STUDIES ON THE FAUNA OF SURINAME AND OTHER GUYANAS: No. 52.

THE GELASTOCORIS NEBULOSUS COMPLEX

(HETEROPTERA - GELASTOCORIDAE)

by

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In the course of studying Gelastocoridae of Suriname it was necessary to examine the *G. nebulosus* (Guérin) complex in depth.

Within the genus *Gelastocoris* Kirkaldy a number of closely related species have been described which, with the "probable exception" of *G. quadrimaculatus* (Guérin), were made synonyms of *G. nebulosus* by TODD (1955). DE CARLO (1959), the author of some of the species TODD (1955) dealt with, disagreed with TODD's interpretation and "revived" some of his species and redefined *nebulosus* and *quadrimaculatus*. TODD (1961) reiterated his 1955 opinion that they all were the same species.

After studying over 800 specimens from various S. American localities, my conclusions are that all these forms should be considered as two subspecies.

In the descriptions $\bar{x}$ is the mean value of the measurement, which is given as 0.95 confidence limits for the mean based on 11 specimens of each sex, assuming a normal distribution. All measurements are in mm.

The following abbreviations have been used:

H Collection of Ing. E. Heiss, Innsbruck.
KU Snow Entomological Collections, Kansas University, Lawrence.
LM Rijks Museum van Natuurlijke Historie, Leiden.
MACN Museo Argentino de Ciencias Naturales, Buenos Aires.
N Collection of author.
PM Musée d'Histoire Naturelle, Paris.
UM Zoölogisch Museum, Rijksuniversiteit, Utrecht.

W Specimens collected by collaborators of the Max-Planck-Institut für Limnologie, Abt. Tropenökologie, at present in the charge of Dr. H. H. Weber, Kiel.

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Gelastocoris nebulosus nebulosus (Guérin-Méneville, 1844)

Galgulus nebulosus Guérin-Méneville, 1844, p. 351–352.
Galgulus flavus Guérin-Méneville, 1844, p. 351, fig. 4, 4a.
Galgulus nebulosus; Stål 1876, p. 137.
Gelastocoris flavus; Melin 1930, p. 161–162, fig. 2, 16–20.
Gelastocoris apureensis Melin, 1930, p. 159, fig. 13.
Gelastocoris paraguayensis De Carlo, 1954, p. 94–95, fig. 4, 10.
Gelastocoris vianai De Carlo, 1954, p. 90, 92, fig. 2, 8.
Gelastocoris nebulosus; Todd 1955, p. 331–335, fig. 24, 35 (partim).
Gelastocoris nebulosus; De Carlo 1959, p. 55–59, fig. 1–6, 10.
Gelastocoris paraguayensis; De Carlo 1959, p. 68–70, fig. 20–21.
Gelastocoris monrosi De Carlo, 1959, p. 70–72, fig. 39, 43–45.
Gelastocoris nebulosus; Todd 1957a, p. 1.
Gelastocoris nebulosus; Todd 1957b, p. 148 (partim).
Gelastocoris nebulosus; Todd 1961, p. 58–61.

The name *nebulosus* and not *flavus* is used as the first reviser, Stål 1876, used *nebulosus* (Todd 1955).

Description (based on specimens from Suriname and N. Brasil)

Length	♂ $\bar{x} = 6.36 \pm 0.22$; ♀ $\bar{x} = 7.18 \pm 0.31$
Greatest width pronotum	♂ $\bar{x} = 3.75 \pm 0.06$; ♀ $\bar{x} = 4.07 \pm 0.10$
Greatest width abdomen measured over embolium	♂ $\bar{x} = 4.24 \pm 0.10$; ♀ $\bar{x} = 4.69 \pm 0.08$

Colour variable, from slightly reddish or yellowish light brown to blackish.

Pronotum not carinate, with six bulbous elevations anterior to, and two posterior to a transverse furrow which lies somewhat behind the middle. Lateral margins bent in, at nearly a right angle just anterior of the transverse furrow. Posterior part often somewhat pointed and/or explanate.

Scutellum with four bulbous elevations, two medio-posteriorly and one pair more antero-laterally.

Hemielytra, apart from the finer granules which cover the entire dorsum, with some greater "blisterlike" granules whose position is as in Fig. 47. Membrane about 1½ times or more the width of posterior femur.

Male, posterior margin of 7th abdominal sternite variable, straight to rather deeply incised (Fig. 45). Genitalia, Figs. 30–35; Fig. 25 shows the terminology taken from MARTIN 1928. The most important features are the form of the right clasper hook and the form of the keel hook which are distinctive for a species, see TODD 1955.

Specimens studied

VENEZUELA: Apure, S. Fernando, 2 ♀ (Maidron, PM, type and cotype of *G. apureensis* Melin).

SURINAME: Paramaribo, 17.I.1958, 4 ♂, 2 ♀; Old road to Hannover, streamlet in savannah woodland, *P184*, 23.IX.1960, 4 ♀; Zanderijsavanne, pool, 28.IV.1963, 11 ♂, 4 ♀; road to Affobakka, roadside, on mud, *P1043*, 19.III.1961, 4 ♂,5 ♀; Sipaliwini, 15. VI.1963, 2 ♀ (P. H. van Doesburg, Jr); Saramacca Exp., Toegoemoetoe, 1903, 3 ♂, 3 ♀ (lgt. Dr. Kok, det. E. L. Todd) (LM); Zanderijsavanne, Sabakoekreek, *SN033Aa*, 25. VII.1969, 1 ♂; same, Carolinakreek, *SN079Bb*, 25.VIII.1969, 1 ♂, 2 ♀; near Carolinakreek, *SN096A*, 10 ♂, 5 ♀; Road to Brownsweg, Km 4, *SN230A*, 17.XI.1969, 4 ♂, 5 ♀; Coesewijneproject, road to the South, Km 25, near tributary of Goliathkreek, *SN422A*, 16.VI.1970, 3 ♂ (Nieser, UM); Zanderij I, 23.IV.1927, 1 ♀; Kabelstation, in sand on bank of river, 25.IX. 1938, 1 ♂ (D. C. Geijskes) (KU).

BRASIL: Pará, Rio Paru, VII.1952, 1 ♂ (J.C.M.C. coll., det. J. A. de Carlo, ex MACN); Santarém, Plage du Tapajoz, 13.VIII.1963, 1 ♂; Santarém, Lac Jua, 15.XII.1963, 3 ♀ (G. Marlier); Rio Tapajoz, Pindobal, Belterra, *S135*, 18.VI.1946, 1 ♂, 1 ♀; R. Tapajoz upstream of Fordlândia, R. Cumina, *S224*, 17.IV.1948, 2 ♀ (H. Sioli) (W).

Distrito Federal, Tres Rios, Jacarepagua, 29.V.1948, 16 ♂, 19 ♀ (A. Leitão de Carvalho).

Minas Gerais, Lassance, 9/19.XI.1919, 1 ♂, 1 ♀ (KU); Minas, II.1938, 1 ♀ (paratype of *G. vianai* De Carlo, lgt. O. Monte, ex. MACN, N).

Espirito Santo, 2 ♂, 2 ♀.

Rio de Janeiro, Rezendo, 29.II.1924, F. X. Williams, 1 ♀; Ariro Angras dos Reis, 28.III.1948, 6 ♂, 7 ♀ (A. Leitão de Carvalho).

São Paulo, Campo Grande, 1 ♂, 1 ♀; Capital, 1 ♂; Campinas, 10.III.1924, 1 ♀ (F. X. Williams); S. Paulo, X.1947, 1 ♀ (F. Plaumann).
Paraná, Alto Paraná, III.1929, 1 ♀ (F. Schade).
Santa Catarina, Nova Teutonia, II.1949, 1 ♀; N. Teutonia, Bauru, V.1947, 2 ♂; N. Teut., Marilia, IV.1947, 1 ♂, 1 ♀; N. Teut. Tupan, L. 2, 1.IV.1947, 32 ♂, 24 ♀ (F. Plaumann).
Abana, 1 ♀; Salta das Cruzes, X.1908, 1 ♂ (KU).
BOLIVIA: Santa Cruz, J. Steinbach, 34 ♂, 25 ♀ (KU).
PARAGUAY: Albovena, Srojoquasi, 16.XI.1922, 4 ♂, 6 ♀ (F. Schade); Paso Yobay, 8.IV.1950, 24 ♂, 27 ♀; Quazu, Coa, XI.1950, 1 ♀ (F. H. Schade) (KU); Paraguay, 1 ♂, 1 ♀ (lgt. G. Williner, *G. monrosi* det. De Carlo, ex MACN, N); Guairá, Villarica, 19.III.1920, 1 ♀ (F. Schade); C. Pfannel, 300 m alt., 7.XII.1950, 5 ♂, 5 ♀ (J. Foerster); same, XII.1950, 1 ♀ (F. H. Schade) (KU); C. Pfannel, I.1948, 1 ♂, 1 ♀ (F. H. Schade, holotype and allotype of *G. paraguayensis* De Carlo, MACN).
ARGENTINA, Misiones, Candelaría, XII.1943, 1 ♂, 1 ♀ (lgt. M. Viana, paratypes of *G. vianai* De Carlo, MACN); Misiones, 1.I.1950, 1 ♀ (J. Foerster); Entre Rios, La Paz, 10.X.1950, 1 ♂ (J. Foerster) (KU).

Gelastocoris nebulosus quadrimaculatus
(Guérin-Méneville, 1844)

Galgulus quadrimaculatus GUÉRIN-MÉNEVILLE, 1844, p. 351.
Gelastocoris quadrimaculatus; MARTIN 1928, p. 361–362, pl. 59 fig. 14–16 (partim).
Gelastocoris flavus; MELIN 1930, p. 161–162, fig. 2, 16–20 (partim).
Gelastocoris flavus; DE CARLO 1954, p. 88–90, fig. 1–7.
Gelastocoris bergi DE CARLO, 1954, p. 96–97, fig. 5, 11.
Gelastocoris bolivianus DE CARLO, 1954, p. 92–94, fig. 3, 9.
Gelastocoris nebulosus; TODD 1955, p. 331–335, fig. 35 (partim).
Gelastocoris quadrimaculatus; DE CARLO 1959, p. 59–65, fig. 8, 9, 11–16, 18, 30.
Gelastocoris bolivianus; DE CARLO 1959, p. 65–68, fig. 19, 28, 29.

Description (based on specimens from NW. Argentina)

Length	♂ $\bar{x} = 7.49 \pm 0.10$;	♀ $\bar{x} = 8.30 \pm 0.25$
Greatest width pronotum	♂ $\bar{x} = 4.46 \pm 0.05$;	♀ $\bar{x} = 4.84 \pm 0.10$
Greatest width abdomen	♂ $\bar{x} = 5.14 \pm 0.08$;	♀ $\bar{x} = 5.75 \pm 0.13$

Colour varying but most specimens seen are either reddish brown or very dark.
Pronotum as in ssp. *nebulosus* but the posterior part of the lateral margin more truncate and rarely explanate.

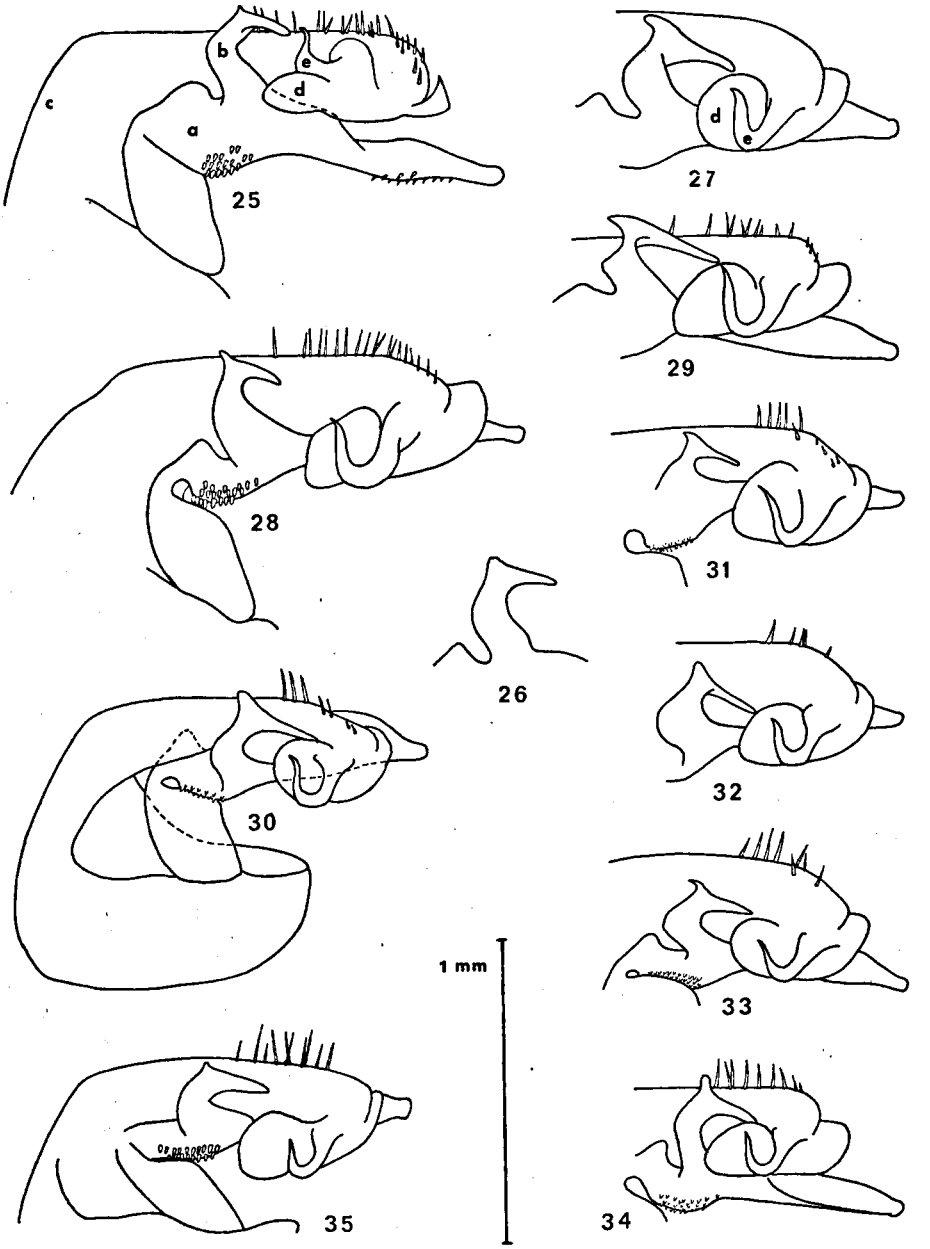

Fig. 25–35. Variability of the male genital capsule in *Gelastocoris nebulosus*; 25–29, ssp. *quadrimaculatus*; 30–35, ssp. *nebulosus* [a, right clasper; b, right clasper hook; c, keel; d, pan; e, keel hook]: 25–29, ssp. *quadrimaculatus*; 30–35, ssp. *nebulosus*; 25, specimen from Salta, det. DE CARLO; 26, from Tarija; 27, from Santa Cruz, *G. bolivianus* det. DE CARLO; 28, from Jujuy; 29, from Salta; 30, from Pará, det. DE CARLO; 31, 32 & 34, from Suriname; 35, holotype of *G. paraguayensis* DE CARLO; 35, from Paraguay, *G. monrosi* det. DE CARLO.

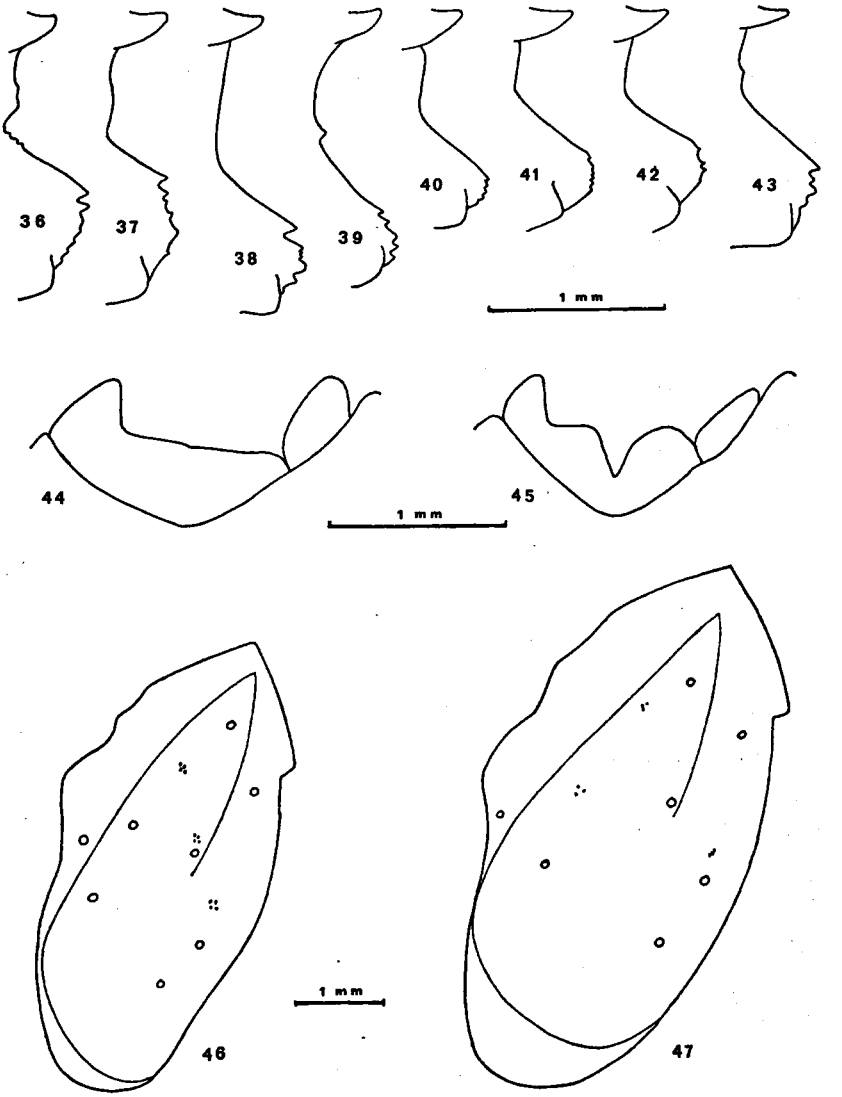

Fig. 36–43. Variability of the lateral margin of pronotum in *Gelastocoris nebulosus*; 36–39, ssp. *quadrimaculatus*; 40–43, ssp. *nebulosus*; 36, specimen from Salta, det. De Carlo; 37–38, from Jujuy; 39, from Salta; 40, from Pará, det. De Carlo; 41 & 43, from Suriname; 42, from Pará.

Fig. 44–45. Seventh abdominal sternite of male *Gelastocoris nebulosus nebulosus*: 44, specimen from Suriname; 45, from Paraguay, *G. monrosi*, det. De Carlo.

Fig. 46–47. Diagrams of hemielytra of *G. nebulosus*, showing the position of the blisterlike granules: 46, *G. bolivianus* of De Carlo. 47, normal form;

Scutellum as in ssp. *nebulosus*.
Hemielytra as ssp. *nebulosus* but especially in Bolivian and Peruvian specimens regularly an additional blisterlike granule as in Fig. 46. Membrane about $1\frac{1}{2}$ or less the width of posterior femur.
Male. Posterior margin of 7th abdominal sternite not incised. Genitalia Figs. 25–29, falling within the range of variability of ssp. *nebulosus*.

Specimens studied

PERÚ: Perú, 1937, 2 ♂, 1 ♀; Perú, 1 ♀; Marcapata, 1 ♂; Río Negro, 4.XI.1935, 790 m, 1 ♀; San Pedro, 900 m, jungle pools, 15/29.V.1935, 9 ♂, 11 ♀; same, sandy shore, 29.V.1935, 4 ♂, 9 ♀ (F. Woytkowski); Río Pichis, Puerto Bermúdez, 13/19.VII.1920, 3 ♂, 3 ♀ (Cornell Univ. Exp.); Satipo, XI/XII.1942, 3 ♂, 5 ♀, 1 lv (P. Paprzyki); dept. San Martín, vic. Rioja, 900 m, jungle, 9.IX.–3.X.1936, 1 ♀; dept. San Beni, Río San Beni, 840 m, 5.IX.1935, 1 ♂, 5 ♀; dept. Loreto, Boquerón del Padre, Abad, 31. VII.1946, 3 ♂, 1 ♀; same, Cordillera Azul, 3.VIII.1946, 2 ♂, 1 ♀; Aguaita, IX.1946, 1 ♂ (F. Woytkowski) (KU); Río Azul near Tingo Maria, shortly before the mouth in the Río Tullomayo, *P18a*, *P19*, 21.V.1963, 7 ♂, 4 ♀ (E. J. Fittkau, W); dept. Huánuco, Loc Shapajilla, 630 m, jungle, 29.VII./10.VIII.1938, 1 ♀; dept. Junín, Río Perenne y Chanchamago, sandy beach, V.1934, 4 ♂; dept. Ayacucho, prov. La Mar, Sivia, 790 m, jungle, stagnant pools, 16/20.VI.1941, 1 ♂, 3 ♀; dept. Cusco, prov. Paucartambo, Callanga Valley, 8/10.III.1953, 82 ♂, 135 ♀; same, banks of river Callanga, 11 ♀ (F. Woytkowski); Callanga, 1 ♂, 2 ♀ (KU).
BOLIVIA: Bolivia, 16/17.VIII.1949, 5 ♂; Chapare, Cristal Mayu, 1949, 3 ♂, 4 ♀; Ichilo, Buena Vista, 24.II.1950, 4 ♂, 3 ♀ (L. E. Peña, KU); Ichilo, Buena Vista, 400 m, III.1955, 4 ♀; same, X.1962, 1 ♂; Santa Cruz, Chinches, La Fortaleza, XI. 1962, 1 ♂; Ibañez, Río Espejo, 400 m, XI.1962, 2 ♂, 5 ♀ (Waltz, H); Tarija, Yaquiba, II.1961, 4 ♂, 2 ♀ (N).
ARGENTINA: Jujuy, Yala, II.1954, 2 ♂, 4 ♀; same, 20.II.1955, 3 ♂, 6 ♀ (N); same, II.1954, 3 ♂, 4 ♀ (Walz, H); Salta, Aquas Blancas, III.1955, 3 ♂, 3 ♀; Pocitos, 26.III.1955, 13 ♂, 20 ♀ (Walz, H); same, II.1952, 1 ♂, 1 ♀ (lgt. S. Bolle, bearing labels *G. nebulosus* (Guérin) det. De Carlo in De Carlo's handwriting, KU); Capiaguti, XII.1917, 1 ♂ (det. De Carlo); Río Carapara, XI.1962, 3 ♂, 3 ♀ (N); Tucumán, Colalao, III.1957, 1 ♂ (Walz, H).

Discussion

The main difference between the two subspecies is their size; ssp. *quadrimaculatus* is, on the average, distinctly larger than ssp. *nebulosus* (see measurements under descriptions). Specimens from Bolivia, Dept. Sta. Cruz may be intermediate. The series of ssp. *nebulosus* (lgt. STEINBACH, KU) from this region have a greater mean

length than other series of this subspecies (length ♂ $\bar{x} = 6.55 \pm 0.1$, ♀ $\bar{x} = 7.39 \pm 0.2$). The available specimens of ssp. *quadrimaculatus* from Sta. Cruz are slightly smaller on the average than other series; although distinctly larger than ssp. *nebulosus* including those from the same region mentioned above (mean length based on 5 ♀: 8.06 ± 0.05).

Further differences between the subspecies are not constant. In the majority of specimens of the ssp. *quadrimaculatus* the posterior part of the lateral margin of the pronotum is truncate; in most specimens of the ssp. *nebulosus* it is more pointed and often somewhat explanate.

The additional blisterlike granule shown in Fig. 46, has only very rarely been found in specimens of ssp. *nebulosus*. The incision in the posterior margin of the 7th sternite of several S. Brazilian and Paraguayan male specimens of ssp. *nebulosus* has not been observed in ssp. *quadrimaculatus*.

DE CARLO 1959 uses the following characters in separating his species.

1. Differences in the bulbous elevations of pronotum and scutellum.

These should be distinctly more prominent in *G. nebulosus* than in *G. quadrimaculatus*. I failed to see differences in these structures when comparing specimens identified by DE CARLO as *nebulosus* and *quadrimaculatus*. Moreover, as TODD 1961 remarks, the differences between *G. bergi* and *G. flavus* in DE CARLO 1954, are, amongst others, that *bergi* has somewhat more pronounced bulbous elevations, another form of the lateral margin of pronotum and right clasper hook, and the presence of two groups of more prominent small granules between the blisterlike ones along the claval suture. In DE CARLO 1959 these forms are both treated as synonyms of *G. quadrimaculatus*, whereas in the same paper he considers several species which are based on the same type of characters.

2. The form of the lateral margin of the pronotum.

Figs. 36–43 give the variability of this outline. Although most specimens of ssp. *quadrimaculatus* have the posterior part truncate and most of ssp. *nebulosus* more pointed, this feature is unreliable.

3. The genital capsule of the male.

Its variability is shown in Figs. 25–35. Within a single series of specimens from a restricted region the variability may be slight. This may account for DE CARLO's opinion that there is disjunct variability in this structure.

4. The development of the membrane.

This is indeed generally better developed in ssp. *nebulosus* than in ssp. *quadrimaculatus*. DE CARLO 1959 states that his *G. bolivianus* has a less developed membrane than his *G. quadrimaculatus*. But this was not very apparent in the specimens studied, although on average the development of the membrane of specimens from NW Argentina (pure *G. quadrimaculatus* according to DE CARLO's interpretation) was stronger than in Peruvian specimens (mixed *G. quadrimaculatus* and *G. bolivianus* of DE CARLO). TODD 1961, states that in Andean specimens of several species of *Gelastocoris*, including *G. nebulosus*, the membrane is commonly reduced.

5. The blisterlike granules on the hemielytron.

DE CARLO's *G. bolivianus* has an additional blisterlike granule as compared with *G. quadrimaculatus* and *nebulosus*. Series in which all specimens have this extra granule do indeed occur. There are, however, also series in which this granule varies from being absent, through a group of slightly enlarged small granules, to a distinct extra granule (e.g. those from Bolivia, Buena Vista in KU and the series from Argentina, Pocitos in the Heiss collection). Moreover *G. bergi* DE CARLO, 1954, which he now places in *G. quadrimaculatus* has the beginning of this additional granule.

6. Colour.

Another characteristic of *G. bolivianus* is, according to DE CARLO 1959, the light castaneous colour which is typical for this "species." Several of the specimens studied which agree with *bolivianus* are very dark brown to blackish grey. The remaining characters on which *G. bolivianus* is based are the variable ones discussed above.

7. The emargination of the 7th abdominal sternite in the male.

Gelastocoris monrosi DE CARLO, 1959, is only distinguished by the emargination of the 7th abdominal sternite of the male (Fig. 45). In the long series from Brasil, Nova Teutonia (KU) this characteristic varies from being absent through vague to very distinct. As

further characteristics are lacking, this form too must be considered synonymous with *G. nebulosus nebulosus*.

In *G. paraguayensis* the right clasper hook should be distinctive. Fig. 33 represents this structure drawn from the slide of the holotype. In my opinion it is within the range of variability of *G. nebulosus nebulosus*.

Finally I studied the type and cotype (both females) of *G. apureensis* Melin. The supposition of TODD 1955 that it also is a synonym of *G. nebulosus nebulosus* was confirmed.

Conclusion: The *G. nebulosus* "complex" consists of one species with two subspecies: *G. nebulosus quadrimaculatus* being Andean in distribution and *G. nebulosus nebulosus* ranging from Venezuela and the Guyanas through Brasil to Paraguay and northeastern Argentina. In Bolivia (Sta. Cruz) these subspecies possibly mix.

KEY TO SUBSPECIES OF *Gelastocoris nebulosus* (G.-M.)

Characteristic	ssp. *nebulosus*	ssp. *quadrimaculatus*
mean length	♂6.4±0.2; ♀7.2±0.3	♂7.5±0.1; ♀8.3±0.3
lateral margin of pronotum	predominantly as in Fig. 40–41, rarely as in Fig. 42–43	predominantly as in Fig. 36–38, rarely as in Fig. 39
hemielytra	only very rarely with an additional blisterlike granule as in Fig. 46	regularly with an additional blisterlike granule as in Fig. 46
7th sternite of male	in S. Brazilian and Paraguyan specimens, sometimes distinctly incised as in Fig. 45	incision as in Fig. 45 not observed

Resumen

Se trata de las espécies del grupo *nebulosus* del género *Gelastocoris*. Según el autór este grupo contiene una espécie con dos subespécies. *Gelastocoris nebulosus nebulosus* (Guérin) con sinónimas *G. flavus* (Guérin), *G. apureensis* Melin, *G. monrosi* De Carlo, *G. paraguayensis* De Carlo y *G. vianai* De Carlo, tiene una distribución de la Venezuela y las Guayanas hasta el Paraguay y el NE de la Argentina. *Gelastocoris nebulosus quadrimaculatus* (Guérin), con sinónimas *G. bergi* De Carlo y *G. bolivianus* De Carlo, tiene una distribución andina, de Perú hasta el Chile (Santiago) y el NO de la Argentina.

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