rows of frontal bristles diverging more or less
broadly toward eye orbits, extending below base of vitta
but those bristles below never as close to inner edges
of genae as those above to sides of vitta; and epaulets
dark.............................................5

5. First genital notum divided into two lateral lips......
Sarcophaga cramptoni n.sp.

First genital notum not divided into two lateral lips.....6

6. Anterior acrostichals present or absent, if present much
weaker than corresponding pairs of anterior dorsocentrals;
bristly vestiture of scutellum shorter than that of rest
of metanotum and decumbent; and first genital notum broad
not divided into two lateral lips, of similar form to
nota of abdomen proper, but seventh notum not visible within it.
Boettcheria R. Parker.
Anterior acrostichals present and usually darker than corresponding pairs of posterior dorsocentrals; vestiture or scutellar not shorter than that of rear of mesosternum, and not decumbent; and first genital notch rarely, not divided into two lateral lips, of similar size to notch of abdomen proper, but seventh notch is visible within it. Sarcophaga pachyprocta n.sp.

**Specific Table.**

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<table>
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<tbody>
<tr>
<td>1. Ground color of second genital segment black, blackish, brownish black or sometimes dark brownish</td>
<td>2. Ground color of second genital segment dull or brownish orange</td>
</tr>
<tr>
<td>3. Front very prominent, at its narrowest part nearly equal to eye width; anterior dorsocentrals, anterior acrostichals and scutellar apicals absent</td>
<td>4. Front prominent, at its narrowest part never greatly exceeding one half eye width, usually less; anterior dorsocentrals present, anterior acrostichals present or absent, scutellar apicals present</td>
</tr>
<tr>
<td>5. Three pairs posterior dorsocentrals; lateral venterals present; second abdominal segment with two marginals; distal portion of anterior face of middle furca with spot of golden, yellowish or whitish reflecting hairs.</td>
<td>6. Four pairs posterior dorsocentrals; marginals of second abdominal segment normally absent, if present weak, hair-like and decumbent (albripal and albinosum); middle furca without spot of reflecting hairs</td>
</tr>
</tbody>
</table>

1. Sometimes blackish or even black in S. helicis Townsend. This species is usually less than 6 mm. long.

3. Three pairs posterior dorsocentrals; lateral venterals present; second abdominal segment with two marginals; distal portion of anterior face of middle furca with spot of golden, yellowish or whitish reflecting hairs. albinosum Meigen.
4. Submesotibial bristle absent; anterior acrostyles absent; ventral row of bristles of anterior face of hind femur, at most, represented by a few bristles distally. *absosa* n.sp.

Submesotibial bristle present; anterior acrostyles sometimes present, sometimes represented only by presutural pair, sometimes absent, but weak and usually hairlike when present; ventral row of bristles of anterior face of hind femur more or less complete. 

5. Anterior acrostyles absent; usually a fifth weak pair of anterior dorsocentrals present; abdominal nota clothed dorsally with short, reclinate bristles that are slightly more erect on the fourth notum. *tuberosa* harpax (Pandelle).

At least the presutural pair of anterior acrostyles present; four pairs long, slender, posterior dorsocentrals; abdominal nota clothed dorsally with reclinate hairs that are nearly erect on fourth notum.

6. Only presutural pair of anterior acrostyles present; posterior tibia with a row of sparsely long, scattered, acrostyles hairs on distal half of posterior face. *uliginosa* Kramer

Presutural pair of anterior acrostyles present, other pairs usually present but very slender and hairlike; posterior tibia with a beard of close set, but not dense, long hairs on distal two thirds to three fourths of posterior face. *aldrichi* n.sp., *uliginosa* Kramer.

7. Three pairs of posterior dorsocentrals, none weak.

Last two pairs of posterior dorsocentrals strong (sometimes only last pair in *dalmatina*), anterior to these two or more pairs that are always shorter and in many species rudimentary or vestigial.

8. Black cilia behind eyes extending practically down to foramen; breadth front at narrowest part distinctly more than one half eye width; lateral verticals present; scutellar apicals absent. *pachyprocta* n.sp.

Black cilia behind eyes arranged in not more than three complete rows (may be scattered hairs below these close to epicranius in *cramptoni*); breadth of front narrowest part not greater than one half eye width; lateral verticals absent; scutellar apicals present.

9. Small species, average length about 5 mm; first and third veins bristy; vestiture of legs short. *helicia* Townsend.

Larger species, average length about 9 mm; first vein bare; posterior tibiae bearded. *cramptoni* n.sp.

10. Species with front not prominent; vestiture of lower, anterior corners of metacephalon black; at most gena with a row of minute hairs near eye orbit; one or more frontal bristles extending below base of vitta, but these not more distant from inner edge of genae than those above from sides of vitta, bases of rows slightly
divergent toward eye orbits; submesotibial bristles absent; lower sternopleurum with bristles only; genitellus apical well defined; genital segment usually yellowish yellowish, ground color dull orange or somewhat darker. New English species of medium group. 11.

Species not having this combination of characters. ......... 12.

11. Typically coarse, trochanters and femora dull to brownish orange, but this color may be restricted to trochanters parts of femora the legs becoming almost entirely dark. Frontal capsules usually exposed, distinctive (see figure 21, plate 5) ............... andreana Walker.

Legs dark, capsules usually exposed, distinctive (see figure 22, plate 5) ............... subaustralis n. sp.

12. Frontal ciliae parallel to sides of vittae; not extending below its base; genitellus apical. absent. chalcinea n. sp.

Bases of rows of frontal ciliae diverging toward eye orbits, usually extending below base of vittae and away from inner edges of genera; genitellus apical present. 13.

13. Lateral verticalis strong; vestiture of legs short (posterior tibiae not bearded) ....................... tribria Aldrich

Lateral verticalis absent; posterior tibiae bearded. ......... 14

14. Vestiture of practically the entire check, or in one species that of only the posterior portion white; either one or two rows of black ciliae behind eyes (three or more, a partial fourth in acerea). .......... 15

Check vestiture black throughout; three rows of black ciliae behind eyes (three or more, a partial fourth in acerea) ....................... 16

15. Anterior and posterior bands of posterior tibiae of practically equal strength; tarsi shorter than their respective tibiae; only posterior portion of check with white hair; marginal hairs at fold of calypters dark. .. bulita n. sp.

Posterior band of posterior tibiae always the stronger; Tarsi not shorter than their respective tibiae; marginal hairs of calypters white at fold. .......... 16.


17. Submesotibial bristles present. ..... falcula. (Pandellid)

Submesotibial bristles present, rarely absent; pregenital cerochilicalae normally absent, if present rarely at all stout. .......... h. emarginatus Maigly.
19. First genital segment with marginal bristles...genus Pandellé.
   First genital segment without marginal bristles..........................19.

19. Ground color of first genital segment blackish or brownish,
   the segment somewhat grayish pollinose...tuberosa exubera (Pandellé)
   Ground color of first genital segment dull orange..................20

20. Ventral row of bristles of anterior face of posterior
   femur absent except for a single distal bristle; posterior
   tibiae heavily bearded their full length; vestiture of
   third ventral plate short and erect..Heliodes dimidiata n.subsp.
   Ventral row of bristles of anterior face of posterior femur
   complete; posterior tibiae bearded, but not heavily so and
   not for their full length; vestiture of third plate short
   and decurrent..................tuberosa helenioides (Riley)

Females.

1. Ground color of genital segment black, blackish, brownish
   black or sometimes dark brownish..............................2
   Ground color of genital segment dull or brownish
   orange,..................5

2. Sometimes blackish or even black in S. helodes Townsend.
   This species is usually less than 6 mm. long.

2. Front very prominent; anterior dorsocentrales and anterior
   acrostichals absent..........................johnsoni n.sp.
   Front prominent; anterior dorsocentrales present; anterior
   acrostichals present or absent..................3.

3. Three pairs posterior dorsocentrales; second abdominal
   segment with two marginals; distal portion of anterior
   face of middle femur with a spot of golden, dull wish or
   whitish reflecting hairs..................syringa Heigen.
   At least four pairs posterior dorsocentrales; marginals of
   second abdominal segment usually absent, if present
   weak, hairlike and decumbent; middle femur without spot
   of reflecting hairs..................4

4. Anterior acrostichals absent...tuberosa helenioides (Pandellé).

3. The female of S. abnormis not known but would probably run
   to this character.

4. Anterior acrostichals present, at least a presumptual
   pair..................aldrichia n.sp.2
2 The female of *S. uliginosa* Kramer will run to this character:


Last two pairs posterior dorsocentrales strong (sometimes only last pair in dalmatine), anterior to these two or more pairs that are always shorter and in many species rudimentary or vestigial ............................ 8.

6. Black cilia behind eyes extending practically down to foramen; anterior acrostichals present .............................. *pachyprocra* n.sp.

Black cilia behind eye arranged in not more than three complete rows (may be scattered hairs below these close to epicophalon in *cramptoni*); anterior acrostichals present .............................. 7.

7. Small species, average length about 5mm.; first and third veins bristly .................................................. *helicia* Townsend.

Larger species, average length about 6mm.; first vein bare .................. *cramptoni* n.sp.

8. Species with front not prominent; vestiture of lower anterior corners of metacephalon black; at most gums with a row of minute hairs near eye orbit; one or more frontal bristles extending below base of vitta, but these not more distant from inner edges of genae than those above from sides of vitta, bases of rows slightly divergent toward eye orbits; only first genital segment normally visible, notum not divided into two lateral lips, but bent at or slightly anterior to middle of margin dorsally so that edges lateral to this point are approximated medially concealing the ventral plates of this region .............................. New England species of *assidua*-group .............................. 9.

Species **have not** this combination of characters .............................. 10.

9. Typically coxae, trochanters and femora dull to brownish orange, but this color may be restricted to femora or parts of femora the legs becoming almost entirely dark ........................................... *assidua* Walker.

Legs dark .................................................. *subaulgata* n.sp. 1

1 When legs of *assidua* are dark it is practically impossible to separate these two species.

10. Frontal bristles parallel to side of vitta, not extending below its base ........................................... *chelopinga* n.sp.

Bases of rows of frontal bristles diverging toward eye orbits, usually extending below base of vitta and away from inner edges of genae .............................. 11.
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Figures in this paper show the same character as S. Tulivina Macquart. The same condition often prevails in S. serapie Pandelle but not uncommonly there are black hairs on the lower, anterior corners.

S. cheloniae n. sp. closely approaches this condition, as much as, indeed, that it should perhaps be considered as having this character.

S. Sarcophaga simuata Meigen.

Pl. 1, fig. 1.


The presence of a somewhat elliptical or oval golden or whitish yellow spot of reflecting hairs on the distal third of the anterior
face of the middle femur is distinctive for this species.

**Length.** 5 to 9 1/2 mm.; average 8 to 9 1/2 mm.

(♂) **Head.** Viewed from side parafrontals and genae with dark reflections. Breadth of front at narrowest part about one half eye width; cheek height approximately one third that of eyes. Front prominent; sides of frontal vitta parallel or very slightly converging upward, tending to be irregular. Second antennal segment dark; third less than twice length of second; arista weakly plumose on basal half or less, the upper hairs but slightly longer than those beneath. Back of head somewhat convex, with three rows of black cilia behind eyes, otherwise clothed with yellowish or whitish hair which completely covers the metacaphalon. Cheeks clothed with black hair. Genae usually with a single row of hairs near lower eye orbit. Palpi dark.

**Chaetotaxy.** Lateral vertexals present; vibrissae inserted on line with oral margin.

**Thorax.** Vestiture of metanotum consisting of short, slightly reclinate bristles. Hairs covering anterior spiracle dark brown; those of anterior margin of posterior spiracle dark brown; those of spiracular cover brown with narrow yellow border. Epaullets dark.

**Wings.** Bend of fourth vein normally a right or slightly obtuse angle; anterior cross-vein usually somewhat more basal than end of first longitudinal, rarely beneath it; third vein bristly; costal spine prominent; section III of costa approximately equal to section V; alulae fringed with hair; calypters whitish or faintly discolored, margins fringed white hairs.

**Legs.** Dark. Posterior trochanter with "brush," latter often concealed by coxal fringe of coarse hairs; femur spindle shaped, weakly hairy beneath; anterior face with three rows of bristles, those of intermediate row slightly the shortest, not present.
distally; posterior face with ventral row of long, very slender, well separated bristles on proximal half or more: tibia straight, distal half of ventral posterior face with a row of medium long, scattered hairs; comparative length of tibia and tarsus varies, fourth segment of latter at least one half fifth. Middle coxa with a single row of bristles: femur weakly hairy beneath, anterior face with a somewhat elliptical or oval golden or whitish yellow spot of reflecting hairs on distal third, posterior face commonly with a centrally located, similar colored but fainter spot; bristles of anterior ventral row scattered, sometimes only a few near center, those of posterior row somewhat longer, but while close set distally do not form a "comb;" submasticibial bristle present. Ventral surface of anterior coxa with an irregular row of bristles at each side only.

**Chaetotaxy:** - Anterior dorsoventrals but little weaker than postpetral; acrostichals short, often but little differentiated from bristly vestiture of preascutum, often absent; inner prescutural absent; three pairs well developed posterior dorsoventrals; prescutellar acrostichals; scutellar apicals present; three sternopleurals: lower sternopleura with a single row of bristles posteriorly, otherwise scantily clothed with hair.

**Abdomen.** - Somewhat conical or oval; clothed above with short, reclinate bristles or bristly hair, beneath with slightly longer hair becoming longest on fourth notum. Ventral plates as a whole with their sides slightly converging posteriorly or nearly parallel; hairy vestiture decreasing in length posteriorly, short and erect on third; all somewhat square but sides and posterior margins of second and third may be somewhat rounded. Fourth ventral plate not visible except "brushes," latter prominent and borne on proximal two thirds or more of in turned inner edges of lamellae.
Chaetotaxy.—Second segment with two stout marginal bristles; third with several laterals that may extend well up on dorsal margin and two equally strong marginals; fourth with complete marginal row ending ventrally in long hairs.

Gutal Segments.—Prominent, both shining black or deep brown or only one may have brownish tinges; vestiture of second the longest. First, usually well exposed, clothed with short hair, in profile slightly arched, "hump" scarcely if at all differentiated, marginal bristles very weak or even absent; second, rotund, somewhat flattened, vestiture of long hair, upper extremity of small anal area extending slightly beyond middle of posterior surface. Forcæps, black or very dark, inner edges of groeve approximated nearly to tips, the latter slightly spread and with a few short hairs; base with upward flap-like extensions that bear short, sparse hairs. (♀) Females differ from males in the following important characters.

Head.—Breadth of front at narrowest part about equal to eye width. Upper inner orbits of eyes practically parallel or very slightly diverging downward.

Legs.—Posterior trochanter often with a slender apical spine: bristles of ventral row of posterior face of femur strong. Anterior ventral row of middle femur represented only by a few bristles at center, posterior row present on about proximal half.

Chaetotaxy of thorax.—Anterior acrostichals occasionally present, rarely at all distinct: three or sometimes four sternopleurals; lower sternopleura with a single row of bristles only.

Abdomen.—Oval; vestiture, short, realinate bristles except that those on ventral surface of fourth notum are more erect.

Genital Segments.—Of same ground color and often with reflections of abdomen. First segment consisting of two lateral lips, their edges lined with bristles at least dorsally, spiracles central.
Redescribed from 40 male and 50 female specimens.


Foreign: Canada (Quebec), Germany, Austria, Hungary, Switzerland, France, Italy, Scandinavia.

This species is rendered quite distinct from other native members of the genus by the presence of the two spots of reflecting hairs on the middle femur. The one on the posterior surface is usually far less noticeable and the reflecting hairs seem to be intermingled with others of the normal color. Frequently it is necessary to get just the right angle of reflection to see either spot. The bristles throughout are very prominent except a few noted in the description. The marginals of the second and third abdominal segments are unusually prominent. The presence of the former and of lateral ventrals is useful in the males when the reflecting spots of the middle femur are not plain as often happens if the legs are bent against the thorax. Four sternopleurals sometimes occur in females. Dr. Büttcher (Deut. Ent. Zeitschr. 1918, p. 709) notes that there are sometimes four pairs of posterior dorsocentrals, but this condition has not been noted among the specimens examined.

There are specimens of *E. simunata* Meigen in the National Museum at Washington determined as *E. albiceps* Meigen and *E. aegra* Walker. The presence of the spot of reflecting hair on the posterior side of middle femur was not noted by earlier writers. Eränen calls attention to it in an article in the Zeits. M. Syst. Hymen. & Dipt. 1904 pp. 348-349, and also mentions the species as possibly attacking
certain grasshoppers. Kelly (1914) mentions this species as bred from a grasshopper at Columbia Cross Roads, Pa. It is quite commonly captured when sweeping in fields, especially females.

(Sacrophaga aldrichii) n.s., S. uliginosa Kramer, S. absona n.s., S. johnsoni n.s., S. utilis Aldrich n.s., and the subspecies of S. tuberosa Pandellé including S. tuberosa subspecies of the appendix all lack marginal bristles on the first genital segment. These bristles are sometimes lacking in S. einmacht Heig.

S. absona n.s., S. uliginosa Kramer, S. tuberosa baccus (Pandellé), S. tuberosa oxuberana (Pandellé), S. tuberosa saracenina (Riley), S. haemorrhoidalis Meigen, S. dalmatina Schiner, S. falcata Pandellé. These species are the only ones dealt with by the writer which have a row of long, slender hairs on each side, on the coxal ventral membrane just anterior to the "humps." This is rather an obscure character and interesting to show possible relationship rather than as a convenient specific character. These hairs are always in line with the spiracles on each side; the significance of their presence is not quite clear. S. aldrichii further agrees with the subspecies of S. tuberosa (Pandellé) in having the vestiture of the first genital segment as long as that of the second, and both aldrichii and uliginosa have a few hairs on the sutural ridge behind the last notopleural bristles as do species of both the tuberosa and haemorrhoidalis-groups that are dealt with in this paper. These two species also resemble the subspecies of S. tuberosa Pandellé in the absence of marginal bristles on the first genital segment.
S. ulrichia n.sp., S. uliginosa Kramer, S. aborea n.sp. The males of these species agree in the following important characters: viewed from side parafaciala and gense with dark reflections; front prominent; cheeks clothed with black hair; metacochynon completely clothed with yellowish or whitish hair; lateral verticals absent; metanotum clothed with fine erect hair that in sometimes quite long; hairs covering anterior spiracle dark basally, lighter toward tips, those of anterior margin of posterior spiracle dark brown, spiracular cover brownish at least centrally; spoulets dark; anterior cross-vein more basal than end of first longitudinal; costal spine vestigial; section III of costa slightly greater than section V; legs dark; bristles of thorax mostly long and slender, at least much longer than vestiture of metanotum; four pairs posdnotural dorso-centraL, anterior two pairs not vestigial; prescutellar acrostichals and scutellar apicals present; lower sterno leura with a single row of bristles; vestiture of X abdominal nota hairy, quite long beneath; third segment with two marginals; genital segments black or blackish, sometimes brownish; not conspicuous, normally hardly more of first segment visible than band of membrane between the segments; "humps" not differentiated; first, at least in part, grayish pollinose; second, rotund, small area flattened; heavily chitinized portion of head of penis black; accessory plates orange brown or brownish, hairy; fourth ventral plates similar.

S. ulrichia n.sp., S. uliginosa Kramer. The genitalia are the only means by which these two species may be safely separated. There are certain external differences which will occasionally differentiate them but variation within the species forbids their use in many instances. These are the two species referred to on page 29 of part 3 of this paper as Group 8 and as agreeing closely in all
external characters and separable safely by the penae and forces only in contradistinction to other groups in which the penae were very similar, the principal specific differences being external, etc.


Pl. 1, fig. 2.

Type d: Massachusetts Agricultural College.

Paratypes (d): Massachusetts Agricultural College, one; United States National Museum, two; Boston Society of Natural History, one; Gypsy Moth Parasite Laboratory, Melrose Highlands, Mass., three; collection of Dr. J. M. Aldrich, one; collection of author, one.

(d) Vestiture of both thorax and abdomen hairy throughout; only presutural pair of anterior acrostichals present, weak; anterior femur with but two rows of bristles, on upper and lower, or, if these present, bristles of intermediate row are very slender and hair-like; posterior face of posterior tibia with a row of scattered long hairs on distal half; second genital segment black or blackish.

Length: 8 1/8 to 11 1/8 mm.

Head.—Viewed from side parafrontals and genae with dark reflections, transverse impression sometimes with a reddish tinge. Breadth of front at narrowest part about one half eye width; cheek height approximately one half that of eye. Front prominent, inner orbits of eyes on its upper part converging downward, sides of front vitta converging backward by straight lines, rarely parallel. Second antennal segment dark; third about twice length of second; arista plumose on basal half or slightly more. Back of head somewhat convex, with three or four rows of black cilia behind eyes, otherwise clothed with yellowish white or whitish hair that completely covers the metacephalon. Cheeks clothes with black hair. Gense clothed with scattered hairs. Palpi dark.
Chaetotaxy. - Lateral verticils absent; vibrissae sometimes inserted on line or oral margin but usually very slightly above.

Thorax. - Metanotum clothed with fine, erect hair that is sometimes quite long. Hairs covering anterior spiracle dark basally, lighter toward tips; those of anterior margin of posterior spiracle dark brown; those of spiracular cover brownish with yellowish tips. Epaullets dark.

Wings. - Bend of fourth vein normally a right angle; anterior cross-vein more basal than end of first longitudinal; third vein bristly; costal spine vestigial; section III of costa slightly greater than section V; alulae fringed with hairs; calyptr Whitish, margins fringed with whitish or slightly yellowish hairs.

Legs. - Dark. Posterior trochanter without "brush," or latter so small as not to be distinguishable as such: femur cylindrical or sub-cylindrical, clothed beneath with medium long, scattered hair; anterior face with three rows of bristles, those of intermediate row shortest and not developed distally; posterior face without ventral row of bristles: tibia straight or slightly curved, a row of scattered, long hairs on distal half of lower posterior face; tarsus equal in length to tibia, fourth segment at least one half fifth. Middle coxa with a single row of bristles: femur clothed beneath or posterior, proximal half with fine but rather short hair; anterior ventral row of short bristles complete, posterior row represented by "cost" on distal one third to two fifths; submetatibial bristle present. Anterior coxa with two rows of bristles; femur usually with two rosettes, but if three are present, intermediate row consists of very fine, hair-like, scarcely distinguishable bristles.

Chaetotaxy. - Bristles usually long and slender. Anterior dorso-centrals, as a rule, scarcely shorter than posterior; only
presutural pair of acroostichals developed, slender, others rarely present and if so very hair-like; inner presuturals slender, nearly as long as anterior dorsocentrals; four pairs postesutural dorsocentrals; prescutellar acroostichals present; scutellar apicals present; sternopleurals, sometimes both sides with three or two but very commonly two on one side, three on the other; lower sternopleura with a single row of bristles, otherwise with long hair.

Abdomen. Somewhat conical or slightly oval; hairy vestiture longer and finer beneath. Ventral plates, as a whole, with their sides slightly converging posteriorly, almost parallel; at sides vestiture long on all three but centrally vestiture of third shortest on third and erect.

Chaetotaxy. Second segment usually without marginal bristles, at rest they are short, hair-like, and decumbent; third with two and often with weaker, hair-like bristles between these and laterals; fourth with complete row ending ventrally in long hairs.

Genital Segments. Not conspicuous, normally but small part of first showing, often only membranous band joining the segments. First, ground color varies from brownish orange to blackish, grayish pollinose except "humps" which are not differentiated, vestiture about equal in length to that of second, in profile slightly arched, marginal bristles absent; second, rotund, anal area flattened and extending about to upper limit of posterior surface; shining black, often faintly grayish pollinose, sometimes with a brownish tinge. Forceps, normally not visible, blackish brown, or orange brown; prone flattened, their inner edges meeting ridge-like for more than two thirds their length then separated but tips so bent that edges normally meet just before the extremities of prongs the latter spreading slightly, vestiture increases in length and amount basally; base with upward flap-like
extensions. Connecting membrane just anterior to "humps," with a row of long, slender hairs on each side.

**Genitalia.**- Heavily chitinized portions of head of penis black or blackish: anterior claspers broad and flattened: accessory plates brownish orange, hairy, and with an almost linear extension that parallels forceps for a way. Inner edge of lamellae of fourth ventral plate fringed with hair: \( \frac{9}{4} \) not known.

Described from 11 male specimens, 71 others examined.


United States: N. Y.

Foreign: Canada (Quebec).

This species is named in honor of Dr. J. M. Aldrich.

The bristles are long and slender except on the legs. It is peculiar that the left sternopleura often bears two sternopleurals, the right one three, which in none of the specimens examined was the reverse condition found. The rows of cilia should be counted on that portion of the back of the head which is nearest the epiphallus. In exposing the genitalia the forceps are apt to be spread and flattened out so that they do not appear normal.

The external characters which may be used to separate this species from *S. uliginosa* Kramer are, for the most part, variable in both species. The most constant distinctive character seems to be the presence of a row of long scattered hairs on the distal half of the longer, posterior face of the hind tibia; while in *uliginosa* Kramer the hairs are close set and form a distinct beard on the distal three fourths. The number of rows of black cilia behind the eye, commonly distinctive, varies in both species. In *aldrichii* there are usually but two rows of bristles.
of the anterior femur but sometimes an intermediate row is very weakly developed; uliginosa Kramer, on the other hand, commonly has three rows though occasionally the intermediate one is so weak as to resemble that condition in aldrichiana. The former seems to constantly have three sternopleurals while the number varies in aldrichiana. Usually anterior acrostichals are lacking in the latter except the presutural pair, while in uliginosa all are commonly present; but again this character varies in both. The vestiture of the third ventral plate tends to be longer and more erect and the hair on the base of the forceps shorter in aldrichiana.

Aldrichiana may easily be distinguished from anona by its greater size, broader front and the presence of the submacrotibial bristle, of at least a presutural pair of anterior acrostichals, of only a "comb" to represent the posterior ventral row of bristles on the middle femur, and of a ventral row of stout bristles on the anterior face of the third femur.

The penis is characteristic for the species but the fourth ventral plate is like that of uliginosa Kramer. The forceps of uliginosa and aldrichiana are also alike, that of ferrumdi specific.

Among my material I have fourteen specimens of S. aldrichiana from the Gypsy Moth Laboratory at Melrose Highlands which are recorded as bred from pupae Partheneia hispor (Linnæus) collected at Melrose, Wakefield, North Saugua, Woburn, North Andover, Beverly, Essex, Topsfield, Gloucester, and Swampscott. Certain of these towns should appear under distribution but I have no means of discriminating. Of Samophagida collected at Lunenburg, Massachusetts during the season of 1914 by R. T. Webber of the Gypsy Moth Laboratory, this species is by far the most numerous.
10. Sarco phaga uliginosa Kramer.

**Pl. 1, fig. 3.**


Length: 10 to 12 mm.

Aside from the genitalia, this species differs so little from *S. aldrichiana* that a complete redescription seems unnecessary; therefore only those characters which have differential value are given.

(1) Anterior acrostichals usually all present but only the presternal pair well differentiated, the others sometimes wanting; three sternopleurals. Posterior tibia with a beard of close set, but not dense, long hairs on distal two thirds to three fourths of posterior face. Anterior femur with three rows of bristles, intermediate occasionally weakly developed. Except at sides vestiture of third ventral plate short and sometimes almost decumbent. Base of forceps clothed with long, fine, hair.

Six specimens examined, 2 native, 4 European.


Foreign: Germany, Roumania, France, Italy.

Unless one has become very familiar with this species and *S. aldrichiana* the genitalia should be used to separate them. See discussion following *S. aldrichiana*. The slender curved membranous
appearing process shown at the extremity of the penis (Plate 1, Figure 3 is double in fresh specimens.

The presence of prenotal acrostichals, or a subnotal bristle, or a "comb" only on the posterior ventral surface of the middle femur, and of a more or less complete ventral row of bristles on the anterior face of the posterior femur are sufficient to separate this species from S. abscura. See discussion following

S. tuberosa hyperx (Pandellé).

Kramer (Abhandl. d. Naturf. Gesell. z. Grlitz, 1911, p. 145) mentions S. uliginosa as occurring in certain localities in coincidence with Psilura longicauda (Linnæus) and Lysiocampa jini (Linnæus). He also states that adults were bred from cocoons of the former and that it has been proved to be a parasite of the latter. I have three specimens from the Gypsy Moth Laboratory at Melrose Highlands, Mass. Which were bred in the larvae and pupae of Porthätia dispar (Linnæus) imported from Germany (Record numbers 5-308 and 5-308). The native specimens were collected, not reared.

11. Sarcoptes fennesii, n.sp.
Pl. 1, Fig. 4.

Type °: United States National Museum (no. 19166).

Paratypes (5): Gypsy Moth Parasite Laboratory, Melrose Highlands, Mass., two; collection of author, one.

(5) Anterior acrostichals absent; ventral row of bristles of anterior face of third femur at most represented by a few bristles distally; posterior ventral row of bristles of middle femur consisting of "comb" and two or three very long bristles proximal to it; subnotal bristle absent; second genital segment black or blackish.
Length: 6 1/8 to 9 mm.

Head. — Viewed from side parafrontals and genae with dark impressions; those of transverse impression may be brownish or reddish. Breadth of front at narrowest part about one third eye width; cheek height approximately one third that of eyes. Front prominent, inner orbits of eye on its upper part converging downward; sides of frontal vista converging upward. Second antennal segment dark; third about twice length of second; arieta plumose on basal half or somewhat more. Back of head somewhat convex, with three or four irregular rows of black cilia behind eyes, otherwise clothed with whitish or yellowish hair that completely covers the metacaphalon. Cheeks clothed with black hair. Genae with at least a line of hairs near lower eye orbits, usually with other shorter ones chiefly on upper portion. Palpi dark.

Chestotaxy. — Lateral verticils absent; vibrissae inserted on line of oral margin.

Thorax. — Metascutum clothed with fine, erect hair. Hairs covering anterior spiracle dark basally, lighter toward tips; those of anterior margin of posterior spiracle dark brown; those of spiracular cover brownish centrally and basally with yellowish tips. Epaulcts dark.

Wings. — Bend of fourth vein normally a right angle; anterior cross-vein more basal than end of first longitudinal; third vein bristly; costal spine vestigial; section III of costa slightly greater than section V; sulci fringed with hair; calypters whitish or faintly discolored, margins fringed with whitish hairs.

Legs. — Dark. Posterior trochanter without "brush": femur cylindrical or sub-cylindrical, clothed beneath with medium long
or long hair: anterior face with three rows of bristles, those of intermediate row shortest and not developed distally, lower row usually represented by one or more bristles distally though the others may be very slender and scarcely different from the hairs; posterior face with ventral row of long, slender, well separated bristles which may not be distinguishable as such in small specimens: tibia straight, with a weak beard of medium long hairs on distal two thirds to three fourths of lower posterior face and in larger specimens a thicker row on anterior face; tarsus not shorter than tibia, fourth segment at least one half fifth. Middle coxa with a single row of bristles: femur clothed beneath with quite long hairs on proximal, posterior surface; anterior ventral row of short, scattered bristles complete, posterior represented by "coat" of rather slender bristles and two or three very long, much stouter bristles proximal to it: submesotibial bristle absent. Ventral surface of anterior coxa with an irregular row of bristles on each side only; with usual three, though those of intermediate row are sometimes scarcely differentiated.

**Chaetotaxy.**—Anterior dorsocentrals, as a rule, but little shorter than posterior; acrostichals absent; inner presuturals indistinguishable or scarcely differentiated from hairy vestiture of prescutum: four pairs postsutural dorsocentrals; prescutellar acrostichals present: scutellar apicals present: three sternopleurals: lower sternopleura with a single row of bristles, otherwise with long hair.

**Abdomen.**—Somewhat conical; hairy vestiture longer and finer beneath. Ventral plates, as a whole with their sides converging posteriorly, at sides vestiture equally long on all, but centrally that of third shortest and crest.

**Chaetotaxy.**—Second segment without marginal bristles or at
most they are short, hair-like and decumbent; third with two and sometimes with weaker, hair-like bristles between these and marginals; fourth with complete row ending ventrally at forward turn of the margin.

Genital Segments.—Not conspicuous, normally but small part of first showing, often only membranous band joining the segments, ground color typically black or blackish, sometimes brownish.

First, grayish pollen; usually but not always present on posterior half or less, "humps" not differentiated, vestiture shorter than that of second, but long on posterior margin, in profile slightly arched, marginal trikasts absent; second, rectal, anal area somewhat flattened and extending about to upper limit of posterior surface, sometimes faintly grayish pollinose. Forceps, normally not visible, blackish or orange brown; prongs approximated to beyond the middle their tips blunt, spreading, each with small tooth-like projection, vestiture increases in length basally; base with very short upward flap-like extension. Connecting membrane, just anterior to humps with a row of long, slender hairs on each side.

Genitalia.—Heavily pollinized portions of head of penis black or blackish, lower, posterior portion develops into distinctive hump-like projection: viewed from side anterior and posterior claspers seem to end in a knob; accessory plates brownish orange, hairy, triangular. Fourth ventral plate same as that of _P. clavichia_.

(♀) Not known.

Described from 4 specimens, three other examined.

Range.—New England: Maine; Stonington. United States.

The character of the posterior ventral row of bristles on the middle femur, of the lower anterior row of the ventral face of the posterior femur, the characters of the forceps, and those of the penes and claspers furnish distinctive features.
See discussions following descriptions of *Sarcophaga niuricihin* and *S. vigilinaea* Kramer.

Two specimens in the collection of the Gypsy Moth Laboratory at Melrose Highlands, Mass. were reared from the larvae of *Porthetria dispar* (Linnaeus). A specimen received from Tuthill was labelled "parasite of leaf roller."

(12, 1912)

*Sarcophaga johnsoni* n.sp. *G. bullosa* n.sp., *S. fulvipes* n.sp., n.subsp., *G. secabrica* Pandelle. These species at least tend to have bearded middle tibiae. In *S. fulvipes* gissidida the bearded character is more pronounced.

<— (10) *Sarcophaga johnsoni*, n.sp. It is hard to say with any degree of certainty that this species is at all closely related to any of the other species described. In certain characters the males seem very distinct from other members of the genus; the chaetotaxy and other features are extremely similar to those of certain West Indian and Mexican forms. Of the species herein described it perhaps comes nearest *S. cumina* n.sp., for, though they seem very distinct superficially, yet there is a general similarity of the genital segments and accessory genital structures, the long, erect vestiture of the ventral plates, and the chaetotaxy of the legs. The females are very distinct and that of *S. utilis* Aldrich seems closely related to that of *S. cumina* Pandelle. Aldrich's figure of the penis of *utilis* indicates that it is more like that of *johnsoni* than my own shown by my own drawing.

1. *Sarcophaga johnsoni*, n.sp.

Pl. 2, fig. 6; pl. 2, fig. 5.


New Jersey. List reference questioned.

Mr. Johnson has assured me that both these references have to do with the species here described.

Boston Society of Natural History, one male, one female.

Paratypes: Massachusetts Agricultural College, one male; Boston Society of Natural History, one male, one female.

(5) Breadth of front at narrowest part nearly equal to eye width; cheek height usually about four seventh that of eye; front very prominent; arista shortly plumose; facial plate roundly carinate, antennis grooves distinct; gennae very broad; palp light colored vibrissae inserted well above mouth margin (about one eighth inch in normal specimens), middle coxa, at least dorsally, with more than a single row of bristles; ventral row of anterior femur present on distal half only; posterior tarsus shorter than tibia; anterior dorecentrals, acrostichals and inner prealars absent and usually only the posterior two pairs of postalar dorecentrals present; scutellar epicals absent; ventral plates with long erect hair; genital segments black or blackish, first without marginal bristles.

(6) Breadth of front at narrowest part one and one third to one and one half times eye width; cheek height usually about four sevenths that of eye; front very prominent; arista shortly plumose; facial plate roundly carinate; gennae very broad; palp light colored; vibrissae inserted well above mouth margin, middle coxa, at least dorsally, with more than a single row of bristles; anterior face of posterior femur with two rows of bristles, intermediate absent, lower represented by stout, well separated bristles on proximal half.
and a single stout trisile distally; the two broad, lateral lips of first genital segment of same ground color and pollination as abdomen, spiracle nearest anterior margin.

Length: 15 to 17 mm; average 16 mm.

6) Head:— Viewed from side parafrontale and genae with dark reflections, transverse impression sometimes brownish. Breadth of front at narrowest part nearly equal to eye width; cheek height more than one half, usually about four sevenths that of eye. Front very prominent, inner orbits of eyes on its upper part either parallel, or converging slightly forward; sides of frontal vitre usually parallel, sometimes slightly convergent backward. First antennal segment prominent, second unusually long, dark but usually with brownish or dull orange colored tip; third one and one half to one and three fourths times length of second; cribs shortly plumose on basal two thirds; facial plate roundly and prominently carinated, the antennal grooves distinct. Back of head strongly convex, with two complete rows of black cilia behind eyes, second row very irregular, a partial third may be present near epicranium, otherwise clothed with whitish or yellowish hair that completely covers the metacephalon. Cheeks clothed with black hair. Genae very broad, extent of vestiture variable, but usually sparsely clothed with short hairs that often extend over or to transverse impression. Palpi light colored.

Chaetotaxy.— Lateral verticalae absent or weakly developed, rarely, as strong as last frontal; vibrissae inserted well above oral margin (about one eighth inch in normal specimens).

Thorax.— Metanotum thickly clothed with slender bristles. Hairs covering anterior spiracle dark brown basally, lighter toward tips; those of anterior margin of posterior spiracle dark brown; those of spiracular cover brownish with yellowish tips. Epandria dark.
Wings.—Band of fourth vein a right or an acute angle; anterior cross-vein more basal than end of first longitudinal; third vein biretly; costal spine vestigial; section III of costa about one and one-half times section V; margin of alula sometimes naked; sometimes fringed with hair; calyptere whitish, margins fringed with whitish or yellowish hair.

Legs.—Dark. Posterior trochanter without "brush": femur stout, sub-cylindrical, straight beneath or very slightly arched and clothed with long hair becoming longer posteriorly; anterior face with three rows of bristles, those of intermediate row not developed distally; posterior face usually without ventral row of bristles (there may be a few bristles centrally): tibia curved, often but slightly, posterior and anterior faces each with a beard of long, rather coarse, black hairs on distal half or a little more, later much the stronger: tarsus shorter than tibia, fourth segment at least one half fifth. Middle coxa, at least dorsal, with more than a single row of bristles: femur clothed beneath on proximal half, especially proximally with long hair; anterior and posterior rows of bristles complete (at least on distal two-thirds to three-fourths), "cone" not differentiated as such: subesotrichial bristle strong, often obscured by hair that covers tibia ventrally on distal half or less and anteriorly, and posteriorly becomes longer and beard-like. Ventral surface of anterior coxa completely clothed with bristles that form several irregular rows: ventral row of femur present on distal half only; vestiture of tibia longest ventrally, posteriorly, and distally.

Ovipositor.—Anterior dorsocentrala, acrostichals and inner prescuturals absent: several pairs posterior dorsocentrala, last two strong and anterior to them one (usually) or more pairs that are scarcely distinct from vestiture of scutum; prescutellar acrostichals
present: acellular spines absent; three sternopleurals; lower sternopleura with a single row of slender bristles, otherwise with hairs that are dense, long and almost bristly.

**Abdomen.** - Oval somewhat conical; clothed above with short, reclinate bristles, beneath with very long, dense, hairs that become longest on ventral plates. Latter, as a whole, with their sides parallel; vestiture coarsely diminishing in length posteriorly.

**Chaeotaaxy.** - Second segment without marginal bristles; third with two, sometimes with short, decumbent bristles between these and laterals; fourth with a complete row ending ventrally in long coarse hairs.

**Genital Segments.** - Somewhat prominent, at least posterior half of first exposed. First, ground color deep brown, graysish pollinose, vestiture shorter than that of second, in profile slightly and evenly arched, "humps" with few hairs, marginals bristles absent; second, appears rounded and squat in normal position, basal area large and flattened (when segments are pulled out appears rose rounded) its upper extremity reaching to upper limit of posterior surface, black or blackish, densely clothed with quite long hair. Forelegs dull or brownish orange, base with upward flag-like extensions clothed with fine curly hairs as long or nearly as long as vestiture of segment; groups rather short, approximated nearly to tips and short; they appear apart each with a tuft (covert) of dense, short, fine hairs that is very prominent, in profile each tip with a forward tooth-like projection.

**Genitalia.** - Heavily chitinized portion of base of penis not black; clasper blackish; accessory plates very large filling all the space between forelegs and ventral edge of second segment, almost bare, with a few hairs anteriorly.

(4) Females differ from males in the following important characters.
Head.—Breadth of front at narrowest part one and one third to one and one half times eye width. Upper, inner orbits of eyes diverging downward. Facial plate less strongly carinated.

Thorax.—Metanotum clothed with short, slender, reclinate bristles.

Legs.—Anterior face of posterior femur with two rows of bristles, intermediate absent, lower represented by stout, well separated bristles on proximal half and a single stout bristle distally; ventral posterior row present on proximal half and consisting of several long, well separated bristles; tarsi not shorter than tibia. Anterior and posterior ventral rows of middle femur present on proximal half only. Ventral row of bristles of anterior femur complete, bristles of intermediate row much stouter than in male.

Abdomen.—Oval; vestiture throughout of short, reclinate bristles.

Genital Segments.—Not protuberant, and visible fron below. The two broad, lateral lips of first genital segment of same ground color and pollination as abdomen, above line of the spiracles at least their edges fringed with hairs and bristles or with bristles alone; spiracles nearest anterior margin. Spiracles of fifth segment usually concealed.

Described from 5 male and 3 female specimens.

Range.—New England: Massachusetts: Chatham, Tolland, Plum Island; R. I.: Boston Wood.


This species is named in honor of Mr. C. W. Johnson.

Among our New England species <em>Paracoryphos johnsoni</em> is peculiarly
distinct. The absence of anterior and posterior postnotural dorso-centrals is a character common among certain West Indian, Mexican and probably South American forms, but I have not yet met with it in any other northern species. The strikingly pronounced front and prominent, silvery gray parafrontals and genae are very distinctive. The cheeks are very high and the eyes comparatively small. The vestiture of the ventral plates is unusually long.

The apical spines of the posterior trochanter is absent in both males and females. The genital segments are very difficult to pull out apparently because cadaverous areas are restricted so that there is less give and the notum of the fifth segment (sixth and locally) is well developed.

S. johnsoni is the S. carnaria of Smith’s New Jersey List(1909). This is one instance in which it is possible to clear up the erroneous references to the latter species in North America.

Dr. Hough, through his work upon the Sarcoptagidae some years ago, was able to show that this species did not occur here. S. carnaria(L.) is certainly very distinct from any of our American species and offers no difficulties in the way of identification.

This species is apparently a sea coast form.

(13) Sarcoptagia utilis Aldrich, S. scoparia Pondid. While the males of these species are very distinct, the females, on the other hand, are very close and their genital segments almost identical. Structurally this holds good for both European and American forms of S. scoparia, but this species in Europe has black genital segments, in America dull orange, though the first is sometimes more or less grayish pollinate. It is possible that the female of S. pseudoscoparia Kramer(European) has the same type of genital structure.

Pl. 2, Fig. 6.


**Type:** United States National Museum (male).

(6) **Breadth of front at narrowest part about two thirds eye width; lateral vertical bristles strong; tibiae not bearded; posterior femur with complete ventral row of bristles only; last two pairs of posterior dorsocentrals strong, several very weak pairs anterior to these; ventral plates with long erect hair; genital segments dull orange, first with cut marginal bristles.**

(7) **Cheeks clothed black bristly hair; transverse impression usually with several hairs or bristle like hairs; vestiture of acutellum bristly; lips of first genital segment dull orange, but slightly protuberant, not visible from above; sides of sixth ventral plate overlapped by lips of first genital segment, its posterior margin bare or with hairs only; posterior dorsocentrals as in male.**

**Length:** 7 to 14 mm; average 12 to 14 mm.

(6) **Head.**—Viewed from side parafrontale and genae with dark reflections. Breadth of front at narrowest part fully two thirds eye width; cheek height nearly one half that of eye. Front prominent; inner orbits of eyes on its upper part converging slightly downward; sides of frontal vitta usually parallel. Second antennal segment dark, tip brownish; third two to two and one half times length of second; arista strongly plumose to beyond middle. Cheeks clothed with black hair. Back of head somewhat convex, with three rows of black cilia behind eyes, otherwise clothed with yellowish hair that completely cover the postocophysis. Genae with one to several rows of coarse hair on half nearest eye orbit. Palpi dark.
Chaetotaxy.—Lateral verticals present, strong; vibrissae inserted on or just above line of oral margin.

Thorax.—Metasternum clothed with quite short, radially bristles. Hairs covering anterior spiracle mostly yellowish but shading to dark brown at bases; those of anterior margin of posterior spiracle dark brown; those of spiracular cover mostly yellowish, shaded darker centrally. Epimera dark.

Wings.—Bend of fourth vein normally a slightly acute angle; anterior cross-vein more basal than end of first longitudinal; third vein bristly; costal spine vestigial; section III of costa one and one half times section V; alulae with fringes of very short hair; calypters whitish, margins fringed with white hair.

Legs.—Dark. Vestiture short and bristly (more hair-like in smaller specimens) except for long hairs on proximal portions of ventral faces of femora. Posterior trochanter with tuft of long hairs, "brush" absent; femur sub-cylindrical; anterior face with three rows of bristles, those of intermediate row shortest and not developed distally; posterior face with complete ventral row; tibia straight or slightly curved; tarsus equal to or shorter than tibia, fourth segment at least one half fifth. Middle coxa at least dorsal, with more than a single row of bristles; femur with complete anterior and posterior ventral rows, "comb" sometimes not well defined; tibiaostial bristle present, strong. Ventral surface of anterior coxa completely clothed with bristles that form several irregular rows.

Chaetotaxy.—Anterior dorsoenterals not weaker than anterior poststernals, short and stout but longer than vestiture of prescutum; preapicicilia absent or only slightly differentiated anteriorly; inner presuturales very weak and inconspicuous; last two pairs of posterior dorsoenterals strong, several very weak
pair anterior to these; prescutellar acrostichals present; scutellar apicals present: three sternopleurals; lower sternopleure with bristles only.

Abdomen.-- As a rule almost oval but somewhat conical in smaller specimens; clothed above with short recinate bristles, beneath with longer, more erect hair. Ventral plates, as a whole, with their sides parallel; their vestiture decreasing in length posteriorly but quite long and erect on third plate. Posterior edge (rarely more) of fourth notum, at least dorsally, of same ground color as genital segments.

Genital Scaly.-- Second segment without marginal bristles; third with two; fourth with complete row ending ventrally in long, coarse hairs.

Genital Segments.-- Prominent; dull orange, except that first is somewhat darkened at sides just posterior to "humps". First, intensely or faintly yellowish pollinose, vestiture short except a few long hairs on "humps", in profile very slightly arched (almost flattened), marginal bristles absent: second, rotund, not flattened, vestiture longer than that of first, anal area small, its upper extremity not extending above center of posterior surface. Forecaps of same color as segments, base with upward flag-like extensions clothed with fine, curly hair not longer than vestiture of segment; prongs rather short, approximated nearly to tip, each covered with very short hair, in profile with forward tooth like projection.

Genitalia.-- Distinctive. Each accessory plate with a short, broad, anteriorly directed, tooth like process.

♀ Females differ from males in the following important characters.

Head.-- Breadth of front at narrowest part about equal to eye width. Upper inner orbits of eyes diverging downward. Cheeks clothed
with black, bristly hair.

**Dorsum.** - Vestiture throughout of short hair, except that of scutellum which is bristly. Posterior tibiae darker with slender, distal bristle; bristles of intermediate row on anterior face of femur very short, posterior face with row of long, well separated bristles on proximal half or slightly more. Anterior and posterior ventral rows of middle femur complete but bristles very indistinct; inconspicuous distally. Subcrestital bristle very strong, sometimes a stout bristle just above it.

**Abdomen.** - Oval; vestiture throughout of short, reclinate bristles.

**Chasmatocory.** - Second segment sometimes with two or more weak distal bristles.

**Genital Segments.** - But little protuberant, only visible from below. The two broad, lateral lips of first genital segment dull orange, sometimes yellowish pollinose ventrally; upper edges fringed with hair and bristles, latter mostly above line of spiracles nearest to anterior margin. Spiracles of fifth segment usually concealed. Sixth ventral plate (seventh morphological) without posterior marginal bristles and its sides overlapped by lips of ninth.

Redescribed from 11 male and 5 female specimens; others examined.


Foreign: Mexico.

So distinctive are the strong, lateral, ventral bristles among our New England species that the males are exceptionally easy to determine. Deformation of the penis is common, apparently due to a sort of gelatinous substance of consistency and it may
resemble the drawing but roughly. In well developed females the bristles of the lower sternopleurae are long and prominent but in smaller specimens are less well marked except the customary single row, but they do not become at all hair-like. The same statement will apply to the additional bristles of the middle coxae in both sexes.

This description was written previous to that published by Aldrich under the name atrilis. In naming collections I have already sent out specimens of this species under the manuscript name grinita. This name should be changed. The drawing presented with Aldrich’s description was made from a boiled specimen, that given here is made from one in the normal condition. The former drawing does not show the process of the accessory plate which is distinctly a specific character and present in all specimens examined by the writer. The following characters are noted in the original description; "vibrissae inserted well above oral margin, almost on level with lower edge of eye, ......... fourth tarsal joint very, short, less than half the fifth." In my material the vibrissae are but slightly above the line of the oral margin and well below the lower level of the eyes, while the fourth tarsal segment in males is one half or greater than one half the fifth, in females one half or slightly less (more apparent from inner surface).

E. grinita and E. scoparia Pandalus; comparison of females. Though the males of these species are quite distinct the females, of medium and small size are very similar. With the exception of a few characters, which seem constant, the condition typical for any external character in each species varies toward that typical for the same character in the other.
<table>
<thead>
<tr>
<th>Characters which seem constant.</th>
<th>S. acarinia Pandellé.</th>
</tr>
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<tbody>
<tr>
<td>Transverse impression with</td>
<td>Bare</td>
</tr>
<tr>
<td>several hairs on ciliate-like</td>
<td>hair.</td>
</tr>
<tr>
<td>hairs.</td>
<td></td>
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<tr>
<td>Sides of sixth ventral plate</td>
<td>Sixth late entirely external and</td>
</tr>
<tr>
<td>overlapped by lips of first</td>
<td>its posterior margin with cilia,</td>
</tr>
<tr>
<td>genital segment, its posterior</td>
<td>margin bare or with hairs only</td>
</tr>
<tr>
<td>at least at sides.</td>
<td></td>
</tr>
<tr>
<td>Characters which are strongly indicative,</td>
<td>perhaps even differential.</td>
</tr>
<tr>
<td>First genital segment (lips of)</td>
<td>Protuberant, extending beyond</td>
</tr>
<tr>
<td>not protuberant and only</td>
<td>edge of fourth notum and visible</td>
</tr>
<tr>
<td>visible from beneath.</td>
<td>from above in most specimens</td>
</tr>
<tr>
<td>Typical conditions which vary toward the opposite condition in the other species, useful collectively rather than simply.</td>
<td></td>
</tr>
<tr>
<td>Vestiture of scutellum bristly</td>
<td>Hairy</td>
</tr>
<tr>
<td>Bristles of anterior and pos-</td>
<td>Those of posterior are longer.</td>
</tr>
<tr>
<td>terior ventral rows of middle</td>
<td>femur equally strong and long.</td>
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<tr>
<td>Anterior acrostichals differ-</td>
<td>Scarcely, if at all, discernible</td>
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<td>entiated anteriorly.</td>
<td></td>
</tr>
<tr>
<td>Anterior postacutural hor-</td>
<td>At least as strong and long.</td>
</tr>
<tr>
<td>centrals shorter and usually a little weaker than those before the suture.</td>
<td></td>
</tr>
<tr>
<td>Ventral surface of abdomen</td>
<td>With short, almost erect hair</td>
</tr>
<tr>
<td>clothed with short, reclinate</td>
<td>cilia.</td>
</tr>
</tbody>
</table>
Two lateral bristles that are usually four or more of nearly equal strength on third abdominal segment, seem to become weaker and more numerous in small species.

It may be that the protuberant character of the first genital segment in *S. truncatissima* is sufficient to differentiate the two species but so few females of *S. utilis* are available for study at this time that such a statement cannot be made with any degree of certainty.

I have seen specimens of this species from Mexico but have been unable to identify it with any of Van der Wulp's descriptions.

Three females and one male in the National Museum are labelled "bred from mounted beetles." The same collection also contains a male and a female labelled as reared from *Melonophaea differentialis* Brunner. A male specimen was taken by the writer at Springfield, Mass., crawling upon human excrement. C. H. Richardson has reared this fly from horse manure at New Brunswick, New Jersey. It has also been reared from *Allorhina nitida* (see original description).

(14 to 16, 20 to 25) *Sarcophaga tuberosa harpax* (Pandelle), *S. tuberosa exuberana* (Pandelle), *S. tuberosa sarracenioides* (Riley), *S. bullata n. sp.*, *S. fulvipes dissidens* n. subsp., *S. scoparia* Pandelle. In these species the second genital segment is rounded and not flattened and the anal area small.

(14, 15, 16, 17, 18, 19) *Sarcophaga tuberosa harpax* (Pandelle), *S. tuberosa exuberana* (Pandelle), and *S. tuberosa sarracenioides* (Riley) as a group compared with *S. haemorrhoidalis* Maigen, *S. delmatina* Schiner
and *S. calceolata* Pandellé as a group. The principal characters which are common to all the species of each group are listed on pages ___ and ___ respectively.

(i) The males of all these species agree in the following more important characters: viewed from side parafrontals and lenses with dark reflections; breadth of front at narrowed part at least one half eye width (if less, it is an individual variation); metacoxa complete; clothed with whitish (haemorrhoidalis-group) or whitish or yellowish hair (eucerae-group); lateral vertical bristles absent; venter inserted just above line of mesopleural vein and of first longitudinal; third vein broader; mouth margin; anterior cross-vein; section III of costa greater than section V; calypters whitish, margins fringed with white hair; anterior face of posterior femur with three rows of bristles, those of intermediate row shortest and not developed distally, posterior ventral row absent; anterior and posterior faces of tibia each with a beard of coarse hair, latter always the stronger; middle coxa with a single row of bristles; femur clothed beneath on posterior, proximal half or more with long hair, anterior ventral row of short bristles complete, posterior row represented only by "comb" extending back to the long hairs; ventral surface of anterior coxa with an irregular row of bristles at each side only; anterior and anterior postabdominal dorso-centrals short but longer than vestiture of preacetabulum; acrostichals absent or at most slightly differentiated anteriorly; only last two pairs of posterior dorso-centrals strong; lower sternopleurals with a single row of bristles; abdomen clothed above with short reclinate bristles; beneath with longer, almost erect hair; vestiture of third ventral plate short and decumbent except at margins; genital segments prominent; connecting membrane on each side just anterior
I.

The principal characters in which the males these two groups differ are as follows: size; number of rows of black dilis behind eyes; vestiture of cheeks and genae; color of anterior spiracular hairs and those of spiracular cover; size of "brush" of posterior trochanter; presence and absence of inner presutural; comparative length of vestiture of second ventral plate and of that of first and second genital segments. The characters of the genital segments are quite different and it is interesting to note that the members of the tuberosa group are united, not only by the external characters hereafter listed but the penes of the subspecies of 3. tuberosa Pandelli differ only in minor details, whereas the members of the hemorrhoidalis-group are united by external characters, the penes, fourth ventral plates and forceps differing for all species herein discussed.

Possibly there is needless repetition in thus enumerating the characters in which these two groups agree but my object is not to indicate absolute and definite groups. I am merely placing together such species as seem closely related naturally and names used to designate them are merely convenient handles. It seems possible that other workers who may be able to deal intensively with a larger territory, may able to enlarge upon the grouping or perhaps to suggest more comprehensive aggregates through study of relationships among a greater number of species, and it is the hope of the writer that to such a worker discussions of the above may be of use.

An interesting point common to both these groups is their wide distribution, each having representatives in at least North America, Europe, Asia and Africa. As suggested in the introduction
to part 2, their extensive distribution may be explainable by habits which do not limit their territorial expansion. The members of the haemorrhoidalae group mentioned are perhaps principally scavengers, while the subspecies of S. tuberosa Pandelli seem to have habits adaptable to very diverse conditions.

(14,15,16) Sphaeroma tuberosa Proctor, S. t. exuberans (Pandelli), S. t. scabrous (Pandelli), S. t. maculipennis (Riley). See pages 88, 89 and 90.

The subspecies of these subspecies, together with S. scabra (Pandelli) agree in the following important characters: viewed from side parafrontals and genae with dark reflections; breadth of front at narrowest part approximately one half that eyes (may be slightly less in exuberans), metacaphalon completely clothed with whitish or faintly yellowish hair; cheeks clothed with black hair; lateral verticals absent; vitrience inserted just above line of mouth margin; hairs covering anterior spiracles mostly dark brown; epaulet dark; anterior cross-vein more basal than end of first longitudinal; third vein bristly; section III of costa greater than section V; calypters whitish, fringed with white hair; legs dark; posterior trochanters with small, inconspicuous "brush"; anterior face of posterior femur with three rows of bristles, those of intermediate row shortest and not developed distally, posterior ventral row absent; anterior and posterior faces of tibia such with a beard of coarse hairs, latter always the stronger; middle coxa with a single row of bristles; femur clothed beneath on posterior, proximal half or more with long, fine hair, anterior ventral row of short bristles complete, posterior represented only by "comb" extending back to the long hair; anterior and posterior postacutural dorsoventrals considerably longer than vestiture of metaturnat; acrostichals absent (sometimes anterior ones
very weakly differentiated in *sauropsidus*; inner presutural weak; last two pairs of posterior dorso-centrals strong, anterior to these usually two weak pairs, sometimes three; scutellar spicile present; inner sternum lumen with a single row of bristles; abdomen clothed above with short, reclinate bristles, beneath with longer, almost erect hair; vestiture of third ventral plate short and decumbent except at margin; genital segments prominent; both with vestiture of equally long hair; first without marginal bristles, second rotund, not flattened; anal area small and not extending above middle of posterior surface of segment; vestiture of base of forccya longer than that of segment; penae similar.

Mott, American

I have seen but a single specimen of *S. tuberosa tuberosa* (Pondellé), which was recently sent me by Mr. Collin and was collected in Manitoba, Canada, by Mr. Cridle. The list of characters given above was made out previous to the receipt of this specimen, but it was found to agree in all points. This is the first record of its occurrence in North America. It will probably be found in New England and may easily be identified by its two black genital segments as in *tuberosa*, while the forccya were like those of *exuberana*.

As I have only females of *S. tuberosa tuberosa* (Pondellé) and *S. tuberosa sanguinea* (Riley) no list of characters could be given, though such a list could probably safely be made from these two subspecies.
The group is based not only on the large number of similar external characters but also on the similar pane; the sub-species are further separated within the group by the characters of the forcaps. The figures show that S. tuberosa, var. purpurea (Pandeili) and S. tuberosa, var. semiremis (Riley) have similar forcaps, while those of the other two sub-species are alike. Subspecific differences are found in certain external characters and the shape of the fourth ventral plate. These sub-species are all members of the tuberosa-group as defined by Büttcher (Deutsch. Ent. Zeitachr., 1918, p. 53) in which he also includes a species not known in North America. He also states (Deutsch. Ent. Zeitachr., 1918, p. 1) that S. hickami Villeneuvee may be considered as a sub-species of S. tuberosa (Pandeili).

Pandeili (Rev. Ent., vol. 15, 1898, Cane) described the three species S. tuberosa, S. semiremis and S. purpurea. According to the present usage of the more prominent workers on this genus in Europe (Böttcher, Villeneuve, and others) these flies are considered as sub-species of S. tuberosa Pandeili and are so dealt with here, though entirely for the reason that it seems best to do treat them. It may be that such designation is a matter of preference or opinion but I am very strongly inclined to believe it well founded and as indications of an important close, natural relationship which it is well to keep in mind. In most cases the species of the genus have very distinct and unmistakable genitalia but in the case of these forms the resemblance of the panes is so close that differences are in points of micro detail. The preceding list of characters concerns to all four sub-species herein discussed does not exhaust the similarities but gives only the more prominent. The presence of the two rows of hairs on the connecting membrane is an unusual character, found only in members of this
group, those of the group following ant in S. melanicke, and S.

uliginosa, as far as the writer is acquainted with the species of

the group."

1. Since the above comparison was written I have received a
single male specimen which probably will prove to be another
subspecies of S. tuberosa. It agrees with S. tuberosa ssp. canescens
in having both genital segments dull orange, but differs in
having its forelegs of unbarred and tuberosa, as well as in
several minor features. It agrees with the group characters as
above listed.

Like the members of the samastollid-alig-group S. tuberosa Pandellé
is represented by its subspecies in several continents,- North America,
Europe, Asia and Africa. - S. tuberosa ssp. canescens (Riley) is only
known from North America.


Pl. 3, fig. 7.

1896. Sarcophaga tuberosa Pandellé, Rev. Ent. France, vol. 15,


zu Gießen, vol. 1, p. 135, Pl. 1, Fig. 1. Habits.

1912. Sarcophaga tuberosa harpax Böttcher, Deutsch. Ent.

Zeitschr., p. 348.

1912. Sarcophaga tuberosa harpax Böttcher, Entomologische Mitteilungen,

vol. 1, No. 6, p. 153.

1912. Sarcophaga tuberosa harpax Böttcher, Deutsch. Ent. Zeitschr.,

p. 733, Fig. 390. Description, figure male genitalia, occurrence.

1914. Sarcophaga tuberosa harpax Parker, Proc. R. Soc. Nat. Hist,

vol. 55, No. 1, pp. 30, 42. Characters.

Metanotum clothed with almost erect hair; at least four

hair posterior dorsocentrals, last two somewhat the strongest;
ground color of genital segments black or blackish; forelegs pronge
blunt, in profile with a small tooth-like projection at tip as
in S. tuberosa ssp. canescens (Riley).
(q) Metanotum clothed with short, slightly reclinate, bristles except that scutellum bears almost erect hairs anteriorly; the anterior and two (sometimes three) anterior postocular hairs strongly reclinate; anterior acrostichals absent; vestiture of abdomen of short, reclinate bristles except that of ventral surface of fourth notum which is hairy and erect; genital segments not protuberant, usually well concealed by fourth notum; the two narrow, lateral lips of first genital segment brownish or of same ground color as abdomen, usually pallidose ventrally, spiracles usually concealed by fourth notum.

**Length:** 10 to 12 mm.

(2) Head.—Viewed from side parafrontales and genae with dark reflections and transverse impression often brownish. Breadth of front at parascutal part about three fifths eye width; cheek height approximately one half that of eye. Front prominent, inner orbits of eyes on its upper part converging downward; sides of frontal vitta slightly converging backward. Second antenna segment dark; third usually twice length of second; aristae beyond middle. Back of head somewhat convex, usually with three rows of black cilia behind eyes, otherwise clothed with silvery white or faintly yellowish hair that completely covers metacephalon. Cheeks clothed with black hair. Genae with a row of hairs near lower eye orbit and other scattered hairs. Palpi dark.

**Chaetotaxy.** Lateral verticals absent; vibrissae inserted just above line of mouth margin.

Thorax.—Metanotum clothed with almost erect hair. Haired covering anterior spiracle dark basal, lighter toward tips; those of anterior margin of posterior spiracle dark brown; those of spiracular cover brown or sometimes but faintly so with yellow border.
**Wings.**—Bend of fourth vein normally a right angle or slightly less; anterior cross-vein more basal than end of first longitudinal; third vein briztly; costal spine vestigial; section III of costa about one and one half times section V; alula fringed with hair; clypeus whitish, margins fringed with whitish or sometimes yellowish hair.

**Legs.**—Dark. Posterior trochanters with small "brush" forma sub-cylindrical; clothed beneath with long hairs that become still longer and beard-like posteriorly; anterior face with three rows of bristles, those of intermediate row shortest and absent distally; posterior face without central row of bristles; tibia usually slightly curved, posterior and anterior faces each with a band of long, coarse hairs on distal three fourths or thereabouts, former a little the stronger; tarsus not shorter than tibia, fourth segment at least one half fifth. Middle tarsus with a single row of bristles; femur clothed beneath on posterior proximal half with beard-like growth of long, fine hairs; anterior ventral row of short bristles complete, posterior row represented by "comb" only, which extends back to long hair: submesotibial bristle present. Ventral surface of anterior coxa with an irregular row of bristles at each side only.

**Chaetotaxy.**—Anterior dorso-centrals not weaker than anterior postaururals and longer than vestiture of prescutum; scrostralcha absent; inner preaururals very weak; four pairs. posterior dorso-centrals, last two much the stronger, a weak fifth sometimes present; prescutellar, crostral,cha present; scutellar piliscs present; three sternopleurals; inner tergopleura with a single row of bristles, otherwise clothed with hair.

**Abdomen.**—Somewhat conical or slightly oval, clothed above with short, reclinate bristles, beneath with longer, almost erect hair.
Ventral plates, as a whole, with their sides converging slightly posteriorly; their vestiture decreasing in length posteriorly, that of second short, of third very short and decumbent.

Chaetotaxy.—Second segment without marginal bristles; third with two and sometimes shorter, slender bristles between these and laterals; fourth with a complete row ending ventrally in long hairs.

Genital Segments.—Not prominent, usually only second segment and the membranous band between it and first showing, ground color black or blackish, vestiture of both equally long except that hairs on ventral side of first become much longer. First, sometimes brownish, sometimes faintly grayish pollinose, in profile slightly arched, marginal bristles absent; second, notulun, not flattened, anal area small and not extending above middle of posterior surface. Forcipes black, base with upward flag-like extensions clothed with fine, curly hairs longer than vestiture of segment; prongs approximated for about half their length, tips bare and in profile with a short, blunt, spike projection.

Genitalia.—Similar to those of G. tuberosa tuberosa (Pamellia)
Accessory plates hairy. Base of fourth ventral plate with angular ridge, in profile its posterior extremity not upturned.

(Q) Females differ from males in the following important points.

Head.—Breadth of front at narrowest part/eye width. Upper inner orbits of eyes diverging downward.

Thorax.—Metanotum clothed with short, reclinate bristles except that vestiture of anterior part of scutellum is more erect and hairy.

Legs.—Posterior trochanter with slender apical bristle; bristles of intermediate row of anterior face of femur well separated and present on proximal half only, in small specimens
may be but two or three; posterior face with ventral row of
certain long bristles on proximal half. Posterior ventral row of
bristles of middle femur complete, proximally consisting of
strong, stout bristles, "cub" not differentiated.

Characters.—Three or four sternopleurals, rarely five.

Abdomen.—Oval; vestiture throughout of short reclinate
bristles except that of ventral surface of fourth notum which is
hairy and erect.

Genital Segments.—Not protuberant, not visible from above.
The two narrow, lateral lips of first genital segment brownish
or of same ground color as caduceus, usually pollenose ventrally,
margin fringed with hairs and bristles, apicles central but
usually concealed by edge of fourth notum.

Redescribed from 23 male and 40 female specimens.

Range.—Most of my material from which the description was
made is in the collection of the Gypsy Moth Laboratory at Melrose
Highlands, Mass., and is mostly European and Japanese. I have,
however, three males bearing no locality labels and a few
females from Massachusetts which I should consider to be those of
range if males were positively known to occur here. While the
presence of this species in North America may be questioned, it
seems best to give the description.

Foreign: Germany, Austria, Hungary, India, Japan.

So far as I am able to determine the female of this species
has not been previously described unless under some other name
as a distinct species.

The males of E. uliginosa Kramer and E. aldrichia resemble
this species superficially but the more arrest character of the
vestiture of their third ventral plates marks them as distinct.
The females of aldrichia differ in several characters among
which may be mentioned the more erect character of the anterior
and the anterior postmental dorso-centrals, the presence of at
least a pre-atual pair of anterior acrostichals, and the fact
that vestiture of the ventral surface of all the abdominal nota
is erect and hairy. A European species S. achiazi, Kr€uner

1. Since writing the above I have provisionally identified
a male Sarcophaga from Weston, Mass., as S. acliitzi.

is very close to S. tuberosa harpe as regards external characters;
in the male of the former the front is two fifths the eye width
and a pre-atual pair of acrostichal bristles is present though
often weak; in the latter the front is three fifths the eye width
and anterior acrostichals are lacking. The presence of the
pre-atual pair of acrostichals also differentiates the species.

In material from the Gypsy Moth Laboratory there are specimens
of this species reared from larvae and pupae of Porthetria dispar
(Limneus) imported from Germany and others from pupae sent from
Japan.

states that "in the economy of nature this "subspecies" plays an
important roll in the multiplication of Lepidoptera" and that it
has been bred from Pailura monochae (Limneus) and Lagiozampa pini
(Limneus). He also states that in the feeding places of the
latter it is more common than any other species and suggests that
it is an important agent in its control. It is interesting to
note its rearing records from larvae and pupae of the gypsy-moth
collected in such widely separated countries.

15. Sarcophaga tuberosa exuberans (Pandell€).

Pl. 3, fig. 8.

1896. Sarcophaga exuberans Pandelld, Rev. Ent. Frane., vol. 15,


1912. Sarcophaga tuberosa exuberana Böttcher, Deutsch. Ent. Zeitschr., p. 735, fig. 29 w. Description, figure male genitalia, occurrence.


(♂) Metanotum clothed with almost erect bristly hair; at least four pairs posterior dorsal centralia, host two much the strongest; ground color of first genital segment brown, of second dull orange; forceps prongs pointed in profile as in S. tuberosa tuberosa (Pendellid).

Length: 8 1/2 - 10 mm.

(♀) Head.—Viewed from side parafrontals and genae with dark reflections. Breadth of front at narrowest part nearly or fully one half eye width; cheek height approximately two fifths that of eye. Front prominent, sides of frontal vitta converging backward. Second antennal segment dark but may be somewhat brownish at tip; third about one and one half times the second; bristles plumose on basal half or to slightly beyond. Back of head somewhat convex, with three rows of black cilia behind eyes, otherwise clothed with faintly yellowish or whitish hair that completely covers the metacephalon. Cheeks clothed with black hair. Genae with an irregular row of bristly hairs near lower eye orbit, lowermost much the longest. Palpi dark.

Ommatidia.—Lateral verticals absent; vibrissae inserted just above line of mouth margin.

Thorax.—Metanotum clothed with almost erect, bristly hair. Hairs covering anterior spiracle brownish basally, lighter toward tips; those on anterior margin of posterior spiracle dark brown;
those of spiracular cover dark brown with yellowish tips. Epaullets dark.

**Wings**—Bend of fourth vein normally a right angle; anterior cross-vein more basal than end of first longitudinal; third vein bristle; costal spine short or vestigial; section III of costa about one and one-third times section V; clune fringed with hair; calypters whitish, margins fringed with white hair.

**Legs**—Dark. Posterior trochanters with a small ill-defined, inconspicuous "brush": femur sub-cylindrical, clothed beneath with short hair that becomes longer posteriorly and may form a weak beard; anterior face with three rows of bristles, those of intermediate row but little the shortest and about equally; posterior face without ventral row of bristles: tibia straight or slightly curved, with beard of very but not dense, hairs on distal two thirds to three fourths of posterior face, anterior face with incomplete beard like line of much shorter, scattered hairs; tarsus about in length to tibia, fourth segment at least one half fifth. Middle coxa with a single row of bristles: femur clothed beneath on posterior, proximal half with beard like growth of long hairs fine hairs; anterior ventral row of short bristles complete, posterior row represented by "comb" only, which extends back to the long hairs: submesoapical bristle present. Ventral surface of anterior coxa with an irregular row of bristles at each side only.

**Chasitology**—Anterior dorsocentrals not weaker than anterior postnoturals and much longer than vestiture of prescutum; acrostichals absent or indistinguishable from vestiture; inner prenoturals present, rather short: four pairs posterior dorsocentrals, last two much the stronger, a weak fifth sometimes present; prescutellar acrostichals present; scutellar apicals present: three sternopleurals: lower sternopleura with a single row of bristles, otherwise clothed with hair.
Abdomen.—Somewhat elliptical or oval, clothed above with short resinous bristles beneath with almost erect hair. Ventral plates, as a whole, with their sides slightly converging posteriorly; their vestiture decreasing in length posteriorly, that of third short and decumbent.

Chastotaxy.—Second segment without marginal bristles; third with two and with short, slender, decumbent bristles between these and laterals; fourth with a complete row ending ventrally in long hairs.

Genital Segments.—Prominent, vestiture of both equally long except that those on ventral side of first become much longer. First, ground color brown and except "humpa" faintly grayish pollinose, marginal bristles absent, in profile its outline straight or nearly so: second, rotund, not flattened, dull orange, oval area small and not extending above middle of posterior surface. Forcipe darkened, base with short, upward, flap like extensions clothed with fine, curly hairs longer than vestiture of segment; pronot approximated about half their length, tips bare. Connecting membrane on each side, just anterior to "humpa", with a row of long hairs. Base of fourth ventral plate may show as a rounded darkened ridge the posterior end of which is slightly, upturned and prominent in profile.

Genitalia.—Similar to E. tuberosa tuberosa (Pandellé). Accessory plates hairy. (♀) Not known, probably similar to that of E. tuberosa appressum (Riley).

Redescribed from 1 specimen.


Foreign: France, Spain, Italy, Hungary, Dalmatia, Greece, South West Africa.
Three specimens of this species collected at NewBedford were very kindly loaned me from the Hough collection by Dr. J. M. Aldrich. The only other specimen examined was from the Cornell collection.

13. Sarcophaga tuberosa sarraceniae (Riley)

Pl. 3, fig. 7.

1874. Sarcophaga sarraceniae Riley, Gen. Ent., vol. 6, p. 209 - 213, Fig. 26. Habits, etc.


1878. Sarcophaga sarraceniae sarraceniae Riley, Ist Rept. U. S. Ent. Comm., p. 194, Fig. 26.


1880. Sarcophaga sarraceniae Riley, Bull. 2, U. S. Ent. Comm., pp. 39 - 41, Fig. 55. Habits, etc.

1. In a note at the bottom of page 39 Riley mentions that the specimen bred from Alaba. homei (Hb.) lacks marginal bristles on the third abdominal segment. I doubt, therefore, if the specimen reared actually belonged to this species. There are at least four species occurring in the United States which lack these bristles, S. colei Riley, R. Bub. R. Bub. & Riley, and two others which occur in the western and southwestern states. Other references in this article are perhaps to Riley's species.


1. I have specimens from C. W. Johnson labeled S. surraeinae Riley which are probably the ones referred to in this article. They are from Summerville, S. C. and were collected by Mr. Jones. These, so far as known, belong to an undescribed species and the above reference I consider doubtful.


1913. Sarcophaga surraeinae Graham-Smith, Flies and Diseases, pp. 33 and 34. Habits.


(♂) Metanotum clothed with almost erect slender bristles; ground color of genital segments dull orange; tibial spines blunter, in profile with small tooth-like projection at tip as in S. [illegible] harpex (Pandelli).

(♀) Vestiture of metanotum of short, recinate bristles, not differing on scutellum; anterior escutellum differentiated anteriorly; vestiture of abdomen of short, recinate bristles except that of ventral surface of fourth notum which is hairy and erect; ground color of posterior portion or border of fourth notum dull orange; genital segment not prominent, not visible from above, dull orange, the two rather narrow, lateral lips of the first genital segment, so far as exposed, of practically the same width throughout, or, what pressed down normally so that line of junction is nearly vertical, epandria central. These characters probably will not serve to separate this species from females of exuberans or subaeratae which are not recognized at the present time.

Length: 7 to 12 1/2 mm., average 10 to 12 mm.

Head.—Viewed from side parapreastal and genae with dark reflections; transverse impression often brownish. Breadth of front at narrowsest part one half to three fifths eye width; cheek height two to three sevenths that of eye. Front prominent, sides of frontal vitta converging backward. Second antennal segment dark, usually brownish at tip; third about twice length of second; arista plumose for more than half its length. Back of head somewhat convex, with three rows of black vili behind eyes, otherwise clothed with whitish hair that completely covers metasternion. Cheeks clothed with black hair. Genal with a row of hairs near lower eye orbit. Palpi dark.

Gnathology.—Lateral verticals absent; vibrissae inserted just above line of mouth margin.
Thorax.—Metacoxa clothed with almost erect, slender bristles. Hair covering anterior spiracles dark basally, lighter toward tips; those anterior margins of posterior spiracles dark brown; rows of epipodial cover brown or faintly brownish with yellow border. Eyes.

Wings.—Head of fourth vein normally a right angle or a little less; anterior cross-veins more basal than one of first longitudinal; third vein broadly; coxal veins very indistinct; section III of costal one and one fourth to one and half times section V, alula fringed with hairs. Only hairs whitish, not in. fringed with white hair.

Legs.—Dors. Posterior trochanter with small, inconspicuous "brush" : femur subcylindrical, clothed beneath with long hairs, becoming very long and beard-like posteriorly; anterior face with three rows of bristles, those of intermediate row the shortest and absent distally; posterior face without ventral row of bristles: tibia straight or slightly curved, anterior and posterior faces each with a beard of long, coarse hairs on distal three fourths or there about, latter always the stronger: tarsus not shorter than tibia, fourth segment at least one half fifth. Middle coxa with a single row of bristles: femur clothed beneath on distal, proximal half with beard-like growth of long, fine hairs; anterior ventral row of short bristles complete, posterior row represented by "comb" only, which extends back to long hairs: subacrotibial bristle present, often short and hard to see. Ventral surface of anterior coxa with irregular rows of bristles at each side only.

Chaetotaxy.—Anterior dorsocentrales not weaker than anterior postseturals and longer than vestiture of prosetura; acrostichals absent or slightly differentiated anteriorly; inner postseturals weak; four pairs posterior dorsocentrales, last two much the stronger, a weak fifth sometimes present, preacutellar acrostichals
present: scutellar spines present; three sterno pleurae; lower sterno pleurae with a single row of bristles, otherwise clothed with hair.

Abdomen.- Oval or somewhat conical; clothed above with short reclinate bristles, beneath with longer, almost erect hair.

Ventral plates, as a whole, with their sides parallel, in rule square or rectangular and sides nearly straight; their vestiture decreasing in length posteriorly, and at second short, of third very short and decurrent. Posterior half or at least posterior margin of fourth notum usually of same ground color as genital segments but sometimes not thus differentiated.

Chestnuy.- Second segment without marginal bristles; third with two, occasionally with others between these and laterals; fourth with a complete rows ending ventrally in long hairs.

Genital Segments.- Prominent, sometimes only posterior part of first exposed, sometimes segments completely rolled out showing the connecting membranes which bear, on each side just anterior to "humps" a row of long hairs, dull orange, vestiture of both equally long except that hairs on ventral side of first become much longer. First, sometimes faintly yellowish, pallid orange, "humps" not darkened, in profile slight arched, marginal bristles absent: second, round, not flattened, small area small and not extending above midway of posterior surface. Perceps darkened, cone with upward flap like extension clothed with fine, curly hairs longer than vestiture of segment; prolegs approximately for about half their length, tips bare and in profile with short, blunt, tooth like projection.

Genitalia.- Similar to those of R. intermed tubercos (Pavollid).

Accessory plates hairy. Base of fourth ventral plate may show as a rounded ridge the posterior extremity of which is slightly
upturned and shows prominently in profile.

(♀) Females differ from males in the following important characters.

**Head.**—Breadth of front at narrowest part equal to eye width. Upper inner orbits of eye diverging downward.

**Thorax.**—Metanotum clothed with short reclinate bristles.

**Legs.**—Posterior trochanter with slender apical bristle: bristles of intermediate row of anterior face of femur weaker and present on proximal third or half only; posterior face with ventral row of several long bristles on proximal half. Posterior ventral row of bristles of middle femur complete, proximally consisting of strong, stout bristles, "comb" weak.

**Abdomen.**—Oval; vestiture of short reclinate bristles, except that of ventral surface of fourth notum which is erect.

**Genital Segments.**—Not protuberant, not visible from above.

The two rather narrow, lateral lips of first genital segment as far as exposed of same size, dull orange throughout, their line of junction dorsally practically vertical, at least their upper margins fringed with hair or bristles sometimes both; rarely without bristles, spiracle central and usually visible.

Redescribed from 25 male and 15 female specimens, others examined.


Foreign: Canada (Quebec, British Columbia).
Riley (1874) described this species from larvae and adults reared from the pitcher plant, _Sarracenia variolaria_. I have examined the specimen labelled as the type in Riley's collection at the United States National Museum. It was at first considered by Riley as a variety of the European species, _Sarcophaga carneria_ (Linnaeus), which Hough was probably the first to discover is not represented among North American Sarcophagidae. Careful comparison, however, demonstrates the subspecific relationship to _Sarcophaga tuberosa_ Pandelid, a species described by Pandelé (1896) from Europe. Specimens were sent to Dr. Villeneuve of Rambouillet, France and he agrees with again this regard. It is probably the most widely distributed subspecies of _tuberosa_ on the continent; but four specimens of _S. tuberosa exuberans_ (Pandelé) have been seen, one of _S. tuberosa tuberosa_ (Pandelé) and the occurrence of _S. tuberosa variolaria_ (Pandelé) is questionable. I also have but a single record of a new subspecies to be described at a later date.

Females of _sarracenia_ will probably be confused with those of _S. tuberosa exuberans_ and the undescribed subspecies just mentioned.

_Sarcophaga bullata_ n.sp. and _S. tuberosa sarracenia_ (Riley)
The males of these two species are apt to be confused, but those of _bullata_ may be distinguished by the broader front, the longer third antennal segment, the presence of two rather than three rows of black cilia behind the eyes, the presence of _white_ hair on the posterior portion of the cheek the scattered vestiture of the genna, the shorter anterior and anterior posttectal dorsoventrals, the tuft of dark hairs at the fold of the calypters, the presence (usually) of dark hairs on the inner, posterior margin of the anterior calypter, the almost equally strong anterior and posterior
beard of hind tibia, the presence of at least one or marginal bristles on the first genital segment, the characters of the forelegs and genitalia and other characters as mentioned in descriptions.

The male of the new subspecies, it is probably separable with difficulty without referring to the character of the forelegs. From the other subspecies the color of the genital segments serves as a distinguishing character for the sexes.

Riley mentioned S. tubercum sarraceniæ several times in connection with grasshoppers, but apparently considered it as a scavenger rather than a parasite. It is doubtful how many of the references to Riley's accounts given in the bibliography actually refer to sarraceniæ. Indeed Aldrich (Jour. Agri. Res. vol. 5, No. 6, p. 444) has shown that Riley's reference to S. sarraceniæ (7th. Mo. Report, p. 180) concerned S. kelki Aldrich. I have already noted in the bibliography several doubtful references to this subspecies as a parasite of Alabama aprilliææ (Wolm.).

Among my material is one specimen bearing the following label, "From maggot in a crab (Sea Spider), Harpswell, Maine." A male and female received from Dr. O. C. Bartlett, Phoenix, Arizona, were labelled, "Bred from dead larvae of Allornina nitida, the Green June bug or fig eater." While engaged on fly investigations for the Montana State Board of Entomology during the summer of 1914, the writer bred this fly from waste fish thrown out in the rear of a meat market. According to results obtained by Kelly (Jour. Agri. Res., vol. 2, No. 6, p. 441) sarraceniææ is considered parasitic on grasshoppers and found second in importance to S. kelki Aldrich in investigations carried on at Wellington, Kansas. Among my notes I have a record of this species, from material examined in the
National Museum at Washington, as reared from *Rhabdophis bivittatus* Morse (Washington State). It has also been reared from *R. maculata* (Richardson, J. J.) and Mats has raised it on fish and meat. Banks has captured a male on Guatemalan rain.

(17 18, 19). *Rhabdophis maculatus* Leidy, R. *detritus* Schinz, S. *tobulata* Pandelit

The rules of these species agree in the following more important characters: viewed from side parafrenal and genna with dark reflections; breadth of front the narrowest part about one half that of eye; metacarpia completely clothed with white hair; vestiture of cheeks almost wholly, cranial part (haemorrhidian) of white hair; vestiture of genna confined to that half nearest eyes; lateral verticiles absent; vibrissae inserted just above line of oral margin; metanotum clothed with quite dense, almost erect hair; apical hairs mostly light colored (variable in *haemorrhidian*); anterior cross-vein more basal than end of first longitudinal; third vein bristly; section III of costa one and one half to one and two thirds times section V; calyptrae white, fringed with white hair; legs dar.; posterior trochanter with distinct "brush"; anterior face of posterior femur with three rows of bristles, those of intermediate row shortest and not developed distally, posterior ventral row absent; anterior and posterior faces of tibia each with a bear of coarse hairs, latter always the stronger; middle coxa with a single row of bristles; femur clothed beneath on posterior, proximal half or more with long hair, anterior ventral faces of short bristles complete, posterior row represented only by "comb" extending back to the long hairs; ventral surface of anterior coxa with an irregular row of bristles at each side only; anterior dorsocentrals not
seeker than anterior postventral, short or longer than vestiture of prepectus; succenturials absent or only very slightly differentiated anteriorly; inner prepecturals absent; last two pairs of posterior dorsocentral strong, anterior to these three or four pairs which are mostly weaker than those before the nature; scutellar apicula present; lower sternopleura with a single row of bristles, otherwise clothed with hair; abdomen clothed except with short, reclinate bristles, beneath with longer, almost erect hair; vestiture of third ventral plate short and decumbent except at margins; genital segments prominent, first with marginal bristles, second rotund, flattened, dull orange, and are large; connecting membrane on each side just anterior to "humps," with a row of long hairs; vestiture of base of forcipal not longer than that of segment usually shorter.

(2) The females differ in the following more important points: breadth of front at most part approaches base of eyes; antennum clothed with quite short, reclinate bristles, not differing on scutellum; anterior face of posterior femur with upper and lower rows of bristles only, posterior face with ventral row of long, well separated bristles on proximal half or slightly more; posterior and posterior ventral rows of middle femur complete; our bristles weak and inconspicuous distally; ventral plates of genital segment usually completely exposed, fifth and sixth plates fused, latter of characteristic, specific shape.

According to Böttcher (Deut. Ent. Zeitschr., 1912, pp. 9-10) these species are members of the Hemorrhoidalis-group in which is also included Sarcophaga beckeri Villeneuve and S. quitilla.

Pendella, which are not known in North America. If the group were less strictly defined other North American species might be included but those which the writer has in mind do not occur in New England, so far as known, and I can see no advantage in so doing. Böttcher,
if I interpret his tables correctly, includes 3. \textit{falculata} Pandelli, 3. \textit{villosa} Pandelli, and 3. \textit{calcarata} Schoepfer (\textit{autograph} Villeneuve) in a subgroup, the \textit{falculata}-group.

In his introductory remarks to this group Böttcher (Dent. Ent. Zeitschr., 1912, p. 6) states that while up to the present these species included have been exclusively observed with the second genital segment "red," yet this character in itself proves no closer relationship, and further that 3. \textit{amphronchilid} Meigen might stand closer to the \textit{amphronchila}-group (including the sub-species of 3. \textit{hulcrna} Pandelli) than to 3. \textit{falculata} Pandelli. Considering the number and nature of the characters listed in which our New England species of the \textit{amphronchila} and \textit{amphronchilidae} group of Böttcher agree, I should be inclined to consider these groups to be closely related. Along this line Böttcher states that 3. \textit{baerelli} Villeneuve is considered to be a sub-species of 3. \textit{hulcrna} Pandelli. The peculiar character of the two rows of long, slender hairs, one at each side on the connecting membrane, just anterior to the "hump" of the first genital segment is found in all the species of both groups which are dealt with in this paper and in 3. \textit{hulcrna} Pandelli as well. These facts are presented mainly to indicate possible larger relationships within the genus which further study may either prove or disprove.

Another point of interest in connection with these three species is their wide distribution, all three are known from North America, Europe, and Africa, while 3. \textit{falculata} Pandelli and 3. \textit{calcarata} Pandelli are also found in Asia. It might almost be safely suggested that 3. \textit{hulcrna} Schoepfer will be found there also; 3. \textit{amphronchila} Wiedemann, a very similar species, is found there reported from Olfa.
17. Sarcoptes haeomorphoidalis Meigen.

Pl. 4, Fig. 16


1882. Sarcoptes haeomorphoidalis Wiedemann, Insects Injurious to Vegetation, ed. 2d., p. 58.

1867. Sarcoptes haeomorphoidalis Goureau, Insects nuisances, etc. p. 176, 184. Habits.


The "species" referred to under this name (S. haeomorphoidalis) contains two pairs of S. haeomorphoidalis Meigen taken in population and a single specimen, two females of haeomorphoidalis H. Parker and a specimen of S. haeomorphoidalis used in the study of haeomorphoidalis Wiedemann.


1. Figure: Female; pronocephalic scutellum tristis present in drawing, absent in haeomorphoidalis as a rule.
(7) Two rows of black ocella behind eyes; anterior portion of cheek clothed with black, posterior with white hair; hair covering anterior spiracles mostly dark brown (not asatif constant); last two pairs posterior dorsoventrals strong; preascutellar armotichela usually absent (distinctive when absent); first portion of first genital segment posterior to "hump" grayish penicillae with reflecting colors of abdomen, usually a single marginal bristle on each side of center; second genital segment dull orange; foreleg prolegs approximated for about half their length, their distal portions wide spread forming an U-shaped apex, in profile lower edges of proleg seen to be notched about midway.

(8) Two rows of black ocella behind eyes; anterior portion of cheek clothed with black, posterior with white hair; last two pairs posterior dorsoventrals strong, those anterior to them very short and distinguishable; preascutellar armotichela usually absent (distinctive when absent); anterior face of posterior tentorial gap and lateral rows of bristles only; vestigial of abdomen of short replaccd bristles except that of ventral surfaces of first and fourth nates which is erect; genital segments slightly protuberant; lateral lips of first genital segment dull to brownish orange; epiphragms of fifth segment seen to open through
lips of sixth (first genital); fifth and sixth ventral plates seemed to be fused; sixth widely, having swollen appearance but its posterior corners flattened so that the swelling narrows posteriorly.

Length. 11 to 15 mm., average 12 to 15 mm.

Head.-Viewed from side parafrocnalv and genae with dark reflections. Breadth of front at same about one half eye width; cheek height nearly the half width of eye. Front prominent, sides of frontal vitreus converging backward either by curve or straight line, if the latter vitreus, a pear bulb like at base. Second antennal segment dark; third about twice length of second; antennal lobe to beyond middle. Back of head more or less convex, with two rows of black will behind eyes; otherwise clothed with white hairs that completely cover metacoxal. Anterior portion of cheeks clothed with black; posterior with white hair. That half of genae nearest eye bristly bearing coarse hair arranged in two or three irregular rows. Palpi dark.

Cementary.- Lateral verticals absent, vibrissae inserted just above line of oral margin.

Thorax.- Metacoxal clothed with quite dense, erect hair.

Hairs covering anterior spiracles only dark brown though more or less light colored at tips, sometimes light except at base; those of anterior margin of posterior spiracles dark brown; those of spiracular cover yellowish or light colored. Epipleurals dark.

Wings.- Bend of fourth vein normally a slightly acute angle; anterior cross-vein more based than end of first longitudinal; third vein bristly; costal spine vestigial; section III of costa one and one half to one and two thirds times section V, alula fringed with hair; calypters whitish, margins fringed with white hair.
Legs.—Dark. Posterior tibiae seter with distinct "brush" not obscured by hairs; apical bristles present, not always distinct; four subcylindrical, clothed beneath with rather short hair of about same length as bristles of lower row of anterior face, becoming slightly longer anteriorly forming a very weak band often only present distally; anterior face with three rows of bristles, lower of in middle row absent, and one developed distally, those of lower row present all most to third or sometimes three fourths; anterior face without ventral row of bristles; tibia straight or slightly curved, anterior and posterior faces each with a band of long, coarse, black hairy spinules with ends or slightly more, later, longer for about one third or shorter in ventral, fourth segments at least the half third. Middle coxae with a single row of bristles; tibiae clothed beneath on posterior, proximal half or more with long hair; anterior, ventral row of short bristles complete, posterior row represented only by "corn" extending proximally to the long hair; being vestigial of lower surface of legs increasing in length distally, but short and not forming anterior and posterior bands; submarginal bristles present, often quite weak. Ventral surface of anterior coxae with an irregular row of bristles at each side of each.

Genitalia.—Anterior acetabula large than anterior postacetabula, short and sometimes in line, no longer than vestiture of preacetabula; acetabular sacs or only slightly differentiated as slender, inner preacetabula absent; last two pairs of posterior acetabula usually strong, anterior to them the to four pairs that are mostly rather than longer blades. Subacetabula often almost indistinguishable from vestiture of acetum; preacetabular acrostichals usually absent, 9 present very slender, rarely at
at all about: scutellar spines present; three sternopleurae; lesser sternopleurae with a single row of bristles, others clothed with hair.

Appendages: Somewhat conical; clothed above with short, reclinate bristles, beneath with slightly longer, almost erect hairs. Ventral plates as a whole with their edges converging posteriorly; their edges usually quite straight and not curved as in last apodemes; first clothed with erect hair of about same length of that of ventral parts of corresponding notum, for most part covered by third with erect decurrent hair, that of their segments but little longer.

Gnathopods.—Second segment, without marginal bristles; third with two, sometimes with shorter, slender bristles between them and laterals; fourth with a complete row ending centrally in long hairs.

Genital Segments.—Prominent, sometimes fully exposed. First; "humps" dull orange, or sometimes bronzy, bare or with scattered hairs; remainder of segment grayish collins with reflecting colors of abdomen, ground color probably bronzy, vestiture about half length of that of second segment; in profile somewhat arched; marginal bristles present, usually one on each side of center: second, rounded, flattened, anterior and posterior surfaces of nearly equal size, dull orange, vestiture inclined toward central, anal area large and central extending upward to limit of posterior surface. Forceps darkened, sometimes visible, prongs approximated for about half their length, distal portions widest forming a V-shaped space that is indented dorsally. In profile inner edges of prongs are seen to be notched, base with upward flap like extensions clothed with fine hair that is shorter than vestiture of
second segment. Connecting membrane, on each side just anterior to "hump" with a row of long hairs.

Genitalia.—Head of penis elongate and with distinctive paired, lateral processes that project forward and then turn upward; accessory plates hairy, of same color as second segment. Fourth ventral plate darkened, lamellae short, with large membranous area between their bases, distally each with an inward rounded projection bearing short bristles, normally these projections are much nearer to each other than shown in figure and may even touch.

( Q ) Females differ from males in the following important characters:

Head.—Breath of front at narrowest part varies from four fifths to same as eye width. Upper inner orbits of eyes diverging downward.

Thorax.—Metanotum clothed with quite short, reclinate bristles, not differing on scutellum.

Legs.—Veititure short throughout. Posterior femur somewhat spindle shaped; anterior face with upper and lower rows of bristles only, those of former well separated, especially distally; posterior face with ventral row of long well separated bristles on proximal half or slightly more. Anterior and posterior rows of bristles of middle femur complete but bristles weak and inconspicuous distally; submesotibial bristle very strong, sometimes a short bristle just above it.

Chaelotaxy.—Anterior and anterior postanastural dorso-centrals more distinct; projecting above vestiture of metanotum; lower sternopleura with a single row of bristles, hairy vestiture anterior to these not nearly so conspicuous.

Abdomen.—Oval; vestiture practically throughout of short reclinate bristles, hairy and almost erect on ventral parts of first and fourth nota.
Genital Segments.—Slightly protuberant; bristles of first segment usually visible from above. The two lateral lips of first genital segment dull to brownish orange, of medium width, narrowed and distinctly separated dorsally, their margin fringed with bristles that decrease in length ventrally, spiracles central. Fifth segment not discernible as such, its spiracles rarely visible and apparently open through lips of first genital segment (first genital). Fifth and sixth ventral plates (sixth and seventh morphological) seem to be fused, at least anterior margin of fifth of same color as sixth, the remainder grayish pigmented or colored as those anterior to it, sixth raised having a widened appearance but its posterior corners flattened so that swelling narrows anteriorly.

Redescribed from several hundred specimens, males and females.


Foreign: Bermuda, England, Germany, Austria, Hungary, France, Spain, Italy, Dalmatia, Greece, Sardinia, Tunis, Algeria, other parts of Africa, India.

The lack of precocceal acrostichal bristles is very distinctive when it holds true but their occasional presence is sometimes confusing especially since the subacrostichal bristle is sometimes absent as in S. fucata. The anterior portion of the cheek is clothed with black hair, the posterior with white, as in S. cerealis. The transverse impressions often bear a few hairs similar to those on the gape. The two rows of long, slender hairs, one at each side, just anterior to the "humps"
of the first genital segment are sometimes very much reduced and even vestigial. Böttcher (Deut. Ent. Zeitachr., 1913, p. 369) states that the characters of this species are quite constant in Europe but rather variable in Africa.

To separate this species from S. dalmatina Schiner, S. fulculata Paris, and S. tuberosa carrascea (Riley) see table on page 90.

The habits of hepemorrhoidalis are probably somewhat varied. Webster (1907) discusses a species under the name of S. georgina Wiedemann in its relation to grasshoppers. As this is a synonym of S. hepemorrhoidalis, it is possible that the latter is the species referred to. Meade (1876) mentions \( S. \) cruentata Meigen as bred from pupae found in pigeon dung in which were the remains of dead pigeons. Metz during the summer of 1914 reared a specimen on meat. In the collection of the National Museum at Washington a specimen was noted, apparently of this species, from India, labelled, "S. tenionota Wiedermann, apple and pear fruit pest."

During July and August, 1914, while engaged on certain investigations for the Montana State Board of Entomology, the writer frequently had occasion to deal with this species. It was bred extensively from human excrement; a total of 1405 adults were secured from 7 experiments, 624 in one instance. It was captured in privies, on garbage, on human excrement, and occasionally in houses. Its habits do not elevate it above the level of suspicion as a possible carrier of intestinal diseases. Records from three experiments placed the combined larval and pupal stages at from 17 to 20 days. European records indicate S. hepemorrhoidalis as the causative agent in some cases of intestinal myiasis, the larvae probably being infested with tainted meat. Adults have also been reared from horse manure (Richardson, New Jersey 1914), and taken
feeding on honey dea on a tulip tree (Banks).}

(16, 19) Sarcophaga dalmatina Schiner, S. fulculata Pandelé. The
fact has previously been mentioned that Böttcher (Deutsch. Ent.
Zeitschr., 1913, p. 14) places these flies together with another
European species, under the fulculata-group, apparently a sub-
grouping under the haemorrhoidalis-group. Both males and females
are strikingly alike. It is not necessary to enumerate further
characters in which these species agree but the unusual distinctiveness
of the dark spots of the abdomen, especially in the male is
worth mentioning. The females also have the sixth abdominal
notum undivided in distinction from that of S. haemorrhoidalis Meig.,
On page 45 of the first part of this paper it was stated that the
accessory plates of these two species were bare; this is only
true of these plates as they appear if examined before the genital
segments are pulled out, the hair on the anterior portion cannot
then be seen.


Pl. 4, fig. 11.

1862. Sarcophaga dalmatina Schiner, Fauna Aust., vol. 1, pp. 570
-571, (pars).

1908. Sarcophaga secundipennis Villeneuve, Mitt. Zool. Mus., Berlin,
vol. 4, p. 173. Description. (Is synonym of S. dalmatina
Schiner, pars).

1912. Sarcophaga secundipennis Böttcher, Deutsch. Ent. Zeitschr.,
p. 349. Mentione synonym with S. dalmatina
Schiner.

pp. 16-16, fig. 41. Description, figure male genitalia,
ocurrence. Equales S. dalmatina Schiner, pars. Page 370,
relationships.


(♂) One row of black cilia behind eyes; cheek clothed with white hair, but usually some black hairs just beneath lowest limit of eye; hairs covering anterior spiracle grayish with dark tinge at base only; sometimes only last pair, sometimes last two pairs of posterior dorsocentra strong, those anterior to three scarcel, distinguishable; prescutellar acrostichals present; genital segment dull or brownish orange except that first has a dark band posteriorly, often only dorsally and sometimes to the posterior margin darkened; first genital segment with several stout marginals each side of center.

(♀) One row of black cilia behind eyes; cheek clothed with white hair, but usually some black hairs just beneath lowest limit of eye; hairs covering anterior spiracle grayish with dark tinge at base only; only last pair of posterior dorsocentra strong, other pairs at present, immediately anterior to them and very weak; prescutellar acrostichals present; anterior face of posterior femur with upper and lower rows of bristles only; vestiture of abdomen throughout of short, reclinate bristles; first genital segment not divided into two lips, somewhat protuberant and generally visible from above, dull or brownish orange; fifth and sixth ventral plates seem to be fused; sixth of characteristic shape, divisible into an anterior indented portion with a bristle on each side of center posteriorly and a posterior part divided into two rounded or irregularly rounded lobes that extend backward, one on each side of center.

Length. 9 to 17 mm., average about 14 mm.

Head.—Viewed from side parafrotinals and genae with dark reflections. Breadth of front at its narrowest part about one half eye width; cheek height about three eights that of eye. Front prominent; frontal vitta narrow, at narrowest part of front the
darkened band normally not as wide as each parafacial, its sides converging backward. Second antennal segment dark; third about twice length of second; arista plumose to beyond middle. Back of head somewhat convex, with one row of black cilia behind eyes, otherwise clothed with white hair that completely covers the metacochelan. Cheek clothed with white hair but usually some black hairs just beneath lowest limit of eye. Gena with scattered hairs near the lower eye orbit. Palpi dark.

Chela[otaxy].—Lateral verticals absent; vibrissae inserted just above line of oral margin.

Thorax. Metanotum clothed with quite dense, erect hair.

Hairs covering anterior spiracle grayish with dark tinge basally; those of anterior margin of posterior spiracle dark only at very base; those of spiracular cover yellowish or yellowish white. Epaulets dark.

Wings. Bend of fourth vein normally a right angle or very nearly such; anterior cross-vein more basal than end of first longitudinal; costal spine vestigial; third vein bristly; section III of costa at least one and one half times section V; alulae fringed with hair; calyptra white, margins fringed with white hair.

Legs. Dark. Posteriors trochanter with distinct "brush"; apical bristle present, not always distinct: femur spindle or somewhat spindle shaped, clothed beneath with long hair that become longer posteriorly forming a beard; anterior face with three rows of bristles, those of intermediate row shortest and not developed distally, sometimes only centrally, lower row usually present on distal three fourths at least; posterior face without ventral row of bristles: tibia straight or slightly curved, anterior and
posterior faces each with a beard of long, coarse hairs on about
distal three fourths, latter always the stronger; tarsus not
shorter than tibia, fourth segment at least one half fifth.
Middle coxa with a single row of bristles; femur clothed beneath
on posterior, proximal half of more with long hair; anterior
ventral row of short bristles complete, posterior row represented
only by "corp" extending proximally to the long hair; subscoaticial
bristle present. Ventral surface of anterior coxa with an
irregular row of bristles at each side only.

Chestatax.: Anterior dorsocentra is not weaker than anterior
postauricuals, short, but longer than vestiture of preascutum;
scoaticials absent; inner prescuturals absent: last one or two
pairs of posterior dorsocentras strong, anterior to these two to
four pairs that are mostly weaker than those before the suture and
often almost or entirely indistinguishable from vestiture of
ascutum; prescutellar acrostichals present: scutellar apical
present: three sternopleurals: lower sternopleura with a single
row of bristles, otherwise clothed with hair.

Abderen.: Somewhat conical; clothed above with short, reclinate
bristles, beneath with slightly longer, almost erect hair. Ventral
plates, as a whole, with their sides almost parallel or slightly
converging posteriorly, vestiture decreasing in length posteriorly,
that of last long, then of second short and erect, that of third
short and decumbent though longer at margins.

Chestatax.: Second segment without marginal bristles; third
with two; fourth with complete row ending ventrally in longer hairs.

Genital Segments.: Prominent; dull or brownish orange except
that first has a dark brown band posteriorly often only dorsally,
sometimes just posterior margin darkened. First, usually exposed
only to darkened posterior portion, vestiture, including that of
"humps," slightly shorter than that of second segment; in profile
flatly curved; several short, stout, marginal bristles each side
of center: second, rotund, flattened, anterior and posterior
surfaces of nearly equal size, vestiture not coarse, and are
large and central extending upward to or near, to limit of
posterior surface. Forelegs darkened, short, prongs approximated
nearly their full length, in profile appear broad and so that
flattened, base with short, upward, flag-like extensions densely
clothed with fine hair that is not longer than the vestiture of second
segment. Connecting membrane, on each side just anterior to
"humps," with a row of long hairs.

Genitalia.—Accessory plates darkened, sometimes almost black,
polished, only their anterior portions hairy. Base of fourth
ventral plate dull orange, lamellae darkened and each with a
"brush" on its upper surface bordering the inner margin.

(Q) Females differ from males in the following important
characters:

Head.—Breadth of front at its narrowest part nearly equal
to eye width. Upper inner orbits of eyes diverging downward.

Thorax.—Metanotum clothed with quite short, reclinate
bristles. Epauls at times as in males, sometimes quite distinctly
yellowish outwardly.

Legs.—Vestiture short throughout. Posterior femur with upper
and lower rows of bristles only, those of latter well separated,
especially distally; posterior face with ventral row of long will
separated bristles on proximal half or slightly more. Anterior
and posterior row of bristles of middle femur complete but
bristles weak and short on distal half or more; submarginal
bristle very strong, sometimes a short bristle just above it.
Cephalotaxy. - Anterior dorsal centra very strongly reclinate, longer than but projecting but little above vestiture of prescutum: only last pair of posterior dorsal centra strongly, other pairs, if present, just anterior to them, and very weak; usually three, sometimes four sternopleurala: lower sternopleure with a single row of bristles, a few bristles sometimes mixed with hairy vestiture anterior to it.

Abdomen. - Oval, vestiture throughout of short reclinate bristles. Ventral plates mostly concealed, their posterior margins with bristles.

Genital Segments. - Sixth, seventh (notum of sixth taxonomic segment, seventh morphological) not divided into two lips, somewhat protuberant and generally visible from above, dull or brownish orange, margin fringed with bristles (sometimes weak) that decrease in length ventrally, spiracles central. No visible evidence of fifth notum. Fifth and sixth ventral plates seem to be fused; fifth same color remainder of genital segments, sometimes partially grayish. Seventh notum, sixth of characteristic shape divisible into an anterior inserted portion with a bristle on each side of center posteriorly, and a posterior part divided into two rounded or angularly rounded lobs that extend backward, one on each side of center.

Redescribed from 10 male and 17 female specimens, others examined.


Foreign. Hungary, Italy, Dalmatia, Algeria, Tenerife, Roumania, and coast countries of the Med. terraneum.
Males and females of this species are usually very easily separated from other New England members of the genus by the single row of black oil glands behind the eyes. Additional important characters in the female are the presence of but a single pair of strong posterior dorsocentrales, the vestiture of short reclinate bristles on the ventral portions of all the abdominal plates, and the two rounded or angularly rounded backward projections of the posterior part of the sixth ventral plate (often not distinctly defined due to excrement/due matter or distortion of genital parts). On the middle and anterior tibias of the male the vestiture of the ventral surface sometimes tends to become longer distally but never to the extent to form beard. According to Böttcher (Deutsch., Nat. Zeitschr., 1913, p. 13) the males sometimes have been one strongly developed posterior dorsocentral.

To separate this species from males and females of closely related or similar species see page .

Metz has reared an adult from broken pigeon eggs collected in New York City and the writer has collected specimens on human excrement at Springfield, Mass. Richardson of New Jersey reared a female from material taken from a brooder house.

Sarcophaga dalmatina was described by Schiner in 1862. Böttcher (Deutsch., Nat. Zeitschr., 1914, p. 116) has examined Schiner’s material at the K. K. Hof. Mus., Wien, and found that the specimen from which the original description was made consist of two species since described as S. asperifera Villeneuve and S. exuberans Pandellé. According to the international code the name dalmatina must be retained, in such cases, for one of the resultant species. As no particular specimen was designated by Schiner as the type the species to bear the original name must be arbitrarily selected;
therefore either secundaria or exuberans must fall into the synonymy. Since it is unwise to cause more confusion than absolutely necessary, it seems best to make secundaria the synonym, rather than exuberans, as a change in the name of the latter would involve the other subspecies of S. imperata Pandeili as well as exuberans. The type of S. delatimp is, therefore, here designated as being the species until now known as S. secundaria Villeneuve.

The writer has corresponded with Böttcher concerning this point and he fully agrees that the above designation should be adopted, though at the time he published the paper above referred to he deferred to the wishes of Villeneuve who thought it best to retain the name secundaria for the time being.


   Pl. 5, fig. 12.

1881. Sarcophaga ornatipes (spelled crustata) Hagen, Can. Ent.,
   vol. 15, p. 147.

1. I have found the male and female referred to by Hagen in
   his article to be specimens of S. fulculata Pandeili.

1896. Sarcophaga fulculata Pandeili, Rev. Ent. Franc., vol. 15,
   p. 185. Original description.

   Göttingen, p. 150, pl. 2. Fig. 16. Habitus, figures male
   genitalia.

   p. 193, equals R. nucua Rondani, etc.; also p. 195, 196.

1913. Sarcophaga fulculata Böttcher, Deutsch. Ent. Zeitschr.,
   p. 15. Description, figures male genitalia, occurrence, equals
   R. nucua Rondani, etc.

   35, No. 1, pp. 36, 37, 39, 40, 41. Characters.
(9) Two rows of black cilia behind eyes; cheeks clothed with white hair except that vestiture of that part bordering outer portion of transverse impression and lower portion of posterior orbit is black; hairs covering anterior epiracle grizzled with or without dark tinge at base only; submarginal bristles absent; last two pairs of posterior dorsooccipitale strong; prescutellar acrostichale present; first genital segment brownish, sometimes faintly greyish pellucida dorally and posteriorly.

(9) Two rows of black cilia behind eyes; cheeks clothed with white hair except that vestiture of that part bordering outer part of transverse impression and lower portions of posterior eye orbits is black; hair covering anterior epiracle grizzled with or without a dark tinge at base only; anterior face of posterior femur with upper and lower rows of bristles only; last two pairs posterior dorsooccipitale strong; prescutellar acrostichale present; vestiture of abdomen of short, reclinate bristles except that on ventral surfaces of first and fourth nota it is more erect and sometimes hair like; first genital segment not divided into two lateral lobe; somewhat protuberent but not visible from above, dull or brownish orange; fifth and sixth ventral plates seem to be fused, sixth of characteristic shape, roughly divisible into an anterior portion that usually has a distinct knob like elevation centrally and anteriorly and a posterior part consisting of two semi-circularly rounded lobes that extend backward, or occasionally two bristles at the base of each lobe.

Length—9 to 17 mm., average about 14 mm.

Nests.—Viewed from side parafrontale and parafrontal reflections. Branches of front at its narrowest part from three
fifths to two thirds eye width; cheek height approximately three
eights that of eye. Front prominent, upper inner orbits of eyes
cconverging downward; at narrowest part of front, wider or
wider than each parafrenal, its sides converging backward.
Second antennal segment dark; third about twice length of second;
atrios plumose to beyond middle. Back of head somewhat convex,
with two rows of black cilia behind eyes, otherwise clothed with
white hair that completely covers the metacophalon with white
hair except that vestiture of that part bordering outer part of
transverse impression and lower part of posterior eye orbit is
black. Genae with scattered hairs near the lower eye orbits.

Comments. - Lateral verticals absent; vibrissae inserted just
above line of oral margin.

Thorax. - Metanotum clothed with white dense, erect hairs.
Hair covering anterior spiracles grayish with dark tinge basally;
those of anterior margin of posterior spiracles dark on basal
half; those of apical margin yellowish or yellowish white.
Espiracies dark.

Wings. - Band of fourth vein normally a right angle; anterior
cross-vein more basal than end of first longitudinal; costal
spine vestigial; third vein bristly; section III of costa at
least one and one half times section V; alulae fringed with hair;
calyptra white, margins fringed with white hair.

Legs. - Dark. Posterior trochanter with distinct "brush;"
spiral bristle present, not long or distinct; fourth spindle or
somewhat spiral shaped, clothed beneath with long hair that
becomes longer posteriorly forming a beard; anterior face with
three rows of bristles, those of intermediate row shortest and
not developed distally, often but three or four at center,
lower row present at least on distal half or slightly more; posterior face without ventral row of bristles: tibiae straight or slightly curved, anterior and posterior faces each with a beard of long, coarse hairs for nearly the entire length (at least posteriorly), latter always the stronger: tarsus not shorter than tibia, fourth segment at least one half fifth. Middle coxa with a single row of bristles: feebly clothed beneath on anterior, proximal half or more with long hair; anterior ventral row of short bristles complete, posterior row represented only by "comb" extending proximally to the long hair: subcoxal bristle absent: ventral surface of anterior coxa with an irregular row of bristles at each side only.

**Chrysomyza.**—Anterior dorsocentrals not weaker than anterior postnoturals; short, but longer than vestiture of prescutum; acrostichals absent; inner presuturals absent; last two pairs of posterior dorsocentrals strong, anterior to these two to four pairs that are mostly weaker than those before them and often almost indistinguishable from vestiture of scutum; prescutellar acrostichals present; acrostellar apiculare present; three sternopleurals, sometimes four on one side; lower sternopleura with a single row of bristles only, otherwise clothed with hair.

**Abdomen.**—Somewhat conical; clothed over with short, reclinate bristles, beneath with slightly longer, almost erect hair. Ventral plates, as a whole, with their sides almost parallel or slightly converging posteriorly; vestiture of first slightly longer than that of ventral surface of first notum: that of second (longest) and third short and decumbent, that on each margin longer and on the third decumbent.
Gnatotaxy.- Second segment without marginal bristles; third with two; fourth with a complete row ending ventrally in long hairs.

Genital Segments.- Prominent. First, usually only posterior portion exposed, brownish, sometimes faintly grayish pellucid dorsally and posteriorly, "humps" sometimes less darkened; vestiture shorter than that of second segment, in profile somewhat arched, marginal bristles very short and at end when present scarcely if at all longer than vestiture, sometimes one, sometimes two or three each side of center: second, reddish, flattened anterior and posterior surfaces of nearly equal size, dull orange, anal area large and central extending dorsally nearly to limit of posterior surface. Forelegs darkened, except distally, short, pronot approximate for a little more than half their length, in profile broad and somewhat flattened, base with short, upward, flap-like extensions, densely clothed with fine hairs that is shorter than vestiture of second segment. Connecting membranes on each side, just anterior to "humps", with a row of long hairs.

Genitalia.- Accessory plates darkened at base posteriorly, only anterior portion hairy.

(9) Females differ from males in the following important characters.

Head.- Breadth of frons about equal to eye width. Upper inner orbits of eyes diverging downward.

Thorax.- Metanotum clothed with quite short, radiating bristles.

Legs.- Anterior face of posterior femur with upper and lower rows of bristles only; those of latter near distal; posterior face with ventral row of long, well separated bristles proximally, usually but two bristles present. Anterior and posterior rows of bristles of middle femur complete, but bristles short, and often seek on distal half or more; subcoxal bristle very
strong, sometimes a short bristle just above it.

Chaetotaxy.—Anterior and anterior postural dorso-centrals more distinct, projecting above vestiture of metanotum; lower sternopleura with a single row of bristles, hairy vestiture anterior to these not nearly so conspicuous.

Abdomen.—Oval; vestiture practically throughout of short, reclinate bristles, erect and sometimes hair like only on sides and ventral surface of first and fourth notum, sometimes only on latter.

Genital Segments.—Sixth notum (seventh morphological) not divided into two lateral lips, somewhat protuberant but not visible from above, dull or brownish orange, margin fringed with bristles (sometimes weak) that decrease in length ventrally, spiracles central but often concealed beneath edge of fourth notum. No visible evidence of fifth notum. Fifth and sixth ventral plates seemed to be fused; fifth sometimes grayish pollinose, sometimes same color as remainder of genital segments, the marginal bristles mark its posterior limit; sixth of characteristic shape, roughly divisible into an anterior portion usually with a distinct knob like elevation centrally and anteriorly and a posterior part consisting of two semi-circularly rounded lobes that extend backward, one or occasionally two bristles at base of each lobe.

Redescribed from 14 males and 9 female specimens, others examined.


United States: N. Y., N. J., Pa., Fla., Ill., Minn.

Foreign: Bermuda, Germany, France, Spain, Italy, Dalmatia, Tunisia, India.
The vestiture of the ventral surface of the middle and anterior tibiae of the male often becomes perceptibly longer distally and, on the middle tibiae, may show a tendency to become beard-like posteriorly. The sixth tarsus of the female is somewhat similar to that of *S. dalmatica* Schiner; it is often bent out of shape forming a median ridge dorsally; the characters of the sixth ventral plate are useful when discernible.

Specimens of this species taken in Bermuda have been received from C. W. Johnson of Boston.

Kramer (1911) reports a male as captured on an umbellate and others as bred from Lepidoptera. Specimens received from Metz were reared on meat.

(20) *Sarcophaga bullata* n.sp. This species agrees with members of the *hemorrhoidalis*-group (p.) in several characters and in others with the species of the *tuberosa*-group (p.): with *S. falvinae* the next species, it agrees in having the tarsi shorter than their respective tibiae and the genital segments are essentially the same except as regards the comparative length of the vestiture of the two segments. (See page 39.)

20. *Sarcophaga bullata* n.sp.

Pl. 5, Fig. 13.


*Provisionally determined.

Rept. State Entomologist for 1912, pp. 30-32, pl. 7, figs. 1, 2, and 3.*

*Figure 4, labelled as the genitalia of this species, of Phormia regina (Meigen).*

Habits; description of larval stages and pupa.
<table>
<thead>
<tr>
<th>Characters</th>
<th>S. haemorrhoidalis Meigen</th>
<th>S. dalmatina Schiner</th>
<th>S. falculata Pandelle</th>
<th>S. tuberosa subsp.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of rows of black cilia behind eyes. (♂ &amp; ♀)</td>
<td>Two</td>
<td>One</td>
<td>Two</td>
<td>Three</td>
</tr>
<tr>
<td>Frontal vitta at narrowest part of front. (♂)</td>
<td>Narrower than each parafrontal.</td>
<td>Wider than each parafrontal.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vestiture of cheek. (♂ &amp; ♀)</td>
<td>Anterior portion clothed with black, posterior with white hair.</td>
<td>Clothed with white hairs except for a few just beneath the eye that are black.</td>
<td>Clothed with white hair except for small part bordering outer portion of transverse impression and lower portion of posterior or eye orbit.</td>
<td>Clothed with black hair.</td>
</tr>
<tr>
<td>Hairs covering anterior spiracles. (♂ &amp; ♀)</td>
<td>Mostly dark, lighter at tips (not constant and often as in next two species).</td>
<td>Grayish with dark tinge basally.</td>
<td>Grayish with dark tinge basally.</td>
<td>Light colored toward tips only.</td>
</tr>
<tr>
<td>Prescutellar acrostichals. (♂ &amp; ♀)</td>
<td>Usually absent; if present weak, as a rule.</td>
<td>Present.</td>
<td>Present.</td>
<td>Present.</td>
</tr>
<tr>
<td>Characters</td>
<td>S. haemorrhoidalis Meigen</td>
<td>S. dalmatina Schiner</td>
<td>S. falcata Pandellé</td>
<td>S. tuberosa subsp.</td>
</tr>
<tr>
<td>---------------------</td>
<td>---------------------------</td>
<td>---------------------</td>
<td>---------------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>Ventral plates (♂)</td>
<td>Usually, sides as a whole, converge posteriorly; edges often noticeably straight; vestiture of second and third short and decumbent, but longer on margins.</td>
<td>Sides as a whole almost parallel or slightly converging posteriorly; vestiture of second (at least centrally) short and erect; that of third short and decumbent, except that it is but longer on margins.</td>
<td>Vestiture of second erect; that of third short and decumbent except that it is longer on margins.</td>
<td></td>
</tr>
<tr>
<td>Genital segments (♂)</td>
<td>Grayish pollinose except “humps.”</td>
<td>Dull or brownish orange except that it has a dark brown band posteriorly, often only dorsally.</td>
<td>Dark brown, sometimes faintly grayish pollinose dorsally and posteriorly.</td>
<td></td>
</tr>
<tr>
<td>First, marginal bristles.</td>
<td>Usually one on each side of center; others, if present, much weaker.</td>
<td>Usually several stout bristles each side of center.</td>
<td>Usually several bristles each side of center, but rarely longer than vestiture of segment.</td>
<td>Absent.</td>
</tr>
<tr>
<td>Characters</td>
<td>S. hemorrhoidalis</td>
<td>S. alveolata Schiner</td>
<td>S. fulcicula f. funebris</td>
<td></td>
</tr>
<tr>
<td>------------</td>
<td>------------------</td>
<td>---------------------</td>
<td>------------------------</td>
<td></td>
</tr>
<tr>
<td>Additional characters</td>
<td>Last two pairs strong.</td>
<td>Last two pairs strong.</td>
<td>Divided into two lateral lips.</td>
<td></td>
</tr>
<tr>
<td>Posterior dorso-ventral</td>
<td>Only last pair strong.</td>
<td>Not divided into two lips.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Genital segments</td>
<td>Sixth notum.</td>
<td>Not divided into two lips.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

S. tiberoide subsp.

**Types:** Massachusetts Agricultural College, one male, one female.

**Paratypes:** Massachusetts Agricultural College, one male, one female; United States National Museum, one male, one female; American Museum of Natural History, two males, three females; Boston Society of Natural History, two males; Cornell University, one male, one female; collection of J. M. Allen, one male, one female; collection of writer, six males, five females.

(0) Third antennal segment two and one half to three and one half times length of second; anterior portion of cheek clothed with black, posterior with whitish hair; hairs fringing calypters dark at fold, otherwise whitish except that those on inner portion of margin of upper (anterior) calypter are often dark; all tarsi shorter than their respective tibiae; anterior and posterior faces of posterior tibia each with an equally strong beard, of long, coarse, black hairs; hairy vestiture of lower surface of middle tibia increasing in length distally, short and not forming anterior and posterior beards; ventral surface of anterior coxa completely clothed with bristles that may be divisible into three irregular rows: only last two pairs of posterior dorsoventrals strong; except at sides second and third ventral plates clothed with short, decumbent hair; genital segments dull orange, first either with hair like or seek marginal bristles.

(Q) Third antennal segment two to three times length of second; anterior portion of cheek clothed with black, posterior with whitish hair; hairs fringing calypters dark at fold, otherwise whitish except that those on inner portion of margin of upper (anterior) calypter are often dark; ventral surface of anterior coxa with other bristles than those of the irregular rows at each side, sometimes more or less distinct row between them;
only last two pairs of posterior dorsocentrals strong; abdomen
clothed with short, reclinate bristles; genital segments slightly
protuberant; the two broad, lateral lips of the first genital
segment dull orange, near their edges usually turned abruptly
backward (more protuberant), spiracles nearest to anterior margin;
fifth segment not discernible, its spiracles when visible seem
to open through lips of sixth notum (first genital segment);
ventral plates of genital segments usually concealed.

Length: 9 to 15 mm., average 12 \( \frac{5}{3} \) to 14 mm.

(♂) Head.— Viewed from side parafrontal and genae with dark
reflections. Breadth of front at narrowest part from one half to
four sevenths eye width; cheek height varies from one third to
one half that of eye. Front rather prominent, sides of frontal
vitta usually parallel but often slightly convergent backward or
the sides effaced just below ocellar triangle especially in
large specimens. Second antennae segment brownish at tip,
rarely blackish throughout; third two and one half to three and
one half times length of second, its inner, basal portion often
pinkish or salmon colored; aristae plumose to beyond the middle.
Back of head somewhat convex, typically, with two complete rows of
black cilia behind eyes, sometimes with a partial third especially
dorsally, otherwise clothed with whitish hair that completely
covers metacephalon. Anterior portion of cheek clothed with
black, posterior with white hair. Genae sparsely clothed with
short hair or sometimes with about three irregular rows on that
half nearest eye orbit.

Chaeotaxy.— Lateral venterals absent; vibrissae inserted
just above line of oral margin.
Thorax.—Metanotum clothed with short, quite erect, bristles. Hairs covering anterior spiracle dark brown basally, at least their outer halves yellowish; those of anterior margins of posterior spiracle either entirely dark brown or with yellowish tips; those of spiracular cover vary from brown with yellow tips to almost wholly yellowish. Epaulets dark.

Wings.—Bend of fourth veining normally a strongly acute angle; anterior cross-vein more basal than end of first longitudinal; third vein bristly; cofal spine vestigial; section III of costa equals approximately one and two thirds time section V; posterior margin of alulae with or without fringe of hair; calypters whitish, fringe of hairs dark, otherwise whitish but those on inner portion of margin of upper (anterior) calypter often dark.

Legs.—Dark; all tarsi shorter than their respective tibiae. Posterior trochanter with well defined "brush," especially in large specimens: femur sub-cylindrical, clothed beneath with long hair that often becomes beard like posteriorly, anterior face with three rows of bristles, those of intermediate row shortest and not developed distally; posterior face without ventral row of bristles: tibia sometimes slightly curved, anterior and posterior faces each with an equally strong beard of long, coarse, black hair: fourth segment of tarsus at least one half fifth. Middle coxa with a single row of bristles: femur clothed beneath on posterior proximal half or more with long hair; anterior, ventrally row of short bristles complete, posterior row represented only by "comb" extending proximally to the long hair; hairy vestiture of lower surface of tibia increasing in length distally but short and not forming anterior and posterior beards; sub-mesostibial bristle present. Ventral surface of anterior coxa.
completely clothed with bristles that are sometimes separable into three irregular rows, one at each side and an intermediate that is usually less complete and sometimes indistinct.

**Chaetotaxy.**—Anterior dorsocentrals short, slightly longer than vestiture of prescutum, but slightly reclinate and not projecting above it; acrostichals absent; inner prescuturals, if present, very weak: last two pairs postdorsal dorsocentrals strong, anterior to these three or four pairs that are weaker than those before the suture; prescutellar acrostichals present; scutellar apicale present: usually three sternal, iurales; sometimes two but generally only on one side: lower sternopleurae with a single row of bristles.

**Abdomen.**—Oval or somewhat conical; not clothed above with short reclinate bristles; beneath with slightly longer, almost erect hair. Ventral plates, as a whole, with their sides converging posteriorly; vestiture of first long and erect, that of second and third short and decumbent except at sides. Posterior margin of fourth notum dorsally, also sometimes ventrally, usually of same color as genital segment, sometimes not so colored.

**Chaetotaxy.**—Second segment without marginal bristles; third with two, often very stout; fourth with complete row ending ventrally in long hairs.

**Genital Segments.**—Prominent, often completely exposed, dull orange. First, large, often partially yellowish pale linear, vestiture slightly shorter than that of second, "humps" almost bare, in profile nearly curved, marginal bristles weak or hair like; second, rotund, not flattened, small area small and not extending above middle of posterior surface. Forelegs darkened at least on
distal half, in profile the fine, hairy vestiture is seen extending almost to tips of prongs, which are strongly curved forward and approximated almost to tips but latter slightly spread; base with upward flap like extensions clothed with fine hair that is slightly shorter than vestiture of second segment. Base of fourth ventral plate usually shows as a rounded ridge the posterior extremity of which is slightly upturned or knotted showing prominently in profile, inner portions of isemellae at base thickly set with short, stubby bristles forming a "brush."

Genitalia.- Distinctive. Accessory plates hairy; anterior claspers scarcely longer than posterior.

(?) Females differ from males in the following important character:

Head.- Breadth of front at narrowest part varies from about five alyktos to some up eye width. Upper, inner orbits of eyes diverging downward.

Thorax.- Bristly vestiture shorter.

Legs.- All tarsi equal in length to tibiae. Posterior trochanter with slender apical bristle; femur spindle shaped; anterior face essentially with but two rows of bristles, those of lower row few and well separated, intermediate row may be represented by two or three bristles proximally; posterior face with ventral row of long, well separated bristles on proximal half of slightly more. Anterior and posterior ventral rows of middle femur complete but bristles weak, and inconspicuous distally: submesotibial tibiae/ var. strong, sometimes a short bristle just above it.

Chaetotaxy.- Anterior and anterior postnotural dorsocentrals shorter: usually three sternopleural, sometimes four on one or both sides; lower sternopleura with a single row of bristles, often with several others just anterior to its lower part, otherwise
clothed with hair.

**Abdomen.** - Oval; vestiture practically throughout of short, reclinate bristles.

**Genital Segments.** - Slightly protuberant, visible only from beneath or sometimes bristles of first segment may be seen from above. The two broad, lateral lips of the first genital segment distinctly separated dorsally, their edges abruptly turned backward and fringed with bristles that decrease in length and size ventrally, dull orange, often yellowish pellinose, spiracles nearer to anterior than posterior margin. Fifth segment not discernible as such, its spiracles rarely visible and apparently open through lips of sixth segment (first genital). Ventral plates of genital segments concealed.

Described from 15 male and 12 female specimens, 62 others examined.


United States: N. Y., N. J., N. C., Ga., Fla., Ohio, Ohio, Ind.

The fact that the vestiture of the anterior portion of the cheeks is black and that of the posterior white together with the two bands of equivalent value on the posterior tibiae is sufficient to distinguish males of this species from others known in New England at least. Sarcophagam heemorrhoidalis Heigan and S. imparipenna Schiner, while quite distinct might possibly be confused with it by one not familiar with the group; the above characters will immediately differentiate them. Females of both these species are separated from S. buillata by the character
of the cheek vestiture and the nature of the first genital segment which is composed of one piece as are the abdominal nota and not divided into two lips. In addition the male of *S. fulgur* has one complete row of cilia behind the eyes instead of two.

**Reference Bulletin on *S. fulgur* (Riley)**

While these species belong to distinct groups within the genus, yet as a beginner, I found them hard to separate and hence submit the following table of side by side for striking characters that may be used without pulling out the genitalia.

<table>
<thead>
<tr>
<th><em>S. fulgur</em> n.sp.</th>
<th><em>S. lucas</em> var. <em>fulgur</em> (Riley).</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Comparison of male.</strong></td>
<td><strong>Comparison of male.</strong></td>
</tr>
<tr>
<td><strong>Constant characters.</strong></td>
<td><strong>Constant characters.</strong></td>
</tr>
<tr>
<td>Anterior position of cilia.</td>
<td>Check vestiture. check.</td>
</tr>
<tr>
<td>clothes with same posterior.</td>
<td>clothes with same posterior.</td>
</tr>
<tr>
<td>without hair.</td>
<td>without hair.</td>
</tr>
<tr>
<td>Anterior and posterior beards</td>
<td>Anterior beard considerably weaker</td>
</tr>
<tr>
<td>of hind femur of equivalent value.</td>
<td>than posterior.</td>
</tr>
</tbody>
</table>

**Less distinct or variable characters.**

<table>
<thead>
<tr>
<th>Only two complete rows of black cilia behind eyes.</th>
<th>Three complete rows.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anterior pericentral absent.</td>
<td>Slightly DIFFERENT anteriornly.</td>
</tr>
<tr>
<td>Vestiture of lesser surface of middle titillament short but increasing in length distally.</td>
<td>Not increasing in length distally.</td>
</tr>
<tr>
<td>First genital segment weak. Marginal tristles absent.</td>
<td>Marginal tristles absent. weak hair like marginal tristles.</td>
</tr>
</tbody>
</table>
Comparison of Female

The character of the cheek vestiture and the number of rows of black cilia behind the eyes may be used to in the male.
The genital segments are also distinctive, the edges of the fourth notum much wider apart and the line broad and fully exposed, whereas in S. intergosa the segments the fourth notum tends to close over the genital segments and the line of the first segment are narrow.

When making use of the number of rows of black cilia behind the eyes it must be borne in mind that there is apt to be an incomplete third row in S. bullata. The fourth ventral plates in males of both species under discussion show the posterior extremity of the fourth ventral plate uplifted in profile.

S. haenochridalis Missen also has black hairs on the anterior part of the cheeks. There should be no difficulty in separating it from S. bullata. In case of doubt, however, refer to table on page 105.

In a discussion following the description of Sce-spepl.. colepi

R. (Can. Ent., vol. 46, pp. 417-423, Dec. 1913), it was well known only from Montana, Wyoming and Utah, it was suggested that this species and S. bullata were close relatives. The genital segments of the females are very similar; those of colepi are interesting in that they show (at the sides) one of a distinct fifth abdominal (sixth morphological) segment with its spicules.

Among my material are several reared specimens of S. bullata which have light rather than dark colored elpi. The parts of the penis may be less compact and separated to a greater extent than figured in the drawing.
Felt (1915, see bibliography) described the larval and
the pupal stages from specimens raised on the leaf of a calf.
From larviposition to adult was found to take from June, four
to thirty-six days (Aug. 12 to Oct. 13 to Oct.). Dr. Felt very
kindly sent me six females from the specimens reared, which are
unquestionably those of S. bulbosa. (Station for Experimental
Evolution, Cold Spring Harbor, Long Island), during the summer
of 1915, reared this species on beet in several experiments.
Undoubtedly it breeds in carrion. I also have records of it
captured on cow dung, and at Springfield, Mass., captured it on
human excrement. One specimen in the Massachusetts Agricultural
College collection is labelled as caught flying around the "burrows
of Cryptorhynchus larvae." A female received from
C. H. Richardson was reared from cow manure. Specimens have
also been reared from eggs.

3i. Sarcophaga fulviosa oculata n. sp.

1. S. fulviosa oculata was referred to in part to S
fulviosa nigra, but since has since been found to be preoccupied;
therefore, the subspecies is designated under the name oculata.

Type ♂: Collection of C. W. Johnson, Proctor, Mass.
(♂) Posterior trochanter without "brush;" femur-trochanteric, anterior
face without ventral row of bristles (only a single distal bristle
present); anterior and posterior face of tibia each with a very
thick series of very long, coarse bristle extending full length of
tibia; middle tarsus clothed beneath nearly to distal extremity with
long hair, posterior ventral row of bristles represented only
by a few short bristles on about distal fifth; tibia clothed
beneath on about the distal half with long dense hair that anteriorly

...
and posteriori, become coarser and beard like, subapical bristle absent; ventrite of third ventral plate short and broad; genital segment dull orange, ventricle of last equally long, first longer, without marginal bristles (possibly with). 

Head.—Viewed from side parietal area forms dark reflections. Breadth of front at current part about three fifths its width; cheek height approximately one third that of eye. Front prominent, sides of front vires slightly converging inward. Second antennal segment dark; third about twice length of second; antennae pinnate on last two thirds. Beak of head is slight convex, with three rows of black ocelli above eye, otherwise clothed with yellowish white hair that completely covers the metacephalon. Cheeks clothed with black hair. Gain with a single row of bristle like hair in lower eye orbit. Palpi dark.

Chaetotaxy.—Lateral verticals present; placed in lines on just above line of eye margin.

Thorax.—Metacuticle clothed with cuticle, except bristle like hair. Head covering yellowish pinnate on green, becoming lighter toward tips; elytra of same or longer, of posterior epipleura dark brown, tips of lateral and middle yellowish brown with yellowish tips. Epipleura dull.

Wings.—Front and fourth vein equal, on rise costa vein more basal than end of first; longitudinal; costa is angular; third vein briefly; section III of costa six costa veins, fourth vein section IV; anal fasci. fringed by hair; calyx is entire, merging faintly with radial hair.

Legs.—Dark; all tarsi distinctly, covered with coarse respective tibias. Posteriors tracts with almost "brush" form cylindrical, arched, clothed beneath with long hair that forms a
beard posteriorly; anterior from this point to base of bristles, an upper and intermediate, lower not developed distinctly, or lower not a single bristle present, posterior with
without ventral row of bristles; tibiae slender, anterior and posterior rows each with a single short bristle on each side.
coarse hairs extending half length of tibia, i.e., in pairs to
stronger: fourth tarsal segment at least one half fifth; third
coxa with a single complete row of bristles, etc. Other slender
bristles anterior to not upper part; lower elements each nearly to distal extremity, especially posteriorly, with long
hair; anterior ventral row of short bristles complete. Anterior
row represented only by a few short bristles on ventral side.
Fifth: tibia clothed beneath on its distal half or slightly more
with long, dense hair that precedes coarser and tends like
anteriorly and posteriorly; submetatibial articulation absent. Ventral
surface of anterior coxa with an irregular row of bristles at
each side and naturally with others between them: male with a dark
like line of short hairs distally on posterior face (probably
at least in some specimens).

Chelotaxy:—Anterior dorso-centrals slightly reclinate, not
weaker than anterior postauricals; coxae: last two pairs
posterior dorso-centrals strong, anterior in line, usually with
that are mostly very weak and scarce, distinguishable from
vestiture of coxae; precoxal articulation present; meso
apicals present; three sternal pleura, middle one bare; inner
sternopleura with a single row of bristles, tibia clothed
with long hair.

Abdomen:—Somewhat conical; clothed above with short, reclinate
bristles, beneath with somewhat looser, and close hair. Ventral
plates as a whole, with their sides slightly converging posteriorly
through they may appear approximately parallel; vestiture decreasing
in length posteriorly, and of third var. short and erect. Posterior margin of fourth node of aux color as genital segment.

Cheiridia.—Second segment without marginal ridge; third with two; fourth with one, into valva ventrally, in line color.

Genital Segment.—Prominent; dull orange; vestiture of both axially long. First large in profile slightly curved, marginal bristles least; second, natum, not flattened; and size small, short apical extending to middle of posterior surface. Forelegs bent; tip very strongly bent forward, in profile vestiture extends to forward hind, proxim as approximated to bend; base of forelegs with spines, ventral, flap-like extensions, their vestiture shorter than that of second segment.


( C ) Not known.

Described from 1 male specimen.

Range.—Type specimen taken at Niagara Falls, N. Y.

Aside from the difference between this species and Salandria Fuliginosa (Quatref.), the point of greatest interest is the axially bent, because of the hind tibiae, which is the most striking of any species known to the writer. The headless of the middle tibiae is also unusually long and slender. Considering the extreme weakness of the middle sternopleural bristles probably specimens will be found with this lacking, in fact, of the two specimens of S. Fuliginosa examined one has two sternopleurals on each side, the second the one side, three on the other. Cor. relatively the posterior or lower calyptr is very large.
The single specimen described belongs to the collection of C. W. Johnson of Boston as does one of the two specimens of S. fulviceps fulviceps examined. The latter were taken at St. Augustine, Florida. The genitalia of both subspecies are identical in all respects. The advisability of giving this specimen subspecific ranking may perhaps be questioned, but it seemed to be wiser to err in so doing than that such an extreme variation should be lost sight of. It may be a case of melanism.

Macquart described a S. fulviceps from Cuba in 1848 (Dipt. Exot. vol. 2,5, p. 106), Walker a fulviceps from the United States between 1850 and 1856 (Dipt. Saund., p. 328). The Florida specimens in Johnson's collection were determined by him as S. fulviceps. Macquart and certainly agree more nearly with Marquart's rather vague description than with Walker's which apparently deals with a different species. If this be correct, Walker's name fulviceps must be dropped as preoccupied. Although it cannot be positively stated that the subspecies here described is unquestionably a subspecies of what Marquart has described as fulviceps, the resemblance of the species herein considered as fulviceps to Marquart's description is close enough to warrant its being so considered. In case the identification should prove to be incorrect, and the species represented by the specimen here described should be new to science, it should be known as S. dissidia and the southern form as S. dissidia waltoni, the specimen in Johnson's collection now labelled S. fulviceps fulviceps (Macquart) becoming the type of S. dissidia waltoni and a specimen in my own collection similarly labelled becoming a paratype. Johnson's type of S. fulviceps dissidia would be the type of S. dissidia.
S. fulvipes fulvipes (Macquart) differs from the subspecies just described in the following characters; sides of frontal vittae parallel or slightly converging backward (should probably be same variation in nigra); second antennal segment dull orange; palpi light (dull orange); hairs covering anterior spiracle mostly grayish, bases dark; those of anterior margin of posterior spiracle dark at base only; those of spiracular cover yellowish, perhaps faintly darkened basally; epaulets dull orange, brownish (Ramu-like) basally; coxae, trochanters, femora and tibiae of all legs dull orange, tarsi brown or brownish orange; anterior dorsocentrals not differentiated except that one or two show anteriorly; anterior poststatural dorsocentrals not differentiated; two or three sternopleurals, middle one weak if three are present; first genital segment with or without marginal bristles, if present very slender and hair-like, several each side of center; forceps only darkened distally.

The most striking of the differences above noted is the dull orange color of the second antennal segments, palpi, epaulets and first four segments of the legs. Though all the anterior dorsocentrals are differentiated in the subspecies nigra, this may be a variable character; the presence of marginal bristles on the first genital segment may perhaps be variable. In the smaller specimens of fulvipes the bearded character of the middle tibiae is far less distinct, the anterior tibia lacks a beard-like line of short hairs distally, the posterior beard of the hind tibia is much stronger the anterior, and the ventral surface of the anterior coxa has an irregular row of bristles at each side only.
22. Sarcophaga aczauria Pand. See page 43.

22. Sarcophaga aczauria Pandellé.


(©) Posterior trochanter without "brush," with long hair only; femur usually arched, posterior face without ventral row of bristles; tibia more or less curved, with an anterior and a posterior board, latter much the stronger; middle coxa, at least dorsal half, with more than a single row of bristles; tibia on about distal half with short, weak, anterior and posterior boards; ventral surface of anterior coxa clothed completely with bristles; anterior postero-internal dorso-centrals weak but at least as long as those before the suture only last two pairs strong; vestiture of
third ventral plate erect and not short; genital segments usually dark dull orange but first may be in part or wholly grayish pollinose; first segment in profile with a slight depression just anterior to marginal bristles, latter usually red and often hair-like.

(9) Vestiture of metasternum of short, erect, beak bristles or of short nearly erect bristly hair except that vestiture of scutellum is hairy and erect throughout or at least anteriorly; anterior postnotural dorsocentral scale but at least as long as those before the notum, only last two pair strong; note of abdomen clothed with short, reclinate bristles above, beneath with more erect hairs or bristles; genital segments protruberant, somewhat cone shaped, visible from above; the two broad, lateral lobe of the first genital segment dull orange, sometimes slightly darkened, spiracles close to anterior margins; fifth and sixth ventral plates fused; sixth fully exposed, not overlapped by lips of first segment, narrowed posteriorly, its posterior margin with bristles on each side of center.

Length: 9 1/3 to 15 mm., 13 to 14 mm.

(5) Head—Viewed from side parafrontals and gena with dark reflections. Breadth of front varies from slightly less to slightly greater than one half eye width; cheek height approximately one third or three sevenths that of eye. Front prominent, sides of frontal vitta parallel or slightly convergent backward. Second antennal segment dark; third about twice length of second; arista plus one to beyond the middle. Back of head somewhat convex, usually with four sometimes three irregular rows of black cilia behind eyes, otherwise clothed with whitish or yellowish hair that completely covers the metacerebrum except that occasionally there are black hairs in lower, anterior corners.
Cheeks clothed with black hair. Gena with short row of long, sometimes bristly hairs near lower eye orbit, other short ones may continue upwards. Palpi dark.

*Cheastotaxy.*—Lateral verticals absent, rarely weakly developed; vibrissae inserted slightly above mouth margin.

*Thorax.*—Metanotum clothed with slender, reclinate bristles or with bristle like hair. Hairs covering anterior spiracle dark brown basally, lighter toward tips; those of anterior margin of posterior spiracle dark brown; those of spiracular cover dark brown or brownish, tips yellowish. Epaulets dark.

*Wings.*—Bend of fourth vein either an acute, right, or slightly obtuse angle; anterior cross-vein more basal than end of first longitudinal; third vein bristly; costal spine vestigial; section III of costa about one and one half times section V or even longer; posterior margin of alulae either bare or fringed with hair; calypters whitish, fringe of hairs dark at fold, otherwise whitish.

*Legs.*—Dark. Posterior trochanter without "brush"; femur cylindrical or somewhat spindle shaped, often more or less arched, clothed beneath with long, fine hairs that become longer and coarser posteriorly forming a sort of beard; anterior face with three rows of bristles, those of intermediate row shortest, and not developed distally; posterior face without ventral row of bristles; tibia more or less curved; anterior and posterior faces each with a beard of long, coarse, black hairs on about three fourths, latter much the stronger; tarsus usually somewhat shorter than tibia, fourth segment at least one half fifth. Middle coxa, at least dorsed, with more than a single row of bristles, through the additional bristles may be rather slender; femur clothed beneath on posterior proximal half, or more with long hairs;
anterior ventral row of short, scattered bristles complete, posterior row represented only by "comb" extending proximally to the long hair; abdominalid present, often obscured by dense vestiture that covers titio ventrally on distal half of tibiae and becomes beard-like anteriorly and posteriorly. Ventral surface of anterior coxa clothed completely with bristles which are often separable into three irregular rows, one at each side and one intermediate that is usually less complete; vestiture of titio longest ventrally, posteriorly, and distally.

Chaetotaxy.-- Anterior dorsocentrals short and usually stout but longer than vestiture of prescutum; acrostichals absent or but slightly differentiated anteriorly; inner prescuturals short and slender; last two pairs poststernal dorsocentrals strong, anterior to these several weak pairs that vary greatly in length; prescutellar acrostichals present; scutellar apicles present; three sternopleurals: lower sternopleur with a single row of bristles, otherwise clothed with long hair which, in large specimens, becomes quite coarse.

Abdomen.-- Somewhat conical or oval; clothed above with short, reclinate bristles, beneath with longer, more erect hair. Ventral plates, as a whole, with their sides converging posteriorly, their shape and size variable; vestiture decreasing in length posteriorly, that of third plate shortest and erect. Posterior margin at fourth notum, especially dorsally, may be dull orange.

Chaetotaxy.-- Second segment without marginal bristles; third with two and usually with slender, decumbent ones between these and laterals; fourth with a complete row ending ventrally in long hairs.
Genital Segments.—Prominent, usually the greater part of first exposed; ground color dull orange or yellowish; first sometimes brownish, usually without pollen, sometimes partly grayish pollinose and occasionally entirely so except lateral posterior portions. First, vestiture shorter than that of second, "humps" almost bare, in profile with a slight depression anterior to marginal bristles, latter rarely strong, usually hair-like or even so small as to be scarcely distinguishable. Membrane joining first and second segments dorsally often blackish. Second, rotund, not flattened, and are rather small and not extending above middle of posterior surface. Forelegs darkened, usually blackish, at least distally, hairy to beyond middle; base with upward flap-like extensions clothed with fine hair shorter than vestiture of second segment; tips of pronon spread and bent forward.

Genitalia.—Distinctive.

Q Females differ from males in the following important characters.

Head.—Breadth of front at narrowest part slightly less than eye width. Upper inner orbits of eyes diverging downward.

Thorax.—Vestiture of metastomum of short, reclinate bristles or nearly erect; bristly hair except that vestiture of scutellum is hairy and erect throughout or at least anteriorly.

 Legs.—Posterior trochanters with slender, apical bristle; femur somewhat spindle-shaped, not arched, bristle of intermediate row on anterior face restricted to proximal half and sometimes only a few present; posterior face with ventral row of long well separated bristles on proximal half or slightly more. Anterior and posterior ventral rows of middle femur complete but bristles each and inconspicuous distally; subcoxal bristle very strong, sometimes a short bristle just above it.
Crustotexy. — Lower sternopleurae with bristles only, or at most but a few long hairs anteriorly.

Abdomen. — Oval; vestiture short throughout, clothed above with reciliated bristles, or beneath either with more erect hair or bristles.

Genital Segment. — Protuberant, visible from above. The two broad lateral lips of first genital segment distinctly separate dorsally; dull orange, sometimes slightly darkened, occasionally yellowish pollinose ventrally; upper edges fringed with hair and bristles, latter mostly above lines of spiracles which are close to anterior margin. Fifth segment wide dorsally, Spiracles usually concealed. Sixth ventral plate (seventh anatomical) with posterior marginal bristles at each side, and not overlapped by lips of first genital notch.

Rede cited from 40 male and 14 female specimens.


Foreign. — Germany, Switzerland, France, Italy, Great Britain, Turkey.

Böttcher (1918) has shown that this species should properly be called Sarcothrips parvus, Rondani. It is one of the most variable species with which we have to deal in New England, the description given ample evidence. The characters of the penis are as such as the external characters. In the figures of the genitalia, lateral distal process may be noted ending anteriorly in two sharp projections. Sometimes the lower projection is lacking while in other specimens the two processes are united anteriorly forming a sort of distal ring.
Among my material are one female and two male European specimens of this species. These differ considerably from the American form. The genital segments and genitalia are black or dark blue, the bristles of the thorax are longer and more slender, and its vestiture more hairy. Some of our specimens approach the European as regards exoconch and vestiture but I have seen none with any tendency toward black genital segments though the first is sometimes brownish. It is possible that our North American form might justifiably be designated as a subspecies.

To separate families of *S. neoperam* Pandelli and *S. utilia* Aldrich see discussion following the latter.

Kramer (Abhandl. d. Natur. Gesell. z. G"orlitz, 1911, p. 14) suggests that this species may be a parasite of *Psiliodes monachae* (Linnaeus). Specimens captured by Merz larvaposed on dung and refuse. A female received from Richardson (N.J.) was reared from cow manure.

(23) *Sarcophaga cramptoni* n. sp. This species shows no apparent relationship to other species or species groups discussed in this paper.

23. *Sarcophaga cramptoni* n. sp.

*Type:* United States National Museum, male and female.

*Paratypes:* Massachusetts Agricultural College, one male, one female; Gypsy Moth Parasite Laboratory at Melrose Highlands, Mass., one male, one female; collection of author, one male, one female.

(♂) Back of head strongly convex and below the rose of cilia clothed with yellowish white hair except that vestiture or lower anterior portions of metacephalon is black; vestiture of cheeks
black, bristle-like anteriorly; marginal hairs at fold of calyptrae dark; vestiture of legs short except for beard of hind tibiae and ventral, proximal surfaces of middle femora; posterior face of hind femur with complete ventral row of slender bristles; posterior ventral row of middle femur complete, not distinct proximally; anterior dorsocentrals strong; inner prescutum absent; three pairs strong posterior dorsocentrals, vestiture of third ventral plate short and erect (except on margin); genital segments dull orange, except that first is darkened just posterior to "hump" (usually only); dull orange portion exposed).

(2) Back of head very strongly convex and below the roof of cilia clothed with yellowish white hair except that vestiture of lower, anterior portions of metascephon is black; vestiture of cheeks black, bristlely; vestiture of scutellum erect; marginal hairs at fold of calyptrae dark; costal spines short and prominent; fourth segments of tarsi about same length as their respective fifth segments; anterior dorsocentrals strong; three pairs strong posterior dorsocentrals; posterior margin of fourth notum may be dull orange and is angularly bent at middle so that sides are turned inward; the two lateral lines of first genital segment dull to brownish-orange, edges fringed with bristles and tend to become approximated or overlap; ventral plates decrease in size posteriorly.

Length: 9 to 12 mm., females tend to be the larger.

(6) Head.—Viewed from side parafrontals and genae with dark reflections. Breadth of front at eyes is about slight, less than one half eye width; cheek height a little less than one third that of eye. Front prominent, sides of frontal vibra slightly converging backward. Second antennal segment dark;
third about twice length of second; arista plumose to beyond middle. Back of head strongly convex, with three complete rows of black cilia behind eyes, otherwise clothed with yellowish white hairs except that vestiture of lower anterior portions of the metacephalon is black. Vestiture of cheeks black, becoming bristle like anteriorly. Gena with a short, sometimes irregular row of several prominent bristles between lower eye orbit, and transverse impression in line above these a few hairs extending up on to parafrentals. Palpi dark.

**Cephalotaxy.**—Lateral verticals absent; vibrissae inserted just above line of mouth margin.

**Thorax.**—Metanotum clothed with erect, bristle like hair. Hairs covering anterior spiracle dark brown, usually lighter toward tips; those of anterior margin of posterior spiracle dark brown; those of spiracular cover brownish with yellowish tips.

Epaulets dark.

**Wings.**—Bend of fourth vein a right or slightly acute angle; anterior cross-vein more basal than end of first longitudinal; costal apines vestigial; third vein bristly; section III of costa one and one fourth to one and one half times section V; males fringed with hairs; clyptra whitish, margins fringed with white hair except that those at fold are dark.

**Legs.**—Dark; vestiture short except as herein noted. Posterior trochanter without "branched"; femur cylindrical or sub-cylindrical, slender, sometimes slightly arched; anterior face with three rows of bristles, those of intermediate row shortest and not developed distally; posterior face with a complete ventral row of slender bristles; tibia straight or slightly curved, an erior and posterior faces each with a beard of long, coarse hairs.

distal two thirds to three fourths; latter always the stronger: tarsus equal in length to tibia, fourth segment at least one half fifth. Middle coxa with a single row of bristles; four clothes beneath, anteriorly and proximally with scattered, long hairs; anterior and posterior ventral rows of bristles complete but latter not distinct proximally: subescahtial bristle present: ventral surface of anterior coxa with an irregular row of bristles at each side only.

Chaetotaxy.- Anterior dorseconcentric strong, at least the two largest pairs about as strong as the anterior pair of postacriturals, much longer than vestiture of prescutum; acrostichals absent, inner precuturals absent: three pairs posterior dorseconcentric, all strong; prescutellar acrostichals present scutellar apicals present: three, sometimes four sternopleurals: lower sternopleurals either with a single row of bristles and long, coarse hairs anterior to it or with bristles only.

Abdomen.- Somewhat conical; clothed above with short, reclinate bristles, beneath with slightly longer, more erect hair. Ventral plates as a whole, with their sides slightly converging posteriorly; their vestiture decreasing in length anteriorly, that of third short and erect (except on margins). Dorsally the posterior margin, of fourth notum same color as genital segments.

Chaetotaxy.- Second segment without marginal bristles; third with two; fourth with a complete row ending ventrally on forward turn of margin.

Genital Segments.- Prominent, dull orange except first is darkened just posterior to "humpa" (darkened portion does not usually show unless segments are pulled out). First, vestiture shorter than that of second, may be faintly yellowish pollinose dorsally
and posteriorly, in a profile with slight depression just anterior to margin, bristles, several of latter on each side of center; second, retum, not flattened; anal area rather small, its upper limit not extending above middle of posterior surface. Forelegs, darkened, flattened; tarsi approximated nearly to tibia, ventiture very short, longest near ends of upward flag-like extensions.

Genitalia.—Distinctive.

♂ Females differ from males in the following important characters.

Head.—Breadth of front at its narrowest part slightly less than eye width. Upper, inner orbits of eyes diverging downward. Back of head very strongly convex. Cheek ventiture bristly.

Thorax.—Metanotum clothed with short, slightly reclinate bristles.

Wings.—Costal spine usually short and prominent.

Legs.—Ventral row of bristles of posterior face of hind femur usually consisting of long bristles on proximal half, sometimes a few others distally. Anterior ventral row of middle femur complete, bristles short and weak on distal half; posterior ventral row complete or present on proximal half and distally represented by a few short "comb" like bristles at every ecd.

Chaetotaxy.—Lower sternopleura with bristles other than those in the posterior row but with hairs also.

Abdomen.—Somewhat oval; ventiture of short reclinate bristles that become more erect on ventral surface of fourth notum.

Ventral plate mostly concealed. Posterior margin or portion of fourth notum may or not be dull orange, margin bent at middle.

Chaetotaxy.—Marginals of third segments sometimes form a complete row.
Genital Segments.—The two lateral lips of first genital segment dull or brownish orange, not wide, margin fringed with bristles, spiracles about central. Ventral plates not modified except in size and color.

Described from 4 males and 4 female specimens; several others examined.

United States: N. J., Ohio.

This species is named in honor of Dr. G. F. Crompton who kindly assisted me in the preparation of the morphological section of the first part of this paper.

(24) *Sarcohaga cheloniæ* n. sp. In several respects this is a very interesting species.

In the male the presence of a fifth abdominal notum separate from and overlapping the first genital segment must be considered a primitive character. In some species there is no visible evidence of this sclerite except the spiracles, in others the spiracles open through the first genital segment (apparent fusion). In the female the slightly modified characters (vestiture, color, size) of the fifth, sixth and seventh ventral plates also seem to be primitive: in many species their shape differs conspicuously from the plates of the abdomen proper.

The males have the following significant characters in common with the genus *Revinia* R.-Desvoidy: frontal bristles parallel to sides of frontal vitta and not extending below its base; vestiture of metasternum of short, reclinate bristles; vestiture of legs short; scutellar apicule absent; lower sternopleurae bearing bristles only; forceps somewhat similar and base lacking upward flap like extensions.
They disagree, however in several important points, namely: epaulets
dare; anterior cross vein much more basal than in, of foster
longitudinal; anterior heterothallic stern; abdomen oval; ven
eral plates of different character. Aside from these differences the
genital segments are of a distinctly different type as are also
the genitalia. The character of the frontal bristles in the females
also agrees with Havidia. I have indicated these resemblances and
differences not only to call attention to them but also because
they illustrate admirably the points I strove to bring out in the
last paragraph of page 55 or part one concerning the relationship
between specific characters, in a parent genus and generic characters
in derived genera. The comparison also serves to show how easily
a person relying on a single prominent character, such as that of
the frontal bristles, could err and place this species in the
genus Havidia, whereas a glance at the genital segments or other
characters would at once indicate the error. Or, to put it differently
it brings out the importance of groups or combinations of characters
as generic designations.

The strong pleurality of the bristles nearly to the tips is
with extreme
an unusual character, and differs from the usual family character
given in American works as much as species of some genera go to
the other.

24. Sarcophaga cheloniæ n.sp.
Type: United States National Museum, male and female.
Paratypes: Gypsy Moth Parasite Laboratory at Melrose Highlands,
Mass., two males, one female; collection of author, one male.
Third antennal segment about one and one half times length of second; arista very strongly plumose at tip; vertical bristles inserted behind the vertex; frontal bristles parallel to sides of frontal vitta (Ravinia-like); vestiture of legs short; anterior face of posterior femur with upper and lower rows of bristles only, posterior face with complete ventral row; middle femur with complete anterior and posterior rows of bristles; submesotibial bristle absent; scutellar apicals absent; lower sternopleura with bristles only; abdomen oval; first ventral plate somewhat triangular, sides converging strongly posteriorly, "apex" rounded; vestiture of ventral plates of about equal length and nearly erect; fourth notum of same ground color as genital segments though it may be darkened posteriorly, genital segments neither prominent nor protuberant, first much larger than second, both dull orange, their vestiture short, second almost discoidal; fifth notum shows dorsally overlapping first genital segment; base of forceps without upward flap-like extensions, vestiture short.

Third antennal segment but little longer than second; vertical bristles inserted behind the vertex; lateral verticals short and directed outward laterally; frontal bristles parallel to sides of frontal vitta (Ravinia-like); posterior trochanter without distal spine; posterior face of femur with complete ventral row of bristles, latter weak distally; anterior femur with a weakly developed fourth row of bristles (indistinct); genital segments dull orange; sixth notum not divided into lateral lips; fifth sixth and seventh ventral plate not modified in shape.

Length: 7 to 9 mm.

Head—Viewed from side parafrontals and genae with dark
reflections. Breadth of front half narrowest part about three-fourths 
eye width; cheek height approximately one third that of eye. Front 
very prominent, sides of frontal vitta slightly converging 
backward. Second antennal segment dark; third about one and one 
half times length of second; criista very strongly plumose to tip. 
Back of head slightly convex, with three rows of irregularly placed 
(except first row) black cilia behind eyes, otherwise clothed 
with yellowish white hairs that completely covers metacephalon 
though the row of bristles along lower edge of cheeks may extend 
slightly beyond on to the posterior mouth margin at each side. 
Cheeks clothed with black hair. Gena with an irregular line of 
short, fine hairs that originate on transverse impression and 
become shorter and minute as they approach the frontal bristles. 
Palpi dark.

Chaetotaxy.—Vertical bristles inserted behind vertex; lateral 
verticals short, stouter than nearest cilia but little longer, 
directed laterally, perhaps occasionally absent; frontals 
parallel to sides of vitta throughout (as in Ruvinia); vibrissae 
inserted just above line of mouth margin.

Thorax.—Metanotum clothed with short, slightly reclinate 
bristles. Hairs covering anterior spiracles entirely yellowish or 
light brown at bases; those of anterior margin of posterior 
spiracle dark brown basally, lighter toward tips; those of spiracular 
cover yellowish or light colored. Epaulets dark.

Wings.—Bend of fourth vein a slightly obtuse angle; anterior 
cross-vein more basal than end of first longitudinal; third vein 
bristly; costal spine vestigial; section III of costa about one and 
one fourth times section V; alulae fringed with hair; calypters 
whitish, margins fringed with white hair.
Legs.- Dark; vestiture short. Posterior trochanter without "brush"; femur spiracle shaped, anterior face with upper and lower rows of bristles only, posterior face with complete ventral row: tibia practically straight or may be strongly curved: tarsus not shorter than tibia, fourth segment at least one half fifth. Middle coxa with a single row of bristles but a few other anterior to it dorsally: femur with complete anterior and posterior rows of bristles, "comb" bristles absent and stubby: submesotibial bristle absent. Ventral surface of anterior coxa with an irregular row of bristles at each side only.

Chaetotaxy.- Anterior dorsocentrals short, not weaker (usually stronger) than anterior postsetalurs, projecting slightly above vestiture of prescutum; acrostichals absent; inner presuturals weak: last two pairs of posterior dorsocentrals strong, anterior to these three or four pairs that are mostly quite weak: prescutellar acrostichals present: scutellar apicals absent: usually three, sometimes four sternopleurals: lower sternopleura with bristles only.

Abdomen.- Oval, clothed above with short reclinate bristles, beneath with slightly longer, more erect hair. First ventral plate somewhat triangular, posterior extremity or "apex" rounded, sides strongly converging posteriorly; second and third plates narrower than base of first, practically of equal size, distinctly elliptical in outline; vestiture of plates of about equal length and nearly erect tending to be slightly bristle-like posteriorly. Ground color of fourth notum of same color as genital segments (dull orange) except that it may become darker dorsally and anteriorly, pollinose reflecting spots of light color.
Chaeotaxy.—Second segment without marginal bristles; third either with two at center or with complete row between laterals; fourth with a complete row ending ventrally near posterior limit of fourth ventral plate (does not give way to long hairs).

Genital Segments.—Neither prominent nor protuberant, fourth notum extends beyond them dorsally, first much larger than second, both dull orange. Fifth notum shows very distinctly dorsally and is separate from but overlaps first genital segment/s (it may have a few bristles on its margins but probably bare as a rule). First segment, faintly whitish yellow pollinose dorsally, vestiture short and scattered, in profile practically straight or slightly depressed before bristles, latter instead of being marginal are bowed, rows one on each side of center, bending forward and toward each other; second, very small, almost discoidal, appears flattened unless segments are pulled out, vestiture short; anal area comparatively large, its dorsal limit extending upward to limit of posterior surface. Forceps slightly if at all darkened, short; slightly separated beyond middle, tips bare and pointed; base without upward flap-like extensions, vestiture short, that of basal margin about as long as vestiture of second segment.

Genitalia.—Distinctive. Anterior claspers of peculiar shape, first bent inwardly and nearly approximated then turned forward and terminating in a sharp point. Fourth ventral plate of same color as genital segment, posteriorly divided by central lobe for only a very short ways so that lamellae are scarcely indicated.

Females differ from males in the following important characters.

Head.—Breadth of front at its narrowest part equal to or slightly greater than eye width; cheek height two fifths to one half
that of eye. Inner orbits of eyes on upper part of front first practically parallel then diverging downward. More cilia on back of head.

**Chaetotaxy.** - Lateral verticals short and directed outward laterally (about same as in male).

**Wings.** - Bend of fourth vein more obtuse.

**Legs.** - Submetatibial bristle present. Anterior femur with a weakly developed fourth row of bristles.

**Chaetotaxy.** - Number of sternopleurals variable, at least three.

**Abdomen.** - Vestiture throughout of short, reclinate bristles.

**Genital Segments.** - Not protuberant, not visible from above.

Sixth notum not divided into two lips, margin with bristles, dull orange, (spiracles not seen). Fifth, sixth and seventh ventral plates not modified in structure, about same general shape as fourth,

Described from 4 male and 2 female specimens.


The two male and the female paratypes at the Gypsy Moth Laboratory at Melrose Highlands are deformed. Each has the vertical bristle on the right push back and two superfluous, shorter bristles occupy the normal point of its insertion. In two female paratype and one of the males the lateral verticals are not developed probably due to the deformation

The specimens from which this description was made were among material received from the Gypsy Moth Laboratory and bore the following label, "Mag for ex Axilla of Turtle Apr. 26 '11. Begun to emerge May 22- all had emerged May 24, all dead May 26 and pinned." This original label is now on the types in the
United States National Museum at Washington. The label, dates and number of adults correspond with the account given in Psyche (vol. 18, pp. 173-174, 1911) by T. L. Patterson of the Yale Sheffield Scientific School concerning Sarcophids reared from the axilla of a turtle and there can be no question but what these were the flies reared by him.

(25) *Sarcophaga nuchyprocts* n.sp. There has been considerable doubt in my mind into which niche in the family this species could be side-tracked. Both its genital and external characters differ decidedly from those found in the genus *Sarcophaga*. Some time ago I submitted a specimen to Böttcher for his opinion. He replied in part that it "represents a type which I do not know from Europe or palaearctic countries, but it has much the same features characteristic for several South American species," and also states that he had thought of making a new subgenus on the characters involved. This seems inadvisable for me to attempt on the basis of the single species represented among my material, so, for the present, it seems best to accept the genus *Sarcophaga* as a useful dumping ground. The more important characters which harmonize least with *Sarcophaga* are the vestiture of the back of the head, the broad front in the male, the stout nature of the chaetotaxy throughout, the shape and vestiture of the abdomen in the male, and the genital segments and genitalia. There are other characters which would assume importance if they were duplicated in related forms.
25. Sarcoptahge pachyprocta n. ap.


Types: Massachusetts Agricultural College, male and female.
Paratypes: United States Natural History, one male, three females; Boston Society of Natural History, one male, three females; Gypsy Moth Parasite Laboratory at Melrose Highlands, Mass., one male, one female; collection of C. W. Johnson, one male, two females; collection of author, two males, one female.

(©) Breadth of front at its narrowest part from five sevenths to five sixths eye width; arista shortly plumose on basal half, vestiture of back of head black except for a narrow band of yellow hair just above foramen and similarly colored hairs on a small portion of the metacephalon just beneath; cheeks clothed with black bristles and bristle like hairs; lateral verticils present; greater ocellars nearly as strong or sometimes stronger than uppermost pair of frontale; first and third veins prominently bristly; costal spine short but distinct; section III of costa practically equal to section V; vestiture of legs short except for scattered, long, hairs on ventral surfaces of middle and hind femora; middle femur without posterior ventral row of bristles; bristles of thorax stout and prominent, hinder two pairs of anterior dorso-centrals almost as strong as post-suturals; acrostichals present; three pairs posterior dorso-centrals of about equal size; scutellar apicals absent; lower sternopleura with bristles only; abdomen short, stout, its outline more elliptical than oval; nota clothed dorsally and ventrally with short,
reclinate bristles; vestiture of third plate erect; second segment usually with two stouter marginals at center; genital segments completely filling cavity of fourth notum (see figure); second segment discoidal, rounded, dull orange, first much larger, and completely pollinose on its posterior part dull orange.

(♀) Vestiture of back of head black except for a narrow band of yellow hair just above foramen and similarly colored hairs on a small portion of the metacephalon just beneath; cheeks clothed with black bristles and bristle like hairs; greater ocellars nearly as strong or sometimes stronger than uppermost pair of frontals; hairs covering anterior spiracles mostly grayish; first and third veins prominently bristly; occipital spine short but distinct; section III of costa practically equal to section V; bristles of thorax stout and prominent; hinder two pairs of anterior dorcocentraals almost as strong as postauriturs; acrostichals present; three pairs posterior dorcocentraals of about equal size; bristles of lower sternopleura in three distinct rows; distinctly larger and more erect bristles mixed with vestiture of lateral and ventral surfaces of fourth notum; second segment usually with two stouter marginals at center; genital segments dull orange, sixth notum not divided into lateral lips, seventh similar in shape and visible just beneath it, but much smaller (almost vestigial).

(♂) Length: 5 to 11 mm., average 8 to 10 mm.

(♀) Head.—Viewed from side parafrontals and genae with dark reflections. Breadth of front at its narrowest part varies from five-sevenths to five-sixths eye width; cheek height one-third or slightly greater than one third that of eye. Front prominent, sides of frontal vitta parallel anteriorly but its margins effaced below ocellar triangle. Second antennal segment dark, sometimes brownish especially at tip; third about twice length of second;
arista shortly plumose on basal half. Back of head somewhat
convex, its vestiture black except for a narrow band of yellow
hair just above foramen and similarly colored hairs on a small
portion of the metacephalon just beneath. Cheeks clothed with
black bristles and bristle-like hairs. Gena with a row of minute
hairs near lower eye orbit and a few others that are scattered.
Palpi dark.

Chaetotaxy. - Lateral verticals present; vibrissae inserted
just above line of oral margin; greater ocelli nearly as
strong, sometimes stronger than uppermost pair of frontals.

Thorax. - Metanotum clothed with short scattered reclinate
bristles. Hairs covering anterior spiracle dark basally, lighter
toward tips; those of anterior margin of posterior spiracle
dark brown, those of spiracular cover brownish only basally,
mostly yellowish. Epigauls dark.

Wings. - Bend of fourth vein varies from an acute to a right
angle; anterior cross-vein slightly more basal than end of first
longitudinal; first and third veins prominently bristly; costal
spine distinct; section III of costa practically equal to section V;
alulae fringed with hair; calypters whitish, their margins fringed
with white hair.

Legs. - Dark; tarsi without bands of reflecting hairs; vestiture
short except for a few scattered, long hairs on ventral surfaces
of middle and hind femora. Posterior trochanter without "brush":
femur spindle shaped; anterior face with three rows of bristles,
those of intermediate row shortest and not developed distally,
those of lower row well separated and present on distal two
thirds or thereabout; posterior face with ventral row of long,
slender, hair-like bristles; tibia straight or slightly curved:
tarsus not shorter than tibia; fourth segment at least one half fifth. Middle coxa with a single row of bristles, but there may be a few others anterior to it dorsally; femur with a complete anterior ventral row of bristles, posterior ventral row lacking or represented by long, well separated hairs; subesotibial bristle very strong; Ventral face of anterior coxa with an irregular row of bristles at each side only.

**Chaetotaxy.**- Bristles stout and prominent. The hinder two pairs of anterior dorsocentraals almost as strong as postaururals; two pairs of acrostichals, presutural pair absent; inner presuturals absent or very weak; three pairs posterior dorsocentraals of about equal size; prescutellar acrostichals present but weak as compared to other bristles: scutellar apicals absent: three sternopleurals: lower sternopleura with bristles only.

**Abdomen.**- Rather short; depth almost equal to width so that it appears somewhat cylindrical, outline more elliptical than oval; nota clothed dorsally and ventrally with short, reclinate bristles. Ventral plates, as a whole with their sides converging posteriorly, sides of second and third distinctly rounded; vestiture hairy, that of first and second long, that of third shorter but erect.

**Chaetotaxy.**- Second segment usually with a row of weak, slender, decumbent marginals, sometimes two at center may be stronger and more erect; third with a complete marginal row dorsally and laterally or dorsally with only two marginals at center; fourth with a complete row ending ventrally at third notum.

**Genital Segments.**- Prominent; large, abruptly terminating the abdomen and occupying to its fullest extent cavity of
fourth notum (see figure). Pollinose varying to extent, sometimes entirely with reflecting colors of abdomen but usually the posterior portion dull orange, posteriorly its vestiture longer than that of second segment, viewed from behind its presents a very large, slight convex surface abruptly rounded forward dorsally (the segments being in their normal position), marginal bristles absent. The second segment (examined in similar position) appears like a slightly raised dull orange disk, anal area small. Forceps short, base without upward flap-like extensions, its vestiture not longer than that of second segment; beyond base prongs become abruptly slender and very small, thence attenuated to tips, both together looking like the end of a large blunt needle, their outline in profile is sinuate, the anterior edges hairy. Lamellae of fourth ventral plate may show beyond edges of fourth notum as dull orange colored plates.

Genitalia.- Penis and claspers peculiarly modified, head of penis prominently spiny anteriorly as seen in profile. Accessory plates short but as segments are pulled out they show from behind as two erect plates parallel to, but much shorter than forceps.

(♀) Females differ from males in the following important characters.

Head.- Breadth of front at its narrowest part practically equal to eye width, inner eye orbits diverging downward. Vestiture of genae may be longer and more scattered.

Thorax.- Hairs covering anterior spiracle more distinctly grayish, entirely so or dark only basally.

Legs.- Lower row of bristles on anterior face of third femur more nearly complete than in male, ventral row of posterior face consisting of long, well separated bristles (usually four or five)
on proximal half or slightly more. Anterior and posterior rows of bristles of middle femur complete, very weak on distal half, "comb" absent.

**Chemotaxy.**—Bristles of lower sternopleura arranged in three distinct rows.

**Abdomen.**—Depth much less than width, outline oval. Vestiture of short, reclinate bristles except that bristles become longer and more erect laterally on second and third nota and laterally and ventrally on fourth notum. Ventral plates concealed in part, first and second plates, sometimes also third and fourth with one or more pairs of surface bristles besides those of posterior margin.

**Genital Segments.**—Dull orange, grayish or yellowish pollinose. Sixth notum not divided into lateral lips, narrow, visible only from behind, margin fringed with bristles, spiracles below center, often concealed by edge of fourth notum: seventh notum much smaller than sixth, but similar and visible just beneath it.

Described from 7 male and 9 female specimens; several others examined.


Foreign: Canada (Manitoba?), Cuba(?), Hayti(?).

This species is peculiarly distinct from all others herein described. The character of the genital segments is distinctive for each sex, respectively. The parafrontals and genae are silvery gray, and particularly striking in the male because of the unusual wide front for that sex.
Hagen, when listing North American Sarcophagidae as determined by Meade (see bibliography), uses the name under which this species is described in discussing nine specimens determined as such by Loew. Due to the kindness of Mr. Henshaw I was able to examine the material with which Meade worked (Museum of Comparative Anatomy, Cambridge, Mass.) and found the specimens so labelled. To the best of my knowledge this is a manuscript name and it is retained to avoid any possible confusion. Small specimens from Hayti and New York were labelled "S. pachyprocta var. minor." Another specimen was from Cuba. I have questioned Hayti and Cuba in the list of reported occurrences because the material was not examined closely enough at the time to be certain that the specimens from these islands might not represent a distinct species.

Not long ago I received what was possibly a female of this species reared from Lachnosterna dubia by Criddle, (Manitoba, Canada).

(S6) Sarcophaga helicia Townsend. This species was made the genotype of the genus Heliochiza Coquillett. As previously discussed (part one, p. 33), this genus does not seem justified on the basis of the description given. The species is not like Sarcophaga in several respects; there are southern and tropical species close to it that may perhaps form the basis of a group within the genus if a proper combination of characters is selected. In several respects the species resembles the group next discussed, particularly in respect to the genital characters of the female and certain of those of the head in both sexes.
26. Sarcophaga helicis Townsend.

Pl. 7, fig. 17.


Type: University of Kansas, Lawrence, Kansas, female.

Paratypes: Massachusetts Agricultural College, male.

Massachusetts Agricultural College, four males;
collection of author, three males.

( 6 ). Small species, average length about 5 mm. Front not prominent; cheek height one sixth to one fifth that of eye; cheeks clothed with bristles and bristle-like hairs; vibrissae inserted on line with \( \frac{2}{7} \) margin; first and third veins bristly; section III of costa about equal to section V; vestiture of legs short; fourth segment of posterior tarsus nearly if not fully as long as fifth; "comb" of posterior ventral row of middle femur absent; hind pair of anterior dorsocentrals farther from suture than anterior postnotural pair; three pairs poster or dorsocentrals of about equal size; vestiture of all three ventral plates erect and of about same length; first genital segment dark, second with bristles; base of forelegs without upward flap-like extensions.

( 9 ) The above characters of head and thorax equally good for female. Additional characters:--normally only first ventral plate visible, its vestiture hairy; note of other segments meet medially; sixth notum the only visible part of genital structure, ventral plates, if they exist as such concealed within it; edges of the unseparated lateral halves of sixth notum meet medially and protrude slightly as a median ridge.

**Length**: \( \frac{3}{4} \) to 6 mm., average about 5 mm.

**Head**: Viewed from side parasfrontale and genae slightly darkened. Breadth of front at its narrowest part nearly one half eye width; cheek height varies from about one sixth to one fifth that of eye. Front not prominent, sides of frontal vista slantly converging backward. Second antennal segment dark; third about twice length of second; arista plumose to beyond middle. Back of head varies from rather flat to slightly convex, with three rows of black cilia behind eyes, otherwise clothed with whitish
hair that vestiture of lower anterior corners of metacaphealon is black. Cheeks clothed with bristles and bristle-like hairs. Below eyes transverse impressions reduced to mere lines. Genae narrow, a few bristles on lower part near eye orbit, short, fine hairs continuing upward along lower eye orbit. Palpi dark.

Cheesetoscy. — Lateral verticala absent; vibrissae inserted on line with oral margin; bases of rows of frontal bristles but slightly divergent.

Thorax. — Metanotum clothed with short, scattered, reclinate bristles. Hairs covering spiracles dark except that those of spiracular cover may be light colored toward tips. Epaulets dark.

Wings. — Bend of fourth vein varies from a right to a quite strongly obtuse angle; anterior cross-vein more basal than end of first longitudinal; first and third veins bristly; costal spine very short and inconspicuous; section III of costa approximately equal to section V; alulae fringed with hair; calyters whitish; margins fringed with white hairs.

Legs. — Dark; vestiture short. Poster or trochanter without "brush"; femur spiracle shaped; anterior face with three rows of bristles, those of intermediate row not developed distally, its bristles sometimes scarcely shorter than those of upper row; posterior face with ventral row of several long, well separated bristles on distal half or more; tibia straight; tarsus not shorter than tibia, fourth segment practically as long as fifth. Middle coxa with a single row of bristles; anterior and posterior ventral rows of femur complete, but inconspicuous distally, "comb" absent; submetatibial bristle present. Ventral surface of anterior coxa irregular with no row of bristles at each side only.
Chaetotaxy.—For most part bristles strong and conspicuous.
Hind pair of anterior doreocentrals of about equal size to post-
suturals and more distant from suture than first pair of latter;
scrochial absent or vestigial; inner presuturals very small:
three pairs postsutural doreocentrals of about equal size;
precocutellar scrochials short and weak; scutellar apicals present:
three sternopleurals; lower sternopleura with bristles only, a
few bristles anterior to the posterior complete row.

Abdomen.—Conical; not clothed dorsally with short, reclinate
bristles, ventrally with slightly longer, more erect bristles
except that vestiture becomes hairy and longer near sides of
ventral plates. Latter, as a whole, with their sides slightly
converging posteriorly; vestiture of all about equally long,
hairy and erect; second and third plates somewhat elliptical.

Chaetotaxy.—Second segment without marginals; third with
two; fourth with a complete row ending ventrally in long hairs.

Genital Segments.—Small, prominent. First, dark, brownish
or blackish, often faintly grayish pollinos, vestiture short
and scattered, marginal bristles present but weak, one or two on
each side of center: second, dull orange to almost blackish,
distinctly flattened (appears less so if segments are pulled out),
surface bears several prominent bristles and a few scattered
hairs. Forceps short, darkened, base with fine hairs and without
upward flap-like extensions; prongs approximated their entire
length, attenuated.

Genitalia.—Distinctive.

(♀) Females differ from males in the following important characters.

Head.—Breadth of front at its narrowest part nearly or fully
equal to eye width. Upper, inner orbits of eye very slightly
diverging downward.
Abdomen.—Oval; not clothed throughout with short reclinate bristles. Usually not clothed ventrally leaving only first ventral plate exposed, vestiture of latter hairsy short and erect.

Chaetotaxy.—Second segment with a dorsal marginal row of short, decumbent bristles.

Genital Segments.—Sixth notum the only visible part of genital structure, ventral plates, if they exist as such, concealed within it; the notum dull to brownish orange or even darker, sometimes pulvinose, not divided into separate lateral lips but edges to the lateral halves approximated medially and pushed out so that edges, which are fringed with bristles, appear as a median ridge, at least dorsally.

Male described from 6 specimens, females redescribed from 20 specimens; several hundred examined.


Foreign: Bermuda, Bahamas, Jamaica, Porto Rico.

The original description of this species, only for the female and though the male must be well known it seems advisable to furnish an adequate description.

The parafrontals and genae are usually a silvery gray color, sometimes with a faint brassy tinge. Two marginals are rarely developed on the second abdominal segment. There is a southern, closely related species which possesses these bristles. The
lateral bristles of the third abdominal segment in both sexes extends well on to the ventral surface. Among northern forms, at least, the genital segments of the females are quite distinctive. The second genital segment of the male usually bears four very distinct bristles paired laterally, the most anterior pair in the stronger; no specimens examined showed the spiracles of the first segment. While four notopleurals are present, the first and third are often extremely weak, especially in males.

This species was described by Townsend (1893) from a single female adult bred from Helix thyroides Say. In this regard it is interesting to note that there is a species in the collection of the K. K. Hofmuseum, Wies, labelled Sarcophaga helicovar. Schin. "litt" which Böttcher has assured me is identical with the above. He further states in correspondence that "the three specimens have the shells of small snails on their tribules.

Besides the above S. heliosa has been reported as reared from Lachnosterna sp., Pieria napae, Leucania unipunctata (Forbes; publ. Townsend, 1893), Loxostege sticticalis (Howard, 1894), Melanoplus differentialis (Morgan, 1901) and Melanoplus sibirica (Washburn, 1905). Banks (1913) reported it as captured on Sarcophaga. Pratt (1912) reported a single specimen bred from cow manure at Victoria, Texas, considering its occurrence accidental. Personally I have never seen it either on human or animal excrement. It is very common in hay fields about Mahomet and can be captured by sweeping.

(27,28) Sarcophaga assiata Walker, S. subulenta H. sp. Assidum-group.

Characters common to both males and females:-Viewed from.
side or front parafrontal and genae of same color, cheek height not greater than one third that of eye, usually less; front not prominent; arista strongly plumose; facialis darker than facial plate; back of head slightly convex, metacoxa clothed with whitish or yellowish hair except that vestiture of lesser, anterior portion is black; cheeks clothed with black hair; transverse impression and genae of same color, not distinctly differentiated; genus close to eye orbit, usually with a row of minute hairs that extend up on to parafrontal plate and practically indistinguishable in small specimens; one or two (probably rarely more or none) frontal bristles extending below base of vitta but these not more distant from inner edges of genae than those above from sides of vitta (or from inner edges of parafrontales), bases of rows somewhat divergent; vibrissae inserted on line with oral margin; metacoxa clothed with short, bristles, slightly reclinate in males, more strongly so in females; anterior spiracular hairs dark those of anterior margins of posterior spiracle very dark, those of spiracular cover lighter; epaulets dark; third vein bristly; section III of coxa approximately equal to section V; onlyptera whitish, lower faintly discolored; vestiture of legs short; posterior trochanter without "brush"; intermediate row of bristles of anterior face of posterior femur usually absent or if present very weak and on proximal part only; fourth segment of posterior tarsus at least one half fifth; middle coxa with a single row of bristles; anterior and posterior ventral rows of bristles of middle femur present on proximal half only or at least their distal portion inconspicuous; ventral surface of anterior coxa with an irregular row of bristles at each side only; anterior
dorsocentrala present, distinct, more strongly reclinate in females; anterior acrostichals absent or inconspicuous in males, absent in females; inner presutural present; last two pairs posterior dorso-centrala strong, anterior to these; several pairs that are weaker than the larger ones before the suture; prescutellar acrostichals present; three steropleurals; lower sternopleurae with bristles only, most distinct in females; second abdominal segment without marginal bristles.

Characters common to males only: third antennal segment usually three times length of second, sometimes a little more or less; lateral verticals absent; posterior face of hind femur without ventral row of bristles; posterior and middle tarsi slightly shorter than their respective tibiae; "comb" of middle femur present, consisting of several short, stubby, close-set spines at very distal end; submesotibial bristles absent; abdomen short, somewhat conical, about as deep as wide; fourth notum more or less yellowish pollinose; third abdominal segment with two marginals and other short, slender, decumbent bristles between these and laterals; genital segments prominent, usually yellowish pollinose, ground color mostly dull orange; first segment, vestiture shorter than that of second, in profile usually with a slight depression anterior to marginal bristles; forecoxa usually completely exposed, base without upward flap-like extensions, vestiture short.

Characters common to females only: third antennal segment usually two to two and one half time length of second; posterior face of hind femur with ventral row of several long bristles on proximal half; "comb" of middle femur absent; submesotibial bristle present; abdomen sub-circular; normally only first ventral plate visible, nota of remaining segments meeting over their respective
plates; third segment dorsally with complete row of short, slender, decumbent marginals, two stronger ones at center not differentiated. Of genital segments only first is normally visible, notum not divided into two lateral lips, but bent at middle of margin dorsally so that edges of lateral to this point are approximated medially concealing ventral plates of this region.

The penes of the males agree closely in their general structure as may be seen from the figures.

I have referred to the species concerned as the amicifera-group merely as a matter of convenience and not in an attempt to assign a name. It is my opinion, however, that these species with others, present characters of sub-generic, if not generic value. At one time I had expected to include S. incerta Walker¹ in this paper, and as

¹. The species here referred to as S. incerta Walker was so determined, I believe, by Coquillett. There are representatives of this species from Florida, Cuba, Jamaica, and the Bahamas in the collection of C. W. Johnson of Boston. Specimens were also received from R. H. Van Zelvensburg from Porto Rico.

Walker's original description was given in the Dipt. Sand., p. 381, 1859. The more I read this description the more it seems to refer to the species in hand but there is a reasonable doubt. Other references to S. incerta are as follows: Howard, (1901), Can. Ent., vol. 33, p. 43, brevica in cow manure; Smith (1910) Report New Jersey State Museum 1909, p. 785, occurrence in New Jersey; Banks (1912), Bull. 22, Tech. Ser., Bur. of Ent., U. S. Dept. Agri., p. 16, pl. 4, fig. 75, description of larva; Johnson (1913), Am. Mus. Nat. Hist., vol. 32, p. 75, occurrence in Florida. Aldrich lists Cuba and Bermuda occurrences reported by Right and Johnson
respectively. Johnson's reference to the occurrence of a S. incerta in Florida I know refers to some species here described, Smith's New Jersey reference I believe was intended to refer to this species but the actual occurrence in New Jersey seems doubtful; whether the other references are to this same species or not it is impossible to suggest.

Pratt (Can. Ent., vol. 44, p. 180, 1912) mentions S. incerta as bred abundantly from cow manure. I have examined specimens of his material and find that the species concerned belongs to the genus Ravinia.

The figure of the penis has been prepared it is presented for comparison. Other species which would fall into this group are S. turbata Van der Wulp,* S. trivialis Van der Wulp,* S. obtusifrons Thomson* and certain undetermined southern and tropical species.

*As determined from labelled specimens in the United States National Museum.

Of the characters listed above, those which seem of possible importance as of subgeneric or generic value have been italicized, though they would not be applicable without changes in expression. S. incerta Walker agrees with the characters as given practically throughout, but the fourth abdominal notum is unusually long and is used to cover the genalia in the same manner as the first genital segment in samidus and subculata. The male of a Bahamas species has short, hair-like apical bristles scarcely worthy the name, the frontals do not extend below the base of the vitta, and the third abdominal segment has no prominent marginals at the center their character corresponding to that described for the females; the first genital segment of the females is very similar.
An Arizona species has a more prominent front and the vibrissae are inserted slightly above the mouth margin. The penis have been examined in assidua, subaulcata, incerta and in the Bahama and Arizona species. All are essentially similar. Each, except the last has the small, forward projecting, paired, lateral processes on the basal posterior or posterior plate of the penis as shown in the species figured. The forceps and cleavers are distinctive for each species, the former is strikingly modified. If it were not for the fact that I have had no opportunity to put sufficient study on the species concerned I should separate this group as a distinct sub-genus at the present, but it is better that this should wait until it is possible for someone to examine in detail all available species concerned. Aldrich has referred S. trivialia to the genus Ravinia, but it is certainly erroneous.

Ravinia resembles these species in several respects such as the lack of scutellar spicula in the males, the character of the vestiture of the lower sternopleure, and in a way the arrangement of the frontal bristles though these do not extend below the base of the vitta as in the assidua group while in the latter the basal portions of the rows are as broadly divergent as in some species of Sarcophaga, especially in the females. The characters of the genitalia and genital segments are absolutely distinct from Ravinia in both sexes. Sarcophaga helicis Townsend greatly resembles the species of this group and the genital segments of the female correspond fundamentally to those of assidua and subaulcata.

References have been made above to the character of the frontal bristles. The frontal vitta in these species is very slightly depressed so that the inner edges of the parafrontals are sharply defined and in profile the bright colored edge of the
parafrontal can be seen, scarcely but perceptibly raised. The base of the vitta is not narrowed as is so often the case with other species of Sarcophaga and the inner edge of the gena seems to be simply a continuation of the inner margin of the corresponding parafrontal. Or to express it differently the distinct between parafrontal and gena is so slight that there is no demarking limit, the two areas seeming as one with an unbroken inner margin. The frontal bristles are parallel to this margin. The fact that the color of the parafrontals and gena is the same whether viewed from side or front and does not have the dark reflections of so many species is possibly due to some slight structural difference; in most of the previously described species the parafrontals are somewhat swollen basally.

(27) Sarcophaga assidua Walker: See group discussion immediately preceding.

27. Sarcophaga assidua Walker.


1911. Sarcophaga assidua Howard, The House Fly, pp. 254-255. Figure, habits.


(♂ and ♀) Coxae trochanters and especially femora usually dull brownish orange, tibiae commonly only darker, sometimes the segments of anterior legs are all dark, rarely all legs are dark; forecaps of male distinctive.

**Length:** 7 1/2 to 8 1/2 mm.

**♂** Head.- Viewed from side or front parafrontals and genae of same color. Breadth of front at its narrowest part one half that of eye; check one fourth to one third that of eye. Front not prominent, sides of frontal vitta slightly converging backward, sometimes parallel. Second antennal segment dark; third usually about three times length of second but may be more or less; arista strongly plumose to beyond middle. Facialia dark. Back of head slightly convex, with three rows of black cilia behind eyes, otherwise clothed with whitish hair except that vestiture of lower, anterior portions of metacephalon is black. Cheeks clothed with black hair. Transverse impression and genae rarely with differentiating limit; latter, close to lower eye orbit, with a row of minute hairs that extends to on parafacial plate. Palpi dark.

**Gnathotaxy.-** Lateral verticals absent; one or two frontal bristles extending below base of vitta but these not more distant from inner edge of genae than those above from sides of frontal vitta (or from inner edges of parafrontals), bases of rows but slightly divergent; vibrissae inserted on line with oral margin.
Thorax.—Metanotum clothed with short, slightly reclinate bristles. Hairs covering anterior spiracle dark brown, yellowish or grayish toward tips; those of anterior margin of posterior spiracle dark brown or blackish; those of spiracular cover brownish with lighter colored tips. Epaulets dark.

Wings.—Bend of fourth vein either a right or slightly obtuse angle; anterior cross-vein more basal than end of first longitudinal; third vein bristly; costal spine vestigial; section III of costa equal to or slightly less than section V; alulae fringed with hair; clytaera whitish, lower somewhat discolored, margins fringed with white hair.

Legs.—Vestiture short. Tarsus darker than other segments of legs, tibia picaceous or with other segments varies from dull to brownish orange especially on the middle and hind legs, anterior femur not uncommonly grayish occasionally all femora are grayish or only brownish distally. Posterior trochanter without "brush"; femur somewhat spindle shaped; anterior face typically with three rows of bristles, intermediate row rarely lacking its bristles shortest and not developed distally; posterior face without ventral row of bristle; tibia practically straight. At least middle and hind tarsal practically straight. At least middle and hind tarsal shorter than their respective tibiae. Middle coxa with a single row of bristles; anterior and posterior ventral rows of femur present on proximal half only or at least their distal portions inconspicuous except that latter has "comb" of probably not over six very short, stubby spines at its very end; subpatentibial bristle absent. Ventral surface of anterior coxa with an irregular row of bristles at each side only.
Chaetotaxy.— Anterior dorsocentrals stout, not short, the largest intermediate in size between anterior two pairs and posterior two pairs of postsetaeurs, much longer than vestiture of preascutum; acrostichals absent or scarcely differentiated; inner postsetaeurs weak: last two pair posterior dorsocentrals long and strong, anterior to those other pairs that are short and weak; preascutellar acrostichals present; scutellum apicale absent; three sternopleurals: lower sternopleura with bristles only.

Abdomen.— Somewhat conical; about as deep as wide; not clothed above with short, reclinate bristles, beneath with somewhat longer, erect hair. Ventral plates, as a whole, with their sides slightly converging posteriorly; vestiture of long hair then scarcely becomes shorter on second and third, erect on latter; usually brownsish orange with a dark central band. Ground color of fourth notum either that of genital segments with the dark reflecting colors of the abdomen anteriorly or just the posterior margin is dull orange.

Chaetotaxy.— Second segment without marginal bristles; third with two and other a corner, slender, decumbent bristles between these and laterals; fourth with a complete row extending well on to ventral surface.

Genital Segments.— Prominent; both dull orange, usually yellowish pollenose. First, short (anterior-posteriorly), with short, scattered hairs on sides, in profile with a shallow depression anterior to marginal bristles, latter prominent, usually four on each side of center; second, shallow, slightly rotund, vestiture scattered, longer than that of first, a pair of cruciate, slender bristles near upper limit of anal area, latter small but prolonged
upward about to limit of posterior surface. Forceps usually completely exposed, only tips darkened; prongs attenuated and approximated nearly to tips, then slightly spread apart and the ends flattened, broadened and darkened; base clothed with short hair, without upward flap-like extensions, each prong base bluntly pointed.

Genitalia.— Penis, forceps and claspers distinctive.

( Q ) Females differ from males in the following important characters.

Head.— Breadth of front at its narrowest part varies from three fourths to scarcely less than eye width; Upper, inner orbits of eyes parallel or very slightly diverging downward. Sides of frontal vitta parallel.

Legs.— Anterior face of posterior femur typically with upper and lower rows of bristles only; an intermediate row rarely present; posterior face with a few bristles on ventral proximal half only. "Comb" of middle femur absent; submesotibial bristle present.

Abdomen.— Sub-circular; vestiture throughout of short, reclinate bristles except that those of ventral surface of fourth notum are more erect and hair-like. Normally probably only first ventral plate is exposed, nota of remaining segments meeting over their respective plates; other plates sometimes visible, their posterior margins with bristles; dark central band not differentiated. Part of fourth segment may be dull orange.

Chasitotaxy.— Third segment dorsally with complete row of short, slender, decumbent marginals, two stronger ones at center. Strong lateral marginals not developed on first or second segments.
Genital Segments.—Externally apparently identical with those of S. subulatus, n. sp. Dull orange, more or less yellowish pollinose. Normally only sixth notum visible, this not divided into two lips, but bent at middle of dorsal margin so that edges of its lateral halves are approximated medially connecting ventral plates of this region; margin fringed with bristles.

Redescribed from 20 male and 31 female specimens.

Range.—Not reported from New England.


Foreign: Bermuda, Cuba, Jamaica, Bahamas, Fort St. Croix.

Walker described a species S. saxatum from the "United States." I do not know that the species here described are the same, but is the species to which this name has been applied by Coquillett and others and is retained for obvious reasons.

The parafrotons, genal and transverse impressions are usually brassy, the posterior eye orbits grayish. New Jersey specimens have the fourth notum dull orange only, posteriorly while in southern specimens the whole segment is usually so colored though with dark reflecting colors anteriorly. It will probably be "turned up" in New England.

This species has been reported as reared from human excrement (Howard, 1900), from Melanophlus differentialis (Morgan, 1901), from dead fish (Neris, 1907), from cow manure (Pratt, 1912) and from dead insects. Howard has also reported it as sometimes occurring in houses.

26. Sarcoptes subulatus, n. sp. See group discussion on page...
98. Bacomohaga subsulcata n.sp.

Pl. 7, fig. 22.

Type: Massachusetts Agricultural College, male and female (taken in collection).

Paratypes: Boston Society of Natural History, two males; Cornell University, one male, one female (taken in collection); collection of author, two males, two females.

("♂ and ♀) Bacocomaha assina Walker is the only species recognized in the northern United States with which there is any danger of confusing subsulcata. The shape of the forecoxa is distinctive for males, the color of the legs for both sexes and is the only significant character noted for females though the front tends to be narrower in subsulcata. It is very probable that when females of assina have their legs dark, as occasionally happens, it will be hard to separate the two species.

Length: 7 to 8 1/2 mm.

♂ Head.— Viewed from side or front parafrontals and genae of same color. Breadth of front at its narrowest part one third to two fifths eye width, rarely nearly one half; cheeks, height between one fourth and one third that of eye. Front not prominent, aides of frontal vitta slightly converging backward. Second antennal segment dark; third usually about three times length of second but may be more or less; arista strongly plumose to beyond middle. Facialis dark. Back of head slightly convex, with three rows of black cilia behind eyes, otherwise clothed with whitish or yellowish hair except that vestiture of lower, anterior portions of metaccephalon is black. Cheeks clothed with black hair. Transverse impression and gena rarely with
differentiating limit; latter, close to lower eye orbit, with a row of minute hairs that extends upward on to parafrontal plate.

Palpi dark.

Chelotaxy.—Lateral verticals absent; usually two frontal bristles extending below base of vitta but these not more distant from inner edge of genae than those above from sides of vitta (or from inner edges of parafrontals), bases of rows but slightly divergent, vibrissae inserted on line with oral margin.

Thorax.—Metanotum clothed with short, slightly reclinate bristles. Hairs covering anterior spiracle dark brown; yellowish or grayish toward tips; those of anterior margin of posterior spiracle dark brown; those of spiracular cover brownish with lighter colored tips. Elytra dark.

Wings.—Bend of fourth vein normally a right angle; anterior cross-vein sometimes under, but usually slightly more basal than end of first longitudinal; third vein bristly; costal spine vestigial; section III of costa equal to or slightly less than section V; elytra fringed with hair; calypters whitish, lower slightly discolored, margins fringed with white hair.

Legs.—Dark; vestiture short. Posterior trochanter without "brush": femur slender, cylindrical or sub-cylindrical; anterior face probably in most cases with upper and lower rows of bristles only, but often an intermediate row of very weak bristles present on proximal half; posterior face without general row of bristles; tibia straight or slightly curved; fourth tarsal segment at least one half fifth. Middle and hind tarsi slightly shorter than their respective tibiae. Middle tarsus with a single row of bristles; anterior and posterior ventral rows of femur present on proximal
half only or at least their distal portion inconspicuous except that latter has comb of several short, stubby, spines at its very end; submesotibial bristle absent. Ventral surface of anterior coxa with an irregular row of bristles at each side only.

Characters.- Anterior dorsocentrales stout, not short, the largest intermediate in size between anterior two pairs and posterior two pairs of postaeuturals, such longer than vestiture of prescutum; acrocoelials weak or scarcely differentiated; inner prescuturals usually same size as anterior postaeutural dorsocentrales; last two pairs posterior dorsocentrales long and strong, anterior to these two other pairs that are short and weak; prescutellar acrocoelials present; scutellar apicals absent; three sternopleurals: lower sternopleura with bristles only.

Abdomen.- Somewhat conical; short; about as deep as wide; nota clothed above with short, reclinate bristles, beneath with somewhat longer, erect hair. Ventral plates, as a whole, with their sides slightly converging posteriorly but second and third of about same width; vestiture of long hair that scarcely becomes shorter on second and third, erect on latter; usually of some grayish color as corresponding nota, rarely brownish orange with a dark central band. Ground color of fourth notum may be dull orange with dark reflecting colors only, anteriorly (southern forms usually) or only on posterior half or only margin may be dull orange; always with more or less yellow pollen.

Characters.- Second segment rarely with two marginals at center; third with two and with other short slender, decumbent bristles between these and lateralis; fourth with a complete row extending well on to ventral surface.

Genital Segments.- Prominent; both dull orange, usually
yellowish pollinose. First, short (anterior-posteriorly), with short, scattered hair on sides, in profile its outline straight or with slight depression anterior to marginal bristles, latter prominent, usually each side of center: second, somewhat rounded but flattened diagonally upward and forward, vestiture scattered, longer than that of first, a pair of cruciate, slender bristles near upper limit of anal area, latter small but prolonged upward about to limit of posterior surface. Forceps usually completely exposed, darkened beyond base or only tips of spongs; latter slightly attenuate beyond base, approximated to end, tips flattened and broadened so that both together resemble an arrow head in shape; base clothed with short hair, without upward flap-like extension, each prong base rounded or bluntly pointed.

Genitalia.—Penis, forceps and claspers distinctive.

(?) Females differ from males in the following important characters.

Head.—Breadth of front at narrowest part varies from about three fifth to three fourths eye width. Upper, inner orbits of eyes parallel or very slightly diverging downward. Sides of frontal vitta parallel.

Lega.—Anterior face of posterior femur typically, with upper and lower rows of bristles only, intermediate row sometimes weakly developed on proximal half; posterior face with a few bristles on ventral proximal half only. "Comb" of middle femur absent; subependytilid bristle present.

Abdomen.—Sub-circular; vestiture throughout of short, real tenta bristles except that those of ventral surface of fourth notum are more erect and hair-like. Normally only first ventral plate exposed, rest of remaining segments meeting over their respective plates; other plates sometimes visible, their posterior
margins with bristles. Fourth notum may be same color as preceding segments throughout, may or may not be partially yellowish pollinose, and posterior margin may or may not be dull orange.

Cheirotecta.-- Third segment dorsally with complete row of short, slender, decumbent marginals, two stronger ones at center not differentiated. Strong lateral marginals not developed on first and second segments.

Genital Segments.-- Externally apparently identical with those of S. vaniqua Walker. Dull to brownish orange, more or less yellowish pollinose, sometimes with darker reflections. Normally only sixth notum visible, this not divided into two lips, but bent on middle of dorsal margin so that edges of lateral halves are approximated medially concealing ventral plates of this region; margin fringed with bristles.

Described from 6 male and 4 female specimens, several others examined.


The parafrontals, genae, and transverse impressions are usually brassy, the posterior eye orbits greyish.

29. Sarcophaga amblyorynchus Coquillet.


Type.-- United States National Museum (no. 7963).

As the male of the species is unknown and the type female not available for study Coquillet's description is quoted.
"Black, the fourth abdominal segment and the genitalia yellow. Head gray pruinose, on the face and lower part of sides of front grayish yellow, vertex three-fifths as wide as either eye, frontal vitta deep brown, on the upper portion nearly twice as wide as either side of the front at the same point, two pairs of orbital bristles, frontals descending almost to base of third antennal joint, antennae three-fourths as long as the face, the third joint, antennae three-fourths as long as the face, the third joint less than three times as long as the second, longest pair of arista about four times as long as its greatest diameter. Body gray pruinose, abdomen with darker reflecting spots, mesonotum marked with three black vittae, only three pairs of postnotural dorsocentral bristles, these are large and of nearly an equal length, three sternopleurae in a curved row; middle of dorsum of abd on bearing only bristly hairs on the first two segments, the third and fourth segments each with a marginal row of stout bristles, basal segment of genitalia not cleft dorsally, bearing a marginal row of rather short bristles. Legs devoid of long hairs, hind tibiae bearing two bristles; the anterior-inner, anterior-outer and posterior-outer sides besides those of the apex. Wings hyaline, third vein bristly two-thirds of distance from base to the small cross vein. Calyptrae whitish.

Length 7 mm.

Springfield, Mass. A female specimen used by Dr. George Dimmock from a larva that issued from a living adult of

Amblycorixa oblongifolia."

Appendix.

Under this heading is given data concerning the genera Rovinia
and Boettcheria which has come to writers attention since the completion of parts a few additional facts concerning the genus Sarcophaga, and a few notes on other New England genera. At least two species of Ravinia occur in New England besides those previously described but it is not possible to describe these at present. Revised generic descriptions of Ravinia and Boettcheria are presented giving the female characters. The importance of dealing with the generic characters in here cannot be too strongly emphasized. No Sarcophagid genus dealt with is definable on the basis of a few characters. However, for the sake of convenience, these characters of the genus Ravinia which, in combination, have always proved sufficient to separate its species from those of all other genera known in the United States are printed in italics.

It is necessary also to enlarge somewhat upon the discussion given in part one on the validity of Ravinia and Boettcheria as genera. To indicate the difference of opinion on this point let me note that when I first submitted specimens of Boettcheria to Dr. Boettcher suggesting that generic characters were involved, he favored either a new genus or a subgenus of Sarcophaga. Ravinia was treated in his paper as a subgenus. It has been impossible to communicate with him since part one was published. Villeneuve holds Ravinia and Boettcheria as "good subgenera." Aldrich considers Ravinia a genus, Boettcheria a subgenus, while I have employed both names as generic. This position I still hold, not only because I believe it justified but also because it seems distinctly advantageous when dealing with sharply defined groups in such a heterogeneous collection of species as the genus Sarcophaga has proved to be, to deal with them as genera as far
as possible. In part one several pages were given over to a
discussion of "generic and specific characters" for the purpose
of demonstrating the validity of generic standing for the genera
under consideration. It was shown, however, that combinations of
characters were necessary as generic conceptions and that in closely
related genera, presumably derived from a common ancestral stock,
the combinations of characters required to define the genera would
be different combinations (sets) of the generic and specific
to which new characters might be added,
characters of the ancestral genus. Granted that this is theoretical,
yet, as evolutionists, is there a serious and valid objection to
offer. Aldrich has referred to Borotrichia as a sub-genus and in
conversation stated he took this position for the reason that
certain characters given as generic for the males are not present
in females. But, if we admit conclusions stated in part one and
briefly restated above is this only to be expected. For instance,
let us consider Poroschera. Here we find a large number of species
and specific characters. Because we find females of two species
difficult or impossible to separate, is that any reason for considering
them conspecific when the males are as different as a and b? Such
species actually occur? This statement is significant for this
reason; it indicates that characters of specific value may be
present in one sex and absent in the other. If in due course of
time, a group of such species becomes differentiated as a genus,
is there any reason why, in contradistinction to the defining
characters of some other group, such characters may not become of
generic value? It is certainly impossible to eliminate secondary
sexual characters else we would have few defining characters left
(this may be if more general application but I restrict it to the
taxonomic limits under consideration. And as stated in part one, if we admit the premises, this argument holds good whether we consider that Ravingia and Brachypilus are genera derived from Saccopteryx, or that all three had a common ancestral origin, or that each or any combination of them are derivatives of derived ancestors. It may well be -- indeed, it is a fact -- that many of our generic and subgeneric conceptions are expressions of the narrowness or breadth of individual perceptions, but the writer believes that from the standpoint of a natural taxonomic classification, he is correct in the generic designations as given. Viewpoint is the determining factor.

**Ravingia R.-Desvoldy.**

*Generic characters common to males and females.* Medium to small sized species. Front prominent, in mature not less than one half eye width; cheek vestiture black; black ellis behind eye never extending as far down as foramen (but at least twice ross in all species examined); metastrophes practically completely clothed with yellowish or whitish hairs or there may be black hairs on its lower, anterior corners; vibrissae inserted just above line of mouth margin, usually but slightly; row of frontal bristles parallel to side of vitre, the lowermost one or two bristles may be slightly more distant than those above; bases of ross not extending below base of vitre, the ross themselves almost parallel in some species, in others their basal portions slightly divergent. Vestiture of metapodium of short, scattered reclinate bristles except that it may become more erect and even hair-like on scutellum of male; epilypeal brown and light yellow or only yellowish; vestiture of legs short, four notopleural...
second and fourth strongest (first place vestigial in one species); anterior dorsocentrals and paratergals always present; paratergals always absent; lower sternopleural with bristles only.

Generic characters found in males only. Anterior face of posterior femur with several rows of bristles, an upper method or always present, one or more intermediate rows present or absent, if present short and often vestigial; posterior face of posterior femur without ventral row or with a few bristles proximally; middle femur with complete anterior and posterior ventral rows of bristles. Abdomen somewhat conical, not clothed above with short, reclinate bristles, beneath with longer, more erect hairs; epicranial plates as a whole, a proximally, parallel (second may appear the broadest), their vestiture shiny, shorter and never decumbent on third line, latter without longer hairs as above. Cervical segments prominent, first with marginal bristles, second always dull orange, at least as large as first, more or less retund; oral area small, extending but a short distance above base of forcipal; latter without upward flap-like extensions, its vestiture short, prongs sides spread (never approximated along median plane of body), tips decurved and either directed straight forward or more or less convergent.

Generic characters found in females only. Anterior face of posterior femur with several rows of bristles, an upper method lower always present, an intermediate row of short, vestigial bristles present or absent; posterior face of posterior femur with or without a few ventral proximal bristles (rarely a row on proximal half); ventral rows of middle femur prominent only on proximal half. Abdomen subcircular or sometimes somewhat oval. Genital
structure large but little or not at all overlapped by fourth notum (never concealed); for most part dull orange but notum of first genital segment may be yellowish or grayish; polities are same color as abdomen; notum of first genital segment not divided into two lateral lines; fifth and sixth ventral plate in most species are broader than those preceding and the latter may be of specific shape.

The above redescription of this genus has been made from the following species, Ravinia hasmatodes Meigen (type species), R. anguina R. Parker, R. semiculata R. Parker, R. quadridentata (Coquillet), R. latifrons R. Parker, R. Anthophora (Van der Wulp), two new and very distinct species that occur in New England, and several other new or unrecognized species from various parts of the United States and West Indies. These species will agree in all the characters above listed, except that it was not possible to examine a female of the type species, hasmatodes.

In general all the above mentioned species of Ravinia have light colored hairs covering the anterior spiracles; in most species these are practically entirely grayish but in others more yellowish or the hairs may be brownish at their very bases. The spiracular cover is light colored, usually yellowish or whitish. Section V of the costa is approximately equal to section III, rarely slightly longer. The submesotibial is present in all females but absent in the males of most species. All species do not have two marginals on the third abdominal segment, but in some there are several comparatively weak, even acuminate bristles between the laterals. The character of the sixth ventral plate (seventh morphological) in the females is usually of specific validity and it would be well if these could be figured for each species, though
unfortunately it is often concealed by the first genital pore.

Morphologically females show eight ventral plates; the fifth and sixth seemed to be fused in most species; but the line of division is very distinct and the marginal spines of the fifth are present; in S. mazatlanica Van der Wulp, however, there is no visible line in male and marginal bristles are absent. This female shows other odd characters. In the males the writer has noticed three distinct types of ventral plates, the two previously figured in part one and another represented in S. mazatlanica Van der Wulp of which I have special one from Texas. Tarsal claws are shorter in female than in males.

The species of this genus are probably primarily breeders in excrementous matter, both human and animal. This statement is made largely as the result of personal experience and there are a few references in the literature to corroborate this impression. Pratt (Can. Ent., vol. 44, p. 181, 1912) mentions several species of Ravinia as reared in greater or less abundance from cow manure, R. quadrata (Coquillet) (Sarcophaga [Halicobia] quadrata) as records as one of the most abundant. Ravinia cp. (Sarcophaga incerta Walker) was also reared, and another species is given under Coquillet's manuscript name, Sarcophaga variabilis. I have examined Pratt's material at Washington and hence am able to make the above changes in the names of the species concerned, though Pratt's specimens to some extent complicate. Specimens of R. quadrata (Van der Wulp) in the United States National Museum are labelled as reared from horse manure. Howard (Proc. U.S. Nat. Mus., vol. 32, p. 569, 1905) cites R. quadrata (Coquillet) as one of "the most abundant" breeders in human excrement of the species studied by him. When the writer first began his study of the family it was noted that species of Ravinia
and certain species of _Ravina_ were among the first visitors to human excrement deposited in the open and at that time first conceived the idea the former genus was coprophagous. The first real opportunity to test its validity came during the summer while the writer was engaged on investigation work for the Montana State Board of Entomology in the Yellowstone Valley. Two species of _Ravinia_ were encountered, _communis_ R. Parker and _paniculata_ R. Parker. Both were bred from human excrement in great abundance, less abundantly from cow manure. Of the latter species, in one instance, 214 adults were reared from a single stool exposed one day. _R. communis_ R. Parker was also reared from horse and cow manure. Reference to both these species occurs in the summary to my report to the State Board (Montana State Board of Entomology, 1st Biennial Report, Dec. 1914). Richardson of New Jersey had reared _R. communis_ R. Parker and _R. italicata_ R. Parker from horse, pig and cow manure. Metz Station for Experimental Evolution, Cold Spring Harbor, 1914 reared _R. communis_ R. Parker and _R. paniculata_ R. Parker from human excrement, and _R. italicata_ R. Parker from horse manure and on grass. The writer has taken specimens of _R. communis_ and _R. paniculata_ in Montana, and especially in his laboratory at Laurel, Montana, before screen doors were put in. Pratt (loc. cit.) mentions the species recorded by Mr. Foote from cow manure as occurring in stables and milk houses. Both in Montana and in various places in Massachusetts I have found holes of _R. communis_ quite frequent on the leaves of growing corn. Specimens of the same species received from Banks were labelled as captured on squash, chinquapin, and wild carrot. Titus (Utah) has taken it on sugar beets. _R. communis_ and _R. paniculata_ also
frequent garbage to some extent and are found in privies. The presence of species of RaVinia in houses and about human foods should probably be viewed with suspicion. The larvae of these species will travel some distance to find a proper place to pupate, so little, it was possible to trace the larvae of R. communis migrating in hundreds, for a distance of 60 feet from a cow dropping on the banks of the Yellowstone River. This was on hard, compact soil. In another case, larvae were found migrating from a dropping on sandy soil, but pupation took place in the soil within a few inches of the dropping.

Data has also collected in Montana which tended to show that the species of RaVinia and the coprophagous species of Sarcophaga mainly frequent excreta in the eyes or in privies. They also seem to prevent the breeding of oviparous species in any abundance either because they are better adapted to the food supply or it is possible that they prey upon the other larvae.

In connection with R. communis it should be noted that the females of males which can be identified with my original description present several distinct types of sixth ventral plates (seventh ventral are figured). There is also a certain amount of variation among the males such as the presence or absence of the submedian bridge, the extent of pigmentation of the first genital segment, the number of marginal scutellar bristles, etc. I have not had an opportunity to sufficient material to analyze this problem carefully and I present an in doubt as to whether these variations indicate distinct species, subspecies or individual variations.

The commonest fact which fall under communis in more common to England and northern material and rare often absent in southern specimens though it occurs to some extent.
Identifications made by the writer include the various R. j. under the one species, communia. The subcostal line of color which falls also communia is not only present in northern material, but seems to be more often absent in specimens from further south though by no means in every instance.

The female of R. communia (in New England) is recognizable by the four posterior cornocentrals and mesosternum first vein. These characters also occur in another New England species, but the latter is small. R. communia is always separable by the three posterior cornocentrals. The females of R. laticostus and R. quadrastichus have both the first and third veins brieafly, bare.

Their females are very rare to separate the ventral plates of the genital segment are exposed. What seems to be the fusion product of the fifth and sixth plates is quadrastichus in large and swollen with lateral, posterior, rounded projections, often with a small depression between the latter. In communia, on the other hand, the fifth and sixth plates are distinct and by no means greatly, if at all, enlarged. In R. communia and similar species the cornum of the second genital segment, is visible as the lateral lips that are connected dorsoally by a narrow band and overlie the sides of the sixth or fifth and sixth ventral plates. The latter is very large in some forms of communia. In R. laticostus and R. quadrastichus the lateral lips of this segment are not visible and a dorsal connecting band.

Additional localities recorded to those previously given are noted as follows:

<table>
<thead>
<tr>
<th>Species</th>
<th>Location 1</th>
<th>Location 2</th>
<th>Location 3</th>
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Foreign: Canada (Ontario)


United States: N. J., Ohio, Mont.
Foreign: Canada (British Columbia).

Revivina laurius B. C. --United States: Ohio


United States: Va., Ohio, Calif.

Boettgerina R. Parker.

Generic characters common to males and females. Normally medium sized to large flies. Front prominent, of narrow or medium width in males; cheek vestiture black; black cilia on ind as extending, practically, down in formen; vestiture of lower, anterior portions of metacochalons black, otherwise whitish or yellowish; virescent inscribed on lines with obtuse margins; bases of rows of frontal bristles extending below base of vitta and broadly divergent toward eye orbits. Eye laterally; four metacochalons, second and fourth strongest; anterior dorsoventralia present, acrostichalidae present or absent; interscuturalia absent; three pairs posterior dorsoventralia of about equal strength.

Generic characters found in males only. Metatibiae clothed with scattered, erect hair; fourth tarsal segment less than one half length of fifth; anterior face of posterior femur with several rows of bristles, one or intermediate one or more equally considerable longer and stronger (at least as long and stout as) than those of upper and lower rows, posterior face without ventral row
of bristles; posterior tibiae halved; tibia. Maculat.
posterior ventral row of bristles, anterior ventral row decreased or lost, if so, bristle centrally; ventral pigment present.
Abdomen subcircular or somewhat oval; body inclined with short, reclinate bristles, beneath with somewhat longer or long, erect hair; ventral plica very small, with slight scabrous diverging posteriorly (part one, PI. B, fig. 21), vestiture of third segment, especially in newly, short and decumbent and longer hairs not present or visible. Central segment prominent, around the collar, forelegs short, legs splayed but slightly, if at all, usually site a bit, rounded, ring-like extensions clothed with long, fine, curly hair (no longer than vestiture of second segment).

General characters found in E. maculat.: Matturation clothed with short, reclinate bristles that enostiguous are various and practically decumbent; fourth terminal segment at least one half length of fifth. Anterior face of posterior reman with two rows of bristles on upper and lower, posterior face into a few bristles ventrally and proximally (rarely on proximal half); Abdomen subcircular or somewhat oval; body inclined with short, reclinate bristles throughout. Central segment dull to bluish orange, occur of first not divided into two lateral half., shorter and concentric with than an oblique angle.

This description has been made from four species: E. berthotaria, E. latitubera H. Parker (type a species), E. biastora R. Fos. p., B. cimbicia (Townsend)² and one undescribed or unrecognized Jamaican

I. The type of Berthotaria cimbicia Townsend has been examined by Aldrich and found to be the same as E. Berthotaria Ferandii. It is probable that most references to cimbicia in the literature are unreliable.
species. These species also possess in the following characters some
of which may be unique—serrate or spinous external bristle present in both
sexes; "brach" of posterior ocellar plate in males, tend to be shorter than their respective threes, especially in
males; anterior acrostichals hair-like in males, absent in females
(in many species which have them); sometimes simpler very pinnate
and hair-like. In the females seven ventral plates are visible
(eight morphologically).

The males of this genus are generally in very small numbers, in
part concealed. The type specimens of B. gigantica (Townes, Jr.)
were reared from greenhouses and I have a female reared from
horse manure. A specimen of this species received from Britten is
labelled as captured on prince malus (R. H. Walton), another
received from O. W. Johnson (probably gigantica) bears the label
"on back of Asparagus vulgaris" (G. A. Frost, Park, Me.). At
Laurel, Montana, the writer took gigantica occasionally in privies
and rarely on shrubs. Dead specimens were frequently found in
one locality in a dead wood on an overgrown:

The female of R. micans, R. Parker is at once separable by
the absence of long anterior prementals prementals, the absence
of premental acrostichals and the presence of but two prementals
(a third third is occasionally present). The sixth ventral plate
is of characteristic shape but it is unnecessary to see it.
The females of B. gigantica and B. asiantica are often indistinguishable.
The area of the sixth ventral plate is different for each but
these are often misshapen or partially concealed. Both species
have three sternopleurals, short, rather short anterior acrostichals
and the premental acrostichals are either absent or very
short and not hair-like as in the males.
The species of *Euchorthia* have been found in the following localities not mentioned in part one:


**foreign**: Canada (Quebec).

**foreign**: Canada (Ontario).

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**Sarcophagidae**:

Among Sarcophagidae material received from the Montana Agricultural Experiment Station are specimens bearing the record number 356. The notes state that the flies "were seen to fly rapidly at grasshoppers and it is suggested that they deposit larvae under the hopper wings, the maggots later killing the grasshoppers."

The above record was made August 15, 1910 by J. R. Parker of the station, and containing observations made on the Huntley Bench about six miles west of Billings. Concerning the case he has written as follows, "I remember distinctly the incident that led to making this note. I was sent out to investigate a reported grasshopper injury near Billings and found one field where 'Liaecia silvatica' was a particular annoyance. As I walked
through the alfalfa, they were in a cloud near me. And I noticed that some were barely able to raise themselves from the ground and many were in a dying condition. Seeking for the cause, I noticed Sarcoptes dusting at the base and just above. had left the ground."

The species concerned in the above were Sarcoptes Kelly Aldrich, S. alpints Melton and species of Eoeoecus. Though, at the time these notes were made, they were based to some extent on suspicion, that the idea was partly justified has been shown by Kelly in his paper dealing with S. Kelly and other parasitic or supposedly parasitic species (Jour. Agric. Res. vol. 8, no. 6, 1918-19). The species referred to as Kelly as Sarcoptes oncholae Townshend (I.e., Dation) is probably a species of the genus as described. The writer has also taken S. Kelly at Lateral, Montana.

**Other New England Genus.**

A few notes on other genera occurring in New England are put out of place. The writer hopes to be able to deal with these more in detail in subsequent editions to the paper already published but on this possibility is not likely to be realized, none mention of them in made at this time.

**Agria R. -Beauvado.**

So far as determined we have but a single representative of this name, Agria affinis (Fallen). It has been bred from typical of Porphyria histrionis (Linnaeus) collected at Melrose, Wakefield, North Saugus, Woburn, North Andover, Beverly, Braex, Topsfield, Gloucester and Swampscott, Mass., in connection with the work of Gynae Stock Laboratory at Melrose High Hills, and from the same moth in Russia, Austria, Italy and other European countries. I also have a species of what are perhaps the same species from.
North Mountain, P., the British Columbia, 

**Bi.**

To just what extent this group will be recognized by American dipterologists is questionable at present. The larvae, for the most part are not marked by any visible features of the genital segments which are fused or adhered to one another for insemination. Béttcher and Villeneuve have both described an England species submitted to them as *B. brunneus* Randell and also consider Houghton's *Sarcothrips* [**hunteri**] as a member of this genus as well as other undescribed or unagreed species. Concerning one of the latter Béttcher writes that it could be considered a *Sarcothrips* sp. l. or might be placed in the genus *Biogaster* Villeneuve. It seems to stand between *Biogaster* (Gasteroidei) and *Sarcothrips* (Tanypodinae) Bruner and Borgenstam 

*Biogaster* Guérin-Méneville is a similar species. The present tendency seems to be to consider *Sarcothrips* sp. in *Biogaster* as a subgenus of *Biogaster*.

Weisflogia Bruner and Borgenstam.

The only American species assigned to this genus is *Weisflogia ochrea*, which occurs in the Rocky Mountains. It is present, however, that certain species of the ichneumon genus *Pentathela*, perhaps even the type species *Pentathela*, should be placed in this genus to make a distinct genus as some may suggest. It is probable that other ichneumon genera will eventually be placed under the *Sarcothrips* but it is inexpedient to offer this except as a suggestion.

Aside from the genera above, among I have a *Sarcothrips* combining characters of *Sarcothrips*, *Savinia* and *Weisflogia* which I shall later describe, probably as a new genus.
Conclusions.

My papers on the Sarcophagidae of New England have not been presented with the ill thought, nor at all exhaustive or that they approach perfection in any way, but merely with hope that something of value may have been presented as a basis for increasing our knowledge of the North American members of this family or group. With a few exceptions the characters used were the result of personal study before consulting the literature. Wherever expedient, however, terms previously used were adopted to avoid unnecessary confusion. A few new characters have been introduced and it is probable that still others will be revealed by further comparative study, especially of leg characters. In regard to the tibiae in the three genera already discussed a few suggestions may be offered as serving their characteristics distinctive of a single bristle. Each tibia has a median dorsal ridge; anteriorly and posteriorly are rows of bristles (one on each side). On the anterior tibia, however, the row posterior to the ridge is lacking except that in the species described as Sarcophaga quadripunctata there is a single bristle which is about on a level with another on the posterior surface. On the other tibiae, the row anterior to the ridge, consists of short bristles that are usually confined to the proximal half. On the other tibiae, these rows, for the most part, consist of two, three, or more well-developed bristles often with shorter, less conspicuous bristles between them. Besides these rows of bristles near the dorsal ridge there are others on the posterior face of the anterior tibia, the posterior face of the middle tibia and the anterior face of the hind tibia. In all species of Sarcophaga,
Bostonian, *Hemicryptocrinus*, and *Aster A.-Bewick* is so to
the center of four on the posterior row of the anterior tent.
It consists of a single articule divided to the center but that
in *Nannotrite. Johntii* and *Amboyia* usually have (best developed in
families). In *Hemicryptocrinus* this articule is both the posterior way
approximated to the median ridge and the surface row as well,
and consisting of the or the articules in all species examined.
In this case the arrangement is probably generic. In the same
generic races or two species were noted in *Amboyia* but the row in
the middle tidal, those approximated to the median ridge, while
in families the row on the posterior zone in *Amboyia* present. The
row is general, present in the *Amboyia* of other genera. The row on
the anterior surface of the posterior tentil will understood.

*Carsonia* *Amboyia* and *Amboyia* (this was beard) it is
absent, in *Collinid*. *Amboyia* and *Amboyia* (this was beard)
it is represented by some species, but in *Amboyia* with
it all tidal be said the center is often extended to one. The
middle tidal is not only in which the bristle is the lower surface. Usually, but one is present (the submedian bristle)
but two are not unknown, especially in *Amboyia*. This bristle
is sometimes (read a little) to the side of the middle or can be
represented by the external side of the middle bristle. In descriptions
hence, I published whenever necessary to discuss these facts I
shall refer to those approximated to the median ridge or the interior
or posterior row of the pre-, meso-, or postmedian ridge and to
the surface branches as anterior or posterior surface row of the pre-, meso-, or postmedian. The term "row" has been here used
as expressing all may be considered, for systematic purposes,
a typical condition; in some cases a "row" will be represented by only a single bristle.

Plate 1.

Fig. 1. Fourth ventral plate and genital segments of male of *Sarcophaga sinuata* Meigen.

Fig. 2. Fourth ventral plate and genital segments of male of *Sarcophaga aldrichia* n. sp.

Fig. 3. Penis of *Sarcophaga uliginosa* Kramer; forceps and fourth ventral plate as under Fig. 2.

Fig. 4. *Sarcophaga abscona* n. sp., male. a. View of posterior face of middle femur to show ventral posterior row of bristles; b. Genital segments.

Plate 2.

Fig. 5. Fourth ventral plate and genital segments of male of *Sarcophaga johnsoni* n. sp.

Fig. 6. Fourth ventral plate and genital segments of male of *Sarcophaga utilis* Aldrich.

Plate 3.

Fig. 7. Fourth ventral plate, profile view of base of same and genital segments of male of *Sarcophaga tuberosa* harpax (Pandellé).

Fig. 8. Fourth ventral plate, profile view of base of same and genital segments of male of *Sarcophaga tuberosa* exuberans (Pandellé).

Fig. 9. Fourth ventral plate, profile view of base of same and genital segments of male of *Sarcophaga tuberosa* sarraceniae (Riley).

Plate 4.

Fig. 10. Fourth ventral plate and genital segments of males of *Sarcophaga haemorrhoidalis* Meigen.
Fig. 11. Fourth ventral plate and genital segments of male of Sarcophaga deliciae Schiner.

Fig. 12. Fourth ventral plate and genital segments of male of Sarcophaga calcitrana Pindelli.

Fig. 13. Fourth ventral plate and genital segments of male of Sarcophaga bullata n. sp.

Fig. 14. Fourth ventral plate and genital segments of male of Sarcophaga cheloneae n. sp.

Plate 6.

Fig. 15. Fourth ventral plate and genital segments of male of Sarcophaga fulvina n. subsp. (those of S. fulvina have part the same).

Fig. 16. Fourth ventral plate and genital segments of male of Sarcophaga azurina Pindelli.

Plate 7.

Fig. 17. Fourth ventral plate and genital segments of male of Sarcophaga arcuata n. sp.

Fig. 18. Fourth ventral plate and genital segments of male of Sarcophaga helicina Townsend.

Fig. 19. Showing two types of sixth ventral plate (seventh morphological) found in females, the males of which are identified with the original description of Evidia communis B. Pohl.

Fig. 20. Sarcophaga mordax n. sp., male. Lateral view of genital segments.
Plate 4.

Fig. 31. Fourth ventral plate and genital segments of male of *Sarcoptes mitchelli* Walker.

Fig. 32. Fourth ventral plate and genital segments of male of *Sarcoptes mitchelli* n. sp.

Fig. 33. Fourth ventral plate and genital segments of male of *Sarcoptes incertus* Walker.

Explanations of Plates.

The drawings of *Sarcoptes mitchelli* Reden (fig. 1) are fully labelled; corresponding parts in the other species may be interpreted by analogy. The abbreviations used are the same as in part one, but a list is given in order that reference to the latter may not be necessary. All drawings of genitalia have been made with a camera lucida.

Abbreviations.

ac. Accessory digit.
s. Accessory plate.
cl. Base of forceps.
bf. Upward flag-like extensions of base of forceps.
U. IV. "Branch" of fourth ventral plate.
d. Dorsal limit of anal area.
f. Forceps.
pp. Forceps prong.
ri. First genital segment.
s. Second genital segment.
ll. Lateral to fourth ventral plate.
f. Feet.
p. Posterior digit.
v. III. Third ventral plate.
v. IV. Fourth ventral plate.

Plate 5.

Copy of Butter's figure showing part of the genitalia of
*Sarcoptes canariensis* (Linnæus) by R. F. F. F. 1912, p. 533.