Structure of the stridulatory apparatus of some species Heteroceridae (Coleoptera)

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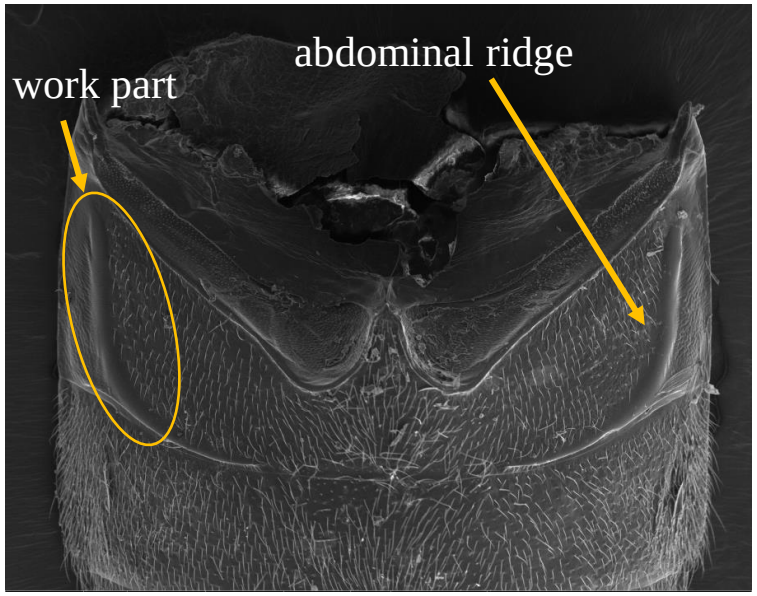
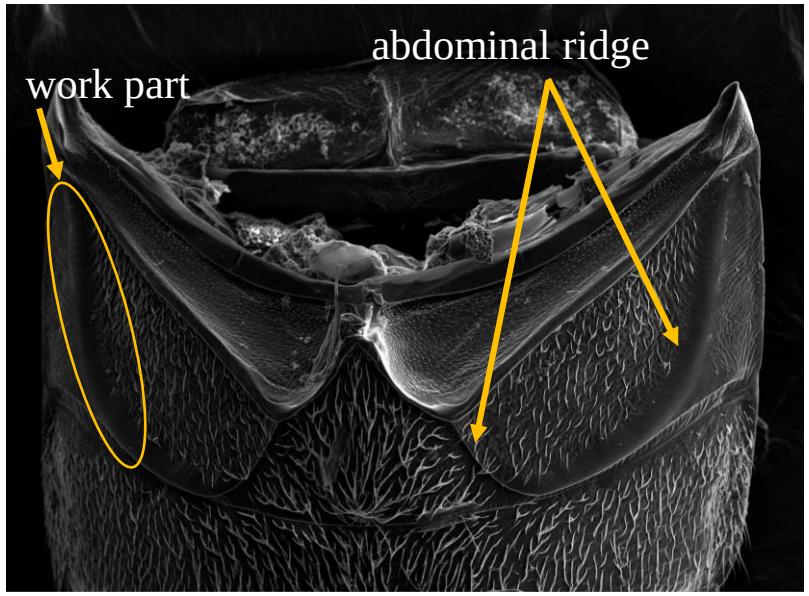
Background

Heterocerus fenestratus Thunb., 1784 (photo by K.V. Makarov)

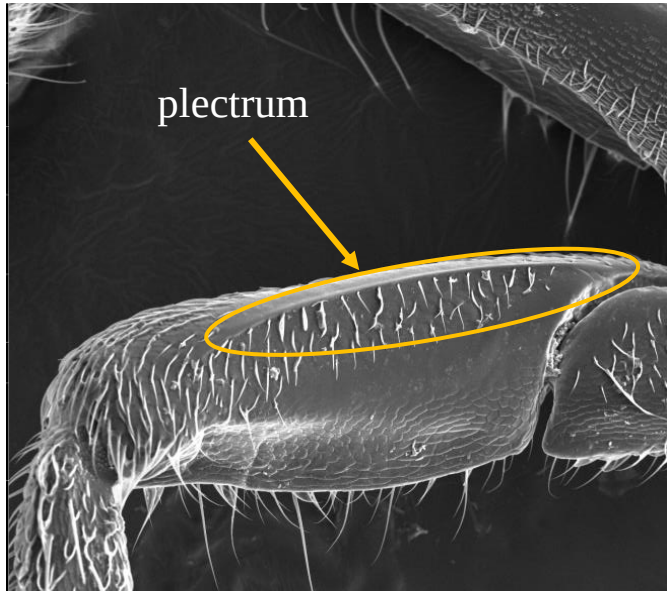
- The world fauna of Heteroceridae, totals 364 species (pers. data); previous estimates ranged from 320–370 species, because the fauna has not been revised.
- Adults and larva of Heteroceridae construct branched networks of tunnels and chambers in a moist soft substrate, which are used for feeding, egg laying and pupation.
- At high densities with another stratobionts they give a specific microrelief for substrate



Heterocerus heydeni Kuwert, 1890 ♀
For genus *Heterocerus* Fabricius, 1792 the abdominal ridge is an incomplete



Augyles interspidulus (Charpentier, 1979) ♀
For genus *Augyles Schiödte*, 1866 the abdominal ridge is a complete



The scraping hindleg ridge (plectrum) of *A. interspidulus*

Background

The variegated mud-loving beetles use an acoustic channel to communicate each over. They produce sound by scraping hind leg ridge (plectrum) over first abdominal ridge (stridulatory file)

Objectives

- To show differences on structure of the hind leg ridge (plectrum) and the stridulatory files for *Augyles* and *Heterocerus* genus for the first time

- To show the difference between species and between sexes of structure of the stridulatory apparatus

Methodology

The process of electronic scanning of samples

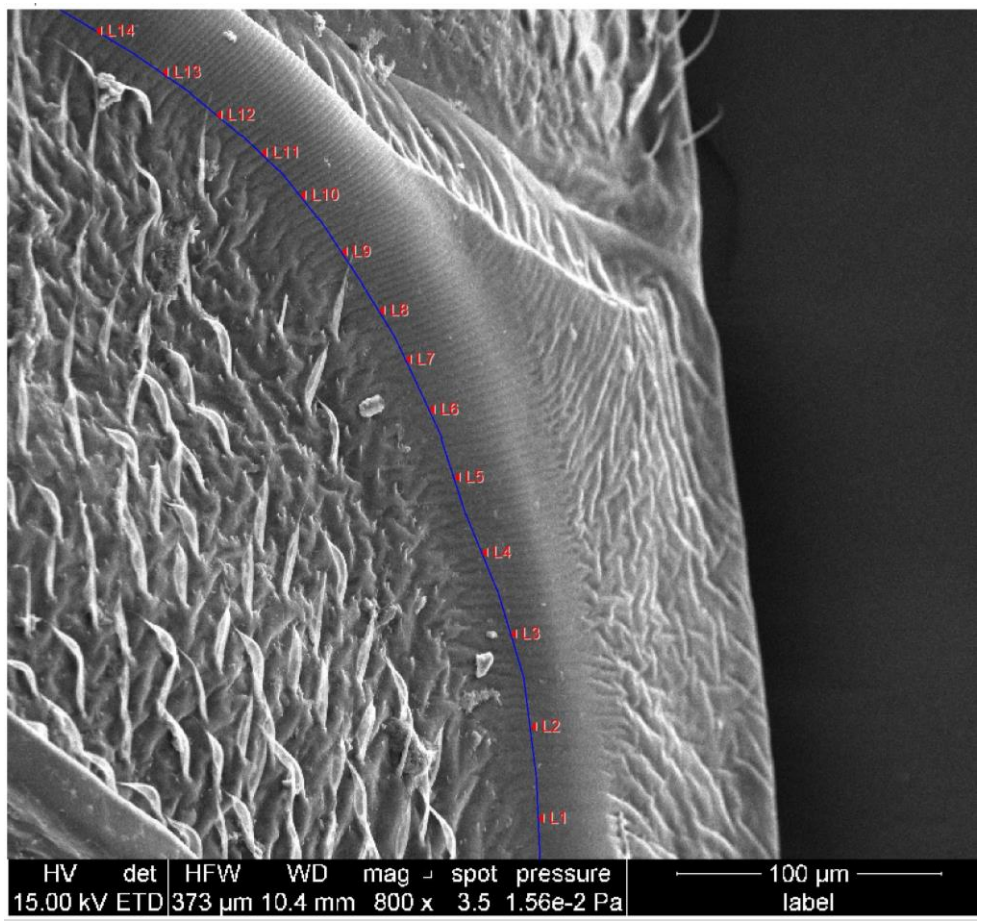
- Beetles were prepared by separating the abdomen and the posterior leg from the rest of the body
- Specimens were mounted on aluminum stubs and coated with palladium prior to imaging using a variable pressure scanning electron microscope (Hitachi TM-1000, Hitachi, Japan) at Zoology Institute of Russian Academy of Science
- We measurements the following parameters for the stridulatory file: the size of stridulatory file on 100 µm, the number of ridges on 50 µm. For the plectrum we measurements the size of plectrum

Results

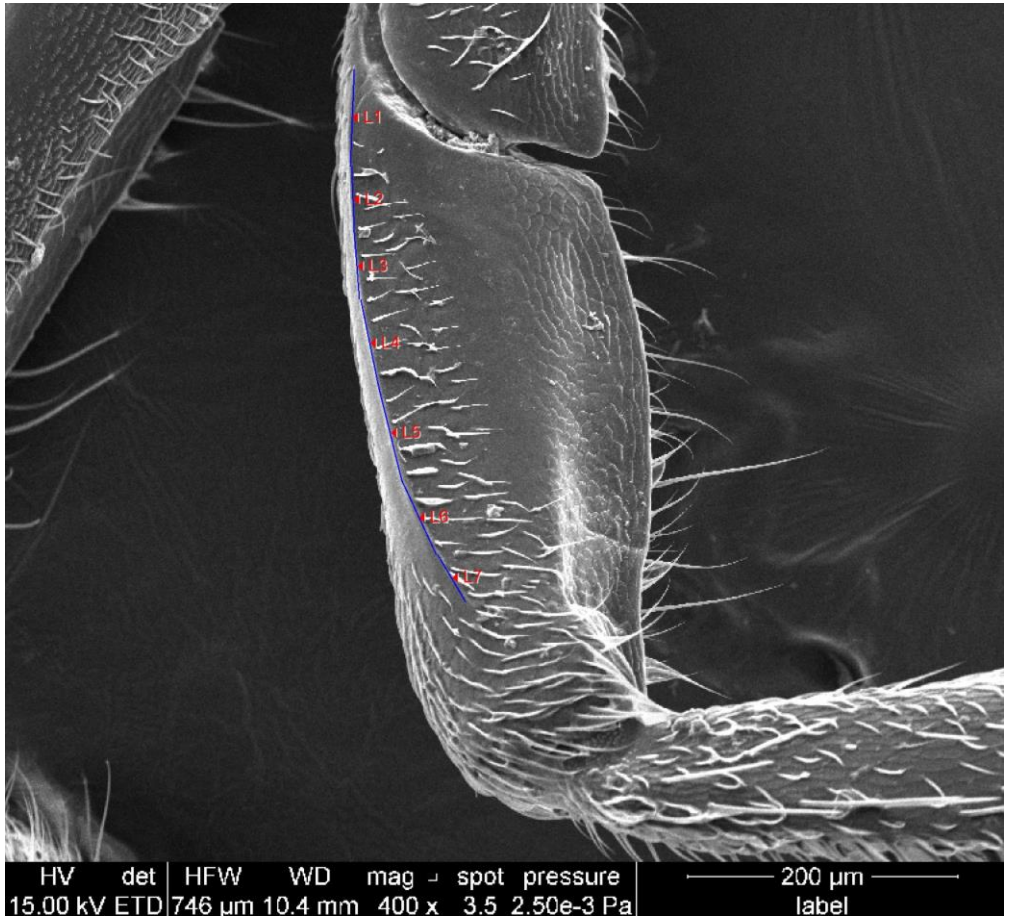
Table 1. The different parameters of stridulatory apparatus of Heteroceridae for *Augyles* genus

Species	size of stridulatory file (µm)	number of ridges (µm)	size of plectrum (µm)
Augyles delutissimus (Reitter, 1887) ♀	408.62	19	441.43
A. delutissimus (Reitter, 1887) ♂	417.71	17	366.99
A. flavidus (Rossi, 1794)	383.19	53	–
A. hispidulus (Kiesenwetter, 1843) ♀	413.33	19	455.22
A. interspidulus (Charpentier, 1979) ♀	390.00	17	423.70
A. interspidulus (Charpentier, 1979) ♂	434.86	16	408.72
A. obliteratus Kiesenwetter, 1843	–	19	517.80
A. turanicus (Reitter, 1887)	411.76	25	385.34

Results



The measurement the size of stridulatory file on 100 µm of *A. interspidulus* ♀ (Image-Pro 10)



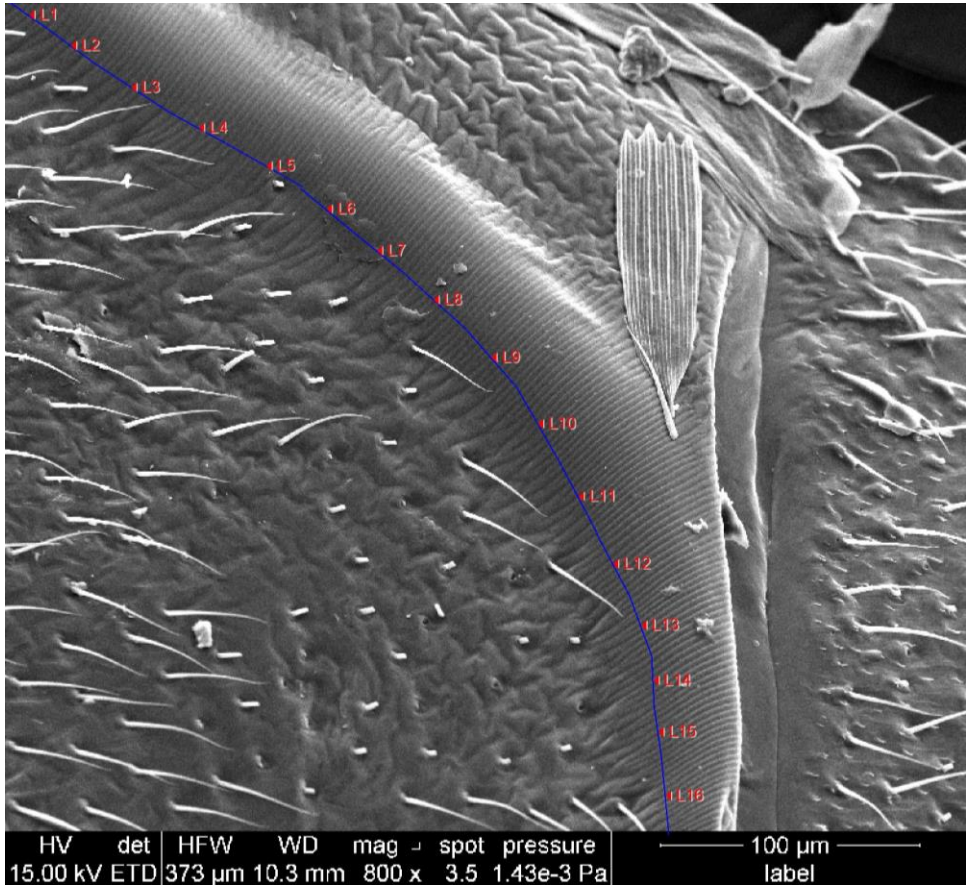
The measurement the size of plectrum of *A. interspidulus* ♀ (Image-Pro 10)

Results

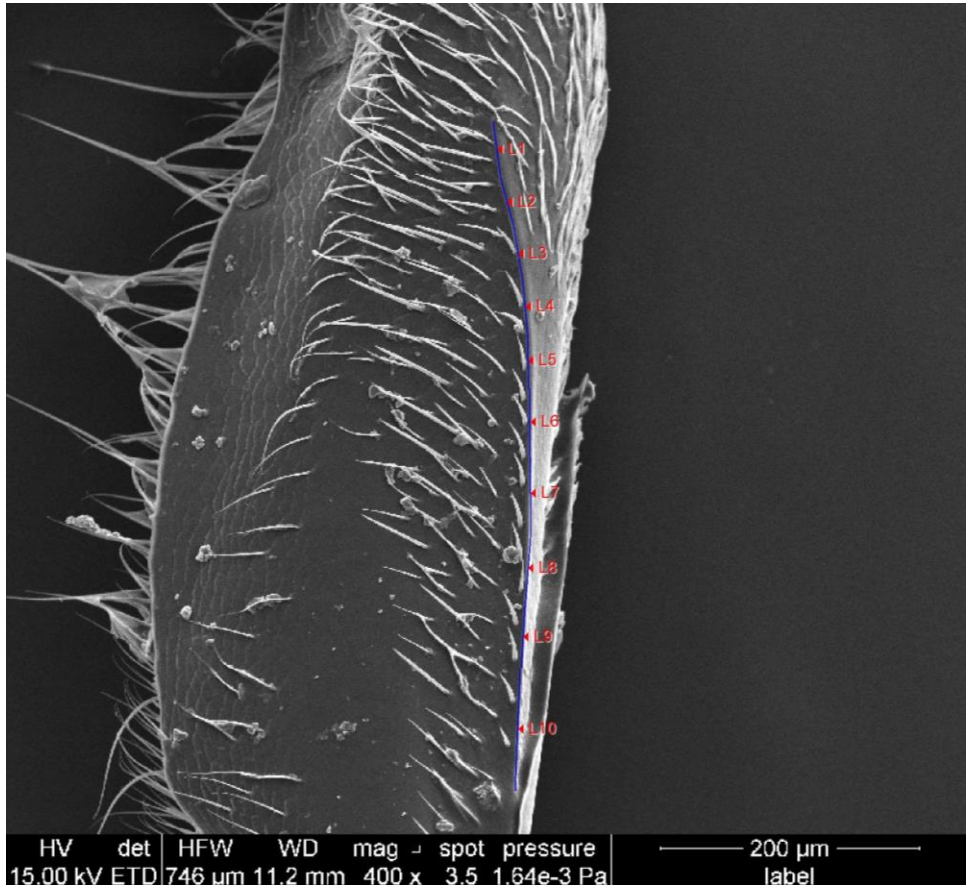
Table 2. The different parameters of stridulatory apparatus of Heteroceridae for *Heterocerus* genus

Species	size of stridulatory file (µm)	number of ridges (µm)	size of plectrum (µm)
Heterocerus fenestratus (Thunberg, 1784)	431.80	21	389.21
H. flexosus Stephens, 1829	426.51	25	–
H. fossor Kiesenwetter, 1843 ♀	475.89	17	518.18
H. fusculus Kiesenwetter, 1843	369.23	30	322.27
H. heydeni Kuwert, 1890 ♀	468.33	20	–
H. kaszabi n. sb.	475.06	22	–
H. marginatus (Fabricius, 1787)	392.09	24	416.42
H. obsoletus Curtis, 1828	328.91	20	574.00
H. parallelism Gebler, 1830 ♀	399.76	15	505.59

Results



The measurement the size of stridulatory file on 100 µm of *H. heydeni* ♀ (Image-Pro 10)



The measurement the size of plectrum of *H. fossor* ♀ (Image-Pro 10)

Discussion

- The size of the stridulatory file for species of *Augyles* genus are vary from 383.19 µm (*A. flavidus*) to 434.86 µm (*A. interspidulus*). But the number of ridges has the inverse proportionality of the size of stridulatory file. The maximum number is 53 for *A. flavidus* and 16 for *A. interspidulus*

- The stridulatory file of *Heterocerus* genus is varied from 328.91 µm (*H. obsoletus*) to 475.89 µm (*H. fossor*). *H. fusculus* has the largest number of ridges (30) and the smallest size of plectrum (322.27 µm). *H. parallelism* has 15 number of ridges, and the size of stridulatory file is 399.76 µm. *H. obsoletus* has the largest size of plectrum (574.00 µm).

Conclusion

- Almost all cases the number of ridges has the inverse proportionality of the size of stridulatory file. And the same time the size of plectrum has the same relation. Future research is needed to investigate large specimens' group for each species (male and female)

- These studied will help us understand the difference at structure of stridulatory organs different species and between sexes within species. Future studies will focus on comparing the morphology of the stridulatory structure with the sound characteristics imago

Thank you!

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