

*Zoology*

## Karyological Study of Three Species of the Genus *Aphis* (Hemiptera: Aphididae) from Georgia

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**ABSTRACT.** Three species of the genus *Aphis* (*A. craccivora*, *A. hederæ* and *A. ruborum*) from Georgia (Caucasus) were studied karyologically. It was shown that the diploid set for these species consisted of  $2n=8$  chromosomes, as in the majority of representatives of the genus *Aphis*. © 2010 Bull. Georg. Natl. Acad. Sci.

**Key words:** Karyotype, *Aphis*, *A. craccivora*, *A. hederæ*, *A. ruborum*, Georgia.

The genus *Aphis* (Hemiptera: Aphididae) is represented by more than 500 species in the world aphid fauna [1], with 49 species and subspecies (10% of the described species) inhabiting Georgia [2-4]. Species diversity within this genus in Georgia (as well as in the whole world) provides an opportunity to investigate a wide spectrum of species, although the taxonomy of the genus has been worked out completely.

At present 69 species, or 14%, of all recorded species of the genus *Aphis* have been studied karyologically [1]. In this genus the modal diploid chromosome set is  $2n=8$  [5-7]. Data on the genus *Aphis* for Georgian populations are not recorded in the literature. This paper reports the karyotypes of Georgian populations of three species of the genus *Aphis*.

**Material and Methods.** For karyological studies material was collected on 5 host plant species during the aphidological expeditions in summer of 2007 and 2008 in three floristic regions with different climatic conditions: Imereti, Racha-Lechkhumi (both Western Georgia) and Khevi (East Georgia). After identification 3 species of the genus *Aphis*: *A. craccivora* Koch, 1854, *A. hederæ* Kaltenbach, 1843, *A. ruborum* Börner, 1940 were selected for further analysis. Sites of their collection, host plants,

number of the studied samples are presented in Table 1.

To make chromosome preparations, III and IV instars larvae fixed in alcohol-acetic acid mixture (3:1) were used. Small-sized embryos cut out from larvae were selected to prepare chromosome spreads, using the method proposed by Blackman [5]. 156 metaphase plates of 28 specimens were analyzed.

**Results and Discussion.** *Aphis craccivora* Koch, 1854 is a cosmopolite, polyphagous species [8]. Previous karyological studies of *A. craccivora* showed that the chromosome number in this species was  $2n=8$  [1], while in Iranian populations from *Lupinus* sp. it was  $2n=9$  [see in 5].

According to our research *A. craccivora* was not previously registered in the floristic regions of Imereti [9] and Khevi (pers. comm). During our study this aphid species was collected from *Minuartia micrantha* Schischk and *Trifolium ambiguum* M.Bieb. for the first time in the world.

$2n=8$  diploid chromosome set was detected in the *A. craccivora* populations studied. It consisted of four pairs of chromosomes. One pair of chromosomes is as long as the following one and could represent a pair of sex chromosomes [6, 10]. Chromosomes of the second

Table 1.

## Aphid material for karyological studies

	Species	Floristic region	Collecting sites	No. of samples	Host plant
1	<i>Aphis craccivora</i> Koch, 1854	Imereti	Villages: Nakhakhulevi (Khoni distr.),	3	<i>Taraxacum officinale</i> Wigg; <i>Minuartia micrantha</i> Schi schk; <i>Trifolium ambiguum</i> M. Bieb.
			Joneti (Tskaltubo distr.);	4	
		Khevi	Village Ketrisi (Kazbegi distr.)	1	
2	<i>A. hederæ</i> Kaltenbach, 1843	Imereti	Villages: Kontuati (Khoni distr.),	6	<i>Hedera helix</i> L.
		Racha-Lechkhumi	Joneti (Tskaltubo distr.);	3	
			Ritseula gorge (Ambrolauri distr.)	1	
3	<i>A. ruborum</i> Bomer, 1940	Imereti	Vill. Kontuati,	1	<i>Rubus</i> sp.
		Racha-Lechkhumi	Noga (both Khoni distr.);	8	
			Ritseula gorge (Ambrolauri distr.)	1	

and third pair are almost equal in length. One pair of chromosomes is comparatively short (Figure 1, a).

*Aphis hederæ* Kaltenbach, 1843 is an oligophagous aphid species, living on *Hedera helix* and other plants of the family Araliaceae [1]. *Aphis ruborum* Börner, 1940 is a monophagous aphid species inhabiting various plants of the genus *Rubus* [1]. Previous karyological studies of the American populations of *A. hederæ* and the British populations of *A. ruborum* showed that their karyotypes are made up of  $2n=8$  chromosomes [1, 5].

For the first time *A. hederæ* and *A. ruborum* were recorded from floristic regions of Imereti [9] and Racha-Lechkhumi [11].

Chromosome number for the studied populations of *A. hederæ* and *A. ruborum* is  $2n=8$ . Four pairs of chromosomes are found in their karyotypes. One pair of chromosomes of *A. hederæ*, which could represent a pair of sex chromosomes, is longer than others. In *A. ruborum* one chromosome pair is comparatively as long as the following one (Figure 1, b and c).

Based on our study, it was proved that the chromosome number of Georgian populations of three aphid species: *Aphis craccivora*, *A. hederæ* and *A. ruborum*, is  $2n=8$ , as in the majority of representatives

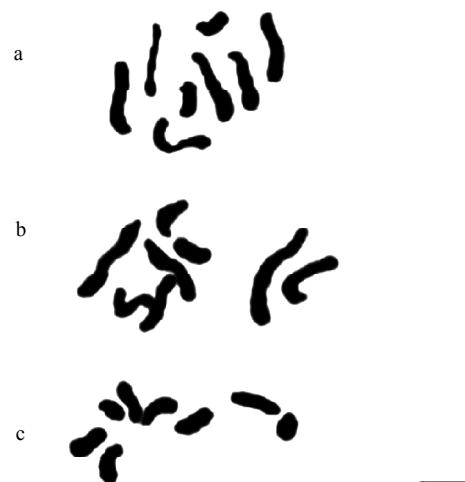


Fig. 1. Karyotypes of three species of the genus *Aphis*: a – *A. craccivora* Koch, 1854 ( $2n=8$ ); b – *A. hederæ* Kaltenbach, 1843 ( $2n=8$ ); c – *A. ruborum* Börner, 1940 ( $2n=8$ ). Bar represents 5 mm.

of the genus *Aphis* [1, 7]. Sex chromosomes could be the longest [6, 7, 12].

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## ზოოლოგია

***Aphis*-ის გვარის (Hemiptera: Aphididae) საქართველოს სამი სახეობის კარიოლოგიური გამოკვლევა**

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კარიოლოგიური თვალსაზრისით შესწავლილია *Aphis*-ის გვარის (Hemiptera: Aphididae) საქართველოს სამი სახეობა: *A. craccivora*, *A. hederæ*, *A. ruborum*. დადგენილია მათი კარიოტიპების სტრუქტურა და ქრომოსომული რიცხვები ( $2n=8$ ).

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