

## THE GENUS *NEPENTHOSYRPHUS* WITH A KEY TO WORLD GENERA OF TROPIDIINI<sup>1</sup>

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### ABSTRACT

The genus *Nepenthosyrphus* de Meijere is reviewed. It is placed in the tribe Tropidiini of Milesinae. Keys to the world genera of Tropidiini and species of *Nepenthosyrphus* are presented. The original description of *Nepenthosyrphus capitata* (Sack), *tobaicus* de Meijere, and *oudemansi* de Meijere are translated into English and *N. venustus* is described new.

The genus *Nepenthosyrphus* was proposed by de Meijere for three species of syrphids whose larval stages were found in the pitcher plant, *Nepenthes*. Among the unidentified syrphid specimens at the Bishop Museum was found a *Nepenthosyrphus* species from the Philippines. The identification of this Philippine species has prompted a review of the whole genus, the results of which are presented below.

De Meijere placed his new genus, *Nepenthosyrphus*, next to *Syritta* St. Fargeau and Serville. Hull (1949) designated the group as a "Phylogeront" without clearly placing it in any tribe. However, the

<sup>1</sup>Diptera: Syrphidae. Contribution No. 1395 from the Systematics and Morphology Research Laboratory, Department of Entomology, University of Massachusetts, Amherst. Accepted for publication March 24, 1971.

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well developed medial facial keel and swollen hind femora are indicative of Tropidiini and support de Meijere's placement next to *Syritta*. Since *Nepenthosyrphus* will not key out in Hull's key (1949) to the genera of Xylotinae (*vide* couplet 2; *Nepenthosyrphus* has a strongly carinate face and swollen hind femora, not the opposite), I have included a key to world genera of Tropidiini, *sensu lato*, that is, all syrphid genera with carinate faces. Only the genera of which I have studied specimens are included in the following key. However, the probable placement in the key of the other genera with carinate faces has been indicated by asterisk and is discussed below. *Cerogaster*, *Crepidomyia*, *Sterphus*, and *Neplas* are all *Xylota* derivatives; the rest of the genera included in the key are true tropidiines. *Tatuomyia* Shannon, *Senoceria* Hull and *Mutillimya* Hull are all considered synonymous with *Crepidomyia* Shannon (Thompson, 1970). *Parrhyngia* Shiraki belongs to Tropidiini, not Eristalini, Helophilina as placed by its author (1968). *Parrhyngia* would probably run out to couplet 7, *Neplas*, but can be distinguished from *Neplas* by its looped third vein. *Rhinotropidia* Stackelberg can be distinguished from all other tropidiines by its snoutlike face (see Stackelberg 1930, Fig. 5; Shiraki 1930, Fig. 28). *Austrosyritta* Marnef is synonymous with *Syritta*. *Austrosyritta* is based only on the lack of a spurious vein, which is insufficient grounds for the retention of the name. *Austrosyritta cortesi* Marnef (1967) = *Syritta flaviventris* Macquart (1842), NEW SYNONYMY.

Key to genera of Tropidiini, *sensu lato*, or syrphid genera  
with carinate faces

- |     |   |                             |
|-----|---|-----------------------------|
| 1.* | <i>Metasterna pilose</i> <sup>3</sup> .....   | 4                           |
|     | <i>Metasterna bare</i> <sup>3</sup> .....   | 2                           |
| 2.  | Occiput and anterior edge of notum with a transverse row of short black spines; postmetacoxal bridge complete (Neotropical) ..... | <i>Cerogaster</i> Williston |
|     | Occiput and anterior edge of notum without a transverse row of spines; postmetacoxal bridge not complete .....                    | 3                           |
| 3.  | Face black, straight, strongly tricarinate (Neotropical) (Fig. 3) .....   | <i>Crepidomyia</i> Shannon  |
|     | Face bright orange, slightly concave above, weakly carinate (Chile) (Fig. 1) .....  | <i>Sterphus</i> Philippi    |
| 4.  | Hind femora with a large ventral bifid spur near apex (Neotropical) (Fig. 4) .....  | <i>Senogaster</i> Macquart  |
|     | Hind femora without a bifid spur .....  | 5                           |

<sup>3</sup> Four conditions relating to hairs are usually recognized in the study of syrphids: 1) Bare—without pile but sometimes with either pubescence or pollinosity; 2) Pollinosity—opaque material that looks like fine powder or dust; 3) Pubescence—very short hairs, closely set together, much like velvet; 4) Pilosity—long scattered hairs, in some genera broadly flattened into scales (i.e., *Lepidomyia*, etc.), in other genera (i.e., *Meromacrus*, etc.) very thick and opaque and called tomentum.

5. Apical cell with a long petiole, petiole longer than humeral crossvein (Fig. 6); metasternal sclerites not divided by a membranous band ..... 6  
 Apical cell with a very short petiole, petiole much shorter than humeral crossvein (Fig. 8); each metasternal sclerite divided by a membranous band (Holarctic, Neotropical) ..... *Tropidia* Meigen
6. Eyes distinctly pilose (Oriental) ..... *Nepenthosyrphus* de Meijere  
 Eyes bare ..... 7
- 7.\* Scutellum with a ventral hair fringe; meta-episterna bare (Neotropical) ..... *Neplas* Porter  
 Scutellum without a ventral fringe; meta-episterna pilose beneath spiracle (cosmopolitan) ..... *Syritta* St. Fargeau and Serville

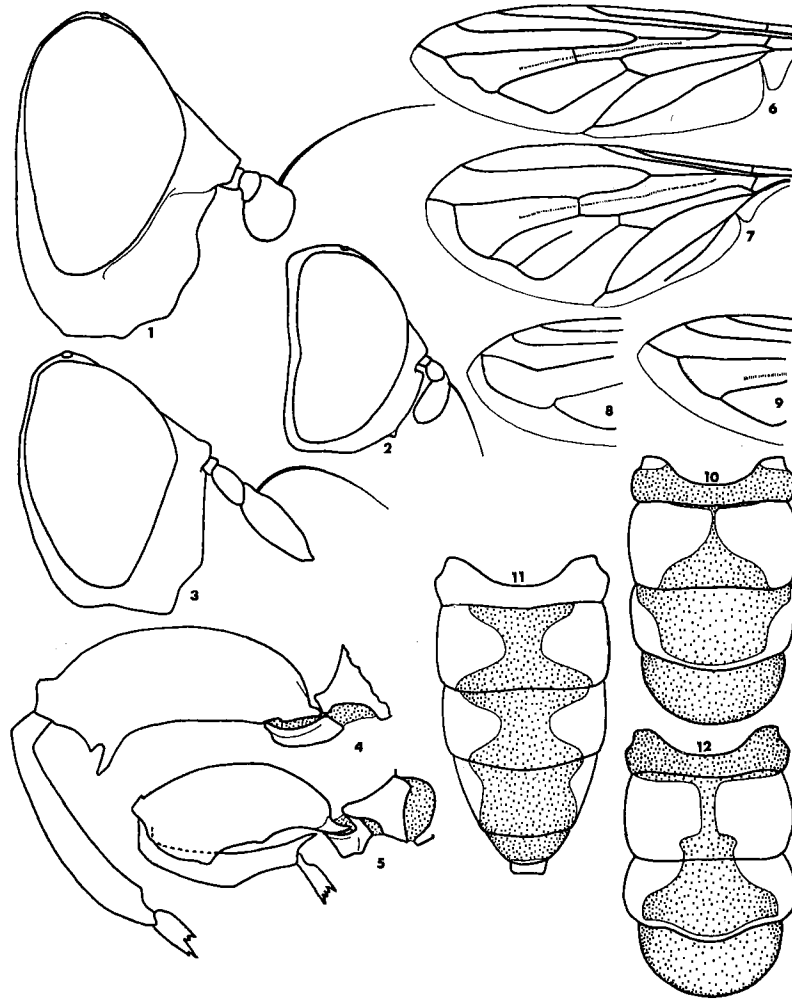
*Nepenthosyrphus* de Meijere

*Nepenthosyrphus* de Meijere, 1932, Tijdschr. Entomol. 75:155 (*N. tobaicus* de Meijere type species by original designation); Hull, 1949, Trans. Zool. Soc. London 26(4):364.

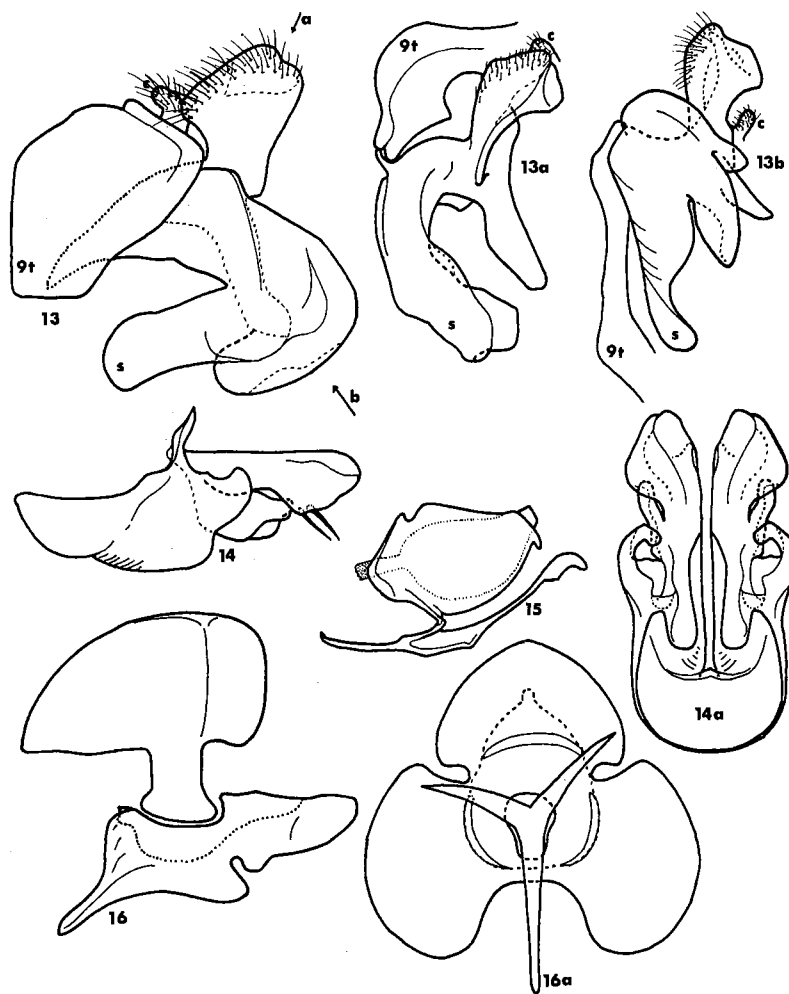
Medium-sized, compact, yellow pollinose flies with a carinate face and massive hind femora.

*Head.* Slightly higher than long; face with a distinct, well developed medial keel extending from oral margin to just under antennal bases, without lateral keels; cheeks small, narrow, linear; oral margin distinctly notched, not projecting; facial grooves very short, not extending above level of epistoma; facial stripes not differentiated; frontal prominence not differentiated, slightly below middle of head; frontal triangle of male small, about one and one-half times as long as eye contiguity; vertical triangle of male long, twice as long or longer than front; front of female longer than face, with only slightly convergent sides above; ocellar triangle small, more than its length anterior to hind margin of eyes; antennal pits connected; occiput normal, not swollen. Eyes holoptic in males, dichoptic in females, with short distinct pile. Antennae variable in length, never longer than face; third segment always longer than first two together, elliptical or elongate; arista bare, inserted at base of third segment.

*Thorax.* Distinctly broader than long; prosterna bare; pro-anepisterna bare; anterior meso-anepisterna with upper posterior corner pilose, with rest bare; posterior meso-anepimera bare; meso-katepisterna with separate dorsal and ventral pile patches; barrette bare; metasterna pilose, well developed; scutellum without a ventral hair fringe, with a distinct apical rim; plumulae very short, broadly rounded. *Legs.* Hind femora greatly swollen, arched dorsally, with a distinct ventral apical toothed keel; hind tibiae flattened laterally, dorsal edge arched, with a long dorsal apical spur; hind tarsi slightly flattened dorsoventrally. *Wings.* Marginal cell open; apical cell closed, with a



FIGS. 1-12. Figs. 1-3, Heads, lateral view; 1, *Sterphus coeruleus* (Rondani), ♂; 2, *Nepenthosyrphus venustus*, new species, ♂; 3, *Crepidomyia* species A, ♂. Figs. 4-5, Hind legs, anterior view; 4, *Senogaster dentipes* (Fabricius); 5, *Nepenthosyrphus venustus*, new species. Figs. 6-9, Wings; 6, *Nepenthosyrphus oudemansi* de Meijere; 7, *Nepenthosyrphus tobaicus* de Meijere; 8, *Tropidia quadrata* (Say); 9, *Nepenthosyrphus venustus*, new species. Figs. 10-12, Abdominal patterns, dorsal view; 10, *Nepenthosyrphus venustus*, new species, ♂; 11, *Nepenthosyrphus oudemansi* de Meijere, ♀; 12, *Nepenthosyrphus tobaicus* de Meijere.



FIGS. 13-16. Male genitalia of *Nepenthosyrphus venustus*, new species. Fig. 13, Ninth tergite and associated structures, lateral view; 13a, Dorsal oblique view; 13b, Ventral oblique view; Fig. 14, Ninth sternite, lateral view; 14a, Dorsal view; Fig. 15, Aedeagus and apodeme, lateral view; Fig. 16, Ejaculatory apodeme and sac, lateral view; 16a, Dorsal view. a = angle of dorsal oblique view; b = angle of ventral oblique view; c-cercus; s-surstylus; 9t = ninth tergite.

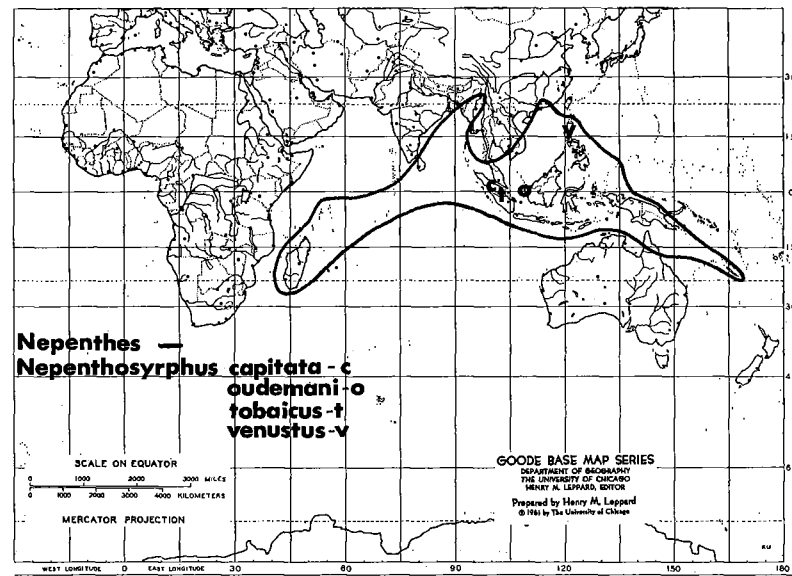


FIG. 17. The known distribution of *Nepenthosyrphus* and *Nepenthes*.

long petiole; anterior crossvein distinctly before middle of discal cell; marginal crossveins without external appendices.

*Abdomen.* Short, cylindrical, little longer than thorax, broad, almost uniformly broad, with apical end in males thickened and clublike below, with apical end pointed in females. Hypopygium very large and globular.

*Distribution.* *Nepenthosyrphus* is presently only known from Sumatra, West Borneo, and the Philippines, but it may have a wide distribution, corresponding to that of the host plant, *Nepenthes*, in which the larvae breed (see map, Fig. 17).

*Nepenthosyrphus* shares the following characters with all other tropidiine groups: 1) distinct facial carina present; 2) males with holoptic eyes; 3) reduced pile on pro-anepimera; 4) posterior meso-anepimera bare; 5) meso-katepisterna with separate dorsal and ventral pile patches; 6) barrette bare; 7) metasterna well-developed and pilose; and 8) marginal cell open. Among the tropidiines *Nepenthosyrphus* displays the following two unique characters: 1) eyes pilose; and 2) anterior crossvein distinctly before the middle of discal cell. Other distinctive generic characters of *Nepenthosyrphus* are: 1) metasterna bare; 2) scutellum without ventral hair fringe; 3) apical cell petiolate; 4) marginal crossveins without external appendices; 5) face broadly pilose on sides; 6) hind femora greatly swollen and with a distinct ventral toothed keel; 7) hind tibiae arched, with apical spur.

Besides the structural and pile characters discussed above, all four known species of *Nepenthosyrphus* share the following color and pollinosity characteristics: 1) eyes with white pile; 2) dorsum of thorax with three transverse yellow pollinose stripes, the first across the anterior edge and narrowly interrupted in the middle, the second bordering on the transverse suture and broadly interrupted in the middle—the first and second are connected laterally on the sides—and the third stretching across in front of the scutellum and reaching up to the wing bases on the sides; 3) pleurae with a broad dull grayish white transverse band in front of the wings, which is continuous below; and 4) species-specific yellowish orange and black abdominal patterns.

Key to the species of *Nepenthosyrphus* de Meijere

1. Face with a medial black stripe ..... 3  
Face orange or yellow medially, not black ..... 2
2. Scutellum all black with all yellow pile; anterior four femora mostly brown (Philippines) ..... *venustus*, new species  
Scutellum with a yellow rim and black pile on basal part; anterior four femora yellow (W. Borneo) ..... *oudemansi* de Meijere
3. Subcosta (Sc) and first vein (R1) very short, ending at about level of base of discal cell (M1 + 2) (Sumatra) (Fig. 7) ..... *tobaicus* de Meijere  
Subcosta and first vein long, ending beyond base of discal cell (Sumatra) (Fig. 6) ..... *capitata* Sack

The original descriptions of *oudemansi* de Meijere, *tobaicus* de Meijere, and *capitata* Sack have been translated and rearranged; characters that are the same for all species have been included in the generic discussion, whereas the others have been left in the specific descriptions.

*Nepenthosyrphus tobaicus* de Meijere

*Nepenthosyrphus tobaicus* de Meijere, 1932, Tijdschr. Entomol. 75:159, Fig. 2, head of male, frontal view; head of female, lateral view; hind leg, lateral view; wing of female; abdomen of female, dorsal view.

**MALE. Head.** Face black, with sides thickly white pollinose and sparsely white pilose, with medial area shiny; facial keel evenly but not strongly arched; oral margin notch moderate; cheeks very narrow, yellow; frontal lunule shiny brownish yellow; frontal triangle mostly yellow pollinose with yellow pile, black in medial area, bare on anterior part; vertical triangle grayish yellow pollinose below ocelli, black with black pile above ocelli; occiput mostly blackish gray, with edges yellow pollinose and pilose above becoming whitish below. Antennae reddish yellow with arista dark and bare.

**Thorax.** Black, diffusely punctate, with short black pile; scutellum black, thickly punctate. **Legs.** Front four legs mostly yellow; fore femora darkened on outer side from base to near tip, middle femora

similar to fore femora except for black color forming almost a complete ring basad. Hind legs with femora black except for yellow outer tips, with tibiae yellow except for black tips, with tarsi yellow. *Wings*. Diffusely smoky on outer half, with stigma slightly darker brown; apical crossvein evenly convex, forming perpendicular angle with third vein, directly continuous with discoidal crossvein; discoidal crossvein short, distinctly concave; anal vein straight. *Halteres*. White.

*Abdomen* (Fig. 12). First segment black; second segment almost all yellow, with small medial T-shaped black area; third segment black except for yellow sides and hind margin; fourth segment black except for narrowly yellow hind margin.

Body length: 6 mm, wing length: 5 mm.

**FEMALE.** Very similar to male except as follows: frons gradually widening below, yellowish white pollinose on the sides, with a black medial longitudinal stripe slightly widening below; third abdominal segment with anterior corners also yellow; discal cell with interior-directed appendix from discoidal crossvein, with this appendix shorter on right side than left.

*N. tobaicus* is quite distinct from most syrphids in that its subcosta and first radial vein are very short, both ending at about the level of the base of the discal cell. Sack did not mention the length of subcosta and first radial vein in his description of *capitata*, which de Meijere states is "obvious extraordinarily similar to *tobaicus*." Outside of the possible differences in wing venation, de Meijere said that *tobaicus* differs from *capitata* only in structure of hind femora, his interpretation of which was based only on Sack's work (1931, Fig. 5).

Recently Vockeroth (in litt.) has examined the types of *Syritta capitata* Sack in the Senckenbergische Museum, Frankfurt. From his notes, it is apparent that Sack's figure and description are misleading and that the hind leg of *capitata* is the same as in the other member of the genus. However, the subcosta and first radial vein of *capitata* are long (as in Fig. 6), and on the basis of this character the two species, *tobaicus* and *capitata*, are considered separate.

#### *Nepenthosyrphus capitata* Sack

*Syritta capitata* Sack, 1931, Arch. f. Hydrobiol. suppl. 8:590, Fig. 4, head of male, lateral view; Fig. 5, hind leg of male, lateral view; Fig. 6, larva; Fig. 7, puparium; Fig. 8, hind spiracles of puparium.

*Nepenthosyrphus capitata* de Meijere, 1932, Tijdschr. Entomol. 75:154, 162 (differences from *N. tobaicus*, generic reassignment).

**MALE. Head.** Face white pollinose except for bare shiny black medial stripe; facial keel slightly arched; oral margin yellow; mouthparts reddish yellow; frontal lunule reddish yellow; frontal triangle golden yellow pollinose with short, appressed, golden yellow pile; vertical triangle iridescent black on posterior half, golden yellow pollinose and pilose on anterior half. Antennae long, reaching almost to tip of facial notch, yellow; second segment twice as long as first;



third segment elliptical, twice as long as second segment, one and one-half times as long as high; arista thin, bare, light brown.

*Thorax.* Black, slightly shiny, finely punctate; scutellum black, with yellowish brown pile. *Legs.* Front four legs mostly yellow; femora with outer and upper sides blackish brown from bases to near tips, inner and under sides with basal third brown; tibiae with blackish brown ring in middle. Hind legs mostly black, coxae long white pilose, femora with reddish yellow tips, tibiae with bases and tips yellow, tarsi all yellow. Hind femora with a ventral medial tooth besides ventral keel. *Wings.* Basal half gray, apical half smoky, with a longitudinal clear stripe along hind edge of border cells; stigma dark; discal cell with interiorly directed appendix from discoidal crossvein; apical crossvein evenly curved, forming perpendicular angle with third vein.

*Abdomen.* Dull black, strongly punctate. First segment black; second segment black, with [yellow?] inverted cup-shaped figure, with sides translucent reddish yellow and slightly swollen; third and fourth segment black with yellow side and hind margins; sternites and genital styles light yellow. Pile yellow to white in color, distinct only on basal half of second segment, sides of first three segments, whole fourth segment and flat side of hypopygium.

**FEMALE.** Very similar to male except as follows: frons at vertex about one-sixth as wide as head width, one-fifth at antennal bases; vertex shiny black above, dull black pollinose across ocellar area; frons thickly yellow pollinose on sides, with dull black pollinose medial longitudinal stripe; end of abdomen pointed.

Length: 6 mm.

For discussion, see *tobaicus* de Meijere.

*Nepenthosyrphus oudemansi* de Meijere

*Nepenthosyrphus oudemansi* de Meijere, 1932, Tijdschr. Entomol. 75:157, Fig. 1, wing; abdomen of female, dorsal view; larva; puparium.

**FEMALE. Head.** Face yellow, white pollinose and pilose; facial keel almost straight in profile; oral margin notch slight; mouthparts yellow; frontal lunule yellow; frons thickly yellow pollinose, with parallel sides above gradually widening below; ocellar triangle and vertex shiny black; occiput yellow pollinose with yellow pile above becoming whitish below. Antennae yellow; third segment oval except for straight dorsal edge; basal two segments short; arista yellow at base with remainder black.

*Thorax.* Mostly black, slightly shiny; pleurae thickly yellow pollinose above becoming slightly whitish below; scutellum mostly black, with hind edge narrowly yellow, with sparse short dark pile with yellow lustre on dark part, with yellow pile on yellow hind edge. *Legs.* Front four legs yellow. Hind legs with coxae and trochanters yellow, with femora black except for yellow outer bases and tips, with tibiae blackish brown except for yellow outer convex edges, tarsi dark

brown above and yellow below. Pile yellow on front four legs, white on hind femora and tibiae, black above on hind tarsi. Hind femora with some small ventral spurs basad of keel. *Wings*. Stigma brown; discoidal crossvein in line with apical crossvein; apical crossvein curved on posterior part, straight on anterior part, forming an acute angle with third vein.

*Abdomen* (Fig. 11). Mostly yellow with broad black markings; first segment yellow; second and third segments yellow with broad black X-shaped markings isolated from side margins; fourth segment yellow with black markings similar to second and third but indented on sides on anterior part; fifth segment black except for narrowly yellow hind margin.

Body length: 9 mm; wing length: 7 mm.

**MALE.** Description based on one slightly teneral specimen. Very similar to female except as follows: vertical triangle shiny black with black pile on posterior half, thickly yellow pollinose on anterior half; frontal triangle yellow pollinose; frontal lunule brownish yellow; antennae brownish yellow; abdomen shorter and more curved, fourth segment strongly arched, almost concolorous yellowish brown, with appressed white pile; hypopygium large, yellowish brown.

Body length: ca. 8 mm; wing length: 7 mm.

*Nepenthosyrphus oudemansi* de Meijere can be easily separated from the other species of the genus by the characters given in the key and by its abdominal pattern and wing venation. *N. oudemansi* is the only species of *Nepenthosyrphus* with an acute apical cell.

*Nepenthosyrphus venustus*, new species

**MALE.** *Head* (Fig. 2). Face orange except dark on uppersides, yellow pollinose except for bare facial keel; facial keel not straight, slightly arched; mouthparts yellow except for black labium; cheeks orange, bare in front, yellow pollinose behind; frontal lunule orange; frontal triangle orange medially, dark on sides, completely yellow pollinose and pilose; vertical triangle yellow pollinose and pilose below ocellar triangle, black with dark brown pile elsewhere; occiput dark, completely yellow pollinose and pilose. Antennae orange, long, almost reaching to oral margin; third segment elongate, about one and one-half times as long as wide, slightly longer than first two segments together; arista as long as antenna, bare, dark.

*Thorax*. Black; with longitudinal patch of short black bristles above wing bases; pile yellowish, slightly darker on dark areas, longer on pleurae than dorsum; scutellum dark, very lightly brown pollinose, with yellow pile. *Legs* (Fig. 5). Front four legs as follows: coxae dark except for orange apices, yellow pollinose; trochanters orange; femora dark brown except for orange bases and apices; tibiae orange with a faint brown medial ring; tarsi orange. Hind legs as follows: coxae black, yellow pollinose; femora black except for narrowly orange bases and apices; tibiae orange except for broad brown spot extending

dorsad of tip of apical spur; tarsi orange. Pile light colored. *Wings* (Fig. 9). Smoky brown; stigma dark brown; apical crossvein evenly convex, slightly recurrent at its junction with third vein; discal cell without interior appendix; microtrichiae present except for the following bare areas: basal half of first basal cell, basal half of second basal cell on posterior part only, and narrowly behind first anal vein. *Halteres* and *squamae*. Orange.

*Abdomen* (Fig. 10). Dorsum with orange and black pattern; first segment black, light brown pollinose; second segment orange except for large black semicircle resting on apical margin, isolated from side margins, and with a narrow medial longitudinal connection to similarly colored area of first segment, with light brown pollinosity on black area; third segment black except for broadly orange sides and apical margin, with light brown medial pollinose triangle in black area; fourth segment shiny black except for orange sides and apical margin. Pile of dorsum golden on orange areas, black on dark areas, long on sides, short and appressed elsewhere. Hypopygium black, with some patches of light yellow pollinosity, with short white pile; cerci and styles orange. Venter with yellow pile; first sternite orangish yellow, light brown pollinose medially; second and third sternites shiny orange; fourth sternite black except for orange apical edge, notched medially on apical edge, slightly keeled medially.

Body length: 9 mm; wing length: 7 mm.

Holotype, ♂, Abatan, Buguias, 60 km S of Bontoc, Mountain Prov., Luzon, Philippines, 1,800–2,000 m, 1 April 1964 (H. M. Torre-villas). The type is deposited in the Bishop Museum, Honolulu, Hawaii (No. 9301).

*Nepenthosyrphus venustus* appears most closely related to *oudemansi* de Meijere but differs from it not only in the key characters but in: 1) the recurrent apical crossvein; 2) black labium; and 3) abdominal pattern.

#### ACKNOWLEDGMENTS

I would like to thank Dr. J. L. Gressitt for the loan of the material used in this study, Dr. J. R. Vockeroth for his notes on the types of *Syrpitta capitata* Sack, and Drs. Charles H. Nelson and John F. Hanson for their critical reading of this manuscript.

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