ACTA ENTOMOLOGICA MUSEI NATIONALIS PRAGAE
Published 8.xii.2008 Volume 48(2), pp. 485-490 ISSN 0374-1036

Phymacysta stysi, a new species of lace bug from Dominican amber (Hemiptera: Heteroptera: Tingidae: Tinginae)

Viktor B. GOLUB[1)], Yuri A. POPOV[2)] & Eric GUILBERT[3)]

[1)] Voronezh State University, Universitetskaya pl. 1, Voronezh 394006, Russia; e-mail: v.golub@inbox.ru

[2)] Paleontological Institute, Russian Academy of Sciences, ul. Profsoyuznaya 123, Moscow, 117997, Russia; e-mail: elena@dataplus.ru, lab@palaeoentomolog.ru

[3)] Muséum National d'Histoire Naturelle, Dept. Systematics and Evolution, 75005 Paris, France; e-mail: guilbert@mnhn.fr

Abstract. One new species of lace bug (Heteroptera, Tingidae), *Phymacysta stysi* sp. nov., is described from the Miocene Dominican amber, and its relationships are discussed. It belongs to the extant Neotropical genus *Phymacysta* Monte, 1942. A key of *Phymacysta* species including the new species and the fossil species of *Leptopharsa* Stål, 1873, from Dominican amber is given.

Key words. Heteroptera, Tingidae, *Phymacysta*, taxonomy, new species, description, new species, comparison, discussion, Miocene, Dominican amber

Introduction

The present paper is a continuation of a series devoted to remarkable fossil lace bug species. Forty of them have been described or recorded so far. Some of them are known mainly from Baltic and Dominican amber (Golub & Popov 1999, Wappler 2003), on which the most recent investigations concentrate. Five species of the Tingidae have been described from Dominican amber so far (Golub & Popov 2000a,b, 2003; Arillo & Ortuño 2005): one species of the small Neotropical genus *Eocader* Drake & Hambleton, 1934 (Cantacaderinae), three species (Golub & Popov 2000a,b, 2003) of the large extant genus *Leptopharsa* Stål, 1873 (Tinginae) (Drake & Ruhoff 1960, 1965), which contains over 100 mostly Neotropical species but has been recorded also from North America, South Africa, and Australia (Drake & Ruhoff 1965), and one species from another large genus *Stephanitis* Stål, 1873, numerous species of which are widespread throughout the Neotropic, Nearctic, Palaearctic, Oriental and Australian Regions (Drake & Ruhoff 1965). The additional new species described here

belongs to the small Neotropical genus *Phymacysta* Monte, 1942 (Tinginae), originally created to distinguish five extant species of the genus *Leptostyla* Stål, 1873, which is closely related to *Leptopharsa* (Monte 1942).

The age of Dominican amber is controversial. Its reported age varies from late Lower Miocene to Mid Oligocene, i.e. it can be up to 23-40 million years old (Grimaldi 1995). We support the conclusion that Dominican amber in the Dominican Republic has most probably formed 15-20 million years ago during the late Early Miocene through early middle Miocene (Grimaldi 1995, Iturralde-Vinent & MacPhee 1996). The fossilized resin of Dominican amber has a leguminous origin, and the leguminose tree *Hymenaea protera* Poinar (Poinar 1991) of the Early to Middle Miocene age is most probably the source of this resin collected at various sites in the Dominican Republic (Iturralde-Vinent & MacPhee 1996).

Thanks to the efforts of Günter Bechly (curator of fossil insects of the Amber Section, Paleontological Department, Staatliches Museum für Naturkunde Stuttgart, Germany), we could study the bugs from the excellent local collection of Dominican amber fossils during the visit of one of us (Yu. A. Popov) in 2004 and select some of the more interesting Heteroptera for determination and description, including the tingid bug described here.

We dedicate the present work to Prof. Pavel Štys in recognition of his outstanding contribution to our knowledge about the comparative morphology, phylogeny, and higher classification of the Heteroptera.

Taxonomy

Family Tingidae Laporte, 1832

Subfamily Tinginae Laporte, 1832

Genus *Phymacysta* Monte, 1942

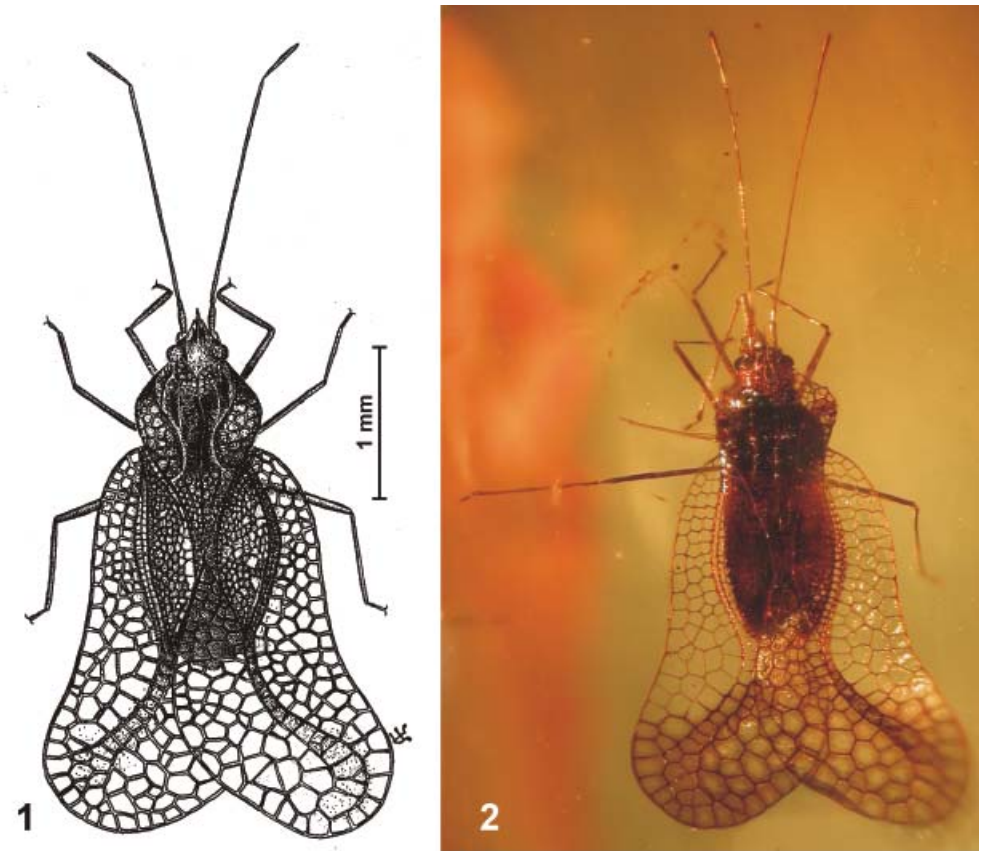
Phymacysta stysi sp. nov.

(Figs.1-2)

Type material. Holotype: ♀, DOMINICAN AMBER, Typ. Kat. Nr. Do-5506-M, V. B. Golub & Yu. A. Popov det., coll. Staatliches Museum für Naturkunde Stuttgart, Germany.

Description (Fig. 1). Body elongate, its common outline distinctly widening from head towards apex of hemelytra, 2.26 times as long as wide at midlength of abdomen and 1.36 times as long as at level of maximal width (close to apices) of hemelytra folded in repose. Areolate structures of pronotum and hemelytra glass-like, transparent. Body nude, without hairs and spines.

Head dark brown, short, 2.05 times as wide as long from clypeal apex to posterior margin of eyes and 1.46 times as wide as long from apex of bucculae to posterior margin of eyes. Head with five very thin spines (two frontal, one median and two occipital). Frontal spines very long and acuminate, conspicuously projecting forward beyond clypeal apex, median one longest among them, extended to apex of bucculae and strongly projecting forward. Occipital spines completely adpressed to head and placed along inner side of eye, their apices not reaching anterior margin of eyes. Antennal tubercles small, with apices curved mediad.



Figs. 1-2. *Phymacysta stysi* sp. nov. 1 – reconstruction of holotype; 2 – photography of amber inclusion (photo D. E. Shcherbakov). Scale bar: 1.0 mm.

Antennae very long (0.67 of body length measured from head apex to hemelytron apex) and very thin, especially segment 3; antennae almost nude, only segment 4 covered with short and scarce hairs. Areolate bucculae closed anteriorly, high and strongly projecting beyond clypeal apex. Rostrum moderately long, extended most probably to hind coxae (the holotype has rostrum turned backwards).

Pronotal disc convex, covered with rather large punctures; pronotum with three very low longitudinal carinae without distinct cells; median carina slightly higher, lateral carinae reaching vesicula and posterior margin of pronotum. Areolate vesicula tectiform and concealing most part of vertex and occiput from above (its anterior and upper parts are broken up by fossilization). Paranota quite wide, reflected on pronotal disc, strongly elevated and inflated, covering lateral pronotal carinae from above, markedly projecting outwards beyond lateral angles of pronotal disc in the widest part (around midlength), with eight irregular longitudi-

nal rows of polygonal areolae; distal margins of paranota sinuate along most of their length and elevated high above pronotal disc; areolate posterior pronotal process with obtuse apex covering hemelytral clavi from above.

Hemelytra almost flattened, very long and extended much beyond abdominal apex, widening from base towards apex (hemelytral apices diverging), with outer margins distinctly sinuate in their posterior part and with apical parts slightly bent upwards. Hemelytra clearly subdivided by raised veins Hc, R + M, Cu and R = M + Cu into costal, subcostal, discoidal and sutural areas. Costal area very wide, slightly sinuate, with large angular areolae, located in three rows in anterior third of hemelytra, in four rows near midlength, and five rows in the widest part. Subcostal area narrow, broadly sinuate at apex, with two rows of small, mostly quadrangular-hexagonal areolae from almost its base up to abdominal apex; one row of large quadrangular areolae enlarging from abdominal apex to hemelytral apex, with additional areolae in second row near hemelytral apex; subcostal areas of both hemelytra in repose forming X-like pattern. Discoidal area slightly emarginated, with 5-6 rows of rather small, angulate areolae at widest part. Posterior pronotal process entirely covered by hemelytral clavi from above. Hypocostal lamina very narrow, with a single row of areolae.

Body fuscous black ventrally. Peritreme rather narrow and long. Legs slender, very long and very thin; pale, lighter than abdomen.

Measurements of holotype (all in mm). Body length 3.5; width of hemelytra folded in repose at midlength of abdomen 1.55, in broadest place 2.55; head length from apex of clypeus to posterior eye margin 0.2, head length from apices of bucculae to posterior eye margin 0.28, head width 0.41, vertex width 0.2, eye width 0.105; length of antennal segments I : II : III : IV = 0.21 : 0.12 : 1.57 : 0.43; pronotum length 1.24, pronotum width 0.85; length of fore femur 0.48, length of hind femur 0.86 (parts of other legs cannot be measured precisely because they are facing downwards and the distorted rays of light in the amber interfere with the process).

Key to species of *Phymacysta* and fossil *Leptopharsa*

Here we provide a key to all species of the genus *Phymacysta*, including the fossil species described below, and to the fossil species of *Leptopharsa*. The extant species of *Leptopharsa* are not included in this key because it would require a revision of the genus that includes more than 100 species, which is far beyond the aim of this study.

1 Paranota moderately wide, raised, not reflexed as to form a shell, median carina wide but never highly elevated, hood moderately large. ***Leptopharsa*** Stål, 1873 2

– Paranota wide, reflexed, shell-like, if not reflexed or shell-like then median carinae wide and highly elevated or hood large and cyst-like. ***Phymacysta*** Monte, 1942 4

2 Costal area of hemelytra with 4-5 rows of areolae in basal half of its length. Paranota with three rows of areolae along most of their length or at least in anterior half. Body length 2.85 mm. ..... ***Leptopharsa frater*** Golub & Popov, 2003

– Costal area of hemelytra with 2-3 rows of areolae in basal half. Paranota with two rows of areolae throughout or at most with two areolae in a third row in the widest part. ... 3

3 Lateral margins of paranota slightly sinuate at middle with two rows of areolae. Larger, body length about 4.25 mm. ..... ***Leptopharsa poinari*** Golub & Popov, 2000
– Lateral margins of paranota evenly rounded, with two and anteriorly three rows of larger areolae. Smaller, body length 3.2 mm.... ***Leptopharsa evsyunini*** Golub & Popov, 2000
4 Paranota reflexed and shell-like. 5
– Paranota raised but not reflexed as to form a shell. 7
5 Median carina very low, without areola. ..... ***Phymacysta stysi* sp. nov.**
– Median carina very high, with areolae. 6
6 Pronotum unicarinate. ..... ***Phymacysta magnifica*** (Drake, 1922)
– Pronotum tricarinate. ..... ***Phymacysta vesiculosa*** (Champion, 1897)
7 Median carina higher than hood, hood moderately large. .... ***Phymacysta mcelfreshi*** (Drake, 1918)
– Median carina lower than hood, hood very large and cyst-like. 8
8 Pronotum unicarinate. ..... ***Phymacysta tumida*** (Champion, 1897)
– Pronotum tricarinate. ..... ***Phymacysta praestans*** (Drake, 1927)

Discussion

Judging by the combination of morphological features, the new fossil species combines in itself the features of two related extant Neotropical and south-Nearctic genera, *Leptopharsa* (also represented by some species in Africa and Australia) and *Phymacysta*. The specific features of both genera are the following (Hurd 1946): long and thin antennae, with segment 1 often 2-5 times as long as segment 2; anteriorly closed bucculae; distinct scent gland openings; thin legs; tectiform and ballooned, ampule-like vesicula that is elongated forward and cyst-like; usually rather wide or very wide paranota, which are more or less raised in *Leptopharsa* but reflexed and turned upwards onto the disc of pronotum or bulbous (opened from the side of the medial line of body) in *Phymacysta*; long hemelytra, which are much longer than abdomen and broaden from base to the often diverging apices; and often longitudinally concave, short discoidal area.

The shape of the paranota classify *Ph. stysi* sp. nov. in the genus *Phymacysta*, but the median carina is low contrary to all other species of this genus, which has been characterized by a high median carina (Hurd 1946). However, taking into account that the lateral carinae in various species of *Phymacysta* may be either absent or of different elevation, but always short, one may suppose that the low median carina of *Ph. stysi* sp. nov. indicates an intrageneric variability of this feature as well. We therefore consider the new species to be a Miocene *Phymacysta* fossil and do not bring it close to any extant species.

Acknowledgements

We are indebted to Günter Bechly (Staatliches Museum für Naturkunde Stuttgart, Germany) for the loan of the fossil amber specimen. We would like to express our sincere thanks to Torsten Wappler (Germany) for a critical review of the manuscript. The work was supported by the Russian Foundation for Basic Research (Grant 08-04-00212-a).

References

ARILLO A. & ORTUÑO V. 2005: Catalogue of fossil insect species described from Dominican amber (Miocene). *Stuttgarter Beiträge zur Naturkunde*, *Series B* **352**: 1-68.

DRAKE C. J. & RUHOFF F. A. 1960: Lace-bug Genera of the World (Hemiptera: Tingidae). *Proceedings of the United States National Museum* **112**: 1-105.

DRAKE C. J. & RUHOFF F. A. 1965: Lace bugs of the World, a catalogue (Hemiptera: Tingidae). *United States National Museum Bulletin* **243**: i-viii + 1-634.

GOLUB V. B. & POPOV Yu. A. 1999: Composition and evolution of Cretaceous and Cenozoic faunas of bugs of the superfamily Tingoidea (Heteroptera: Cimicomorpha). Pp. 33-39. In: *AMBA projects AM/PFICM/1.99: Proceedings of the First International Palaeoentomological Conference, Moscow, 1998.* Bratislava, 199 pp.

GOLUB V. B. & POPOV Yu. A. 2000a: New cantacaderid lace bugs from Dominican amber (Heteroptera; Tingidae, Cantacaderinae). *Acta Geologica Hispanica* **35**: 165-169.

GOLUB V. B. & POPOV Yu. A. 2000b: New Cenozoic lace bugs (Heteroptera: Tingidae). *Paleontological Journal* **34 (Suppl. 3)**: 290-297.

GOLUB V. B. & POPOV Yu. A. 2003: Two new species of lace bugs from Dominican amber (Heteroptera: Tingidae, Tinginae). *Annals of the Upper Silesian Museum*, *Entomology* **12**: 101-110.

GRIMALDI D. 1995: The Age of Dominican Amber. Pp. 203-217. In: ANDERSON K. B. & CRELLING J. C. (eds.): *Amber, Resinite, and Fossil Resins*. American Chemical Society Symposium Series 617. American Chemical Society, Washington, DC, xvii + 297 pp.

HURD M. P. 1946: Generic classification of North American Tingoidea (Hemiptera-Heteroptera). *Iowa State College Journal of Science* **20**: 429-492.

ITURRALDE-VINENT M. A. & MACPHEE R. D. E. 1996: Age and paleogeographical origin of Dominican amber. *Science* **273**: 1850-1852.

MONTE O. 1942: Critica sobre alguns gêneros e espécies de Tingitídeos. *Papéis Avulsos do Departamento de Zoologia* (São Paulo) **2**: 103-115.

POINAR G. O. Jr. 1991: Hymenaea protera sp.n. (Leguminosae, Caesalpinioideae) from Dominican amber has African affinities. *Experientia* **47**: 1075-1082.

WAPPLER T. 2003: New fossil lace bugs (Heteroptera: Tingidae) from the Middle Eocene of the Grube Messel (Germany), with a catalog of fossil lace bugs. *Zootaxa* **374**: 1-26.