Variability of antennomeres at *Scelio rugosulus* Latreille 1805 (Hymenoptera, Scelionidae)

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Abstract

The current study represents the first report of within *Scelio rugosulus* variation. The aim of this paper is to characterize morphologically and biometrically species using the material from north - east of Romania (Iasi). There were analyzed 21 variables of antenna from male of this species. The results show different variations of investigated variables; between these the most stable are width of the 7th and 8th antennomeres (lA7, lA8) and body length (Lbody).

Keywords: intraspecific variability, antennomeres, *Scelio rugosulus*.

Introduction

Scelio rugosulus is a common species in Romania. It is present in the samples from July and it is well represented in August. It is a parasitoid of orthopteran eggs. In the samples collected with the sweeping net the males are much more common then females. At the present there are very few data regarding the intraspecific variation in the Platygastroidea species. Most of the species are describied only by their holotype even if the authors had many paratypes, too. The only mentions regarding the intraspecific variability in the Platygastroidea species are those concerning the dimensions of the body.

Material and Methods

The material was collected in 2002-2004 from vegetable substratum using an entomological seep net. Morphometrics variables taken into the account are length and width of antennomeres and body length. To avoid wrong interpretation of results, all linear measurements were highly repeatable to eliminate measurement errors. The following parameters were calculated: arithmetic mean (X) median (M), standard deviation (SD), standard error of the arithmetic mean (SE), variance (V), skewness (SKEW), kurtosis (KURT), minimum and maximum values (MIN and MAX) and confidence level (CONF). Statistical analysis was performed with the aid of SPSS software.

Results and Discussions

A first procedure in our statistical analysis was that of identification and elimination the measurements and of the atypical individuals. This was made using the Grubb's test and the sequential Bonferonni procedure.

Biometric characterization of twenty one variables from *Scelio rugosulus* was carried out (Table 1).

The coefficient of variation for all variables were significantly different between they (two way ANOVA, F=932,66; P<0,05; Fig. 1). The coefficient of variation for length of the 5th (LA5), 7th (LA7), 10th antennomeres (LA10) and body length (Lbody) were significantly greater than others variables. Also the minimal variation was obtained for width of the 7th and 8th antennomeres (lA7, lA8) (Tukey's HSD test; P=0,001).

The degree of asymmetry of distribution is characterized by skewness. (Table 1). The skew values for width of the 1st, 5th, and 10th antennomeres (lA1, lA5, lA10) are characterized by an approximately zero level, which indicates normal distribution. At the same time, non zero values of skewness show there are individuals with extreme measured values for other studied variables (LA1, LA4, lA7, LA9, LA10).

Table 1

Descriptive statistics of *Scelio rugosulus* Latreille 1805

Variables	Statistical parameters										
	X	SE	M	SD	V	SKEW.	KURT.	MIN	MAX	CONF.	CV(%)
LA1	45,58	0,73	45,00	3,19	10,15	1,84	6,32	40,00	56,00	1,54	6,99
lA1	11,45	0,18	11,00	0,80	0,64	-0,08	-0,35	10,00	13,00	0,38	6,97
LA2	15,11	0,29	15,00	1,24	1,54	-1,39	8,02	11,00	18,00	0,6	8,23
lA2	10,37	0,19	10,00	0,83	0,69	0,47	0,04	9,00	12,00	0,4	8,01
LA3	14,68	0,19	15,00	0,82	0,67	-0,67	0,39	13,00	16,00	0,4	5,58
lA3	12,11	0,17	12,00	0,74	0,54	0,76	1,49	11,00	14,00	0,36	6,09
LA4	10,42	0,14	10,00	0,61	0,37	1,17	0,58	10,00	12,00	0,29	5,82

Variables	Statistical parameters										
	X	SE	M	SD	V	SKEW.	KURT.	**MIN**	**MAX**	**CONF.**	**CV(%)**
lA4	13,07	0,17	13,00	0,75	0,57	0,90	1,02	12,00	15,00	0,36	5,77
LA5	11,42	0,26	12,00	1,12	1,26	-0,44	-0,32	9,00	13,00	0,54	9,82
lA5	14,34	0,17	14,00	0,75	0,56	0,16	0,25	13,00	16,00	0,36	5,2
LA6	10,53	0,18	11,00	0,77	0,60	-0,50	0,03	9,00	12,00	0,37	7,34
lA6	13,71	0,19	13,00	0,84	0,70	0,59	-1,37	13,00	15,00	0,4	6,12
LA7	10,84	0,24	11,00	1,07	1,14	-0,57	2,09	8,00	13,00	0,51	9,85
lA7	13,45	0,15	13,00	0,64	0,41	1,09	0,05	13,00	15,00	0,31	4,78
LA8	10,84	0,22	11,00	0,96	0,92	0,35	0,26	9,00	13,00	0,46	8,84
lA8	13,02	0,14	13,00	0,61	0,38	0,35	-0,24	12,00	14,00	0,3	4,72
LA9	11,21	0,25	11,00	1,08	1,18	1,00	1,09	10,00	14,00	0,52	9,67
lA9	12,66	0,15	13,00	0,67	0,45	0,60	-0,41	12,00	14,00	0,32	5,28
LA10	18,95	0,40	19,00	1,75	3,05	0,30	-0,78	16,00	22,00	0,84	9,22
lA10	10,91	0,17	11,00	0,74	0,55	0,20	-1,17	10,00	12,00	0,36	6,82
Lbody	3,25	0,03	3,30	0,15	0,02	-0,30	-1,50	3,00	3,45	0,07	4,66

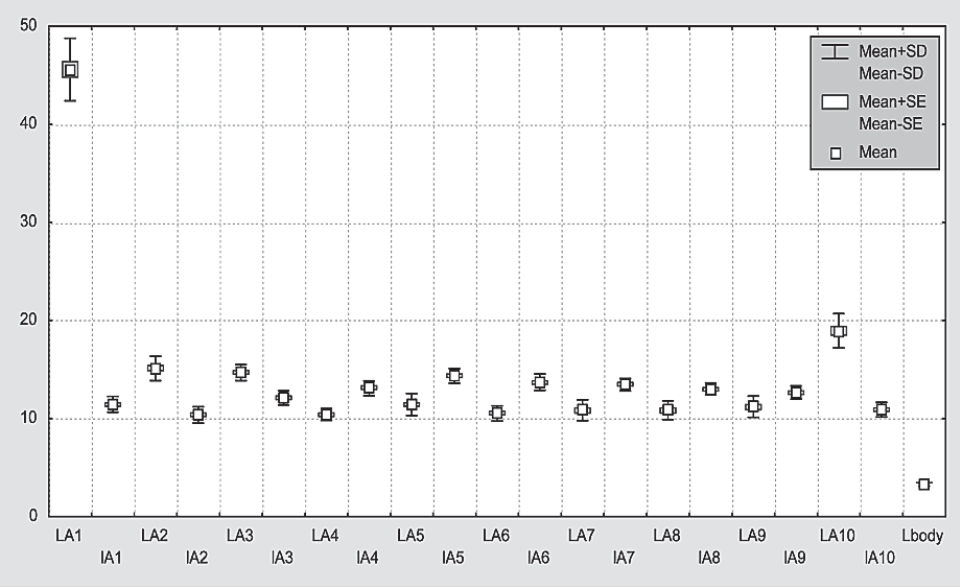

Fig. 1. Box plots for studied variables of *Scelio rugosulus*

Table 2

Correlation of variables (significant at the 0,05 level)

	LA1	lA1	LA2	**lA2**	**LA3**	**lA3**	**LA4**	**lA4**	**LA5**	**lA5**	**LA6**	**lA6**	**LA7**	**lA7**	**LA8**	**lA8**	**LA9**	**lA9**	**LA10**	**lA10**	**Lcorp**
LA1	1,00																				
lA1	-0,16	1,00																			
LA2	-0,02	-0,11	1,00																		
la2	0,52	0,28	0,18	1,00																	
LA3	0,27	-0,03	-0,13	-0,06	1,00																
lA3	0,30	0,44	-0,01	0,39	0,52	1,00															
LA4	0,07	0,11	-0,06	0,01	0,39	0,39	1,00														
lA4	0,27	0,32	0,08	0,40	0,18	0,78	0,47	1,00													
LA5	0,21	0,31	-0,03	0,06	0,09	0,21	0,38	0,42	1,00												
lA5	0,39	0,08	0,14	0,55	0,19	0,59	0,34*	0,73*	0,18	1,00											
LA6	0,10	0,18	0,05	0,20	0,45*	0,48	0,45	0,51	0,44	0,59	1,00										
lA6	0,49	0,00	-0,21	0,28	0,43	0,46*	0,42	0,53	0,25	0,70	0,42	1,00									
LA7	0,03	0,02	0,22	0,26	0,32	0,38	0,37	0,38	0,24	0,56	0,85	0,19	1,00								
lA7	0,38	0,24	-0,27	0,30	0,23	0,48	0,27	0,56	0,42	0,71	0,45	0,87	0,19	1,00							
LA8	-0,11	0,24	-0,13	0,29	0,22	0,50	0,41	0,45	0,38	0,47	0,72	0,18	0,68	0,30	1,00						
lA8	0,25	0,17	-0,04	0,21	0,09	0,55	0,35	0,73	0,23	0,74*	0,47	0,73	0,31	0,75	0,18	1,00					
LA9	-0,01	0,01	-0,06	0,03	0,39	0,32	0,28	0,09	0,24	0,18	0,52	-0,02	0,51	0,02	0,78	-0,16	1,00				
lA9	0,41	0,30	-0,02	0,44	0,35	0,53	0,65	0,58*	0,28	0,75	0,53	0,71	0,43	0,63	0,26	0,70	0,07	1,00			
LA10	-0,07	-0,10	-0,10	-0,37	0,38	0,09	0,02	0,13	0,44	-0,03	0,35	0,10	0,05	0,10	0,19	0,06	0,30	-0,09	1,00		
lA10	0,50	-0,29	0,10	0,28	-0,12	0,12	0,09	0,38	0,18	0,57	0,17	0,51	0,04	0,50	-0,09	0,63*	-0,30	0,42	0,18	1,00	
Lcorp	-0,24	0,47	-0,04	0,09	0,29	0,53	0,43	0,32	0,11	0,41	0,40	0,32	0,38	0,43	0,48	0,41	0,40	0,54	-0,05	-0,20	1,00

*** Correlation is significant at the 0,01 level**

Correlation analysis of characters was preceded by Kolmogorov-Smirnov Test which compares observed cumulative distribution function to a theoretical cumulative distribution. The obtained values for this test showed that for studied variables the existence both normal distribution and non normal distribution. The most of these have a normal distribution therefore there was applied for them Pearson correlation. The variables which have not normal distribution are the following: LA2, LA3, lA2, LA4, lA6 and lA7; for these variables there was applied Spearman correlation. The values of these coefficients are in Table 2. Although there are significant correlations between analyzed variables, the values of correlation coefficient are positioned near zero values, resulting that between studied variables there is a small correlation. The great correlations there are between the following variables: lA3-lA4, lA4-lA5, lA4-lA8, lA5-lA9, lA6-lA7, LA6-L8 and lA6-lA8 (the values of correlation coefficient are over 0, 7). In contrast with these there is not a correlation between lA6 and lA1 having the value of correlation coefficient to 0.

Conclusion

From analyzed variables result that the most stable characters concerning the taken values are width of the 7th and 8th antennomeres (lA7, lA8) and body length (Lbody) and the instable characters are the length of the 1st and 10th antennomeres. The strongest correlation is between: length of 6th antennomeres – width of 7th antennomeres (LA6-LA7) and width of 6th and 7th antennomeres (LA6-LA7).

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