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Redescription of larva, pupa and imago male of *Chironomus* (*Chironomus*) *salinarius* Kieffer from the saline rivers of the Lake Elton basin (Russia), its karyotype and ecology

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Abstract

Cytology and ecology of *Chironomus* (*Chironomus*) *salinarius* Kieffer, 1915 (Diptera, Chironomidae) was examined from material collected in the saline rivers of the Lake Elton basin (Volgograd region, Russia). Larvae of salinarius-type were identified as *C. salinarius* on the basis of their karyotype. The species is redescribed on the basis of all metamorphic stages. The reared imago and karyotype were obtained from larvae of the same population. The karyotype of *C. salinarius*, detailed mapping of the 5 chromosome arms A, C, D, E, F and characteristics of chromosome polymorphism are provided. Information on distribution and ecology of *C. salinarius* from the saline rivers (total mineralization 6.8–31.6 g l^{-1}) of the Lake Elton basin is also given. *Chironomus salinarius* is a common in the saline rivers and occurs in sediments with high silt content. On the basis of recent samplings *C. salinarius* appears to be very abundant in saline, mesotrophic as well as in eutrophic rivers. *Chironomus salinarius* accounted for 49–66% of total abundance of zoobenthos in water with salinity up to 13–31.6 g l^{-1}.

Key words: *Chironomus salinarius*, non-biting midge, taxonomy, karyotype, inversion polymorphism, saline rivers, environmental factors

Introduction

Chironomus (*Chironomus*) *salinarius* Kieffer, 1915 is a very important component of inland waters. The larvae of *C. salinarius* are a common species of brackish water such as saline rivers of the Lake Elton basin. These rivers are characterized by a large range of salinity. This indicates that *C. salinarius* can tolerate important variations of salinity.

The imago male and female of *C. salinarius* were described by Kieffer (1915). Then Karl Strenzke (1959) in the article devoted to the revision of the genus *Chironomus* Meigen from the Thienemann's collection established a new type and gave a more detailed illustrated redescription of the male and female. Linevich & Erbaeva (1971) studied for the first time all phases of the metamorphosis rearing from larvae to adults. Sasa (1978, 1996) made a brief taxonomic description of imago male. *Chironomus salinarius* was reported for the first time in Korea by Chun (1989) in his Master of Science thesis. He gave brief descriptions of the larva, pupa and male imago. Later Ree & Yum (2006) redescribed this species from Korea on the basis of the imago male morphology. All the above mentioned papers contained brief and insufficient descriptions and did not include karyological studies. It is a matter of fact that karyological methods have given the most accurate and reliable results in identification of chironomid species on larval stage, while many species are practically indistinguishable on the basis of morphological characters. In this work the larvae of salinarius-type were identified as *C. salinarius* on the basis of

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TABLE 6. Measurements and ratios of males of the species of *Chironomus* with larvae of the salinarius-type.

Species	Morphological characteristics			
	WL	AR	LRp_1	BRp_1
C. albimaculatus Shobanov et al., 2002	–	≈6.5	–	–
C. brevidentatus Hirvenoja, Michailova, 1998	4.3–4.5	3.7–4.0	1.36–1.39	2.1–2.5
C. cucini Webb, 1969	4.1–5.2	3.7	1.35	"beard very short"
C. hyperboreus Staeger, 1945	5.2	≈5.0	1.24–1.34	"long beard"
C. islandicus Kieffer, 1913	3.7–5.5	4.5–5.5	1.06–1.17	5.1–6.3
C. neocorax Wülker, Butler, 1983	3.93–4.8	3.7–4.0	1.43–1.48	2.2–2.8
C. prior Butler, 1982	4.04–4.80	4.89–5.48	1.10–1.20	4–7
C. salinarius Kieffer, 1915	2.4–4.12	2.84–4.4	1.3–1.5	5.7–7.9
C. tardus Butler, 1982	4.23–5.36	5.09–5.78	1.01–1.14	4–7
C. trabicola Shobanov et al., 2002	–	5.8–7.3	1.03–1.08	5.25–6.78
C. tuvanicus Kiknadze et al., 1992	3.3–3.5	3.9–4.2	1.2–1.4	3.0–3.7

TABLE 7. Measurements of antenna of the species of *Chironomus* with larvae of the salinarius-type (length in μm)

Species	Morphological characteristics				
	L1	L2	W1	L1/L2	L1/W1
C. albimaculatus Shobanov et al., 2002	131–167	–	–	–	–
C. cucini Webb, 1969	134.5–154.2	26.3–39.5	37.6–39.5	3.42–5.14	2.67–4.10
C. hyperboreus Staeger, 1945	86.5–114.7	33.8–37.6	33.8–37.6	2.42–3.22	2.55–3.22
C. islandicus Kieffer, 1913	124.1–148.5	26.3–33.8	43.2–52.6	3.88–5.0	2.36–3.29
C. major Wülker, Butler, 1983	116.6–150.4	30.1–37.6	45.1–67.7	3.50–4.33	2.11–3.07
C. neocorax Wülker, Butler, 1983	92.1–105.3	26.3–30.1	37.6–45.1	3.25–4.0	2.33–2.45
C. salinarius Kieffer, 1915	**68–85**	**17–22**	**24–31**	3.5–4.7	2.4–3.1
C. tardus Butler, 1982	79.8–114.7	30.1–32.0	45.1–56.4	3.25–3.81	1.92–2.45
C. trabicola Shobanov et al., 2002	152–179	–	–	–	–
C. tuvanicus Kiknadze et al., 1992	116–132	24–32	48–56	4.3	2.3
Chironomus sp. 2n=6, Lokka Michailova, 1992	118.9–127.1	32.8–41.0	32.8–36.9	3.0–3.75	3.2–3.8

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