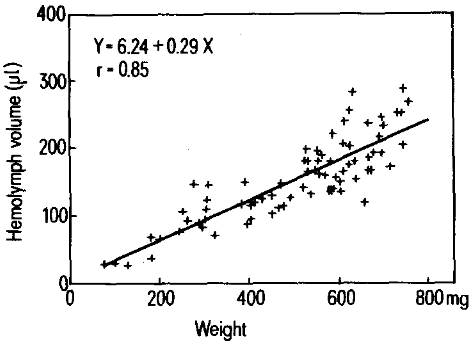
using the equation of Lee[1]: $V=(dg_1/g_2)-a$, where V is the hemolymph volume, g_1 is the weight of the dye injected, g_2 is the weight of the dye recovered, d is the volume of the sample, and a is the volume of the injection.

Data from 76 caterpillars were pooled and subjected to a linear regression analysis (figure). The means of the weights and hemolymph volumes from these observations were used to calculate the volume % by using the equation: 100 V/W = V%. This figure was 30.6%. The hemolymph volume of a larva of known weight can be calculated from the equation for the regression line (figure), or obtained from a V% estimate.



Linear regression analysis of *H. zea* hemolymph volume vs weight.

Discussion. The values obtained with dye are in close agreement with those of Burton et al.[5] who applied the C^{14} inulin method of Wharton et al.[6] to TFW last instar larvae. The dye-technique has the advantages of being accurate, inexpensive, reproduceable, and it requires little in the way of sophisticated equipment or expertise. In Orthoptera, Lee[1] determined that no dye was taken up by tissues other than the Malphigian tubules, and this began 10 min after injection. Hemolymph samples should therefore be taken between 3 and 5 min after injection to prevent loss due to staining.

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Experimental evidence of sexual selection based on male body size in *Jaera* (Isopoda; Asellota)

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Summary. In experiments where 2 males were in competition for mating, large males were at an advantage in *Jaera italica*, while no such selection based on male size existed in *Jaera istri.* Sexual selection is likely to be responsible for the sexual dimorphism in body size found in the 1st species, in which males are larger than females, while the latter species is sexually monomorphic.

Although Darwin regarded sexual competition as the ultimate cause of sexual dimorphism in animals, the debate is still open on the respective parts played by sexual selection and ecological adaptation in the evolution of secondary sexual characters[2-4]. The problem of the evolution of sexual dimorphism in body size is a good illustration of this, since it may result either from the mating system[5-7], or from the bioenergetical constraints required by reproduction[8-10]. In contrast to many sexual characters, sexual dimorphism in body size can be measured, and permits comparison between species. We present here experimental results on sexual selection obtained in 2 related species showing different sexual dimorphisms in body size.

Jaera italica and *J. istri* are 2 isopodan species with the same female reproductive biology[7]. The former is sexually dimorphic for body size (males are larger than females), while the latter is monomorphic[8]. It has been suggested[8] that sexual competition in males was responsible for a relative increase in male size in the 1st species. In order to check this hypothesis, experiments based upon a 'female choice test' were done in both species.

Jaera italica individuals originated from Risan (Yugoslavia), and *J. istri* ones were from Kladovo (Yugoslavia). Groups composed of 2 males and 1 female were constituted in each species, and placed within culture dishes with rearing medium[9]. In both species, females are sexually receptive at moulting, and pairing occurs about 3 days prior to copulation. As soon as a pair was found in a culture dish, it was removed and the body length of the 'mated male', of the 'non-mated-male', and of the female were measured (from the front of the head to the end of the pleotelson). Groups in which a male was moulting during the period of receptivity of the female were discarded.

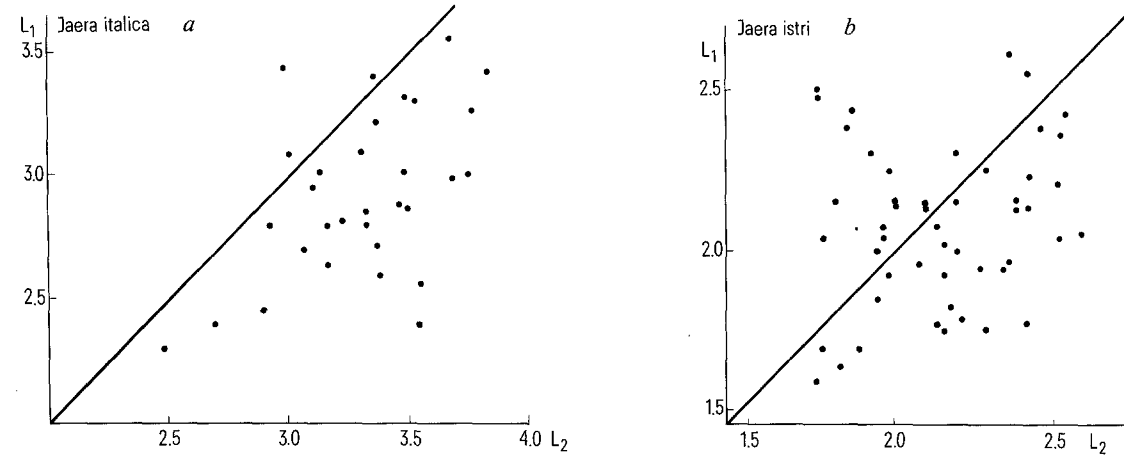
Results are given in the table and the figure. In *Jaera italica,* the mated male was the larger in most instances (table; figure, a). The smallest male was paired with the female in only 3 cases out of 31 and, in 2 of these cases, the body length of its competitor was very similar.

The result of the competition did not depend on the average size of males: the largest was at an advantage

Effect of the body length on the mating success of males

	J. italica	*J. istri*
Number of assays where the mated male was the largest	28*	32
Total	31	50
Body length in mm (mean ± SD)		
Females	2.52 ± 0.26	2.14 ± 0.21
Males	3.10 ± 0.39	2.12 ± 0.26
Mated males	3.29 ± 0.34	2.15 ± 0.26
Probability of the mean being different in males and females	1.00	0.33

* Highly significant deviation from panmixia.



Length of the non-mated male (L_1) as a function of the length of the mated male (L_2) in competition experiments (mm): *a* in *Jaera italica; b* in *Jaera istri.* Values lying below the bisector indicate assays in which the mating male was the largest.

whenever both of them were simultaneously large or small. A positive correlation exists between the lengths of the competitors ($r = 0.51$). This verifies the conclusion that, in each case, the outcome of the competition was determined by an interaction between their relative sizes. The length of the mating male was not determined by the size of the female, since no significant correlation was found between them.

We cannot, however, conclude that sexual selection was due to the males only, since the female's ability to discriminate between males according to their length is not excluded.

In *J. istri,* the largest male was paired with the female in only 32 cases out of 50 (figure, b), so that the panmictic hypothesis cannot be ruled out (probability level $p = 0.05$). No significant difference in mean length was found between both series of males.

It was formerly assumed that sexual selection was responsible for the evolution of sexual dimorphism in body size in *Jaera.* The latter is apparent in our experiment when measuring the probability of the mean length being different in the 2 sexes (table). The difference is not significant in *J. istri,* while it is definite in *J. italica.* This is easily explained as a result of selection: since large males are more likely to reproduce, their greater relative contribution to the next generation will favour the expansion in the population of genetic factors for large size. This mechanism would increase the mean lengths of males in *J. italica.* The observations made in each species conform to this hypothesis, while the reason for which sexual competition evolved in 2 divergent ways remains still to be explained.

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The effect of two new peptide antibiotics, the hypelcins, on mitochondrial function

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Summary. The action on mitochondria of 3 peptide antibiotics, hypelcin-A, hypelcin-B, and alamethicin, was examined. The results showed that they are unique uncouplers of oxidative phosphorylation, with the same mechanism of action.

Recently, Fujita et al.[1] isolated 2 new peptide antibiotics, hypelcin-A and -B, from *Hypocrea peltata.* Both antibiotics consist of 19 amino acid residues and an amino alcohol, leucinol. Hypelcin-A is a neutral peptide, which does not contain any dissociable acidic residues, while hypelcin-B is an acidic peptide containing a glutamic acid residue instead of a glutamine residue in hypelcin-A. The chemical compositions of these peptide antibiotics are very similar to that of alamethicin, which consists of 18 neutral amino acid residues, an acidic amino acid residue, glutamic acid, and an amino alcohol, phenylalaninol[2]. Since alamethicin has effects on biomembrane systems by forming channels[3,4], or by activating Ca^{2+}- and Na^+-K^+ -ATPase[5,6] it is of interest to examine the effect of hypelcins on biomembrane functions and compare them with that of alamethicin.

This paper deals with the effects of hypelcin-A and -B on mitochondrial function, since these peptides were found to have an inhibitory action on the growth of the mushroom