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**NOTE ON ACOUSTIC SIGNALS OF GRASSHOPPER MALES OF
THE GENERA *EPACROMIUS* AND *PLATYPYGIUS* (ORTHOPTERA:
ACRIDIDAE: OEDIPODINAE) FROM RUSSIA AND ADJACENT
TERRITORIES**

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Summary. Acoustic courtship of males of three species, *Epacromius pulverulentus*, *E. tergistinus* and *Platypygius crassus* from Russia (Southern Siberia) and Ukraine (Cis-Azov Region), are described and illustrated by oscillograms at the first time. There are two types of stridulation: tegmina-femoral (all species) and tibia-tegmina (*E. tergistinus*). Calling signals for these species are not recognized.

Key words: grasshoppers, Orthoptera, Acrididae, Oedipodinae, acoustic signals, Siberia, Ukraine.

А. А. Бенедиктов. Заметка об акустических сигналах самцов саранчовых родов *Epacromius* и *Platypygius* (Orthoptera: Acrididae: Oedipodinae) России и сопредельных территорий // Дальневосточный энтомолог. 2018. N 370. С. 21-24.

Резюме. Впервые описаны и проиллюстрированы осциллограммами акустические прекопуляционные сигналы самцов трех видов: *Epacromius pulverulentus*, *E. tergistinus* и *Platypygius crassus* из России (Южная Сибирь) и Украины (Приазовье). Их звуки продуцируются двумя способами: тегмина-феморальной (у всех видов) и тибиа-тегминальной (у *E. tergistinus*) стридуляцией. Призывные звуки у этих видов не обнаружены.

INTRODUCTION

Five grasshopper species of three genera of the tribe Epacromiini (Orthoptera: Acrididae: Oedipodinae) inhabit in Russia and adjacent territories (Bey-Bienko & Mistshenko, 1951; Storozhenko, 1986; Terskov & Tereshchenko, 2017): *Aiolopus thalassinus* (Fabricius, 1781), *A. strepens* (Latreille, 1804), *Epacromius pulverulentus* (Fischer von Waldheim, 1846) (= *E. coerulipes* Ivanov, 1888), *E. tergistinus* (Megerle von Mühlfeld, 1825) and *Platypygius crassus* (Karny, 1907). On the territory of Russia *A. strepens* is known from the southern Crimea and the Black Sea coast of the Caucasus. *P. crassus* is known from Cis-Azov Region to Lower Volga Region. The other three species are distributed more widely from south of the European part in the west to south of Western Siberia (*A. thalassinus*), Transbaikalia (*E. tergistinus*), and even Primorsky Krai (*E. pulverulentus*) in the east. All species are found on saline soils, in particular, on meadows and along the banks of reservoirs, often live together.

Oscillograms of the sounds produced by males are well-studied for *Aiolopus* Fieber, 1853 only. So for *A. thalassinus* (Fabricius, 1781) from Lower Volga Region (Dosang) (Savitsky & Lekarev, 2007) authors noted that the single male placed in cage did not produce any signals for several hours. But as soon as female was placed to the same cage, male approached her and produced a stridulatory signal. After singing, the male jumped on the female and copulated. According to Jacobs (1953), *A. thalassinus* males emit stridulatory signals when they are going to copulate. So authors made a conclusion that the recorded signal is most likely courtship (precopulatory). Courtship lasted up to 10 s and consisted of short pulses of different amplitude. The signal was produced by tibia-tegmina stridulation.

A. strepens male or female from Western Europe (Spain) emit two types of sound (Larrosa *et al.*, 2007): interaction song, when disturbed by other species, by tapping the substratum with its hind tarsi, and courtship by tegmina-femoral stridulation. There is only one previous reference to sound production of *A. strepens* and it involves abdomen percussion against the substratum (Faber, 1953). All other aspects of mating behavior and structure of courtship are similar to *A. thalassinus*. The researchers (Larrosa *et al.*, 2007) assume the courtship behavior is being of «Acrolophitus-type» (Otte, 1970).

By now I have records of stridulatory signals of 3 species from genera *Epacromius* Uvarov, 1942 and *Platypygius* Uvarov, 1942 from Russia (Tuva) and Ukraine (Arabat beli, border regions of Russia and Ukraine). Below please find their description.

MATERIAL AND METHODS

Insect songs were recorded in gauze cages under a lamp with condenser microphone MKE-9 (upper frequency limit 18 kHz) and cassette recorder Proton-402 (in 1995) (upper frequency limit 12.5 kHz) and Elektronika-302-1 (in 1997) (upper frequency limit 10 kHz). Air temperature was measured during or immediately after recording on the place where the singing insect was sitting.

Song terminology is accepted after Zhantiev (1981) and Otte (1970): the song consists of pulses (result of friction of the femur of hind legs against the tegmina) (mono- or bisyllabic echemes sensu: Larrosa *et al.*, 2007) and chirps (result of sliding hitting of the tibia of hind legs against the tegmina).

ACOUSTIC SIGNALS DESCRIPTION

Epacromius pulverulentus (Fischer von Waldheim, 1846)

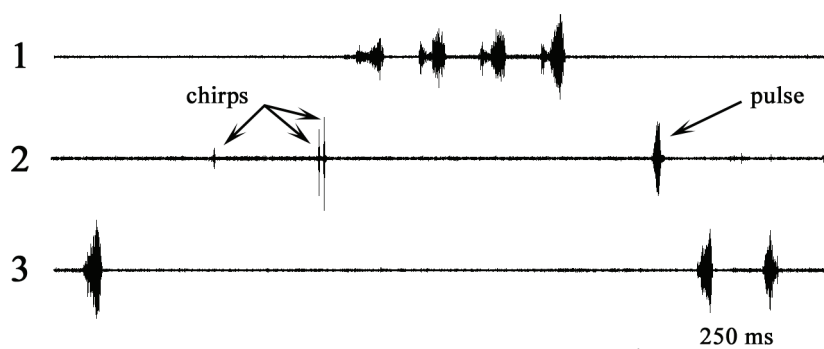
MATERIAL. Russia: Republic of Tuva, 2.5 km S Kyzyl City, a broken steppe with saline soil, 9.VIII 1995, 1 ♂ (recordist: A.A. Benediktov).

ACOUSTIC SIGNAL. The signal is produced by tegmina-femoral stridulation only. The signal (Fig. 1, Table 1) shorter than 1 s, includes series of double-pulses with period of repetition 150–560 ms. Their amplitude is increasing from the beginning to the end of the signal.

Epacromius tergistinus (Megerle von Mühlfeld, 1825)

MATERIAL. Ukraine: Kherson region, Arabat beli neighboring Genichesk, on saline soils near the estuary, 2.VIII 1997, 1 ♂ (recordist: A.A. Benediktov).

ACOUSTIC SIGNAL. The signal is produced by tibia-tegmina (chirps) and tegmina-femoral (pulses) stridulation. The signal (Fig. 2, Table 1) shorter than 2 s, includes very short chirps and following single-pulses.



Figs 1–3. Oscillograms of courtship signals of male grasshoppers of the tribe Epacromiini: 1 – *Epacromius pulverulentus*; 2 – *E. tergistinus*; 3 – *Platypygius crassus*.

***Platypygius crassus* (Karny, 1907)**

MATERIAL. Ukraine: Kherson region, Arabat beli neighboring Genichesk, on saline soils near the estuary, 2.VIII 1997, 1 ♂ (recordist: A.A. Benediktov).

ACOUSTIC SIGNALS. The signal is produced by tegmina-femoral stridulation only. The signal (Fig. 3, Table 1) shorter than 2 s, includes short single-pulses.

Table 1. Characteristics of acoustic courtship signals of males grasshoppers of the tribe Epacromiini

Taxa	Temperature, °C	Number of chirps	Number of pulses	Pulse duration, ms
<i>Epacromius pulverulentus</i>	+30–32	—	3–6 (double-pulses)	65–80
<i>Epacromius tergistinus</i>	+35	1–4	1–2 (single-pulses)	18–25
<i>Platypygius crassus</i>	+35	—	1–3 (single-pulses)	30–50

CONCLUSION

Thus, acoustic signalization of all species from the tribe Epacromiini (including published data on *A. thalassinus* and *A. strepens*) has similar characteristics: 1) calling is not recognized; the emission of acoustic signals in single males is not detected; 2) all males stridulate in the vicinity of females only and then copulate; probably this signal can be considered as courtship (precopulatory); 3) sound is very quiet for the human ear; 4) courtship consist of series pulses at regular intervals (*E. pulverulentus*) or simple short pulses and chirps with irregular intervals between them (other species).

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REFERENCES

- Bey-Bienko, G.Ja. & Mistshenko, L.L. 1951. *Locusts and grasshoppers of the USSR and adjacent countries*. Part II. Academy of Sciences of USSR Publ., Moscow–Leningrad, pp. 381–667. [In Russian; English translation: Bey-Bienko, G.Ja. & Mistshenko, L.L. 1964. *Locusts and Grasshoppers of the U.S.S.R and Adjacent Countries*. Part II. Jerusalem, Israel Program for Scientific Translations, 291 pp.]
- Faber, A. 1953. *Laut- und Gebärdensprache bei Insekten: Orthoptera*. Teil I, Vergleichende Darstellung von Ausdrucksformen als Zeitgestalten und ihre Funktionen. Stuttgart. 198 pp.
- Jacobs, W. 1953. Verhaltensbiologische Studien an Feldheuschrecken. *Zeitschrift für Tierpsychologie*, 1: 1–228.
- Larrosa, E., García, M.D., Clemente, M.E. & Presa, J.J. 2007. Sound production in *Aiolopus strepens* (Latreille, 1804) (Orthoptera, Acrididae). *Articulata*, 22(2): 107–115.
- Otte, D. 1970. A comparative study of communicative behavior in grasshoppers. *Miscellaneous Publications. Museum of Zoology, University of Michigan*, 141: 1–168.
- Savitsky, V.Yu. & Lekarev, A.Yu. 2007. New data on acoustic communication and sexual behavior of grasshoppers (Orthoptera: Acridoidea) from semi-deserts and deserts of Russia and adjacent countries. *Russian Entomological Journal*, 16(1): 1–38. [In Russian]
- Storozhenko, S.Yu. 1986. Order Orthoptera (Saltatoria). In: *Opredelitel Nasekomykh Dalnego Vostoka SSSR. Vol. 1*. Nauka, Leningrad. pp. 241–317. [In Russian].
- Terskov, E.N. & Tereshchenko, D.A. 2017. Fauna and ecology of grasshoppers (Orthoptera: Acrididae) of the Cis-Azov region. *Proceedings of the Russian entomological society*, 88(1): 6–21. [In Russian]
- Zhantiev, R.D. 1981. *Bioacoustics of Insects*. Moscow University Press, Moscow. 256 pp. [In Russian]

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