What's in a name? A Clarification of *Stenamma westwoodi, S. debile*, and *S. lippulum* (Hymenoptera: Formicidae: Myrmicinae)

by

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ABSTRACT

The taxonomic status of *Stenamma westwoodi* and close relatives is reviewed. *S. westwoodi* is redefined and its range found to be restricted to England, Wales, and Belgium. *S. debile* and *S. lippulum*, formerly thought to be synonyms of *S. westwoodi*, are shown to be valid species, with *S. debile* being widely distributed in northern and central Europe, and *S. lippulum* occurring in the region of the former U.S.S.R. between the Caspian and Black Seas (in the Caucasus Mountains and vicinity). All 3 species are redefined, earlier synonymies reexamined, lectotypes designated where needed, and finally, characters useful for separating these species from themselves and from others in the genus are discussed.

INTRODUCTION

J. O. Westwood (1840a, 1840b) described the ant genus *Stenamma* to include a single species, *S. westwoodi.* In addition to various characters cited to differentiate the genus and species from other ants, males of *S. westwoodi* were characterized as having 5 mandibular teeth. During the next 150 plus years, numerous collections of *Stenamma* from across the United Kingdom have yielded two morpho-types of males: one with 3 teeth on a cylindrical mandible, the other with 5 teeth on a triangular mandible. Intermediate forms have not been recorded. Further examination of females (queens and workers) have revealed a suite of morphological characters (and one behavioral character) separating these morpho-types with no intermediates observed. These two forms can be characterized as follows:

Morpho-type "A"

1) Workers and queens with width of central glassy-smooth frontal area (between antennal insertions) greater than 1/3 the total width between antennal insertions.

2) Males with 3 mandibular teeth on a cylindrical mandible.

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3) Worker and queen legs "stout" (more robust; typical *Stenamma* appearance).

4) Shape of petiole for worker as in figure 35 and for queen as in Fig. 39 (anterior processes in dorsal view nearly as wide as node).

5) Nuptial flights usually occur in September.

Morpho-type "B"

1) Workers and queens with width of central glassy-smooth frontal area (between antennal insertions) less than 1/3 the total width between antennal insertions.

2) Males with 5 mandibular teeth on a triangular mandible.

3) Worker and queen legs long, leading to a gracile appearance (atypical *Stenamma* appearance).

4) Shape of petiole for worker as in figure 17 and for queen as in Fig.19 (anterior processes in dorsal view narrower than node).

5) Nuptial flights usually occur in October.

These characters are confirmed by personal observation and some were originally suggested by Barry Bolton (BMNH) and corroborated by Simon Hoy (Pest Identification Service). Additionally, Simon Hoy provided the following separatory characters for queens and workers (these hold up in the specimens observed in the United Kingdom, but are not as reliable in central and southern Europe where numerous *Stenamma* species lead to complications).

"i) The frontal carinae ... are more or less parallel on [morpho-type "A"], but on [morpho-type "B"], they bow outward slightly around the antennal insertion and at their top end are slightly closer together than in [morpho type "A"].

ii) Viewed from above, the propodeal spines on [morpho species "B"] appear slightly closer together, more parallel, and pointed straight backwards with a shallow depression in the cuticle between them. On [morpho-type "A"], they seem more splayed out with a shallower or no depression between them.

iii) The petiole of [morpho-type "B"] is more elongated and slender in appearance and viewed from above, the two small lateral "bumps" near its anterior end ... are more gently raised and less pronounced than in [morpho-type "A"].

iv) In general, individuals of [morpho-type "B"] are slightly paler in color, larger, more slender and 'leggy' than [morpho-type "A"]; they might have slightly more ommatidia as well." (pers. comm., Simon Hoy).

Furthermore, Simon Hoy indicated (pers. comm.) that he has collected both forms in proximity "under big stones at the edge of woodland in Devon, both within 20 meters of each other." I have also observed these character states without intermediates.

Based upon personal observations of numerous *Stenamma* specimens, I believe that the suite of characters discussed above is sufficient to suggest that two species of *Stenamma* are present in the United Kingdom. The fact that both forms have been collected in sympatry, combined with the apparent observed differences in times of nuptial flights supports the view that these are good, reproductively isolated species and not forms of a single, variable species.

This situation has been recognized previously. Kutter (1971) encountered obvious differences between male *Stenamma* specimens near the Switzerland—Italy border. I have not yet examined his material; it appears that he compared males of *S. striatula* and *S.* morpho-type "A" described above. He based his analyses upon two males collected in a garden in San Nazarro [ITALY, 45° 07'N, 8° 54'E, ~100 m]. He assigned the male with 3 mandibular teeth to *Stenamma westwoodi* auctorum (*nec* Westwood, 1840b) (=*S. debile* Foerster, 1850). He ignored the older name *Myrmica lippula* (Nylander, 1849) and made no indication of why the name *S. westwoodi* was selected. Curiously, he did not consult the type material (*S. westwoodi* — OXUM, *M. lippula*—UZMH), but referred to Westwood's original description. He retained the name *S. westwoodi* [of authors] for the male with three mandibular teeth (even though Westwood's original drawing depicts 5 teeth) and assigned the name *S. striatula* Emery for the male with 5 mandibular teeth (Kutter, 1971: 264). I believe this indicates Kutter followed the presiding view that *S. westwoodi* was widely distributed throughout central Europe and that the male had 3 mandibular teeth. The difficulty arises in that the species of *Stenamma* (Kutter's *S. westwoodi* [of authors]) found throughout central Europe does not match Westwood's original description.

The description of *S. westwoodi* clearly shows 5 mandibular teeth on a triangular mandible (Westwood, 1840b: 226, Fig. 13). This has been confirmed by examining the type series. Clearly, morpho-type "B" is *Stenamma westwoodi*. Several colonies of this form have been examined (workers, queens, and associated males). Males with the triangular mandible with 5 teeth are always associated with females having the suite of characters described above for morpho-type "B." The problem then becomes, what name applies to morpho-type "A."

In 1850, Foerster described *Myrmica debilis* from the vicinity of Aachen, Germany. This name has also been previously placed in synonymy with *S. westwoodi*. However, Foerster's description of the male ant includes a reference to 3 mandibular teeth. Morpho-type "A" is commonly found in central Europe, including Germany (around Aachen) and is conspecific with *Stenamma debile* (Foerster).

Another potential name for morpho-type "A" is *Myrmica lippula*. This species was described by Nylander (1849) based upon a single worker sent to him by D. V. Motschulski. After examining the type, I have concluded this name represents a junior synonym of a Russian species, *S. caucasicum* (Arnoldi, 1975) (see below). Therefore, the name *lippulum* is not available for morpho-type "A."

It should be noted that many authors (cf. Mayr, 1861, André, 1883, and Donisthorpe, 1927) placed *Myrmica lippula* in synonymy with *Stenamma westwoodi*. Nylander's specimen came from southern Russia. Westwood's specimen came from England. Arnoldi (1975) indicated that both *Stenamma lippulum* (=*S. caucasicum* Arnoldi) and *S. westwoodi* are found in the Caucasus Mountains. The specimens Arnoldi called *S. westwoodi* belong to morphotype "A".

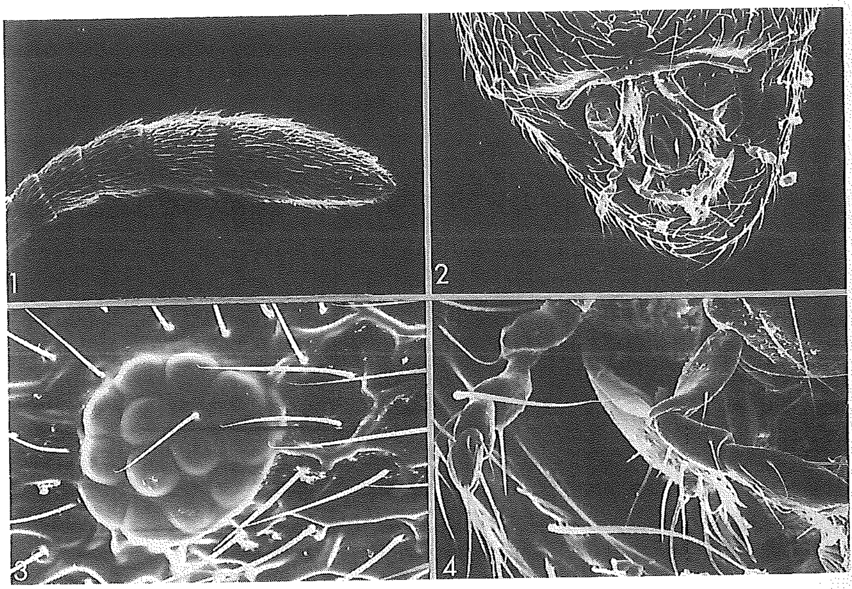
All 3 species (*S. westwoodi, S. debile,* and *S. lippulum*) are formally redescribed below. Additional names are included in synonymy where appropriate.

TERMINOLOGY

Most terms can be found in standard entomological glossaries (e.g., Nichols, 1989). Two terms are defined below to avoid possible confusion regarding their use in this paper.

Full face view. With head aligned so clypeal margin, occipital vertex, and side margins are all in focus simultaneously.

Occipital vertex. More commonly called the occiput. However, occiput is



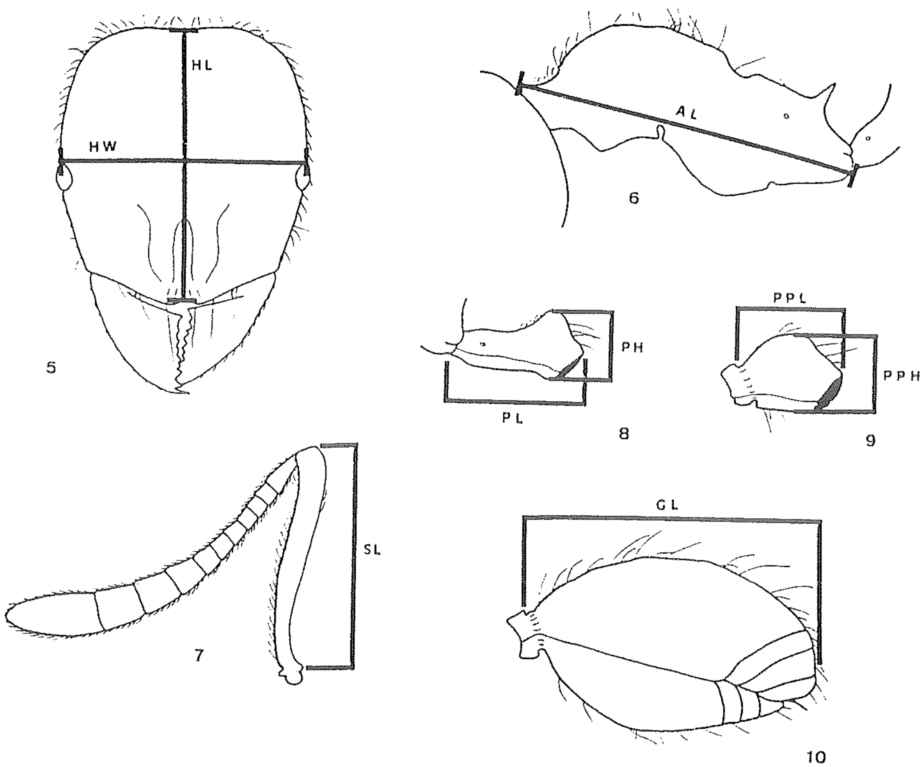
Figs. 1— 4. *Stenamma debile*: Scanning electron microscope photographs by author. 1, Antenna showing indistinct 4-segmented club; 2, Ventral view of mouthparts; 3, Compound eye showing reduced number of ommatidia; 4, Labial and maxillary palps showing number of segments in each. For exact measurements and further explanation, see text.

correctly applied to that area directly above the attachment of the thorax. In ants, this is on the posterior of the head.

MEASUREMENTS AND INDICES

All measurements are in millimeters. Scales are not included in the photographs and drawings as precise measurements are available in the tables and text. The following measurements are listed in Tables 1 - 4. They are described here to illuminate how each measurement was performed.

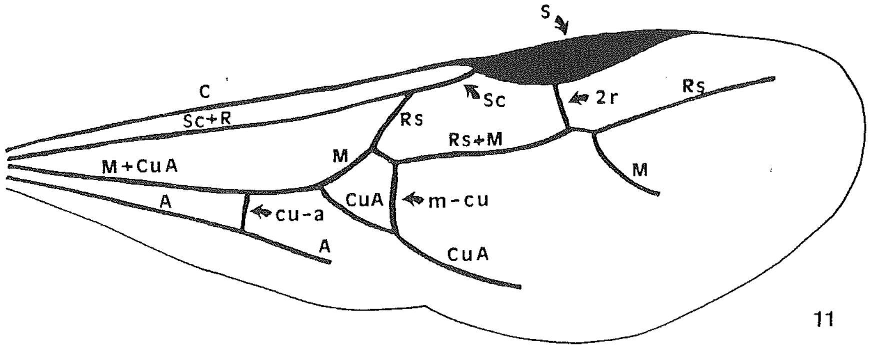
Total length (TL). Total outstretched length of individual from clypeal margin to gastral apex. Although this is usually measured from mandibular apex, many specimens had mandibles buried in glue or placed in positions such that measurement from this point was not practical. Given the size of



Figs 5 —10. Generalized *Stenamma* worker depicting how various measurements were made: 5, Head, full face view. HL - Head Length, HW - Head Width; 6; Alitrunk, lateral view. AL - Alitrunk Length; 7, Antenna. SL - Scape Length; 8, Petiole, lateral view. PL - Petiole Length, PH - Petiole Height; 9, Postpetiole, lateral view. PPL - Postpetiole Length, PPH - Postpetiole Height; 10, Gaster, lateral view. GL - Gaster Length.

mandibles (relative to entire body), such a difference is not appreciable.

Head length (HL) (Fig. 5). Length of head, excluding mandibles, from anterior-most point of the median clypeal margin to midpoint of the occipital margin in full face view.



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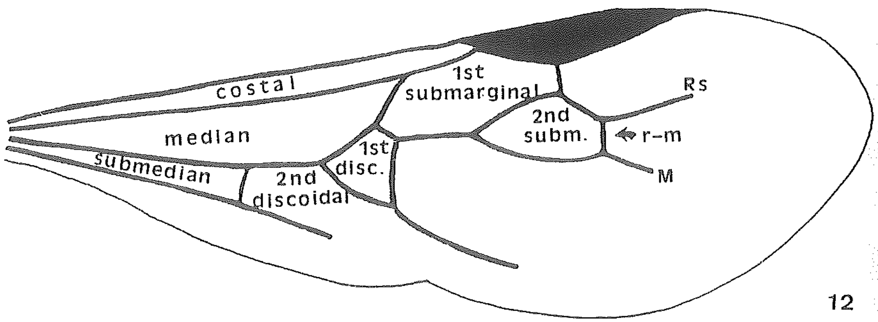

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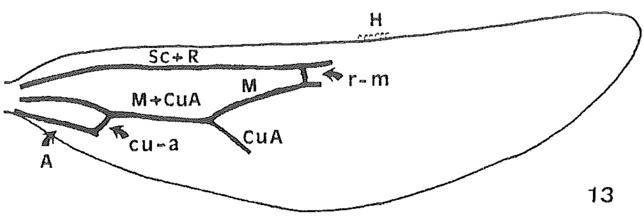

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Figs. 11—13. Generalized *Stenamma* wing venation: 11, Forewing with prominent veins labelled. A - Anal. C - Costal. CuA - Cubito-anal. cu-a - Cubital to anal cross vein. M - Median. m-cu - Medio to cubital cross vein. R - Radial. 2r - Radial cross vein. Rs - Radial sector. S - Stigma (pterostigma). Sc - Subcostal; 12, Forewing with cells labelled. 1st disc. - First discoidal. 2nd subm. - Second submarginal. r - m Radial to median cross vein; 13, Hind wing with prominent veins labelled. H - Hamuli.

Head width (HW) (Fig. 5). Maximum width of head, measured just behind eyes, in full face view, excluding compound eyes.

Cephalic Index (CI). (Head width x 100) / Head Length.

Scape length (SL) (Fig. 7). Straight line length of antennal scape excluding basal condylar bulb and adjacent constriction, or neck.

Scape Index (SI). (Scape Length x 100) / Head Width.

Alitrunk length (AL) (Fig. 6). Diagonal length of alitrunk in lateral view measured from anterior pronotal apex to posterior base of metapleural lobes.

Pronotal width (PRW). Maximum width of pronotum, in dorsal view.

Petiole length (PL) (Fig. 8). Maximum length of petiole, measured from ventral juncture with propodeum to ventral juncture with postpetiole.

Petiole height (PH) (Fig. 8). Maximum height of petiole, measured perpendicularly, from apex of petiolar node to venter of petiole (directly beneath node).

OTHER FEATURES

The following features were shared by all *Stenamma* species examined. They are discussed once below, rather than with each species.

Palpal formula. All specimens examined (and discussed below) exhibited a consistent palpal formula (maxillary palp segments, labial palp segments) of 4, 3. This is consistent between sexes and castes in the specimens examined.

Wing venation. *Stenamma* exhibits some reduction in the primitive complement of wing veins. Bolton (1982: 339, Fig. 42) termed this "the normal pheidoline venation." Specifically, veins Rs + M fuse and extend together to cross-vein 2r (with cross-vein r-m eliminated). This results in what previous workers termed the single closed cubital cell. Bolton (1982: 339) indicated that this is merely one state along a continuum of wing venation variation. With some minor variation, the typical pattern for wing veins is shown in Figs. 11-13. Fig. 11 represents a fairly typical forewing (based on *Stenamma westwoodi*) and includes the vein names. Fig. 12 represents the same wing with the cells labeled. Fig. 13 indicates the reduced hind wing venation (with principal veins labeled). Wing venation is fairly constant within 2 of the 3 species (*S. westwoodi* Fig. 25, *S. debile* Fig. 43). Wing venation is unknown in *S. lippulum.* Subtle differences in wing venation are the result of adventitious vein-stubs or incomplete formation of specific veins (for example, *S. westwoodi* - Fig. 26). The majority of variation within species occurs in the male (presumably due to its haploid condition which allows minor genetic variations and recessive alleles to be fully expressed).

Male genitalia. Since abundant material is lacking for most species, comparisons of male genitalia were not attempted.

Localities. Names and borders for many countries in the world are currently uncertain (for example, East and West Germany recently merged, the

Table 1. *Stenamma westwoodi* measurements.

Measurement	n=	MINIMUM	MAXIMUM	MEAN	STANDARD DEVIATION	STANDARD ERROR
Workers						
TL	11	3.32	4.03	3.67	0.228	0.069
HL	11	0.77	0.92	0.85	0.046	0.014
HW	11	0.66	0.79	0.72	0.041	0.013
CI	11	80.91%	89.42%	84.75%	2.54%	0.77%
SL	11	0.60	0.71	0.66	0.034	0.010
SI	11	85.71%	97.62%	91.79%	3.72%	1.12%
AL	12	1.01	1.22	1.11	0.060	0.017
PRW	12	0.43	0.55	0.49	0.033	0.009
PL	12	0.35	0.50	0.42	0.042	0.012
PH	12	0.20	0.25	0.22	0.016	0.005
Queens						
TL	5	4.44	4.75	4.65	0.127	0.057
HL	5	0.92	0.93	0.93	0.008	0.004
HW	5	0.77	0.84	0.81	0.026	0.012
CI	5	82.76%	89.66%	87.31%	2.94%	1.32%
SL	5	0.69	0.74	0.72	0.020	0.009
SI	5	84.31%	95.83%	89.75%	4.51%	2.02%
AL	5	1.37	1.50	1.45	0.053	0.024
PRW	5	0.64	0.72	0.69	0.034	0.015
PL	5	0.50	0.60	0.54	0.038	0.017
PH	5	0.26	0.29	0.28	0.013	0.006
Males						
TL	12	3.91	4.40	4.08	0.144	0.042
HL	12	0.64	0.74	0.69	0.025	0.007
HW	12	0.58	0.66	0.62	0.027	0.008
CI	12	83.72%	95.35%	90.60%	3.61%	1.04%
SL	12	0.24	0.32	0.27	0.024	0.007
SI	12	39.02%	51.28%	43.23%	3.34%	0.96%
AL	12	1.30	1.51	1.41	0.055	0.016
PRW	12	0.60	0.76	0.69	0.044	0.013
PL	12	0.43	0.50	0.46	0.024	0.007
PH	12	0.19	0.24	0.22	0.016	0.005

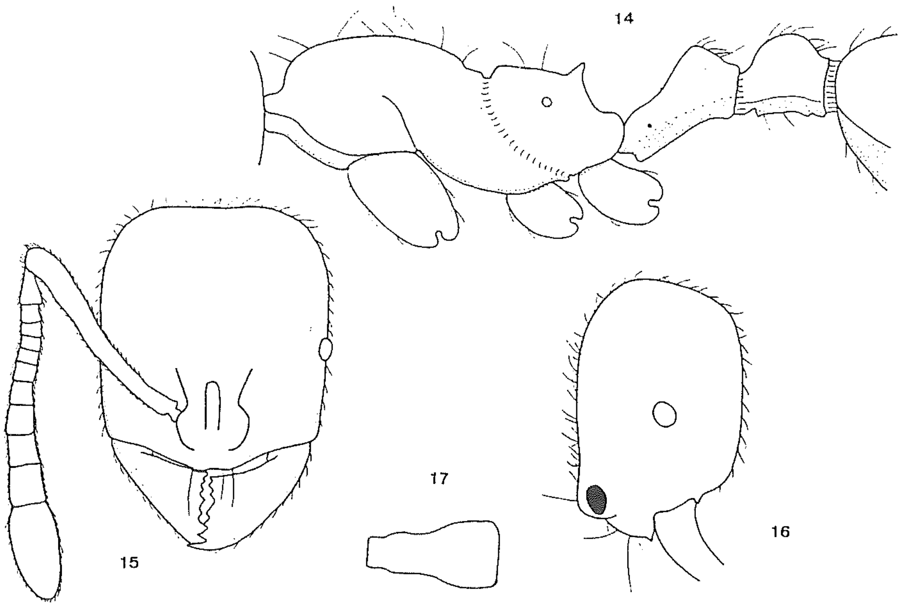
U.S.S.R. has fragmented, Yugoslavia has disintegrated). In an effort to deal with the changes which may occur between manuscript preparation and final publication, type localities are presented as they were originally published. Thus, *Stenamma caucasicum*'s type locality is listed in the U.S.S.R. (Arnoldi, 1975). Since the borders and names within the former U.S.S.R. are still uncertain, specimens from that area are listed by region (such as GEORGIA) under the country heading of the former U.S.S.R.

GENUS *STENAMMA* WESTWOOD

Stenamma Westwood, 1840a: 83.Type-species: *Stenamma westwoodi* Westwood, by monotypy.

Asemorhoptrum Mayr, 1861: 76.Type-species: *Myrmica lippula* Nylander, by original designation and monotypy. [Synonymy by André, 1883: 310].

Theryella Santschi, 1921: 68.Type-species: *Theryella myops* Santschi (=*S.*



Figs. 14—17. *Stenamma westwoodi*, worker: 14, Alitrunk, petiole, and postpetiole, lateral view; 15, Head, full face view. 16, Head, lateral view; 17, Petiole, dorsal view (setae omitted).

punctiventre), by monotypy. [Provisional synonymy by Santschi, 1923: 136].

WORKER DIAGNOSIS

Myrmicine ants of the tribe Pheidolini with the following combination of characters. Worker monomorphic; palpal formula 4,3 (Figs. 2, 4); antenna 12-segmented with indistinct 4-segmented club. Occipital foramen with grooves lacking on either side. Compound eyes reduced (Fig. 3).Propodeum usually armed with a pair of spines. Inferior propodeal plates prominent. Petiole pedunculate with low, convex to flat node. Gaster mostly glassy-smooth with some small carinae near base of first segment (sternite and tergite). (pers. obs., B. Bolton, pers. obs.).

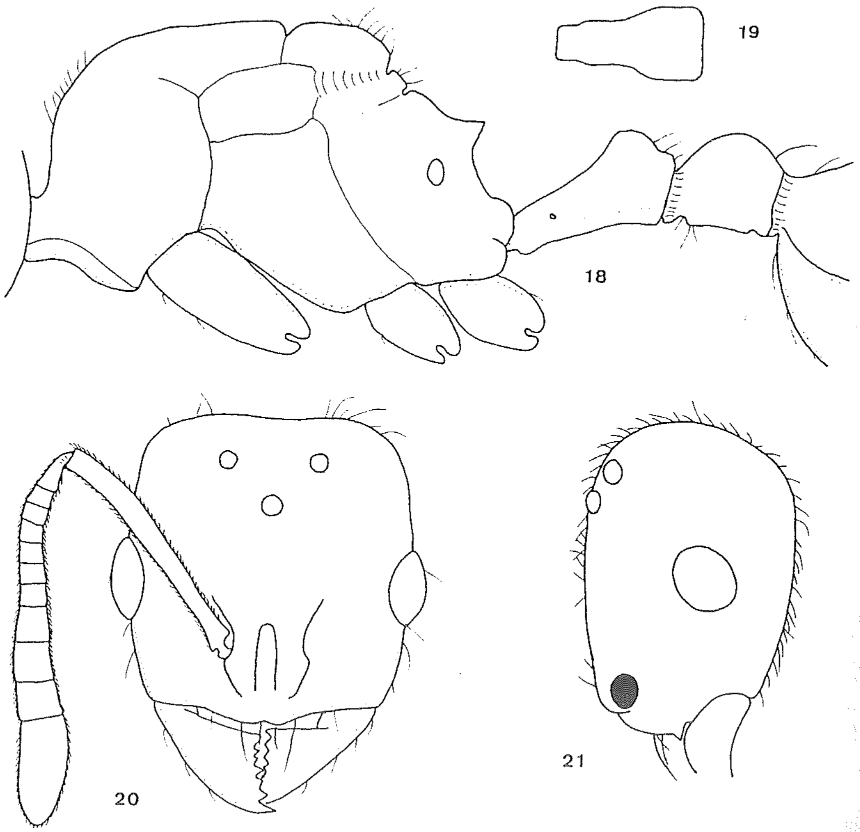
Stenamma westwoodi Westwood
Worker Figs.14-17, 47. Queen Figs.18-21, 25. Male Figs. 22-24,26
Lectotype Male Figs. 27-30. Distribution Fig. 31

Stenamma westwoodi Westwood, 1840a: 83; 1840b: 219, 226 (Figs. 11, 12, 13, 14, 15). Male, England (Lectotype Male-OXUM) [examined].

WORKER

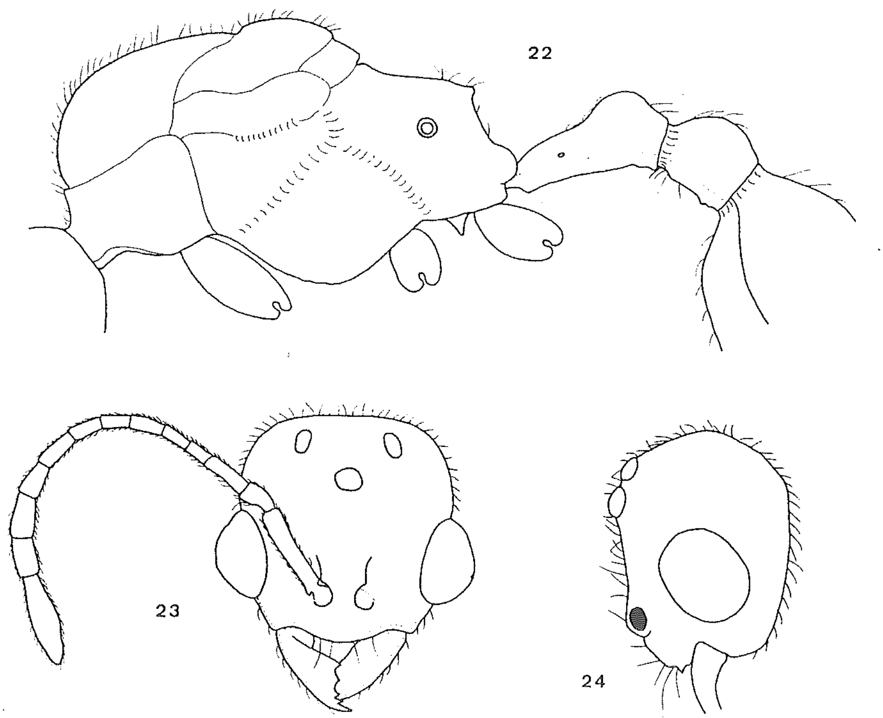
Measurements and associated statistics are listed in Table 1.

Mandible with 7 teeth (apical 2 prominent); anterior clypeal margin in full



Figs. 18 —21. *Stenamma westwoodi*, queen: 18, Alitrunk, petiole, and postpetiole, lateral view; 19, Petiole, dorsal view (setae omitted); 20, Head, full face view; 21, Head, lateral view.

face view with median lobe emarginate; apex in lateral view almost flat. Compound eye with 4 ommatidia in greatest diameter. Propodeal spines of moderate length, almost 1/3 length of declivitous face of propodeum. Scape reaching but not surpassing occipital vertex. Metanotal impression of moderate depth, approximately ½ length of propodeal spines; over 2X as wide as deep, depth decreasing towards anterior. Propodeal plates moderately well developed, almost ½ as long as propodeal spines, directed posteriorly, and slightly upward. Anterior subpetiolar process reduced. Petiole pedunculate; stalk approximately ½ length of petiole. Anterior and posterior subpostpetiolar processes greatly reduced. Head rugose, except as follows: frontal area carinate, carinae diverging strongly towards posterior; central 1/3 (or slightly less) of frontal area (between antennal sockets) glassy-smooth. Interstices



Figs. 22—24. *Stenamma westwoodi*, male: 22, Alitrunk, petiole, and postpetiole, lateral view; 23, Head, full face view. 24, Head, lateral view.

glassy-smooth with scattered piligerous and nonpiligerous punctures. Thoracic dorsum scabrous. Thoracic pleura rugose-scabrous (approaching scabrous near dorsum). Neck of pronotum rugulose (slightly obscured by glue on specimens examined). Metanotal impression scrobiculate. Mesopleuron with scrobiculate median area. Coxae rugose; remainder of legs glassy-smooth with scattered piligerous punctures. Propodeal dorsum with scabrous basal face and glassy-smooth declivitous face. Alitrunk interstices glassy-smooth with scattered piligerous and nonpiligerous punctures. Petiolar node dorsum somewhat rugose with glassy-smooth interstices; remaining surfaces faintly rugulose. Postpetiolar node dorsum glassy-smooth with several faint rugae; anterior surface dorsum with several faint carinae; sides punctulate (punctures becoming more prominent towards posterior); venter faintly rugulose. First gastral tergite with base carinate with numerous carinae diverging towards posterior (longest carinae located near midline of tergite, about ½ length of postpetiole). First gastral sternite with base with several small carinae (most prominent at juncture with postpetiole) not extending far onto the sternite. Remainder of gaster glassy-smooth (even at high magnifications), with scattered piligerous punctures. Setae on head moderately dense, decumbent to suberect, setae on alitrunk, petiole, postpetiole, and gaster erect to suberect. Setae of flexor surfaces of coxae and venter of petiole absent. Entire body brown; appendages somewhat lighter in color (approaching testaceous). Setae yellow.

QUEEN

Measurements and associated statistics are listed in Table 1.

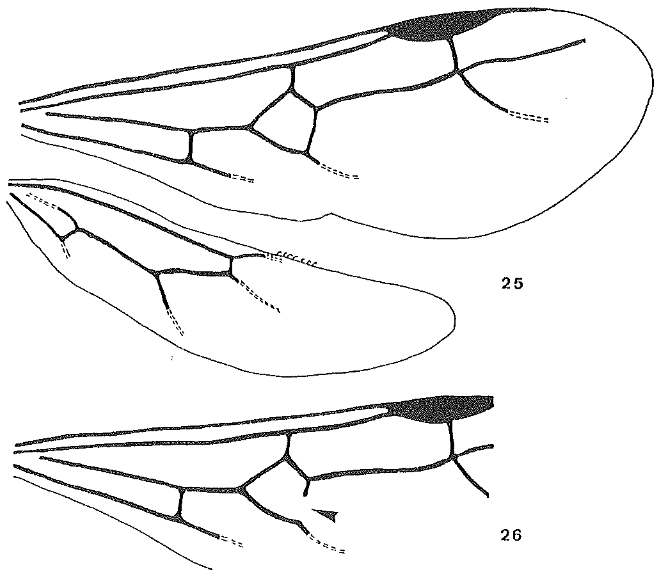
As described for worker except as follows: mandible with 8-9 teeth (apical 2 prominent); anterior clypeal margin with apex in lateral view flat. Compound eye with 16-19 ommatidia in greatest diameter. Metanotal impression absent due to thoracic modifications associated with flight. Propodeal plates well developed, over ½ as long as propodeal spines, directed posteriorly. Anterior subpetiolar process reduced (less prominent than in worker). Thoracic dorsum scabrous-rugose (more rugose towards posterior). Thoracic pleura rugose-scabrous (approaching scabrous near dorsum and anterior margin). Neck of pronotum rugulose (slightly obscured by glue on specimens examined). Propodeal dorsum with scabrous-rugose basal face and a few faint transverse carinae near dorsum of declivitous face (remainder glassy-smooth as in worker). Petiolar node dorsum somewhat rugose with interstices punctulate; sides scabrous; venter rugulose. Postpetiolar node dorsum rugose with punctulate interstices; anterior surface dorsum with several faint carinae; sides scabrous-rugose; venter rugulose. First gastral tergite with base carinate, numerous carinae diverging towards posterior (longest carina located near midline of tergite about 1/2-1/3 length of postpetiole).

MALE

Measurements and associated statistics are listed in Table 1.

LECTOTYPE Measurements. TL 4.09, HL 0.68, HW 0.64, CI 95, SL 0.27, SI 42, AL 1.42, PRW 0.71, PL 0.47, PH 0.21.

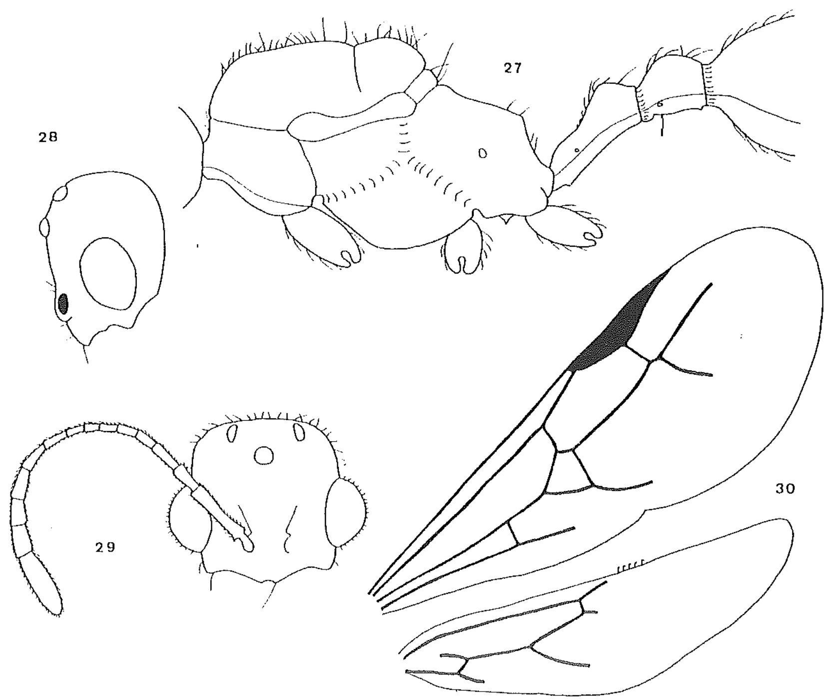
As described for worker except as follows: Mandible with 5 teeth (apical 2 prominent) (one male was observed to have a reduced 6th tooth at the juncture of the basal and declivitous faces of the mandible); anterior clypeal margin in full face view with median lobe flat to slightly emarginate; apex convex in lateral view. Compound eye with more than 25 ommatidia in greatest diameter. Scape never reaching occipital vertex. Propodeal spines reduced to small tubercles at juncture of basal and declivitous faces. Metanotal impression absent due to thoracic modifications associated with flight. Propodeal plates moderately well developed, longer than spines, directed posteriorly. Anterior subpetiolar process slightly reduced. Petiole pedunculate; stalk approximately ½ length of petiole, gradually thickening towards node. Head densely punctulate except as follows: frontal area carinate, carinae diverging strongly towards posterior; central 1/3 of frontal area (between antennal sockets) glassy-smooth; occipital vertex and gular area rugose. Interstices heavily punctulate.



Figs. 25—26. *Stenamma westwoodi*, wing venation: 25, Queen, typical wing venation; 26, Male, abnormal forewing venation showing incomplete vein formation.

Thoracic dorsum moderately punctulate. Thoracic pleura densely punctulate near anterior and posterior borders (with some rugae); median area glassy-smooth with scattered nonpiligerous punctures. Neck of pronotum densely punctulate. Coxae carinate, procoxae also punctulate; remainder of legs glassy-smooth with scattered piligerous punctures. Propodeal dorsum with glassy-smooth faces, basal face also with scattered nonpiligerous punctures, declivitous face with several transverse carinae. Alitrunk interstices glassy-smooth with scattered piligerous and nonpiligerous punctures. Petiolar node dorsum glassy-smooth (some specimens with a trace of rugae); side rugose; venter rugulose. Postpetiolar node dorsum glassy-smooth; remaining surfaces rugulose. First gastral tergite with base carinate with numerous carinae diverging towards posterior (longest carina located near midline of tergite, not exceeding 1/3 length of postpetiole). First gastral sternite with base with several small carinae (most prominent at juncture with postpetiole) not extending far onto the sternite. Entire body brown; head dark brown (approaching piceous); appendages testaceous.

LECTOTYPE DESIGNATION. I examined 3 males from the Hope Collection at Oxford (OXUM). It appears that these 3 males are all that remain of the original type series. All bear labels — [Type Hym 1344, followed with either 1/3, 2/3, or 3/3]; [Ex. Coll. J. O. Westwood, Pres. 1857 by Rev. F. W. Hope, Named 1896 by Edward Saunders as *Stenamma westwoodi*]. One specimen is badly damaged (only portions of gaster and postpetiole remain). Another



Figs. 27—30. *Stenamma westwoodi*, male lectotype: 27, Alitrunk, petiole, and postpetiole, lateral view; 28, Head, lateral view. Note missing mandibles; 29, Head, full face view. Note missing mandibles; 30, Wings.

bears a nearly illegible hand-written locality label [Near Goy (spelling?) Sept. 17, 1851] and another label [*M. graminicola* (Smith) Lat?]. Since *S. westwoodi* was described in 1840, it is unlikely that this specimen was used in the original description. The third specimen bears neither collection information nor date.

This specimen comes from Westwood's collection and is of the proper age. Since Westwood included a detailed drawing of this species' mandibles, I believe it is likely he based those drawings on direct observation, and by necessity dissected out the mandibles (which are missing in this specimen). Since there has been a significant amount of confusion regarding this species, I believe it is desirable to designate the above specimen as lectotype. Accordingly, I have affixed a red, partly hand-written label with the following information: [*Stenamma westwoodi* LECTOTYPE] to this specimen. It also bears the labels: [Type Hym 1344, 1/3]; [Ex. Coll. J. O. Westwood, Pres. 1857 by Rev. F. W. Hope, Named 1896 by Edward Saunders as *Stenamma westwoodi*]. All three males have been returned to the Hope Collection at Oxford (OXUM). Curiously, Westwood never mentioned a collection locality

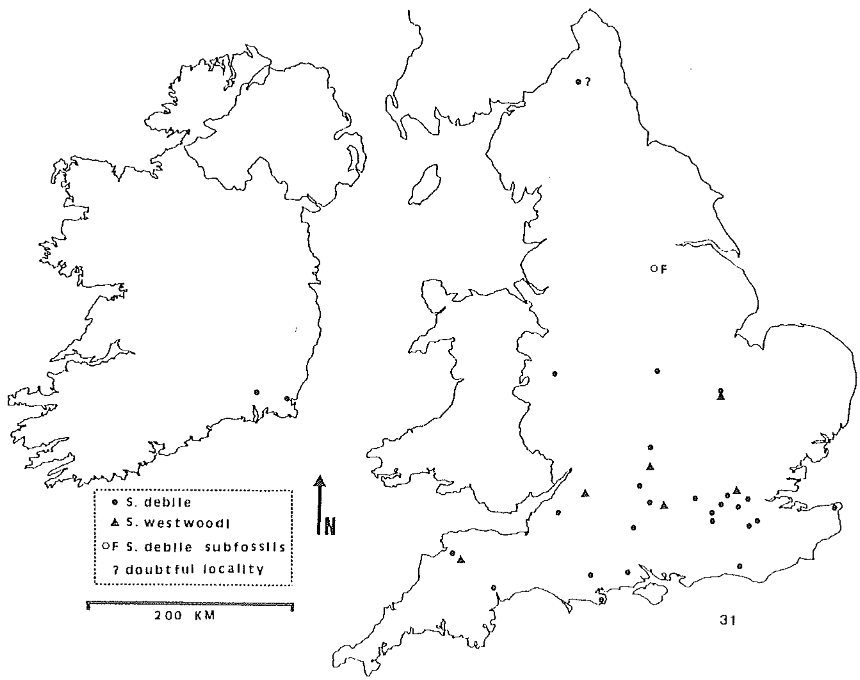


Fig. 31. Distribution of *Stenamma debile* and *S. westwoodi* in the United Kingdom and Ireland. Subfossil locality at Thorne Moor and questionable locality from extreme northern Britain also listed. Localities in Belgium and Israel (mentioned in text) could not be located on any maps consulted. For further discussion, refer to text.

or date. Since he resided in the vicinity of London, it is reasonable that the specimens he examined came from southern England.

DISCUSSION. *S. westwoodi* appears to be limited to England, Wales, and neighboring areas in continental Europe [only known from an unspecified locality in Belgium]. This may be an artifact of collecting. However, I have examined numerous specimens from continental Europe and have located only one exception. One worker has a locality label of Israel. Either this is a disjunct population, an accidental import, or an incorrectly labeled specimen. Further study is required to settle the issue regarding the distribution of this species. I suspect the biology of this species is quite similar to that of *S. debile*. Based upon collection records, it appears that nuptial flights occur in October.

COMPARISONS. *S. westwoodi* is most closely related to *S. debile* and shares many features in common; the two species have been regarded as synonyms for well over a century. However, it differs from the latter in the shape and sculpturing of the frontal area and shape of the petiole in females. It also differs from the latter in the number of mandibular teeth and shape of the mandibles in males.

MATERIAL EXAMINED: BELGIUM: [Brussels vicinity?] (2 workers - ISNB). ENGLAND: [no further collection data] (2 males, including LECTOTYPE - OXUM); [near Goy?] (1 male - OXUM); [London vicinity?] (6 males, 4 queens —BMNH). AVON: Dodington (1 male—OXUM). BERKSHIRE: Bradfield (1 worker - OXUM). CAMBSHIRE: Huntingfield (1 male, 1 queen—OXUM). DEVON: Tavy Valley, Double Waters (1 worker - OXUM). OXFORD: Oxford (1 male 1 queen - OXUM); [no further locality data] (1 male, 2 workers—OXUM). WORCHESHIRE: Chadbury (2 workers - CCPC). ISRAEL: Eilon (1 worker - CCPC). WALES: Dyfed, Grassholm, 12km W Skomer Island (1 worker - CCPC).

Stenamma debile (Foerster)
Worker Figs. 32-35, 44-46, 48. Queen Figs. 36-39. Male Figs. 40-43.
Distribution Fig. 31

Myrmica debilis Foerster, 1850: 52-53. Worker - Germany: Rhein-provinz, Aachen. [Not examined, type could not be located].

Myrmica minkii Foerster, 1850: 63. Worker - Germany: Rhein-provinz, Crefeld [Krefeld]. [Synonymy with *Myrmica lippula* by Mayr, 1863: 395]. [Not examined, type could not be located]. **New provisional synonymy.**

Stenamma westwoodi polonicum Begdon, 1932 (1931): 113-118. Worker, queen - Poland: Pomerania. [Not examined, type could not be located]. **New provisional synonymy.**

This species ranges throughout Europe. Numerous specimens are still being examined from southern Europe. In an effort to expedite publication, only measurement data (and locality information) from England and Ireland are included herein. This facilitates comparisons with *S. westwoodi* which is found in the same area.

As described for *S. westwoodi*, except as follows:

WORKER

Measurements and associated statistics are listed in Table 2.

Mandible with 7-9 teeth; anterior clypeal margin with apex in lateral view convex (almost flat). Compound eye with 4-6 ommatidia in greatest diameter. Metanotal impression of moderate depth, approximately 2/3 length of propodeal spines. Propodeal plates well developed, approximately as long as propodeal spines. Anterior subpetiolar process prominent to somewhat reduced. Head with frontal area carinae diverging towards posterior (less so than in *S. westwoodi*); central 1/3, or greater, of frontal area (between antennal sockets) glassy-smooth. Thoracic dorsum rugose to scabrous. Propodeal dorsum with rugose basal face (a few transverse carinae between spines) and glassy-smooth declivitous face (some specimens with longitudinal carinulae).

Table 2. *Stenamma debile* measurements.

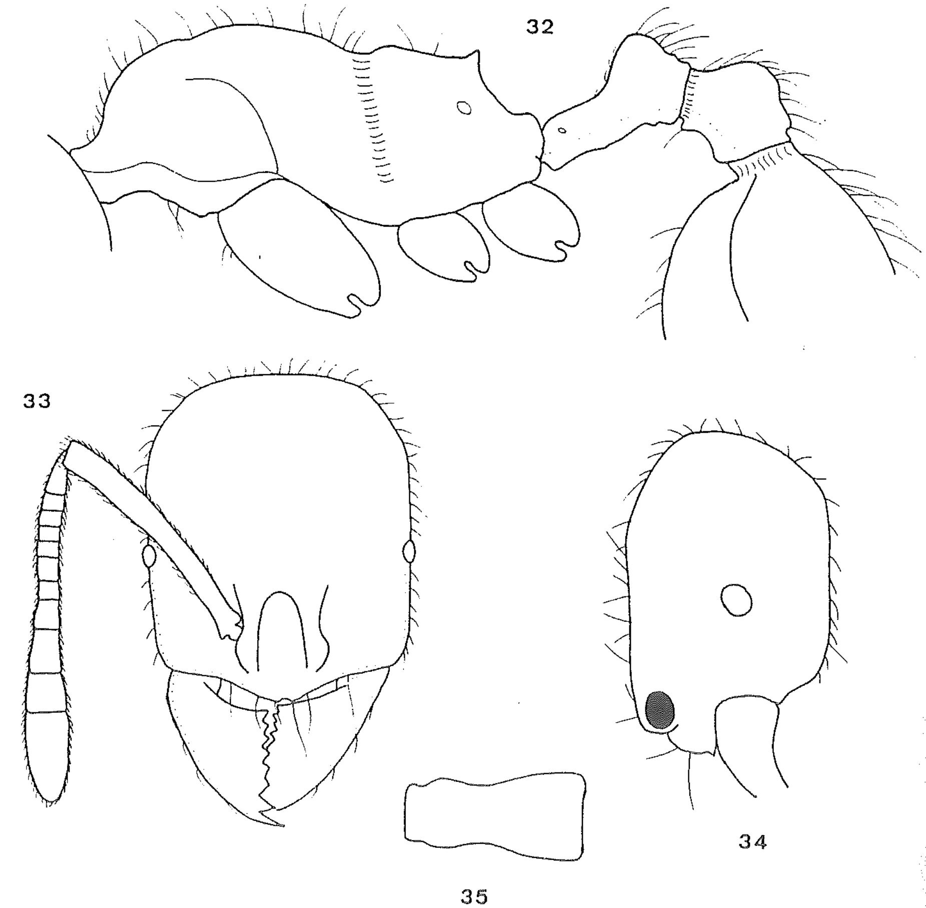
Measurement	n=	Minimum	Maximum	Mean	Standard Deviation	Standard Error
WORKERS						
TL	76	3.30	4.59	3.72	0.193	0.022
HL	76	0.79	0.97	0.86	0.034	0.004
HW	76	0.66	0.82	0.73	0.035	0.004
CI	76	78.85%	92.45%	84.92%	2.61%	0.30%
SL	76	0.58	0.74	0.65	0.025	0.003
SI	76	81.19%	95.35%	88.65%	3.02%	0.35%
AL	78	1.00	1.45	1.14	0.071	0.008
PRW	78	0.43	0.68	0.51	0.033	0.004
PL	78	0.34	0.52	0.41	0.033	0.004
PH	78	0.21	0.27	0.23	0.013	0.001
QUEENS						
TL	13	4.19	4.68	4.46	0.143	0.040
HL	14	0.89	0.98	0.93	0.028	0.007
HW	14	0.76	0.85	0.81	0.022	0.006
CI	14	83.05%	90.91%	86.63%	2.33%	0.62%
SL	14	0.64	0.72	0.68	0.022	0.006
SI	14	81.13%	89.80%	84.83%	2.46%	0.66%
AL	14	1.27	1.51	1.39	0.064	0.017
PRW	14	0.63	0.74	0.70	0.031	0.008
PL	14	0.42	0.52	0.48	0.031	0.008
PH	14	0.24	0.27	0.26	0.011	0.003
MALES						
TL	38	3.51	4.63	4.26	0.251	0.041
HL	38	0.61	0.79	0.71	0.046	0.007
HW	37	0.50	0.69	0.62	0.051	0.008
CI	37	73.81%	94.87%	86.91%	3.63%	0.60%
SL	38	0.23	0.31	0.28	0.018	0.003
SI	37	40.00%	58.06%	44.60%	3.36%	0.55%
AL	38	1.21	1.65	1.48	0.096	0.016
PRW	38	0.60	0.87	0.76	0.071	0.012
PL	38	0.42	0.60	0.49	0.039	0.006
PH	38	0.19	0.26	0.23	0.018	0.003

Postpetiolar node dorsum glassy-smooth to faintly rugose; anterior and posterior surfaces rugose; side rugulose, and venter rugulose to punctate. First gastral tergite with base carinate with numerous carinae diverging towards posterior (longest carina located near midline of tergite, about 1/3 to ½ length of postpetiole). First gastral sternite with base predominantly glassy-smooth with several small carinae (most prominent at juncture with postpetiole) not extending for more than 1/5 to 1/4 length of postpetiole. Head and alitrunk brown to dark brown [almost piceous]; petiole, postpetiole, and gaster brown.

QUEEN

Measurements and associated statistics are listed in Table 2.

As described for worker except as follows: mandible with 8 teeth (apical 1 prominent); anterior clypeal margin in lateral view with apex convex. Thoracic dorsum rugose-carinate (more carinate towards posterior). Thoracic pleura carinate towards posterior and dorsum. Propodeal dorsum with transverse



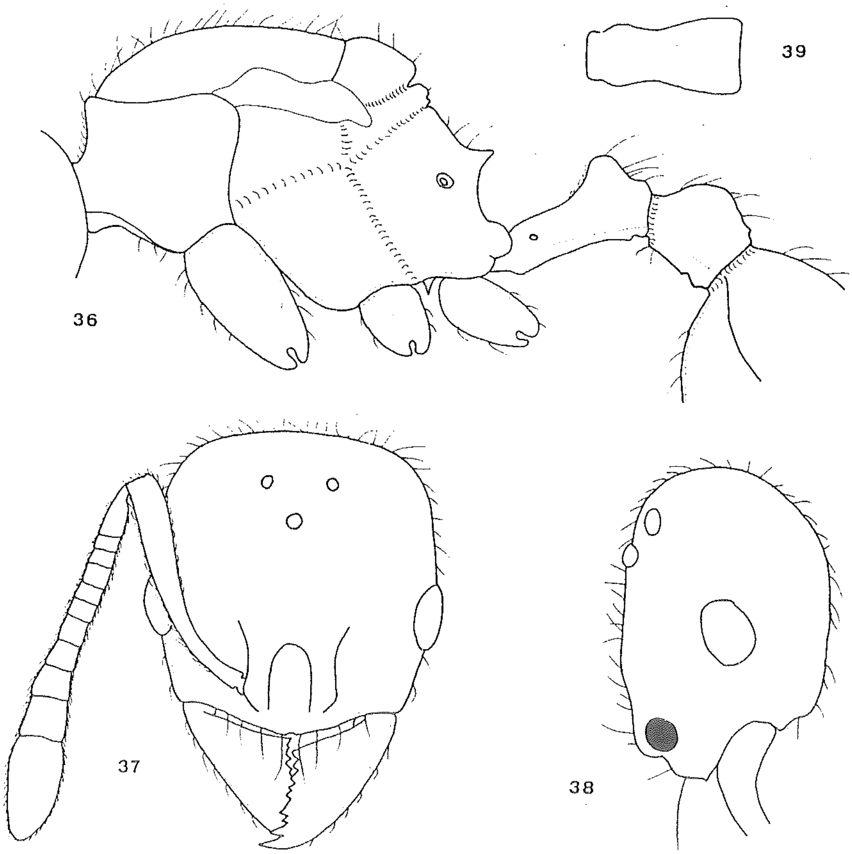
Figs. 32—35. *Stenamma debile*, worker: 32, Alitrunk, petiole, and postpetiole, lateral view; 33, Head, full face view; 34, Head, lateral view; 35, Petiole, dorsal view (setae omitted).

carinae on basal face; longitudinal carinae between spines, extending onto declivitous face (some specimens with glassy-smooth declivitous face). Petiolar node dorsum rugose-carinate; sides rugose. First gastral tergite with base carinate with numerous carinae diverging towards posterior (longest carina located near midline, about 1/4 to 1/3 length of postpetiole). First gastral sternite with base same as first gastral tergite base.

MALE

Measurements and associated statistics are listed in Table 2.

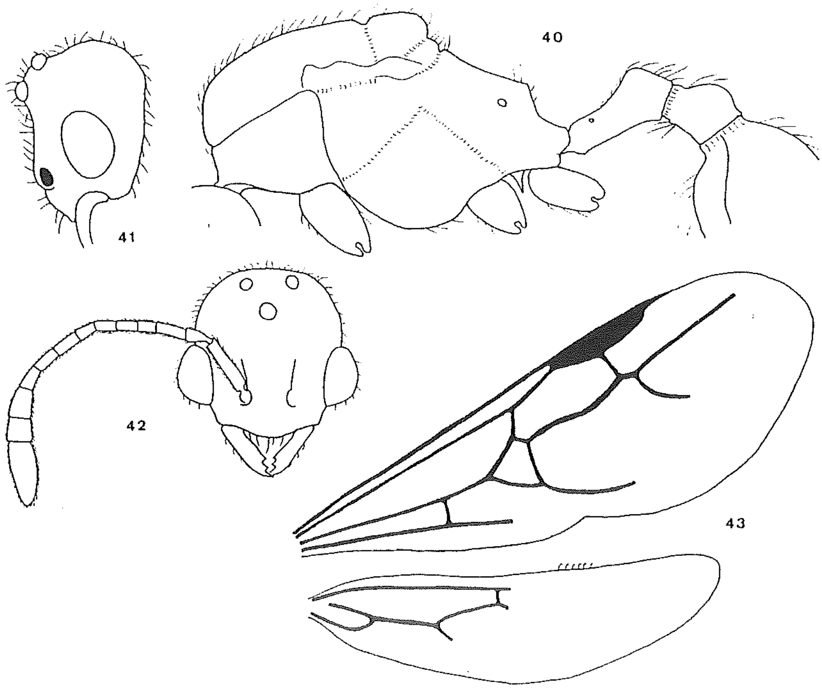
As described for worker except as follows: mandible with 3 teeth (apical tooth prominent); anterior clypeal margin in full face view with median lobe evenly convex. Compound eye with more than 20 ommatidia in greatest



Figs. 36—39. *Stenamma debile*, queen: 36, Alitrunk, petiole, and postpetiole, lateral view. 37, Head, full face view. 38, Head, lateral view. 39, Petiole, dorsal view (setae omitted).

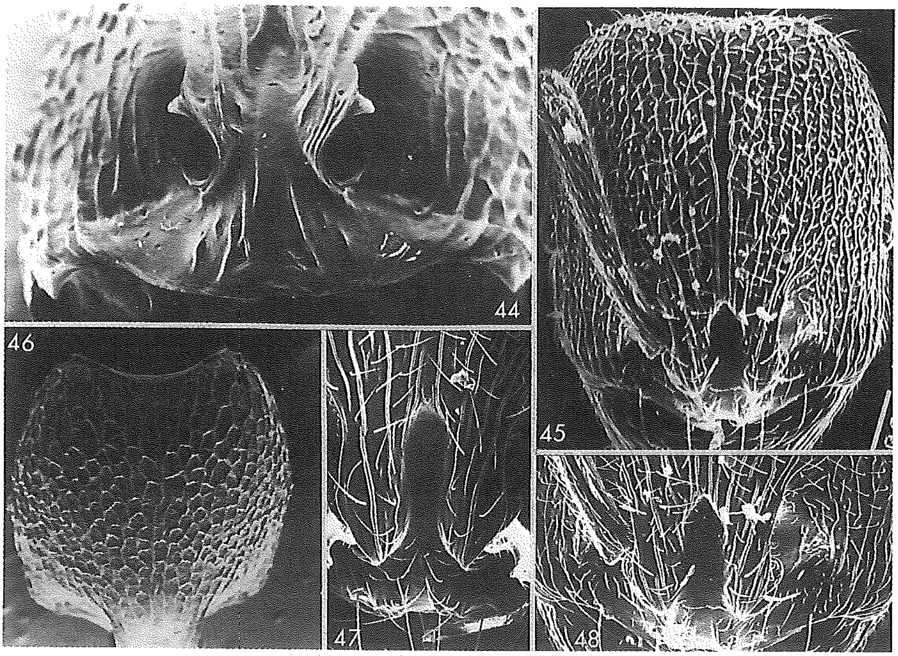
diameter. Anterior subpetiolar process reduced. Thoracic dorsum faintly carinate. Thoracic pleura glassy-smooth with faint carinae near dorsum and venter; median area glassy-smooth with scrobiculate suture. Coxae faintly carinate. Propodeal dorsum with glassy-smooth surfaces. First gastral tergite with base carinate with numerous carinae diverging towards posterior (longest carina located near midline of tergite, about 1/5 to 1/4 length of postpetiole). First gastral sternite base same as tergite base. Entire body piceous; appendages and gaster brown. Compound eyes silver; ocelli amber. Wings testaceous.

NO NEOTYPE IS DESIGNATED. For several years, I have unsuccessfully



Figs. 40—43. *Stenamma debile*, male: 40, Alitrunk, petiole, and postpetiole, lateral view. 41, Head, lateral view. 42, Head, full face view. 43, Wings.

searched for the type series of both *Myrmica debilis* and *Myrmica minkii*. I have inquired of major museums in the following cities: Basel, Berlin, Bratislava, Brussels, Budapest, Gembloux, Geneva, Genoa, Helsinki, Kiev, Leningrad, Moscow, Oxford, Paris, Tervuren, Vienna, Warsaw, and Zagreb. It appears that what remains of Foerster's specimens have been scattered. Given that the type may not have had a locality label or even an indication that it was a type, I believe it has been lost. B. Seifert (pers. comm.) indicated he found a small Foerster collection in the Zoologisches Museum in Berlin, but it was almost completely destroyed by pest insects. I do not believe it is warranted to designate a neotype for this species. Based upon present knowledge of *Stenamma*, only one species is known from the vicinity of Aachen, Germany. Additionally, Foerster's original description includes one of the characters which defines this species (and separates it from its closest relative). Given the difficulties with this genus, I believe it best to wait until additional material is examined from the vicinity of Aachen. Then, designation of a neotype may be warranted.



Figs. 44 — 48. Scanning electron microscope photographs: 44, *Stenamma debile* subfossil head capsule showing details of posterior clypeal margin and frontal area. 45, *S. debile* recent worker showing head in full face view. 46, *S. debile* subfossil head capsule showing details of occipital vertex. 47, *S. westwoodi* recent worker head showing detail of frontal area. 48, S. *debile* recent worker head showing detail of frontal area.

NEW SYNONYMY. *Stenamma minkii* has been regarded as a synonym of *S. westwoodi* (which included *S. debile* - see for example, Donisthorpe, 1927). The synonymy is restricted to *S. debile* in this paper since both *S. westwoodi* and *S. debile* are viewed as distinct species. Foerster (1850) described the species *Myrmica debilis* (based on a single male from Aachen, Germany [50°46'N 6° 06'E]). In the same publication, he described the species *Myrmica minkii* (based on a single worker collected by Mr. Mink near Crefeld [Krefeld], Germany [51° 20'N 6° 32'E]). These names have been regarded as synonyms (see for example, Donisthorpe, 1927). Based upon the original descriptions, both are properly assigned to the genus *Stenamma.* They represent different sexes and were originally discovered within 75km of each other. Although neither type could be located, I believe it best to regard *S. minkii* as a synonym of *S. debile.*

I also believe that *Stenamma westwoodi polonicum* is a synonym of this species. I have examined specimens from southern Poland (courtesy of B. Pisarski). These are clearly *S. debile.* However, Dr. Pisarski cautions that the habitat where these specimens were collected differs significantly from the type locality of *S. westwoodi polonicum*. Respecting this caution, I believe it best to synonymize this name until additional evidence supporting full species status is obtained. *S. debile* exhibits a large amount of variation (both quantitatively and qualitatively, in surface sculpture). This range of variation includes the variation described for the name *polonicum*. Given my unsuccessful quest for the type, I suspect it has been lost. I have inquired of major museums in the following cities: Berlin, Brussels, Budapest, Gembloux, Geneva, Kiev, Leningrad, Moscow, Vienna, and Warsaw. Since the name *S. westwoodi polonicum* has only been used in 2 publications (Begdon, 1931, 1932), the types can not be located, and the original description falls within the observed range of *S. debile*, I believe it best to place the name in synonymy until additional material is available. Readers wishing an English translation of Begdon's description should contact me.

Should additional specimens of *Stenamma* be collected in Poland (type locality is POLAND: Pomerania: vicinity of Lwow [Lwowek? near Poznan]), the issue of the status of *S. westwoodi polonicum* should be revisited.

DISCUSSION. *S. debile* appears to be widely distributed throughout northern and central Europe. In most cases, literature records of *S. westwoodi* probably refer to this species (given the restricted range of the former). The biology of this species is rather typical (for what is known about *Stenamma*); nuptial flights probably occur in September throughout most of its range. Most alate queens and males have been collected in September (some slightly earlier or later depending on the latitude and elevation). It is assumed that specimens associated with workers were collected from colonies, while those not associated were collected during (or after) their nuptial flight.

S. debile exhibits a fairly wide range of altitudinal tolerance. Collections range from near sea level through 1275m (in the majority of central Europe most collections are between 100 and 500m). Elevational tolerance increases towards southern latitudes. For example, collections in former Yugoslavia range from 450m through 1275m and collections from Greece range from 700m through 1200m.

Arnoldi (1975: 1826) provided additional information on the distribution of this species in Russia [called *S. westwoodi* in that publication]. He indicated that this species is widespread (particularly in mossy pine woods) in the sandy areas of the southern half of the central forest-steppe (Kursk and Voronesh regions). It then spreads into the southern forests near rivers. It is succeeded by *S. ucrainicum* in the mountainous regions of eastern Ukraine. *S. debile* is rare in Crimea, but is widespread in the Caucasus in mountainous regions in broad-leaved forests, 500m above sea level.

COMPARISON. *S. debile* is most similar to *S. westwoodi* and differences between these species were previously discussed.

FOSSIL RECORD. Recently, subfossils of *Stenamma* were discovered in

Great Britain (Collingwood & Hughes, 1987: 100-101). These are represented as head capsules of ants which perished during the Bronze Age. Collingwood & Hughes (1987) indicate these specimens were found at Thorne Moor which is about 160km north of the nearest collection of *Stenamma* in recent history. These specimens are clearly *S. debile* given their head sculpture and width of the glassy-smooth frontal area between the antennal insertions (Figs. 44, 46).

MATERIAL EXAMINED. Note: The following records only represent localities in the United Kingdom and Ireland. Many additional specimens have been examined from throughout Europe; these will be discussed further in a separate publication.

ENGLAND: [no further collection data] (5 males, 8 workers - OXUM; 1 worker - CCPC); [London vicinity] (2 males, 5 queens, 2 workers -BMNH); Oxschoff (1 worker - BMNH); Oxshott (4 workers -BMNH); Parkhurd Forest (1 worker - BMNH); Tubney (1 worker - BMNH). AVON: Dodington (1 male, 1 worker - OXUM). BERKSHIRE: Bagley Wood (11 workers - OXUM); Cothill (3 workers - OXUM); Windsor Forest (1 male, 4 workers - OXUM); Wytham (4 workers - OXUM). CAMBSHIRE: Huntingfield (2 males - OXUM). DEVON: Shaldon (1 queen - OXUM); Yelverton (1 male, 2 workers - CCPC). DORSET: Blandford (1 worker - BMNH). ERIE: Wexford (1 worker - CCPC). KENT: Brasted (1 worker - BMNH); Maidstone (4 workers - CCPC); Margate (1 male - BMNH). LEICESTER: Leicester (1 worker - BMNH). NORTHUMB: Mark (1 worker - ZMNH). OXFORD: Begbroke (1 worker - OXUM). S. HANTS: Oberheath (2 workers - OXUM). SHROPSHIRE: Weston (3 queens - CCPC). SURREY: Chobham (1 worker - OXUM); Weybridge (1 worker - OXUM) [with *Lasius fuliginosus*]. SUSSEX: Ditchling (1 worker - BMNH). IRELAND: [no further collection data] (8 males, 10 workers - OXUM). NEW ROSS CO.: (15 males, 2 queens, 12 workers - OXUM); Wexford (3 males, 2 queens, 1 worker - OXUM).

Stenamma lippulum (Nylander)

Worker Figs. 49-56, Worker (*S. caucasicum*) Lectotype Figs.: 49-53
Queen Figs.: 57-61, Worker (*S. lippulum*) Lectotype Figs. 62-67
Worker (*S. hirtulum*) Lectotype Figs. 68-70, Distribution Fig. 71

Myrmica lippula Nylander, 1849: 41. Worker—Southern Russia. (Lectotype worker-UZMH) [examined].

Stenamma westwoodi var. hirtula Emery, 1898: 135. Worker—Russia, Lenkoran (Lectotype worker—MCSN) [examined]. **New synonymy.**

Stenamma caucasicum Arnoldi, 1975: 1823, figure. Worker, Queen—U.S.S.R.: Russian S.F.S.R.: Caucasus, Krasnaya Polyana, VIII-1933 (K. V. Arnoldi). (Lectotype worker, 11 paratype workers, 1 allotype queen-ZMUM) [examined]. **New synonymy.**

As described for *S. westwoodi* except as follows:.
WORKER
Measurements and associated statistics are listed inTable 3.

LECTOTYPE WORKER (*S. lippulum*). TL 3.56, HL 0.82, HW 0.72, CI 88, SL 0.61, SI 84, AL 1.03, PRW 0.48, PL 0.40, PH 0.22.

LECTOTYPE WORKER (*S. hirtulum*). TL 3.88, HL 0.90, HW 0.74, CI 82, SL 0.72, SI 97, AL 1.18, PRW 0.50, PL 0.40, PH 0.23.

LECTOTYPE WORKER (*S. caucasicum*). TL 3.69, HL 0.85, HW 0.74, CI 87, SL 0.61, SI 83, AL 1.18, PRW 0.52, PL 0.35, PH 0.23.

Mandible with 7-8 teeth, rarely 10; anterior clypeal margin with apex convex in lateral view with a small concavity (near mandible). Propodeal spines of moderate length, approximately ½ length of declivitous face of propodeum (shorter in some specimens). (Arnoldi described these as short.) Scape not reaching occipital vertex. (Arnoldi indicated it did not reach by 1.5 X its diameter). Metanotal impression shallow, wide, depth approximately 1/3 length of propodeal spines; approximately 3 X as wide as deep, depth decreasing towards anterior. Posterior ventral edge of the pronotum (near procoxae) with large pit lined with microsetae. Propodeal plates approximately same length as, or slightly shorter than, propodeal spines, directed posteriorly. Anterior subpetiolar process usually a prominent bump. Anterior subpostpetiolar process a prominent bump, posterior subpostpetiolar process reduced. Head (most similar to the sculpture of *S. westwoodi* and *S. debile*) except as follows: frontal area smooth with small carinulae (especially near clypeal margin), carinulae diverging towards posterior; slightly less than 1/3 distance (between antennal sockets) glassy-smooth; venter of head rugose (almost scabrous); occipital area with anastomosing rugae usually forming concentric loops. (Arnoldi described these as loop-like rugae). Thoracic dorsum rugose (almost carinate) decidedly longitudinal (similar to *S. striatula*). Humeral angles almost smooth and devoid of sculpture. Thoracic pleura rugose (almost forming network near center) decidedly longitudinal. Propodeal side and pronotal side with longitudinal carinae. Mesopleuron with weakly scrobiculate median area. Coxa mostly smooth (or with weak transverse carinae); femur with faint longitudinal carinae; remainder of legs glassy-smooth with scattered piligerous punctures. Propodeal dorsum with transversely carinate basal face and glassy-smooth declivitous face (with faint longitudinal carinae in some specimens). Petiolar node dorsum faintly rugose; anterior and posterior surfaces rugose. Postpetiolar node dorsum smooth with faint rugae; anterior and posterior surfaces rugose (almost scabrous); side and venter rugulose. First gastral tergite with base carinate with numerous carinae diverging towards posterior (longest carina located near midline of tergite, 1/4 to 1/3 length of postpetiole). First gastral sternite with base predominantly glassy-smooth with small carinae which do not extend beyond juncture onto gaster. Setae on head

Table 3. *Stenamma lippulum* measurements

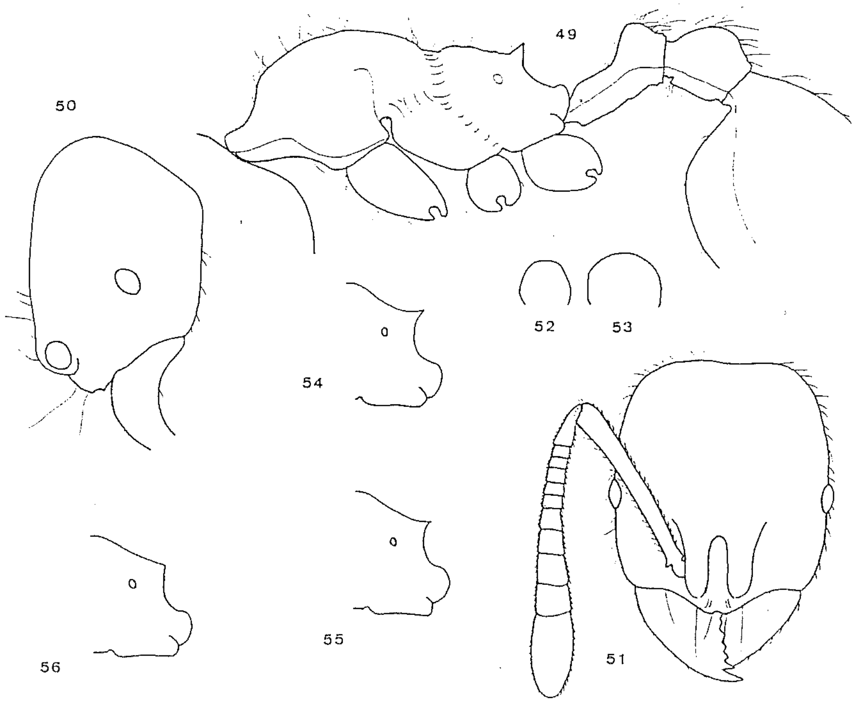
Measurement	n=	Minimum	Maximum	Mean	Standard Deviation	Standard Error
WORKERS						
TL	84	3.33	4.22	3.79	0.173	0.019
HL	84	0.81	0.95	0.87	0.038	0.004
HW	84	0.66	0.81	0.75	0.034	0.004
CI	84	79.25%	90.74%	85.61%	2.51%	0.27%
SL	84	0.60	0.71	0.65	0.026	0.003
SI	84	80.00%	93.62%	86.86%	2.67%	0.29%
AL	87	1.00	1.27	1.16	0.065	0.007
PRW	87	0.43	0.60	0.52	0.032	0.003
PL	87	0.34	0.48	0.40	0.031	0.003
PH	87	0.19	0.29	0.23	0.017	0.002
QUEENS						
TL	3	4.31	4.99	4.63	0.343	0.198
HL	3	0.89	0.97	0.94	0.038	0.022
HW	3	0.79	0.85	0.82	0.032	0.019
CI	3	86.44%	88.33%	87.69%	1.08%	0.62%
SL	3	0.68	0.72	0.71	0.028	0.016
SI	3	84.91%	88.24%	86.29%	1.74%	1.00%
AL	3	1.32	1.58	1.43	0.134	0.077
PRW	3	0.64	0.81	0.74	0.085	0.049
PL	3	0.50	0.52	0.50	0.009	0.005
PH	3	0.24	0.32	0.28	0.041	0.023

moderately dense suberect to decumbent (almost appressed), erect setae on clypeus. Setae on scape decumbent to subdecumbent (on funiculus decumbent to appressed). Setae of petiole appressed on dorsum of stalk, erect to suberect on node. Setae of postpetiole erect to appressed; setae on venter erect. Head, alitrunk, petiole, and postpetiole ferruginous, gaster and appendages testaceous.

QUEEN

Measurements and associated statistics are listed in Table 3.

As described for worker except as follows: mandible with 6-7 teeth (apical 2 prominent); anterior clypeal margin in full face view with median lobe weakly emarginate; apex in lateral view flat to slightly concave. Compound eye with 15-18 ommatidia in greatest diameter. Propodeal spines of moderate length, approximately 1/3 length of declivitous face of propodeum. Scape almost reaching occipital vertex (missing by amount less than length of first funicular segment). Petiole pedunculate; stalk slightly less than ½ length of petiole. Thoracic dorsum longitudinally carinate (similar to *S. striatula*). Thoracic pleura glassy smooth near center, longitudinally carinate towards either end. Neck of pronotum punctulate. Mesopleuron with scrobiculate median area. Coxae transversely carinate. Petiolar node dorsum rugose; anterior and posterior surfaces rugose. Postpetiolar node dorsum glassy-smooth; remaining surfaces rugose. First gastral tergite with base carinate with numerous carinae diverging towards posterior (longest carina located near midline of tergite, 1/5 to 1/4 length of postpetiole).



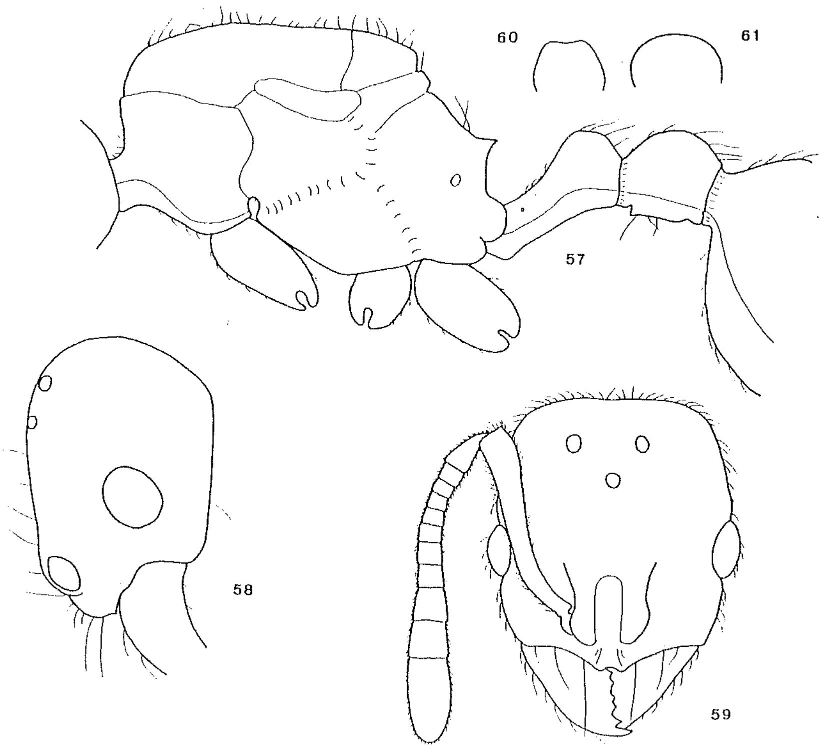
Figs. 49 - 56. *Stenamma lippulum*, worker. 49, Alitrunk, petiole and postpetiole, lateral view. 50, Head, lateral view. 51, Head, full face view. 52, Dorsal petiolar profile viewed from rear. 53, Dorsal postpetiolar profile viewed from rear. 54 - 56, Propodeum of various workers in lateral profile showing variation in length of propodeal spines.

MALE

Arnoldi (1975: 1826) briefly described the male of this species (which he called *S. hirtulum*). To the best of my knowledge, this description was based upon specimens Arnoldi examined from Russia. I do not believe he consulted the type worker for comparison. Since this description is in Russian and I was unable to locate any specimens (in ZMUM or elsewhere), I provide the following translation.

"Scape is narrow, slightly bent at the base, with long setae as in worker. Eyes are bulging and equal in size to the temples. Propodeum is typical. Main surface is depressed. Slanted surface is slightly concave. Both surfaces are covered with net-like pattern of rugae and [are] shining." (Arnoldi, 1975: 1826. Translation by S. Goldgof).

Wing venation is unknown in this species (only 3 queens have been collected to date, all were dealate). The male described by Arnoldi (as *S.*

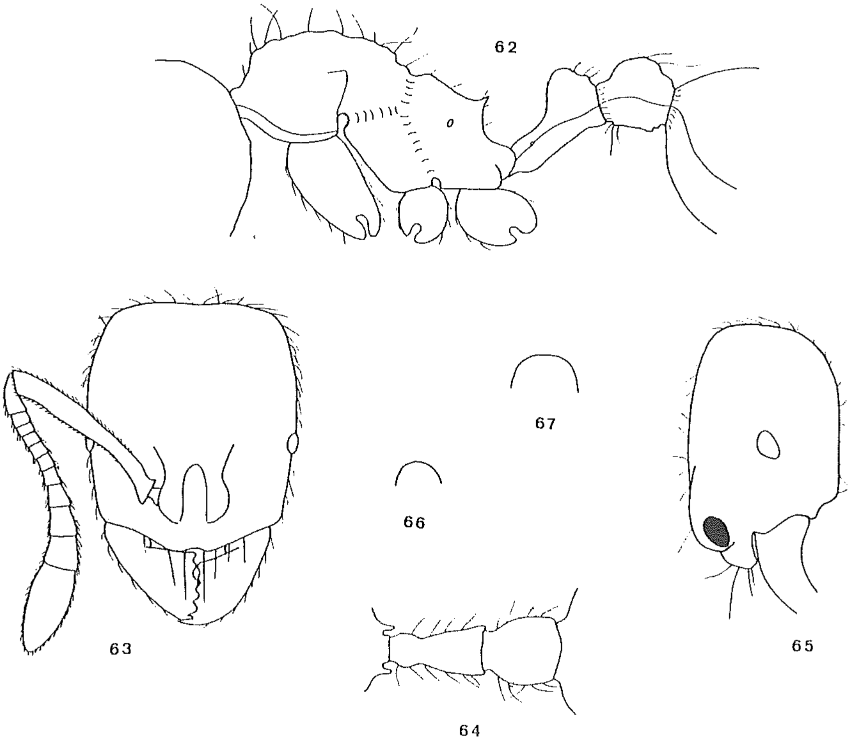


Figs. 57—61. *Stenamma lippulum*, queen. 57, Alitrunk, petiole and postpetiole, lateral view. 58, Head, lateral view. 59, Head, full face view. 60, Dorsal petiolar profile viewed from rear. 61, Dorsal postpetiolar profile viewed from rear.

hirtulum) could not be located. Details concerning mating flights are also unknown.

LECTOTYPE DESIGNATIONS AND SYNONYMIES. Given the current knowledge of *Stenamma* and the fact that type material in several collections is not clearly labeled, I here designate lectotypes for all three taxa currently recognized under the name *S. lippulum*. It is probable that behavioral or other nonmorphological characters of these animals will provide additional clues to the biology of this species.

Both *Stenamma lippulum* and *S. hirtulum* workers examined fit within the observed range of variation of *S. caucasicum* (85 workers examined). Measurement data is presented in Table 4 If these were separate species, it is presumed that at least some measurements would differ between forms. This is also true for qualitative features (such as surface sculpturing and pilosity). Additionally, Nylander's *lippulum* came from "southern Russia." It



Figs. 62—67. *Stenamma lippulum*, worker lectotype: 62, Alitrunk, petiole, and postpetiole, lateral view. 63, Head, full face view. 64, Petiole and postpetiole, dorsal view. 65, Head, lateral view. 66, Dorsal petiolar profile viewed from rear. 67, Dorsal postpetiolar profile viewed from rear.

was probably collected by Motschulsky from the Caucasus Mountains. *S. hirtulum* was probably collected in the forests (and foothills) near Lenkoran. *S. caucasicum* was collected as close as 28km from Lenkoran. Therefore, based on the material examined, I believe all 3 names represent the same species; the name *S. lippulum* (Nylander) has priority.

Accordingly, I have placed a red, partly hand-written label on the single worker from Nylander's collection (UZMH). It bears the information: *Stenamma lippulum* LECTOTYPE. Additional label information is as follows: 35 [significance of this number not known]; Spec. typ.; Coll. Nyland.; *M. lippula* Nyl.

S. hirtulum was observed only from a single locality in south-central Russia (near Iran and Turkey). Ruzsky (1905) indicated this species inhabited the Caucasus (Dagestan, Atli-Buun Mountain Range on the way to Temir-Hun-Shuru). He discovered one worker on the ground in oak brushwood on the slope of the mountain range (near the pass) on 1-VI-1899. He indicated this

Table 4. Measurment comparison among three Russian "species".

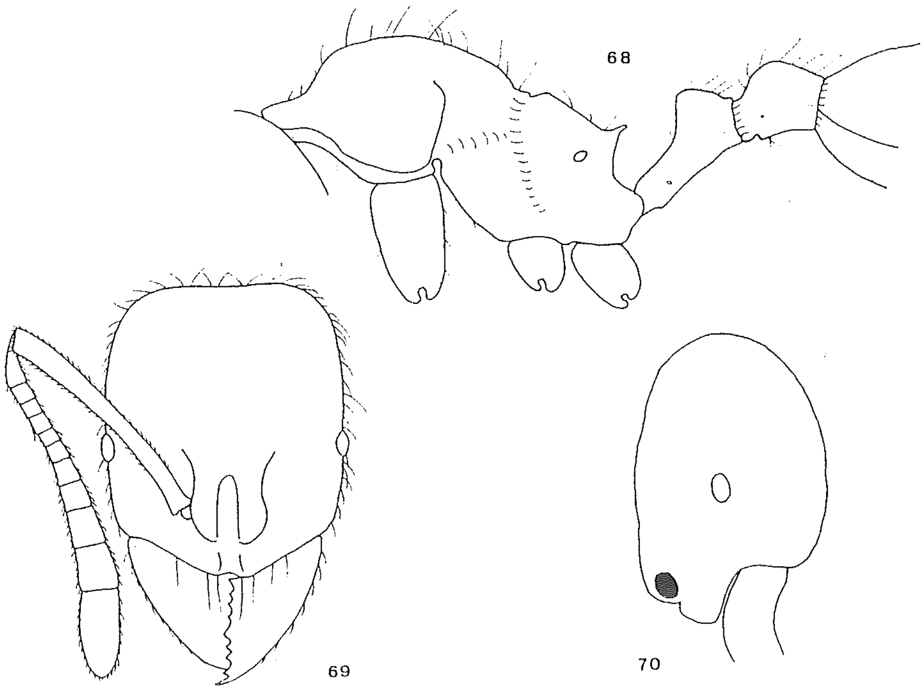
Measurement	Observed Minimum	S. lippulum Lectotype	S. hirtulum Lectotype	S. caucasicum Lectotype	Observed Maximum
T L	3.33	3.56	3.88	3.69	4.22
H L	0.81	0.82	0.90	0.85	0.95
HW	0.66	0.72	0.74	0.74	0.81
C I	79.25%	88.24%	82.14%	86.79%	90.74%
S L	0.60	0.61	0.72	0.61	0.72
S I	80.00%	84.44%	97.83%	82.61%	97.83%
A L	1.00	1.03	1.18	1.18	1.27
PRW	0.43	0.48	0.50	0.52	0.60
P L	0.34	0.40	0.40	0.35	0.48
P H	0.19	0.22	0.23	0.23	0.29

species lives in woods [deciduous forest?]. Arnoldi (1975: 1826) indicated this species is not well studied and its distribution is sporadic. He lists the following localities in his key: Transcaucasus (Talish, Batumi) and Eastern Caucasus (Terek). It should also be noted that Begdon (1932: 114) made comparisons with 4 workers of this species. It is doubtful that Begdon actually examined these specimens [he indicates they are quoted in Arnoldi (1928)] as all measurements are an exact match with those in Arnoldi's publication.

As was previously mentioned, *S. hirtulum* is viewed as a synonym of *S. lippulum* [and *S. caucasicum*] since the type fits well within observed variation of numerous workers examined. Additionally, collection localities are within 28km of each other. Although colonies of *S. westwoodi* and *S. debile* are found in close proximity, there are observable differences between these species (not even all measurements completely overlap as they do with *S. lippulum*, *S. hirtulum* and *S. caucasicum*). However, there are some minor differences between *S. caucasicum* and *S. hirtulum*. These center around the reduced vs. prominent subpetiolar process, pilosity, and number of mandibular teeth. These characters are somewhat variable within the genus. For example, in the previous discussion of male *S. westwoodi* it was noted that one specimen had more mandibular teeth on one side than the other. These usually appear as denticles near the base of the mandible.

Since there appears to be some confusion regarding the distribution of this form and since Emery did not clearly label the type worker, I have affixed a red, partly handwritten label (*Stenamma hirtulum* LECTOTYPE) to the specimen. This worker has been returned to the MCSN.

After examining the type series of *S. caucasicum*, I noted that no specimen



Figs. 68—70. *Stenamma hirtulum*, worker lectotype: 68, Alitrunk, petiole and postpetiole, lateral view. 69, Head, full face view. 70, Head, lateral view.

was clearly labeled holotype or "type." Additionally, there are several collections (represented by different field numbers; A-6183, A-6182, A-6181) all mixed together within the type series. All collections are from Caucasus, Krasnaya Polyana, VIII-1933.

I observed some differences between Arnoldi's description and the specimens I examined. Arnoldi indicated that the third through eighth segments of the funiculus are sharply transverse with the first segment almost square. I observed that the eighth segment represents the base of the antennal club and is decidedly longitudinal; the seventh is similar. I observed that the first segment is decidedly longitudinal and not square. I verified these features against all of type series I examined. It should be noted that Arnoldi's measurements do not correspond with mine either. Any reader wishing a complete translation of Arnoldi's (1975) description should contact me.

Arnoldi designated an allotype female, holotype, and 11 paratype workers. Yet, in the series examined, there are 14 workers and 1 female. Unfortunately, Arnoldi did not indicate separate measurements for the holotype [and does not appear to have labeled one as such]. In order to reduce possible future confusion, I have designated one worker as lectotype and attached a red,

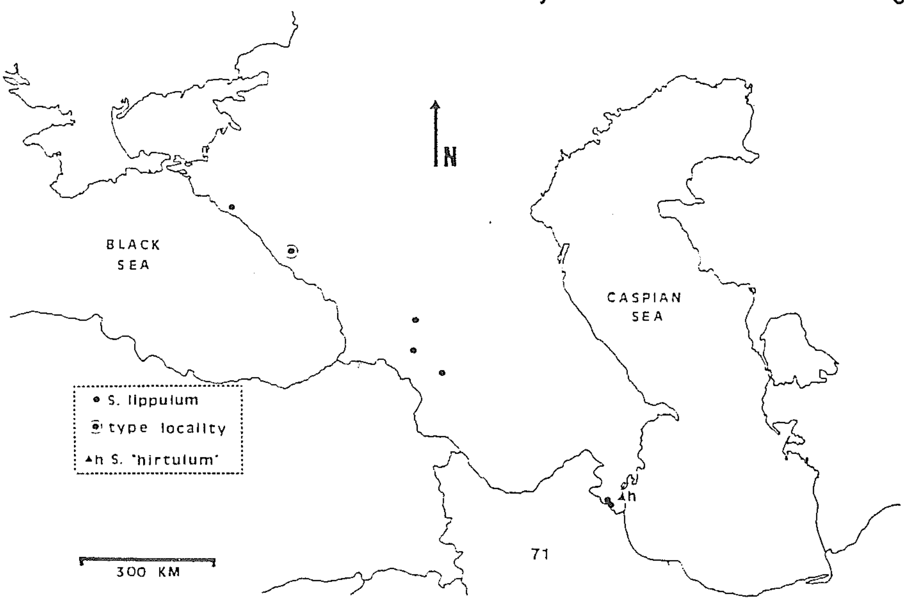


Fig. 71. Distribution of *Stenamma lippulum* in the former U.S.S.R. Type locality is shown for *S. caucasicum*.

partly handwritten label (*Stenamma caucasicum* LECTOTYPE (middle) as this is the middle specimen on a pin with field number A-6183). It is a fairly typical specimen. Although there is some dirt on the specimen, it is covered by much less glue than the remaining specimens. These workers have been returned to ZMUM.

COMPARISONS. *Stenamma lippulum* might be confused with *S. georgii, S. ucrainicum, S. striatula,* and *S. debile* as all species may occur in the Caucasus Mountains.

S. georgii seems to be most closely related to *S. lippulum.* Both species have similar longitudinal carinae on their thoracic dorsa and sides (reminiscent of *S. striatula*). *S. georgii* has more prominent longitudinal carinae on the thoracic sides, particularly the pronotal humeri. The mesopleural medial area in *S. georgii* is smoother, while the same area in *S. lippulum* is more punctate. *S. lippulum* has more setae (greater density) on the thoracic dorsum and on both petiolar and postpetiolar node dorsa. The metanotal impression in *S. georgii* is shallower and not as wide as in *S. lippulum.* Additionally, the postpetiolar node dorsal profile (when viewed from the rear) is flatter in *S. lippulum.* It should be noted that Arnoldi (1975: 1824) indicated that *S. georgii* might be considered a subspecies of *S. lippulum* (=*S. caucasicum* Arnoldi).

S. ucrainicum may also occur in the same area as *S. lippulum,* particularly near the end of the Caucasus Mountain Range nearest the Ukraine. However, this species is more similar to *S. debile* in overall appearance. *S. ucrainicum* has more anastomosing rugae on the thoracic sides and dorsum than the longitudinally carinate *S. lippulum. S. ucrainicum* lacks the numerous transverse carinae between the propodeal spines and on the basal face of the propodeum so prominent in *S. lippulum.* The anterior petiolar process is much more of a reduced bump in *S. ucrainicum.* When viewing heads of the two species in lateral view, the apex of the clypeus is flat to concave near the mandible in *S. lippulum* and convex in *S. ucrainicum.* Although the postpetiolar node dorsal profile (when viewed from the rear) is flatter in *S. lippulum* than *S. georgii,* the same profile in *S. ucrainicum* is completely flat to slightly emarginate.

S. striatula is more similar to *S. lippulum* [of the wider ranging species of *Stenamma*]. Carinae located near the midline on the head of *S. striatula* are more close-set in *S. striatula* with separating troughs the same size or smaller than the ridges. This is also true of the longitudinal carinae on the dorsum and sides of the thorax. *S. lippulum* has a more prominent anterior petiolar process while *S. striatula* specimens have longer propodeal spines [on average].

The final species which might be encountered in the vicinity is *S. debile* (=*S. westwoodi* of Arnoldi). Most often, the head and thoracic sculpture of *S. debile* consists of more anastomosing rugae rather than longitudinal carinae. However, some specimens of *S. debile* exhibit longitudinal tendencies in their rugae (although the rugae still exhibit some waviness). The anterior petiolar process is extremely reduced in *S. debile* and the basal face of the propodeum usually lacks transverse ridges (ridges are also usually lacking between the spines). The metanotal impression of *S. debile* is usually deeper than that of *S. lippulum.*

MATERIAL EXAMINED. FORMER U.S.S.R.: AZERBAIJAN: Lenkoran (1 worker - MCSN); Nagorno-Karabakh A. O., Alazatin, 800-1000m, Talyshskiye Gory [28km SW from Lenkoran], K. V. Arnoldi (19 workers - ZMUM); Talyshskiye Gory, Nyudis-galasi Mountain [31km SW from Lenkoran], K. V. Arnoldi (1 worker - ZMUM). GEORGIA: Daba [in Georgian-most probably Dgvaba], T. I. Zhizhilashvili (1 worker, 1 queen - ZMUM); Dmanisi 616, Georgia, T. I. Zhizhilashvili (1 worker - ZMUM); 117 Tsagveri, T. I. Zhizhilashvili (1 worker - ZMUM). RUSSIAN S.F.S.R.: Krasnodar Kray, Tchab Mountain, Kotsegur Mountain Range, Krasnodarskiy Kray [72km SW from Krasnodar], K. V. Arnoldi (2 workers - ZMUM); Krasnoyarsk Kray, Krasnaya Polyana, NW Caucasus, Beshenki, K. V. Arnoldi (61 workers, 2 queens - ZMUM). [Above labels in Russian and Georgian were translated by A. Antropov].

DISCUSSION

Much of the present confusion surrounding the myriad names of *Stenamma* species can be traced to isolated descriptions of taxa from various localities.

Limited emphasis was placed on comparisons with previously named species. For example, *M. lippula* was thought to be a synonym for *S. westwoodi* [or *S. debile*]. Yet, the type has been available for comparison. An additional clue should have been the vast distance separating type localities (approximately 3,500km). Curiously, when *S. hirtulum* and *S. caucasicum* were described, neither author considered the possibility of comparing their specimens with *M. lippula* (even though the original description clearly places the type locality in the vicinity of these "taxa)".

Given the confusion caused by improper assignment of names, it is imperative that behavioral, genetic, ecological (indeed, biological) investigations provide properly designated voucher specimens. These should be placed in major museums and clearly labeled with associated reference to the study conducted. Given the above changes, previous literature records for *S. westwoodi* should be reconsidered (and associated specimens compared using the accompanying figures and descriptions contained herein). I believe it highly probable that most of these records refer to the more common *S. debile.*

ACKNOWLEDGMENTS

This paper is dedicated to the memory of Joe D. Pratt (September 29, 1945 - June 14, 1992), fellow biophile and ant enthusiast. He sparked the imagination of many and he will be missed.

I thank Barry Bolton (British Museum) for initially pointing out that there may be two species of *Stenamma* in England. He provided many of the characters to separate the species. His support and encouragement during my work have been most appreciated. Simon Hoy provided additional details regarding these species and I am most grateful. Cedric Collingwood provided excellent scanning electron microscope photographs of the *Stenamma* sub-fossils.

I am indebted to Jeri and Benjamin DuBois for their continued patience and support. Thank you for allowing me to spend time working with ants (and for tolerating multiple rooms full of living and dead specimens).

Many others provided numerous useful comments and suggestions. Wally LaBerge (Illinois Natural History Survey) was instrumental in clearing some of the roadblocks encountered in borrowing some specimens. I am most appreciative of all the assistance I have received. The following individuals helped me greatly by reviewing draft copies of the manuscript: Jon Gelhaus (Academy of Natural Sciences), Wally LaBerge (Illinois Natural History Survey), Steve Shattuck (CSIRO), Barry Bolton (British Museum). I am most appreciative of their assistance. Without it, I would have included additional errors. I have strived to incorporate most suggestions. I assume full responsibility for any remaining errors, omissions, or misunderstandings regarding draft comments.

The following museums provided material for this analysis of *Stenamma.*

Without their willingness to loan material, this work would not have been possible. My sincere appreciation to all these curators.

BMNH, London British Museum (Natural History), London, United Kingdom (B. Bolton).

CCPC, Leeds Cedric Collingwood Personal Collection, Leeds, United Kingdom

ISNB, Brussels, Institut Royal des Sciences Naturelles de Belgique, Brussels (P. Dessart).

MCSN, Genoa Museo Civico di Storia Naturale "Giacomo Doria," Genoa, Italy (V. Raineri)

OXUM, Oxford, Hope Entomological Collections, Oxford, United Kingdom (C. O'Toole)

UZMH, Helsinki, Zoological Museum, University of Helsinki, Finland (A. Albrecht)

ZMHB, Berlin, Museum fur Naturkunde der Humboldt Universitat zu Berlin, Germany (F. Koch)

ZMPA, Warsaw, Museum of the Institute of Zoology, Polish Academy of Science, Warsaw, Poland (B. Pisarski)

ZMUM, Moscow, Biological Department, Zoological Museum, Moscow State University, Commonwealth of Independent States [formerly U.S.S.R.] (A. Antropov and G. Dlussky).

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APPENDIX

To many readers, a name is just a reference. Joe Pratt was intensely interested in the origin of species' names. Since this paper is dedicated to his memory, I offer the following comments regarding the names used in this paper. *Stenamma* comes from the Greek words *stenos* [narrow] and *hamma* [connection] (Wheeler, 1956). Although Westwood did not indicate when he named the genus, this name is believed to be in reference to the narrowed connection between alitrunk and gaster in this genus [including both petiole and postpetiole]. Westwood (1840b) presumably used the species name *westwoodi* as a Latinized derivative of his family name. Such practice is no longer followed. Nylander (1849) did not indicate how he arrived at the name *lippulum*; it is inferred this is from the Latin *lippus* [nearly blind]. Most *Stenamma* have greatly reduced compound eyes in the worker caste. Foerster (1850) did not indicate where he derived the species name *debilis*; presumably this was from the Latin *debilis* [weak]. When a nest of *Stenamma* is disturbed, most workers feign death or move exceedingly slowly (pers. obs.). It is believed that such behavior may have been interpreted as "weakness" by Foerster. It would have been helpful if these early authors had indicated the etymology more clearly.

To paraphrase "What's in a name?" — everything. They are the fundamental building blocks of basic research. The proper scientific name is the glue which connects disparate research on various aspects of a species (such as behavior, ecology, morphology, and biogeography).