

## On *Simulium* (*Pternaspatha*), with Description of a New Species (Diptera-Simuliidae)

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*Simulium* (*Pternaspatha*) *diamantinum* n. sp. is described from females, males, pupae and larvae, collected at Mendoza, San Juan and Neuquén. Some specimens of this species from Laguna del Diamante were included before by Wygodzinsky and Coscarón (1967) in *S. strigidorsum* Enderlein. The new species is compared with closely related species of the *S. (Pternaspatha)* "nigristrigatum group". The following synonym is established: *Simulium* (*Pternaspatha*) *bachmanni* Wygodzinsky & Coscarón = *Simulium* (*Pternaspatha*) *nigristrigatum* (Enderlein).

Key words: southern Andean blackflies - description - new species - new synonym

*Simulium* (*Pternaspatha*) is a peculiar Neotropical subgenus composed of 26 species characteristic of the S. W. of South America on both sides of the Andes Cordillera from the Puna plateau to Patagonia, with one species in the northern Andes in Ecuador.

This subgenus is characterized particularly by the following combination of characters: gray, pollinose females with variable ornamentation on the abdomen; a subquadrate, distally concave, smooth or rugose male distimere; pupa with a high number of trichomes variable in number, length and morphology (filiform to flattened), single spatulate to multiramose; and larva with dark head with mostly negative spots on the cephalic apotome and a deep, angular gular cleft.

Revisionary works on the taxonomy of this subgenus were made by Wygodzinsky and Coscarón (1967), and Coscarón and Wygodzinsky (1972). More recently Wygodzinsky and Coscarón (1979), and Coscarón and Matta (1982) included two new species. Despite the taxonomic studies above there remained some doubts on species identity, mostly because not all stages (especially the pupa) had been described. An example is *S. strigidorsum* Enderlein, known only from type material (2EE) from Juliaca, Puno (Perú). Wygodzinsky and Coscarón (1967) included in this species females from Argentina, that show some differences with specimens from Perú. Another example is *S. (Pternaspatha) dureti* from San Juan, described from a single pharate male, a pupa and

several larvae (Coscarón & Wygodzinsky 1972).

From the present study based on females, pupae and larvae from Laguna del Diamante where *S. (P.) strigidorsum* was recorded by Wygodzinsky and Coscarón (1967), and specimens from Neuquen, we conclude that this material is not *S. strigidorsum*, and corresponds to a new species close to *S. dureti*, *S. horcochuspi*, *S. deagostinii* and *S. pichi*

The previous incompletely described *S. (P.) nigristrigatum* (Enderlein 1930), is compared with *S. (P.) bachmanni* Wygodzinsky & Coscarón (1967).

### MATERIALS AND METHODS

Material was collected in the breeding places, and pupae were maintained alive to obtain imagoes. The collecting and dissection methodology used was that of Coscarón (1981). Type specimens of *S. (Pternaspatha) strigidorsum* (E lectotype), and *S. (P.) nigristrigatum* Enderlein (Glectotype, Esynotype) from the Zoologisches Museum of Humboldt University, Berlin were examined.

### RESULTS

Examination of the newly collected material, revision of previously collected specimens and their comparison with type material of *S. strigidorsum* permits us to establish a new taxon that is here described.

*Simulium* (*Pternaspatha*) *diamantinum* n. sp.

*Female*: wing length 3.3-3.7 mm. General color gray pollinose. Antennae, maxillary palp and proboscis blackish. Head brown, dark gray pollinose. Frons, clypeus and occiput blackish with gray pollinosity; occiput a little darker with hairs grayish to black in accordance with the light.

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Mesonotum grayish black with a silvery-gray, submedian, lyre-shaped pattern, lighter anteriorly and grayish laterally and posteriorly (Fig. 1); with changing light position the lyre-shaped pattern becomes thicker, and in some lights its anterior border becomes black, to a silky bright light gray. Mesonotum hairs sparse and upright. Scutellum blackish-gray. Scutum and scutellum hairs light gray. Metanotum velvet blackish. Pleura blackish gray. Wings with yellowish veins and brown hairs and spines. Stem of halteres yellowish-brown, the knob yellowish-white. Legs blackish with basal third of femur III, basal half of tibiae I-III, basal half of basitarsus II and 3/4 of basitarsus III and base of tarsites II-III light brownish. Distribution of pigmentation of hind leg as Fig. 3. Abdomen light grayish pollinose, tergite I dark grayish; black subtriangular median spots on tergites II-V, lighter and pollinose on VII, and 1+1 lateral, blackish, subrectangular spots not reaching posterior border on tergites IV-V (Figs 4-5). Hairs of pleural tuft light gray. Frons as Fig. 6. Fronto-ocular triangle about as long as wide (Fig. 7). Sensory vesicle of palp about 1/3-1/4 of basal articles, its structure as in Fig. 8. Antenna and cibarium as *S. dureti*, typical of the subgenus *Pternaspatha*. Mandible with 25+8-30+9 teeth, and maxilla 23-25 teeth. Sc with 3-5 setae. Base of R without setae; R<sub>1</sub> and R<sub>5</sub> with setae and spines arranged in one irregular row. Shape and proportion of articles of leg III as shown in Fig. 2. Without calcipala; ratio of length to width of posterior basitarsus = 7.2-7.6 (Fig. 3). Claws with well developed basal tooth (Fig. 9). Eighth sternite well sclerotized, with 34-40 hairs on each side, gonapophysis subtriangular (Fig. 10). Paraproct and cercus as in Fig. 11. Genital fork as in Fig. 12; spermatheca with small internal spines. *Male*: wing length 2.8-3.0 mm. Head coloration as in female. Scutum black-grey with 1+1 subtriangular spots anteriorly (Fig. 13); with light anterior to specimen 1+1 anterior gray pollinose spots occupying anterior third. Decumbent, silky grayish hairs sparsely covering scutum. Abdomen blackish with 1+1 large gray spot on tergites II, smaller on tergites VII-VIII, VI and IX mostly grayish except for a small and short median darker spot. Pleura, halteres and wings as female. Legs yellowish brown with light gray hairs; blackish brown on coxae, apex of femur III, apex of tibiae, all of basitarsus I, distal third of basitarsi II and III and tarsites. Hind basitarsus three times as long as wide; calcipala absent (Fig. 14). Genitalia very close to species of *S. (Pternaspatha)* "*nigristrigatum* group"; distimere with abundant tubercles (Fig. 15).

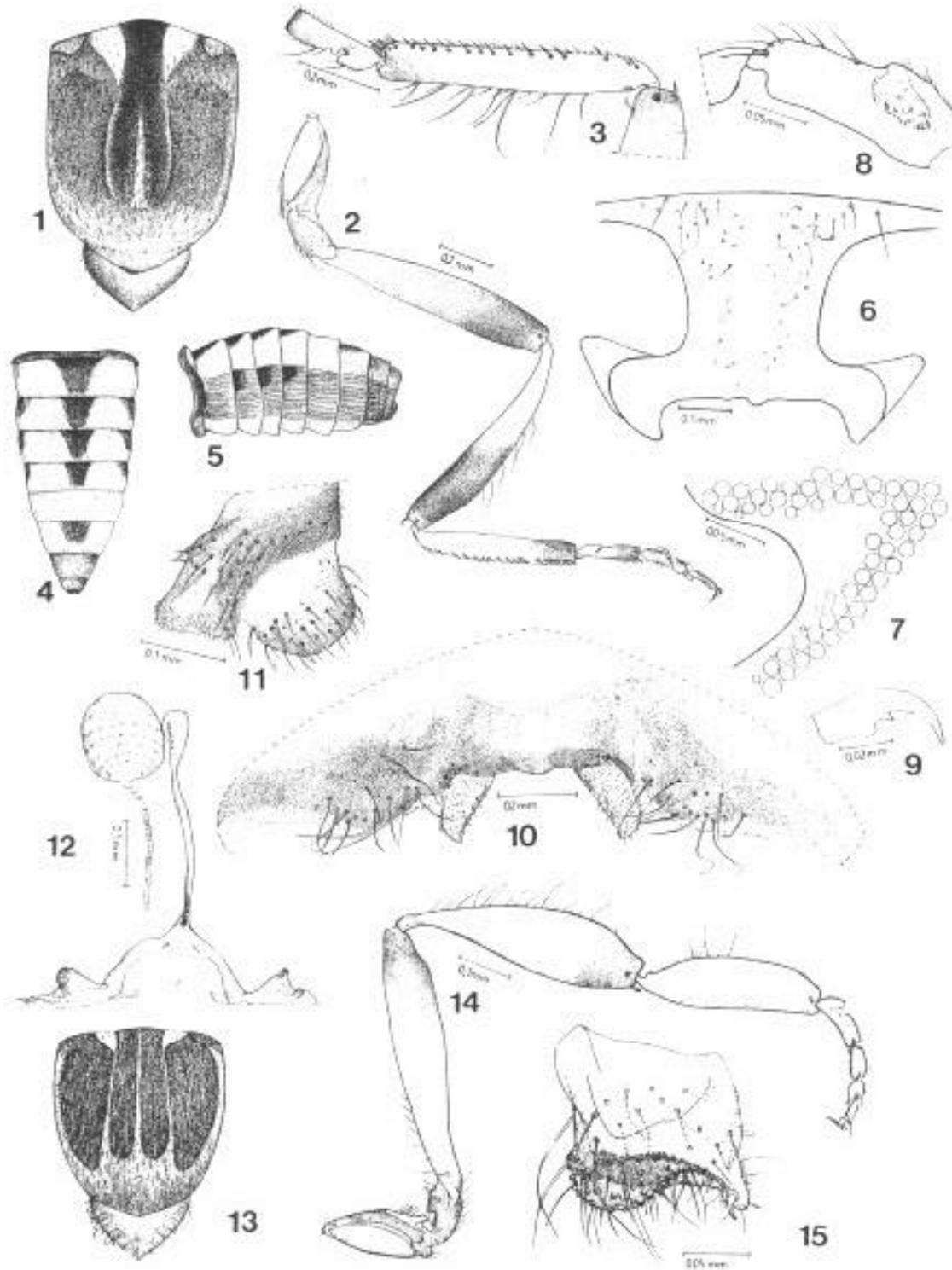
*Pupa*: cocoon shoe-shaped with well developed antero-ventral bridge (Fig. 16); surface generally

smooth, but some specimens with small sand granules incorporated. Cocoon closely woven. Respiratory organs covered basally by walls of cocoon. Length of cocoon 3.8-4.0 mm at dorsum, maximum length along base 5.2-6.0 mm, length of body 4.0-4.7 mm, of gills 2.2-3.3 mm. Respiratory organ with eight filaments, position of basal branching as Fig. 17. Frontoclypeus and thorax with 500-1000 platelets (Fig. 18) those of thorax slightly pointed, especially on the posterior border (Fig. 19), others rounded with a smooth (Fig. 20) or slightly rough surface (Fig. 21); trichomes filiform with 4-8 branches, 5-15 frontal and 3-7 facial trichomes on each side in a continuous group. Length of frontal trichomes 0.19-0.23 mm; thoracic trichomes 0.24-0.35 mm in number of 160-220, with 6-10 filiform branches (Fig. 22). Chaetotaxy of abdomen following the general pattern of *S. (Pternaspatha)* species.

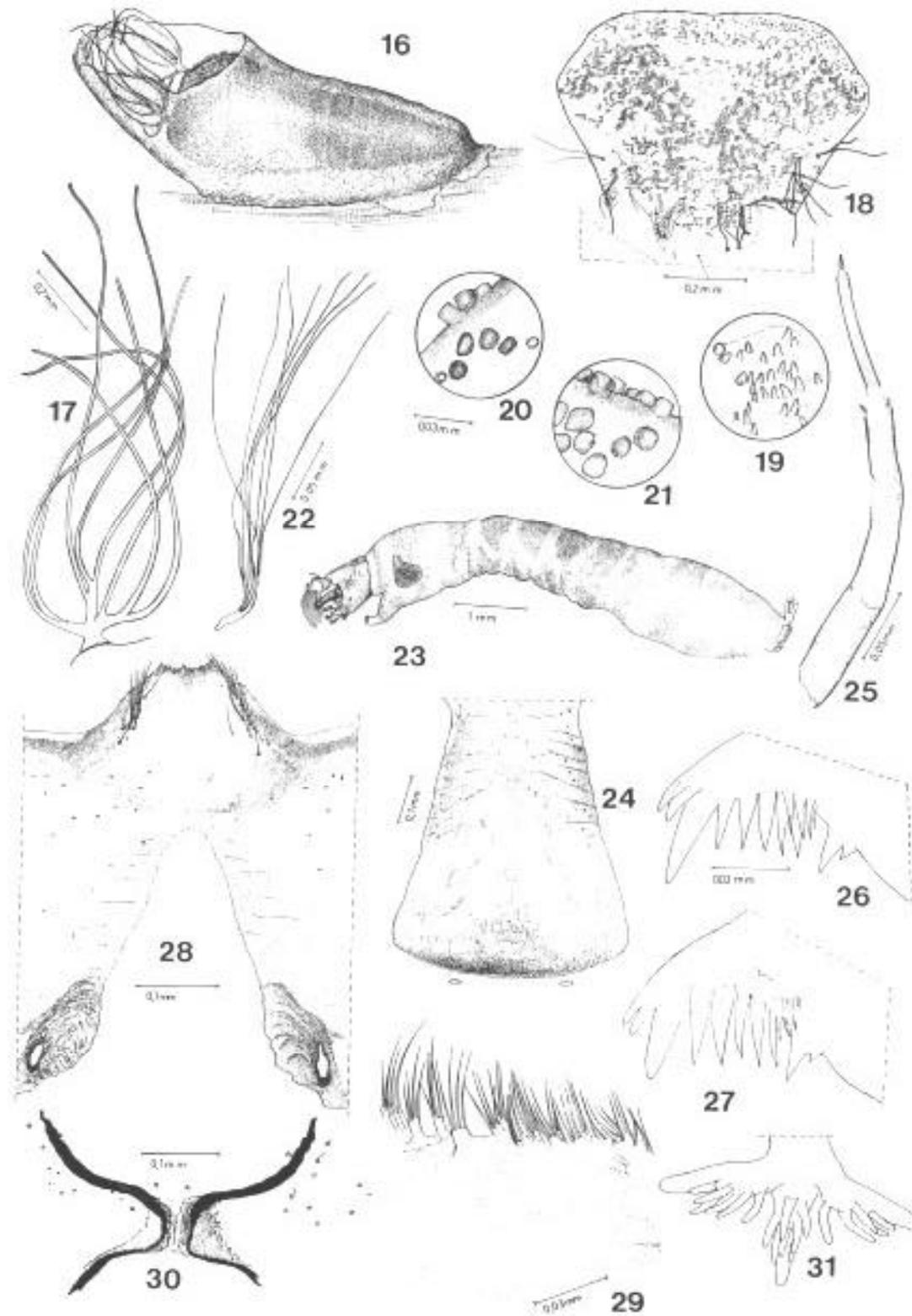
*Larva*: maximum length 7.5-8.5 mm. Head width 0.7 mm. Color dark, greenish brown, ornamentation and shape in accordance to Fig. 23. Integument smooth. Cephalic apotome brown with negative spots without well defined borders (Fig. 24). Antennae dark brown; ratio of length of segments I-III = 1:1.8-1.9:1.2-1.3 (Fig. 25). Cephalic fans with 35-39 combs. Rays of internal border of combs of variable length 3-5 short rays alternating with one longer ray. Mandible with 4-6 secondary teeth arranged in several rows (Figs 26-27). Maxillary palp with 4-5 papillae distally. Teeth of hypostomium border as Fig. 28; 5-6 lateral serrations. 15-17 lateral setae arranged in 1-2 rows; disc of hypostomium with 3-5 dispersed setae. Hypostomial bridge short, ratio hypostomium/hypostomial bridge = 1.4-1.5. Comb of pseudopod with about 43-54 teeth arranged in 12-14 groups (Fig. 29). Anal sclerite without scales but with isolated trichomes as in Fig. 30. Crochet ring with about 94-100 rows, each composed of about 15-17 hooks. Anal gills with 5-7 lobules on each of the three well developed lobes (Fig. 31).

*Material examined*: Argentina, Mendoza, Laguna del Diamante, 3,350-3,400 m, 27-I-95, coll. Coscarón 1E holotype; 77E paratypes; same locality 3,380 m, 27-I-55, coll. Aczel 10 E paratypes; same locality, río Diamante 3,300 m 27-I-95: 4 pupae, 3 larvae in late stage, 8 immature larvae; Neuquén Route 40, 3 km South of Buta Ranquil, 1,200 m 22-IX-75, Coscarón: 1G allotype 3E and 5G reared, 30 larvae, 20 pupae; San Juan, Tocota, 2,400 m one pharate male, one pupa previously identified as *S. (P.) dureti*. Type material in Museo La Plata.

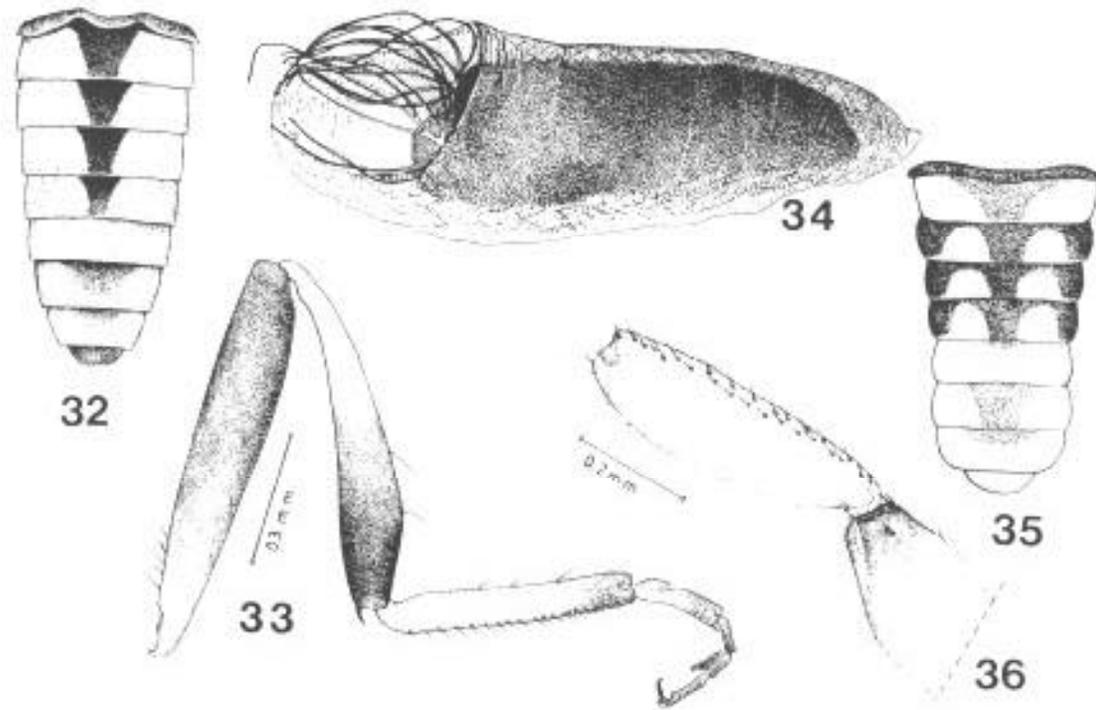
One female cited by Coscarón and Wygodzinsky (1972) as *S. strigidorsum* from Argentina: Chubut, Alto río Senguerr, 12-II-64, Bejarano, in the



*Simulium diamantinum* - Figs 1-12: female. Fig. 1: scutum, dorsal view. Fig. 2: hind leg. Fig. 3: posterior basitarsus. Fig. 4: abdomen, dorsal view. Fig. 5: abdomen lateral view. Fig. 6: front. Fig. 7: fronto-ocular triangle. Fig. 8: palpus basal article with sensorial organ. Fig. 9: claw. Fig. 10: VIII sternite and gonapophysis. Fig. 11: paraproct and cercus. Fig. 12: genital fork and spermatheca. Figs 13-15 male. Fig. 13: scutum. Fig. 14: hind leg. Fig. 15: distimere.



*Simulium diamantinum* - Figs 16-22: pupa. Fig. 16: general aspect. Fig. 17: respiratory filaments. Fig. 18: frontoclypeus. Figs 19-21: thorax platelets. Fig. 22: thorax trichome. Figs 23-31: larva. Fig. 23: general aspect. Fig. 24: cephalic apotome. Fig. 25: antenna. Figs 26-27: dentary portion of mandible. Fig. 28: hypostomium and angular cleft. Fig. 29: pseudopody comb. Fig. 30: anal sclerite. Fig. 31: anal gills.



*Simulium strigidorsum*, female. Fig. 32: abdomen in dorsal view. Fig. 33: hind leg. *S. horcochuspi*. Fig. 34: pupa, general aspect. *S. bachmanni*. Fig. 35: abdomen of female, dorsal view. *S. nigristrigatum* lectotype male. Fig. 36: posterior basitarsus.

Instituto Nacional de Microbiología (Buenos Aires) has been lost.

**Bionomics:** females are anthropophilic and a biting pest in Laguna del Diamante area, a tourist resort frequented by fisherman. Larvae and pupae were collected on *Potamogeton* at a short distance from the breeding place in the Diamante river. At the collection site, the river is clear with slow current. At San Juan (Tocota), the breeding ground was in a small creek with a strong current and in northern Neuquén in a medium sized creek.

**DISCUSSION**

After re-examination of the female lectotype of *S. (P.) strigidorsum* Enderlein and comparison with new material from Laguna del Diamante the following differences are shown in Table I.

Male, pupa and larva of *S. strigidorsum* are unknown. There are also similarities and differences between *S. diamantinum* n. sp. and some other species close to *Pternaspatha* “*nigristrigatum* group” (Table II).

TABLE I

Differences between *Simulium strigidorsum* (Juliaca) and *S. diamantinum* (Laguna del Diamante)

<i>strigidorsum</i>	<i>diamantinum</i> n. sp.
Shorter, wing length: 3.1-3.2 mm	Longer, wing length: 3.4-3.9 mm
Abdominal pollinosity lead-gray opaque	Lighter gray
Abdomen without 1+1 lateral black spots on segments (Fig. 32)	Abdomen with 1+1 lateral black spots on tergites III-V (Figs 4-5)
Legs darker	Legs more yellowish
Fore legs entirely dark brown	Fore legs brown with dorsal surface of femur and basal half of tibia light brown
Hind legs with femur mostly dark brown; basal half of tibia dark yellowish; second to apical tarsal segments all black (Fig. 33)	Hind legs with femur lighter with basal third yellowish; basal half of tibia light yellowish; second to apical tarsal segments with base light brownish (Fig. 2)

TABLE II  
 Characters of *Simulium pichi*, *S. dureti*, *S. diamantinum*, *S. horcochuspi* and *S. deagostinii*

Species	<i>pichi</i>	<i>dureti</i>	<i>diamantinum</i>	<i>horcochuspi</i>	<i>deagostinii</i>
FEMALE					
Scutum hairs:adpressed	+	+	-	+	±
dense	+	+	-	-	±
bright color	silvery	silvery	silvery	silvery	tin
1+1 lateral black spots on T.III-V reaching posterior border	+	+	-	+	+
Wing length	2.4-2.9	3.2-3.7	3.4-3.9	2.9-3.6	3.3-3.5
Calcipala	small	small	absent	absent	absent
Claws subbasal tooth	short	short	large	short	large
Ratio length/width posterior basitarsus	6.4	6.7	7.2-7.6	5.8-6.0	6.6
MALE					
Ratio length/width posterior basitarsus	3.8	3.2-3.4	3.3	3.8	3.7
PUPA					
Cocoon	slipper-shaped, light brown thin translucent	shoe-shaped, large antero-ventral bridge, thick not translucent	shoe-shaped, large antero-ventral bridge, thick not translucent	slipper-shaped, brownish, gray leaden sheen, very thin, translucent (Fig. 34)	shoe-shaped, large antero-ventral bridge, translucent
Maximum gill length	1.2-1.6	2.0-2.5	2.2-3.0	1.8-2.3	2.0-2.4
No. of frontoclypeus platelets	600-900	600-800	500-1000	400	600-800
No. of frontal trichomes on each side	3	12	5-15	3-4	4-6
No. of facial trichomes on each side	1-2	4	3-6	1	3
No. of thorax trichomes on each side	60	150	160-220	60-85	35-80
Trichomes length	0.08-0.12	0.10-0.19	0.24-0.35	0.25	0.17-0.18
LARVA					
Maximum length	6.7	8.5	8.5	8.0	8.0
Cephalic apotome spots	light brown, positive pattern concolorous with head apotome	dark brown, negative	light brown, negative not well defined	light brown, negative not well defined	dark brown, negative well defined
Proportion of antennal articles I-III	1:1.1:0.9	1:1.3-1.4:0.7-0.8	1:1.8-1.9:1.2-1.3	1:1.6-1.7:1.2	1:1.3-1.5:0.8-1.0
No. of mandibular secondary teeth	6-8	3-4	4-6	6	4-5
Lateral setae of hypostomium	11	11-14	15-17	13-14	14-15
Ratio length of hypostomium/hypostomial bridge	1/1.1	1/3	1/4-1/5	1/2	1/3
No. of rows in the crochet ring	83-92	84-92	94-100	110	95-98
No. of hooks	18	17	15-17	22	17-18

No. of anal gill lobules on each lobe	0	0	5-7	0	4-6
No. of teeth in the pseudopod comb	42	34	43-54	38	37
Habitat altitude (m)	10-200	1,800-4,300	1,200-3,400	3,900-4,200	10-300
Provinces	Chubut, Santa Cruz	Jujuy, Salta	San Juan, Mendoza, Neuquén	Jujuy	Santa Cruz, Tierra del Fuego
Endemism area	Patagonia	Puna	Puna, Patagonia	Puna	Subantarctic

Data on Table II show that *pichi*, *dureti*, *diamantinum*, *horcochuspi* and *deagostinii* are very closely related species which can be distinguished by some morphological characters and different distributions. *S. diamantinum* can be distinguished from the other species by several distinctive characters such as: female abdomen with 1+1 small, narrow and short, black lateral spots on tergites III-V, well isolated from the tergites median black spot and leaving a wide white transverse band before the posterior border, scutum hairs not adpressed, narrower posterior basitarsi, longer pupa gill, higher number of frontal and thorax trichomes, longer thoracic trichomes, and in the larva a longer second antennal segment, more lateral setae on the hypostomium, and a shorter hypostomial bridge in relation to hypostomial length.

Another *Pternaspatha* species that requires further study is *S. nigristrigatum* Enderlein particularly the currently unknown immature stages. This species is sympatric with *S. (Pt.) bachmanni* Wygodzinsky & Coscarón. *S. nigristrigatum* was originally described from one male and five females from Neuquén, (Neuquén Province, Argentina). Later, Wygodzinsky and Coscarón (1967) studied more material from localities at near Neuquén, where *bachmanni* is also present.

*S. bachmanni* was described in the female, male, pupal and larval stages from a locality 40 km east of the *nigristrigatum* type locality in the Negro river, formed by the confluence of the Neuquén and Limay rivers. Posteriorly has been collected in the Limay river always at the same locality (Coscarón & Wygodzinsky 1972). *S. bachmanni* was considered by Wygodzinsky and Coscarón (1967) as a new species based mainly on ornamental and morphological differences with *nigristrigatum* female.

*S. bachmanni* is a very well known species with a distribution on Río Negro High and Medium Valleys, Colorado, Chubut and Tecka rivers at different localities (Coscarón 1991). It is a distinctive species in the immature stages, particularly the morphological characters of the pupa such as the

absence of platelets on the thorax and frontoclypeus and the sparse thoracic trichomes of which there are about 10 [in other *Simulium (Pternaspatha)* species always are more than 10]. Ornamental differences that differentiate *bachmanni* and *nigristrigatum* occur particularly on the female abdomen, which has 1+1 sub-lateral, whitish spots as is shown in Wygodzinsky (1958, Fig. 21), with a curved anterior border, or in Wygodzinsky and Coscarón (1967) and Coscarón (1991) showing a more acute anterior border, as also occurs in the *nigristrigatum* female type specimen revised recently. *Simulium bachmanni* also shows similar intraspecific variations in abdominal ornamentation (Wygodzinsky & Coscarón 1967, Coscarón 1991) but the more common condition is shown in Fig. 35. The male *nigristrigatum* lectotype (Stone 1962) does not show morphological and ornamental differences with *S. bachmanni*. Male basitarsi proportions and morphology of the genitalia of *S. nigristrigatum* (Fig. 36) are similar to those seen in *S. bachmanni*.

Previous collections in the Limay, Neuquén and Negro rivers, and other Patagonian creeks, produced immature stages indistinguishable from *S. bachmanni*. Based on this evidence we consider *S. (Pternaspatha) bachmanni* Wygodzinsky & Coscarón 1967 to be a junior synonym of *S. (Pternaspatha) nigristrigatum* Enderlein 1930.

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