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***Adenophoraphis*, a new aphid genus from Kazakhstan (Hemiptera: Aphididae: Macrosiphini)**

Currently, 889 species of aphids from three families are known in Kazakhstan: Adelgidae (10 species), Phylloxeridae (2), Aphididae (877) [1]. A new to science genus of aphids *Adenophoraphis* gen. n. and a new species *Adenophoraphis burabaica* sp. n. described from Kazakhstan. The specimens of the new taxon were collected in Akmola Region of the northern Kazakhstan in 2002. The new genus belongs to the subtribe Macrosiphina of the tribe Macrosiphini (Aphidinae). It lives on *Adenophora liliifolia* (L.) A. DC, no ant attendance was observed. During the collection period, only apterous viviparous females were found. The specimens were collected in a deciduous forest, in the Kazakh uplands, on the Kokshetau Upland. The new genus belongs to the subtribe Macrosiphina of the tribe Macrosiphini of the subfamily Aphidinae. In addition to the new genus, the other members of Macrosiphina inhabiting Campanulaceae include *Campanulaphis* Kadyrbekov, 2016, *Megouroleucon* Miyazaki, 1971, *Tshernovaia* Holman et Szelegiewicz, 1964 and *Uroleucon* Mordvilko, 1914.

Keywords: aphids, new species, *Adenophoraphis*, *A. burabaica*, Aphididae, Kazakh uplands, Kokshetau Upland, Kazakhstan.

Introduction

One of the modern main world priorities in biology is the problem of conservation of biological diversity and the inventory of flora and fauna in specially protected areas.

The inventory of insect fauna in specially protected areas is a priority area of entomology in most countries of North and South America, Africa, Europe and Australia. In all these countries, research is underway on the biodiversity of various insect groups [2–5]. In the last 20 years, similar studies have been gaining momentum in the CIS countries, especially in Russia, Belarus and Ukraine [6–11]. In Central Asia, research on the inventory of insect fauna in specially protected areas is being purposefully conducted in Mongolia, China and Kazakhstan.

In 2002, we studied the aphid fauna of the Burabai Nature Park. Unfortunately, those materials have not yet been fully processed, but a new genus of aphids has been discovered in them.

Materials and Methods

Original microscope slides were prepared using coniferous balsam as mounting medium (Kadyrbekov, 2014). The specimens were examined using a Bel Photonics light microscope. Identifications were done with the reference to authoritatively identified material from the collection of the Institute of Zoology of Ministry of Education and Sciences of Kazakhstan (Almaty). Holotypes and paratypes of newly described species are deposited in the collection of the Institute of Zoology (Almaty, Kazakhstan). All measurements are given in millimeters.

Plant taxonomy were verified according to POWO [12]. Descriptions of the related genera were studied too [13–18].

Results and Discussion

Adenophoraphis gen. n.

Description. The body is elongate-oval. Cuticle thick, without reticulation, smooth, only slightly wrinkled on antennal tubercles. Small and large median and marginal sclerites are present on pronotum, meso- and metanotum, as well as on abdomen. Pronotum, meso- and metanotum, and in some specimens also tergites 2–4 (on one side) with weak small convex tubercles. The spiracles are small, bean-shaped. Setae on the body, antennae, and legs thick and spatulated. The frontal groove of the median tubercle is shallow (in

one specimen with a barely noticeable median tubercle of a square shape). Antennal tubercles high, divergent. Antennae six-segmented. Third antennal segment (0–1) with secondary rhinaria. The ultimate rostral segment reaches the middle coxae, its last segment is slender, not stocky. Siphunculi semi-cylindrical with a light flange and reticulation in the upper quarter. Cauda, either necessarily conical or co-deserved with a squeeze in the main half, with a pointed apex. First segment of tarsi with 3,3,3 setae.

Etymology. The new genus is named for the generic name of the host plant.

Differential analysis. The new genus belongs to the subtribe Macrosiphina of the tribe Macrosiphini of the subfamily Aphidinae. In addition to the new genus, the other members of Macrosiphina inhabiting Campanulaceae include *Campanulaphis* Kadyrbekov, 2016, *Megouroleucon* Miyazaki, 1971, *Tshernovaia* Holman et Szelegiewicz, 1964 and *Uroleucon* Mordvilko, 1914. The new genus differs from *Megouroleucon* and *Uroleucon* in having a shallow frontal groove and a minimal number of secondary rhinaria on the third antennal segment (0–1). *Adenophoraphis* gen. n. differs well from *Tshernovaia* in the cauda, which is different in shape, the minimum number of secondary rhinaria on the third antennal segment (0–1), and the presence of 3, 3, 3 hairs on tarsal segment 1 (5, 5, 5 in *Tshernovaia*). Differences from other genera with a shallow frontal groove are shown in the next key.

Key for distinguishing *Adenophoraphis* gen. n. from the Macrosiphina genera with a shallow frontal groove.

1. First segment of all tarsi with 5, 5, 5 hairs. A single tubercle on the anal plate is clearly expressed. Attended by ants.....2
 - First segment of all tarsi with 3, 3, 3 hairs. A single tubercle on the anal plate is absent or clearly expressed. Attended or not by ants4
 - 2 Cauda is widened at the base, passing further into a long, thin, sinuous process. On *Adenophora**Tshernovaia adenophorae* Holman, 1964
 - Cauda finger-shaped or elongated-triangular.....3
 - 3 Frontal groove gently sloping, but distinct, with large median tubercle nearly equal in height to antennal tubercle. Ante- and postsiphuncular semilunar sclerites are absent. The reticulated zone is at least 0.35–0.45 SIPH. Cauda finger-shaped. On *Echinops* and *Cousinia*.....*Turanoleucon* Kadyrbekov, 2002
 - Frontal groove barely marked, 0.05–0.15 of the distance between apices of antennal tubercles. At least postsiphuncular sclerites are present. The reticulated zone is no more than 0.28–0.35 SIPH. Cauda is elongate triangular. On the root collar and roots of *Campanula*.....*Campanulaphis* Kadyrbekov, 2016
 - 4 Frontal groove gently sloping, median frontal tubercle well defined.....5
 - Frontal groove without median frontal tubercle.....7
 - 5 The last segment of the ultimate rostral segment is short, almost triangular. On plants of the families Rosaceae and bluegrass (Poaceae).....*Sitobion* Mordvilko, 1914
 - The last segment of the ultimate rostral segment is stocky, but not triangular. On Limoniaceae, Amaranthaceae6
 - 6 Siphunculi are darkened only in the reticular zone. Cauda is short, triangular, with a rounded top. On *Atriplex*.....*Metopeuraphis* Narzikulov et Smailova, 1975
 - Siphunculi are darkened everywhere except for the basal third. Cauda is finger-shaped or conical, with notched sides. On Limoniaceae.....*Staticobium* Mordvilko, 1914
 - 7 A single tubercle on the anal plate is clearly expressed. Attended by ants.....8
 - There is no single tubercle on the anal plate. Not attended by ants.....9
 - 8 Ultimate rostral segment almost rod-shaped, with very short setae. Cauda elongated triangular. Dorsal setae of different types: pointed, forked, tridentate, fan-shaped. On *Helichrysum*.....*Ramitrichophorus* Hille Ris Lambers, 1947
 - Ultimate rostral segment slender, elongated. Dorsal setae pointed. Cauda conical or triangular. On Asteraceae, Urticaceae, Apiaceae.....*Metopeurum* Mordvilko, 1914
 - 9 Body with spatulate setae. Reticulated zone 0.17–0.24 SIPH. On *Adenophora*.....*Adenophoraphis* Kadyrbekov, gen. n.
 - Setae of body pointed. Reticulated zone 0.25 SIPH and more. On Asteraceae.....*Macrosiphoniella* (auct.) Del Guercio, 1911

Adenophoraphis burabaica sp. n.

Type material. Holotype: apterous viviparous female, no 2891, Akmola region, Natural Park “Burabai”, lake Zhukey, birch forest, H – 656 m, *Adenophora liliifolia*, 06.06.2002, R.Kh. Kadyrbekov (Institute of Zoology, Almaty, Kazakhstan). Paratypes – 7 apterous viviparous females, same locality and date.

Etymology. The new species are named for name of natural park (Fig. 1).

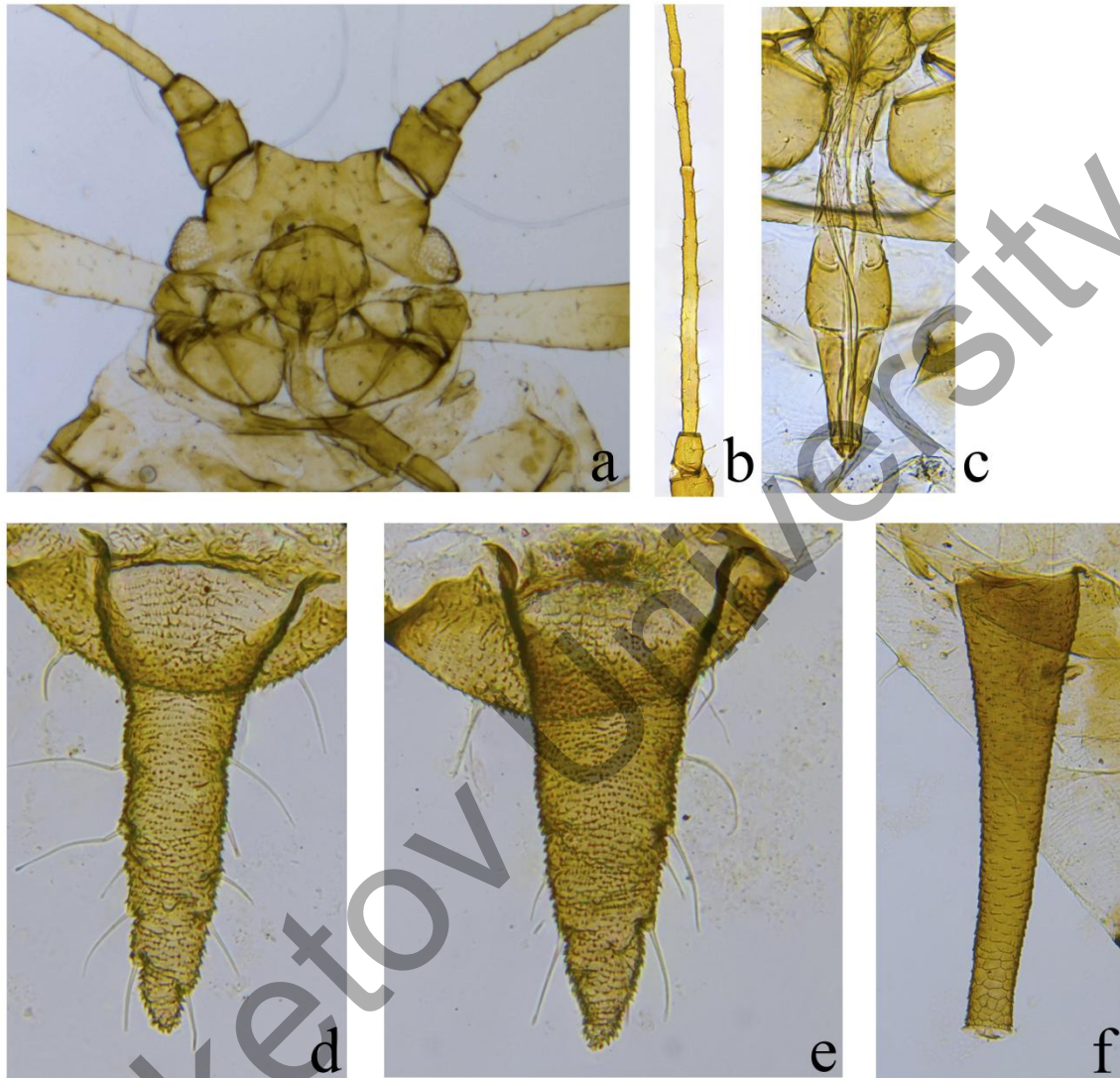


Figure 1. *Adenophoraphis burabaica* sp. n.: a – head; b – III–IV antennal segments; c – ultimate rostral segment; d, e – cauda; f – siphunculus.

Apterous viviparous female (from 8 specimens). Dark brown when alive. Antennae brown, siphunculi, cauda black, legs light with darkened tops of the femora, the very bases and tops of the legs and tarsi brown. On the slide: head, antennae, rostrum, coxae, tops of femora, bases and tops of tibia, tarsi, subgenital and anal plates swarthy. Siphunculi and cauda dark brown. The body elongated-oval. Cuticle thick, without cellularity, smooth, only slightly wrinkled on antennal tubercles. Large marginal sclerites present on pronotum, meso- and metanotum. On the dorsal side of the abdomen, small sclerites are developed at the bases of most hairs. Larger marginal sclerites present on abdominal tergites I–V, each with 2–3 setae, and large massive postsiphuncular sclerite (not semilunar) present on abdominal tergite VI. Abdominal tergites VII–VIII with small sclerites, sometimes combined into longitudinal median bands. Pronotum, meso- and metanotum, and in some specimens also on abdominal tergites II–IV (on one side) with small, weakly convex marginal tubercles. The spiracles small, bean-shaped. Setae on body, antennae, and limbs thickened, spatulate.

Body 2.92–3.67. Frontal groove not deep with low diverged antennal tubercles (Fig. 1a). Frontal hairs (0.058–0.075) long, pointed, 1.12–1.44 of basal diameter of 3rd antennal segment. Antennae normal, six-segmented, 0.68–0.79 of body length. Third segment 2.12–2.93 of 4th one, 1.28–1.36 6th segment, 1.53–1.69 of the processus terminalis. Processus terminalis 2.69–3.58 of the base of 6th segment. Secondary rhinaria in number 0–1 develop on the basal half of the 3rd segment (Fig. 1a). Hairs on the 3rd segment (0.035–0.046) pointed, 0.77–1.00 of its basal diameter. Rostrum reaches before or behind of the middle coxae. Its ultimate rostral segment (Fig. 1c) 1.14–1.33 of the second segment of hind tarsus, 1.08–1.33 of the base of 6th segment with 4–6 accessory hairs. Siphunculi semi-cylindrical with a light flange and reticulation in the upper quarter, 0.16–0.20 of body length, 1.20–1.57 of cauda (Fig. 1 f). Cauda, either necessarily conical or co-deserved with a squeeze in the main half, with a pointed apex, 0.12–0.14 of body with 8–11 setae (Fig. 1 d, e). Second segment of hind tarsus 0.90–1.17 of the base of 6th segment. Dorsal setae 1.15–1.26 of the basal diameter of 3rd antennal segment. There are 12–16 setae on 3rd tergite, 5–6 between siphunculi and 4–6 ones on the 8th tergite. Genital plate broad oval with 2 setae on disk and 8–12 ones along its posterior margin. Legs normal develop. First tarsal segment with 3:3:3 hairs.

Host plant. *Adenophora liliifolia* (L.) A. DC (Campanulaceae).

Bionomy. Aphids live on the stems.

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Р.Х. Қадырбеков

***Adenophoraphis* — Қазақстанда табылған бітенің жаңа тұқымдасы (Hemiptera: Aphididae: Macrosiphini)**

Қазіргі кезде Қазақстанда бітелердің фаунасының үш тұқымдасқа жататын, яғни *Adelgidae* (10 түр), *Phylloxeridae* (2 түр), *Aphididae*-ның (877 түр) 889 түрі белгілі [1]. Қазақстаннан табылған *Adenophoraphis* gen. n және *Adenophoraphis burabaica* sp. n. бітенің ғылымға жаңа тұқымдасы мен түрі ретінде сипатталады. Жаңа таксонның үлгілері 2002 жылы Солтүстік Қазақстанның Ақмола облысынан табылды. Жаңа тұқымдас *Macrosiphini* подтрибасының *Macrosiphini* (Aphidinae) триба тармағына жатады. Тұқымдас *Adenophora liliifolia* (L.) A. DC сабақтарында тіршілік етеді және құмырскалармен қатынасы жоқ. Жазғы кезеңде, дернәсілдерін тірілей туатын тек қана қанатсыз аналықтары жиналды. Коллекциялық үлгілер Қазақтың ұсақ шоқыларындағы аралас орманнан, Көкшетау қыратынан жиналған. Жаңа тұқымдас *Macrosiphina* подтриба тармағындағы басқада тұқымдастарымен бірге қоңыраубаста (*Campanulaceae*) тіршілік етеді және *Campanulaphis* (Kadyrbekov, 2016), *Megouroleucon* (Miyazaki, 1971), *Tshernovaia* (Holman et Szelegiewicz, 1964), *Uroleucon*-пен (Mordvilko, 1914) бірігіп тұқымдастық таксондар тобын құрайды.

Кілт сөздер: бітелер, жаңа тұқымдас, жаңа түр, *Adenophoraphis*, *A. burabaica*, Aphididae, Қазақтың ұсақ шоқылары, Көкшетау қыраты.

Р.Х. Қадырбеков

***Adenophoraphis* — новый род тлей из Казахстана (Hemiptera: Aphididae: Macrosiphini)**

На данный момент фауна тлей Казахстана насчитывает 889 видов из трех семейств: *Adelgidae* (10 видов), *Phylloxeridae* (2), *Aphididae* (877) [1]. Новый для науки род тлей *Adenophoraphis* gen. n. и новый вид *Adenophoraphis burabaica* sp. n. описаны из Казахстана. Экземпляры нового таксона были собраны в Акмолинской области Северного Казахстана в 2002 году. Новый род принадлежит к подтрибе *Macrosiphina* трибы *Macrosiphini* (Aphidinae). Род живет на стеблях *Adenophora liliifolia* (L.) A. DC и не посещается муравьями. В течение летнего периода были собраны только бескрылые живородящие самки. Коллекционные экземпляры были собраны в смешанном лесу, в Казахском мелкосопочнике, на Кокшетауской возвышенности. Новый род вместе с другими родами подтрибы *Macrosiphina*, живущими на колокольчиковых *Campanulaceae*, составляет группу родственных таксонов *Campanulaphis* (Kadyrbekov, 2016), *Megouroleucon* (Miyazaki, 1971), *Tshernovaia* (Holman et Szelegiewicz, 1964) и *Uroleucon* (Mordvilko, 1914).

Ключевые слова: тли, новый род, новый вид, *Adenophoraphis*, *A. burabaica*, Aphididae, Казахский мелкосопочник, Кокшетауская возвышенность, Казахстан.

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