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GRAPHOSOMA (GRAPHOSOMELLA SUBGEN. NOV.)
INEXPECTATUM SP. NOV. FROM SYRIA
(Hemiptera Heteroptera Pentatomidae)

SUMMARY

Graphosoma (*Graphosomella* subgen. nov.) *inexpectatum* sp. nov. from Syria is described. The new subgenus is separated by *Graphosoma* s. str. by several morphological features, the most relevant of which is the scutellum much shorter than the abdomen. Illustrations of both the habitus and the male genitalia are provided.

RIASSUNTO

Viene descritta e raffigurata *Graphosoma* (*Graphosomella* subgen. nov.) *inexpectatum* sp. nov., raccolta in Siria sulle montagne dell'Antilibano. La nuova specie occupa, grazie a una serie di caratteri che la differenziano nettamente da tutte le altre specie del genere *Graphosoma*, tra i quali lo scutello molto corto che non raggiunge l'estremità dell'addome, una posizione isolata all'interno del genere. Questo ha fatto ritenere opportuna la sua collocazione in un nuovo sottogenere.

INTRODUCTION

Graphosoma Laporte, 1833 is a Palaearctic genus of the family Pentatomidae (subfam. Podopinae) whose most striking characteristics is the colour pattern. This consists in a combination of orange (in some cases yellow or red) and black; the latter is arranged dorsally in a series of parallel stripes, sometimes reduced to rows of large dots, and ventrally in regularly arranged spots. Much attention has been devoted recently both to the formation and to the ecological role of this unusual, longitudinally striated color pattern, which has

proved to depend on different melanization of the cuticle; the epidermis is uniformly orange/red while the melanized cuticle forms the black color (TIETZ & ZRZAVÝ, 1996). This alternating dark and light colour organization can play in different situations either an aposematic or a cryptic function (VESELY *et al.*, 2006; TULLBERG *et al.*, 2008).

The genus *Graphosoma* was revised more than a century ago by HORVÁTH (1903), who was also the first to study and illustrate the male genitalia of the European species (HORVÁTH, 1909). Later studies included: the description of one more species from Turkey (LODOS, 1959); examinations of the variability of intraspecific colour pattern (DE BERGEVIN, 1909; ŠTĚPÁNEK, 1926; SEIDENSTÜCKER, 1975): the discussion of the status of *G. italicum*, Müller, 1766 (WAGNER, 1956); the recognition of the species status of *G. interruptum* White, 1839 living on the Canary Islands (WAGNER, 1966). After the establishment of the synonymy of *G. creticum* Horváth, 1909 with *G. semipunctatum* (Fabricius, 1775) (GAPON, 2007), the genus was known to comprise eight species, including *G. alkani* Lodos, 1959, still regarded as a valid species but likely to be a junior synonym of *G. stali* Horváth, 1881.

In this paper a new species, collected twice in a single locality in Syria, is described; since several of its morphological features separate it from all the other species of *Graphosoma*, the establishment of a new subgenus is proposed.

The finding of this new species confirms that the area including part of the Middle East from Eastern Anatolia through Iran and Transcaucasia may be regarded as the centre of evolution of the genus *Graphosoma*, since that is the region where the highest number of species of the genus is present (seven out of nine) and where most of the species with a restricted distribution are concentrated: *G. (s. str.) alkani* Lodos, 1959, *G. (s. str.) consimile* Horváth, 1903, *G. (s. str.) melanoxanthum* Horváth, 1903, *G. (s. str.) stali* Horváth, 1881 and *Graphosoma (Graphosomella subgen. nov.) inexpectatum* sp. nov.

Graphosomella subgen. nov.

Type species. *Graphosoma (Graphosomella subgen. nov.) inexpectatum* sp. nov.

Diagnosis. *Graphosomella* subgen. nov. is clearly separated from *Graphosoma s. str.* by the following combination of characters: body small, subparallel, due to the connexivum little projecting laterad and less rounded



Plate I — Graphosoma spp.: a. *G. (s. str.) lineatum* (L.); b. *G. (s. str.) lineatum* (L.) f. *italicum* Müller; c. *G. (s. str.) melanoxanthum* Horváth; d. *G. (s. str.) rubrolineatum* (Westwood); e. *G. (s. str.) interruptum* White; f. *G. (s. str.) stali* Horváth; g. *G. (s. str.) semipunctatum* (F.); h. *G. (s. str.) semipunctatum* (F.) f. *wilsoni* White; i. *G. (s. str.) consimile* Horváth; j. *G. (Graphosomella subgen. nov.) inexpectatum* sp. nov.

than in *Graphosoma s. str.* (see Plate I); body 1.80× longer than pronotum wide (as shown in Tab. 1, based on original measurements, this ratio varies between 1.42 and 1.63 in all the other species of *Graphosoma*); lateral margins of pronotum evenly rounded, without a well defined lateral angle, not separable into an anterior and a posterior part; scutellum much shorter than abdomen; largest part of membrane exposed; antenna short, as long as 0.33× of body length (0.40-0.48 in all the other species of *Graphosoma*, see Tab. 1); ostiole opening at the top of a simple raised cone in front of a shallow circular depression (in the other species of *Graphosoma*, with the only exception of *G. consimile* Horváth, 1903, there is an elongate, distally raised peritreme emanating from the anterior side of the ostiole); paramere (Fig. 2d) with three apical points.

Tab. 1
Main ratios in *Graphosoma* species.

	Body length/ Pronotum width		Antennae/Body length	
	♂♂	♀♀	♂♂	♀♀
<i>inexpectatum</i>	1.80	–	0.33	–
<i>consimile</i>	1.58-1.64	1.47-1.59	0.40-0.43	0.45-0.48
<i>interruptum</i>	–	1.57-1.59	–	0.40-0.45
<i>lineatum</i>	1.48-1.54	1.45-1.53	0.44-0.47	0.42-0.46
<i>melanoxanthum</i>	1.53-1.54	1.50-1.54	0.40-0.43	0.40-0.41
<i>rubrolineatum</i>	1.42-1.46	1.50-1.54	0.42	0.40-0.44
<i>semipunctatum</i>	1.53-1.66	1.53-1.63	0.43-0.48	0.40-0.43
<i>stali</i>	–	1.56	–	0.46

Etymology. *Graphosomella* means ‘little *Graphosoma*’; a feminine.

Bionomics. While all the species of *Graphosoma s. str.* are known to feed on Apiaceae, the single species of *Graphosomella* subgen. nov. was apparently collected on an unidentified plant of the family Lamiaceae. However, more observations are needed to confirm this otherwise important difference.

Graphosoma (*Graphosomella* subgen. nov.) *inexpectatum* sp. nov.

Type material. Holotype: 1 ♂, ‘SW Syria, Bludan, 1,750/2,100 m, 27-31.V.2000, leg. G. Sama’, coll. A. Carapezza. Paratype: 1 ♂, ‘SW Syria, Bludan (33°44 00 N 36°07 59 E), 1,590 m, 25-26.VI.1998, leg. P. Kabátek’, coll. Z. Jindra.

Bludan is a locality situated in a mountain valley (1590-2100 m a.s.l.)

with relatively rich steppe vegetation in the Anti-Lebanon Mountains, about 30 km NW of Damascus. One of the two collectors (P. Kabátek) of the new species reported that he had collected it on an unidentified Lamiaceae.

Description. Ovoid, flat, glabrous, moderately shining, orange with black markings. Body (Fig. 1) 1.80× as long as pronotum wide, punctate on both dorsal and ventral surface.

Head subtriangular, 0.81× longer (from an ideal line passing through the centre of ocelli to the apex of jugae) than wide between eyes. Lateral margins almost straight, tapering anteriorly to apex; jugae enclosing and widely surpassing the tylus, apically slightly diverging. Dorsal surface of head with transverse rugulose lines and deeply punctate. Length of antennal segments I-V: 0.6-1.06-0.53-0.73-1.06 mm; IV and V with very short semi-erect silvery setae. Rostrum reaching hind coxae, third segment swollen. Head dorsally orange except for two longitudinal black bands which from behind the ocelli converge to the apical extremity of jugae; head ventrally orange except for central part of gula and a small triangular dot near the anterior angle of eye, both black, and an embrowned submarginal stria along jugal margin. I antennal segment centrally embrowned, II and III yellowish, IV and V brown. I and II rostral segments orange, distal half of II embrowned, III brown except for a proximal and a distal pale ring, IV dark brown.

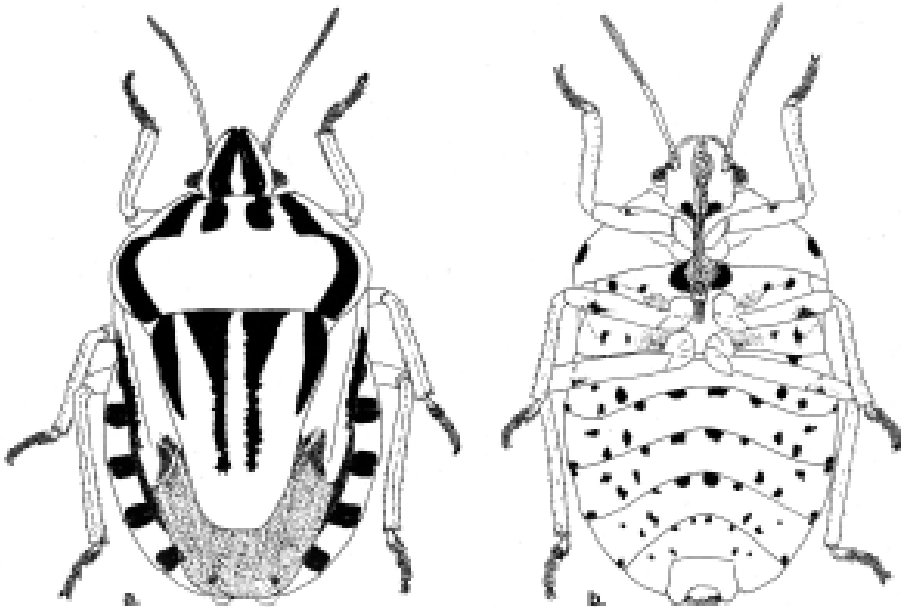


Fig. 1 — *G. (Graphosomella* subgen. nov.) *inexpectatum* sp. nov.; a. dorsal view; b. ventral view.

Pronotum transverse, 2.24× wider than long in the middle. Anterior margin of pronotum behind head slightly concave, medially convex; lateral margins evenly rounded, lateral angle not distinguishable. Anterior third of pronotum with four longitudinal black bands. External bands, at their posterolateral angles, joining two curved black bands running parallel to posterior half of lateral pronotal margin.

Scutellum subtriangular with apex widely rounded, 1.4× longer than basally wide, slightly surpassing the proximal two thirds of abdomen length. Base of scutellum medially with a raised semicircular area continuing posteriorly in an almost impunctate central ridge extending to the apex of the two central black bands. Scutellum orange except for four longitudinal black bands; external ones, vaguely shaped as an elongate comma, extended along the basal half of the lateral margins; inner ones longer, irregularly tapering apically.

Hemelytra orange except for a triangular embrowned spot at apex of r+m vein; exocorium with central part of outer margin black and an embrowned triangular spot. Membrane for the most part exposed, brownish infuscated.

Mesosternum and metasternum deeply depressed medially, forming an U-shaped central groove. Ostiole at the top of a simple raised cone, without an evident canal emanating from it, opening in front of a shallow circular depression; evaporatorium occupying about two thirds of metepisternum.

Legs orange; ventral surface of femora with a blackish spot at the beginning of the distal third; tarsi black except the pale proximal half of the first tarsomere.

Abdomen 1.07× wider than pronotum width. Connexivum flat, punctate except of lateral margins. Laterotergites with large black spots at their anterior and posterior borders. Abdomen ventrally orange with small black spots arranged according to the pattern shown in Fig. 1b.

Pygophore (Figs. 2a-c) subtrapezoid, posterolateral angles projected posteriorly. Ventral wall wrinkled and punctate except in basal fourth; median excavation of ventral rim broadly obtuse. Dorsal rim with two lateral teeth bent inwards. Pygophore orange except for a basal blackish, medially broken, belt on the ventral surface. Paramere (Fig. 2d) robust, regularly curved, provided with a bowl-like structure along the stem and three apical points.

Length: 10.66-10.80 mm.

Female unknown.

Comparative notes. *Graphosoma* (*Graphosomella* subgen. nov.) *inexpectatum* sp. nov. is easily separated from all the other species of *Graphosoma* s. str. thanks to the set of characters listed in the subgeneric diagnosis, the most prominent one being the short scutellum.

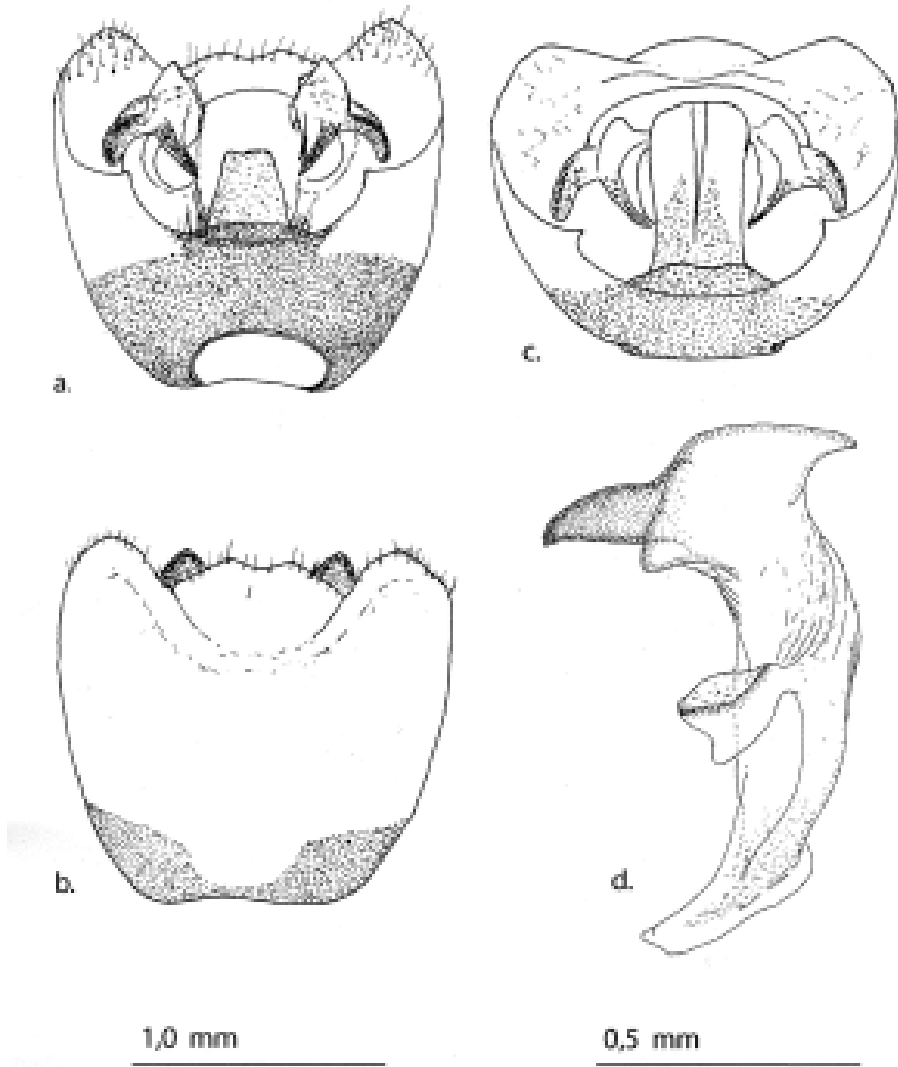


Fig. 2 — *G. (Graphosomella* subgen. nov.) *inexpectatum* sp. nov.; a.-c. pygophore in dorsal (a.), ventral (b.) and posterior (c.) view; d. paramere.

Etymology. The species epithet *inexpectatum* (= unexpected) is given in reference to the strange appearance of this species within well-known *Graphosoma*.

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REFERENCES

- BERGEVIN E. DE 1909 — A propos de quelques cas de mutation dans le genre *Graphosoma* Lap. (Hém.). — *Bull. Soc. ent. Fr.*, 1909: 43-47.
- HORVÁTH G., 1903 — Conspectus specierum generis *Graphosoma*. — *Annales Musei Nationalis Hungarici*, 1: 345-354.
- HORVÁTH G., 1909 — Les *Graphosoma* d'Europe. — *Annales Musei Nationalis Hungarici*, 7: 143-150.
- GAPON D. A., 2007 — *Graphosoma creticum* Horv. is a synonym of *G. semipunctatum* (F.) (Heteroptera: Pentatomidae). — *Zoosystematica Rossica*, 16(1): 78.
- LODOS N., 1959 — A new species of *Graphosoma* from Turkey (Heteroptera-Pentatomidae). — *Annals & Magazine Natural History*, Series 13, 1(1958): 711-713.
- SEIDENSTÜCKER G., 1975 — Über anatolischen Schildwanzen. — *Reichenbachia*, 15: 259-268.
- ŠTĚPÁNEK O., 1926 — *Graphosoma italicum* var. *obscurum* nov. var. (Hemipt. Heteropt.). — *Acta Entomologica Musei Nationalis Pragae*, 4 (32): 111-112.
- TIETZ D. & ZRZAVÝ J., 1996 — Dorsoventral pattern formation: morphogenesis of longitudinal coloration in *Graphosoma lineatum* (Heteroptera, Pentatomidae). — *European J. Entomology*, 93: 15-22.
- TULLBERG B.S., GAMBERALE-STILLE G., BOHLIN T. & MERILAITA, S., 2008 — Seasonal ontogenetic colour plasticity in the adult striated shieldbug *Graphosoma lineatum* (Heteroptera) and its effect on detectability. — *Behavioral Ecology and Sociobiology*, 9: 1389-1396.
- VESELÝ, P., VESELÁ, S., FUCHS, R. & ZRZAVÝ, J., 2006 — Are gregarious red-black shieldbugs, *Graphosoma lineatum* (Hemiptera: Pentatomidae), really aposematic? An experimental approach. — *Evolutionary Ecology Research*, 8: 881-890
- WAGNER E., 1956 — Zur Systematik der Gattung *Graphosoma* Lap. (Hem., Het. Pentatomidae). — *Entomologische Berichten*, Amsterdam, 16: 110-116.
- WAGNER E., 1966 — *Graphosoma interruptum* White, 1839, eine bisher verkannte Art (Hemiptera, Heteroptera, Pentatomidae). — *Reichenbachia*, 6: 231-235.

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