Adaptive modifications in *Daphnia magna* Straus (Crustacea, Cladocera) caused by weak low-frequency electromagnetic field

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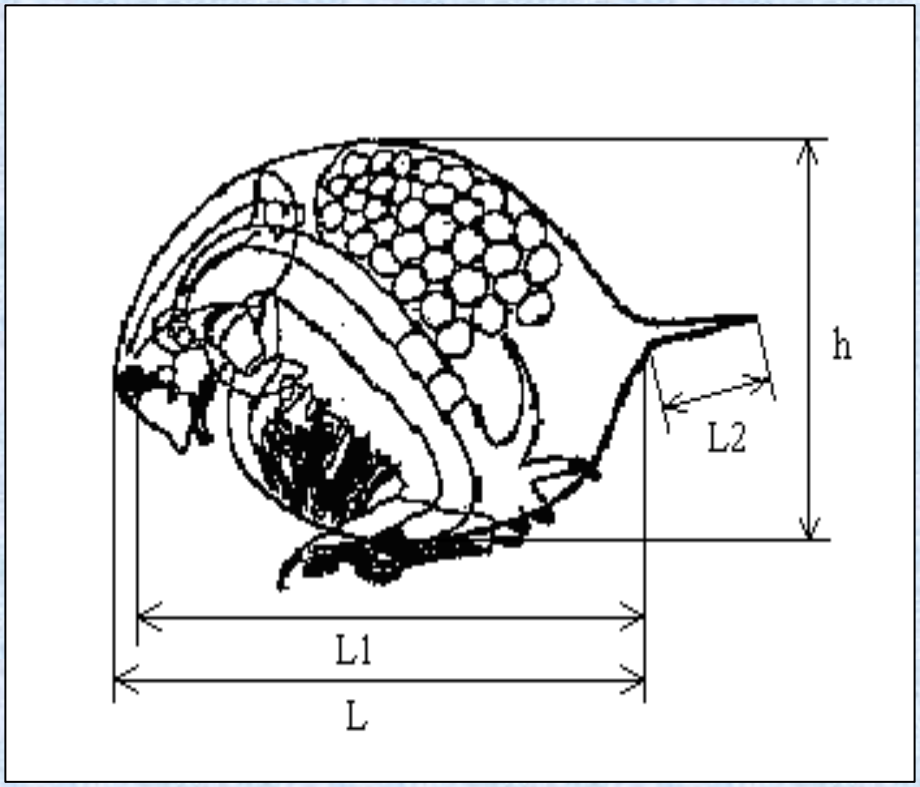
- When studying the action of weak and super-weak factors on biological systems, scientists try to explain the observed phenomena from the position of general physical patterns. At the same time some biological patterns remain obscured. Thus, adaptive processes taking place in populations exposed to weak low-frequency electromagnetic fields (EMF) are practically unstudied. Apparently, such processes may occur on different levels of living matter organization in the situation when organisms are unable to leave the area affected by EMF.
- Furthermore, duration of the majority of experiments carried out with metazoans usually doesn't exceed organisms' life span. However such longevity is insufficient for adaptation display.

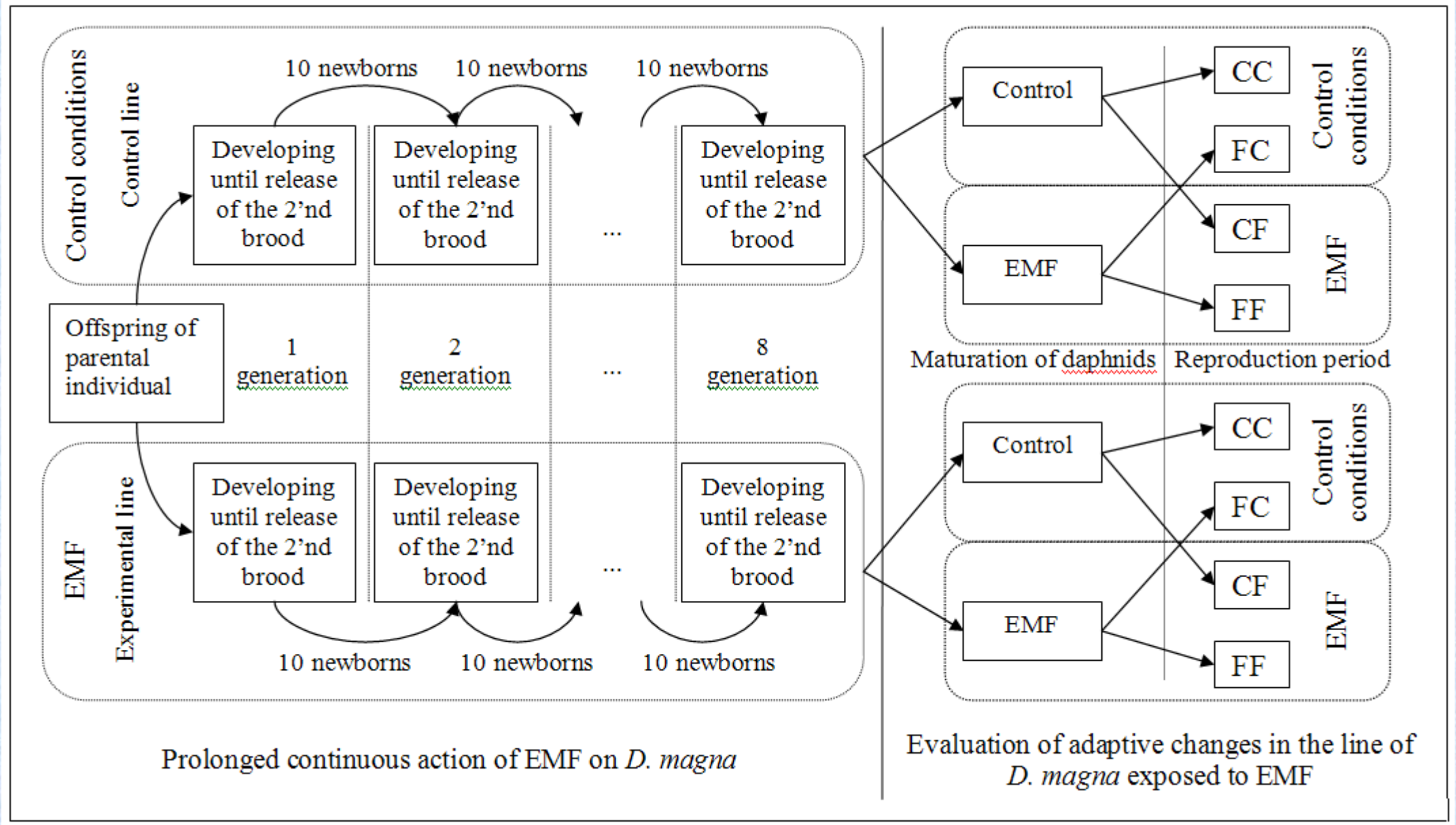
Measured parameters:

morphometric parameters

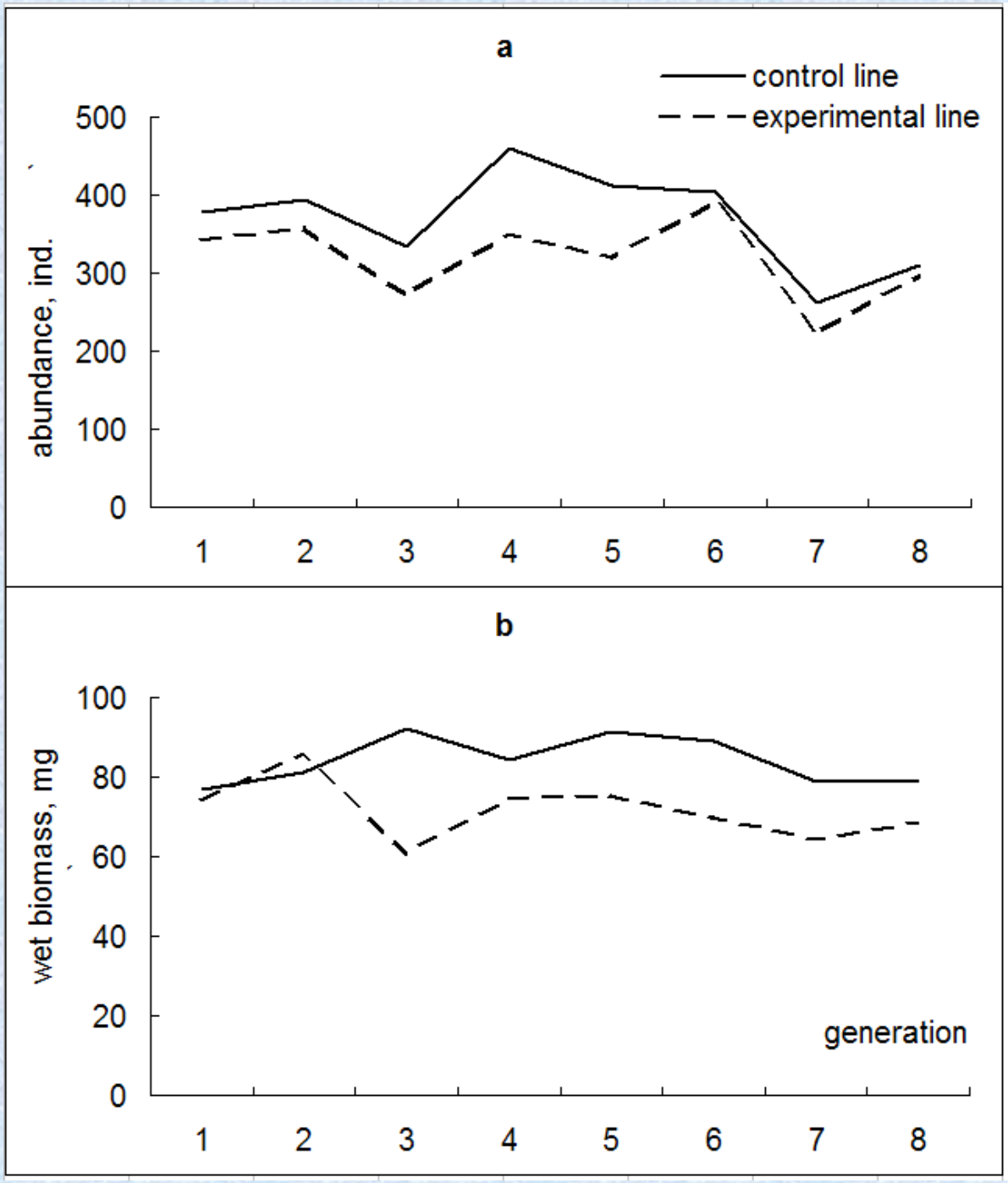


- mortality of parental specimens
- time of first brood's release
- periodicity of offspring release
- number of nonviable offspring in the first five broods
- number of viable offspring for each female over 21 day

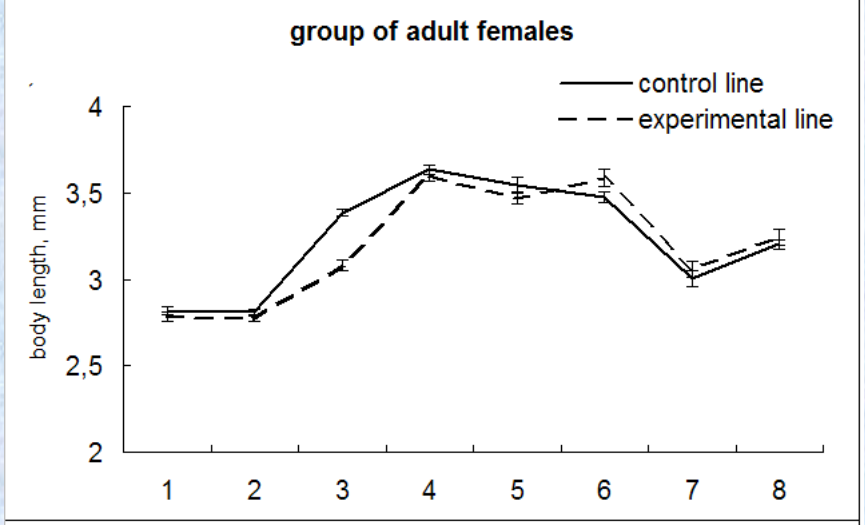
Scheme of the experiments

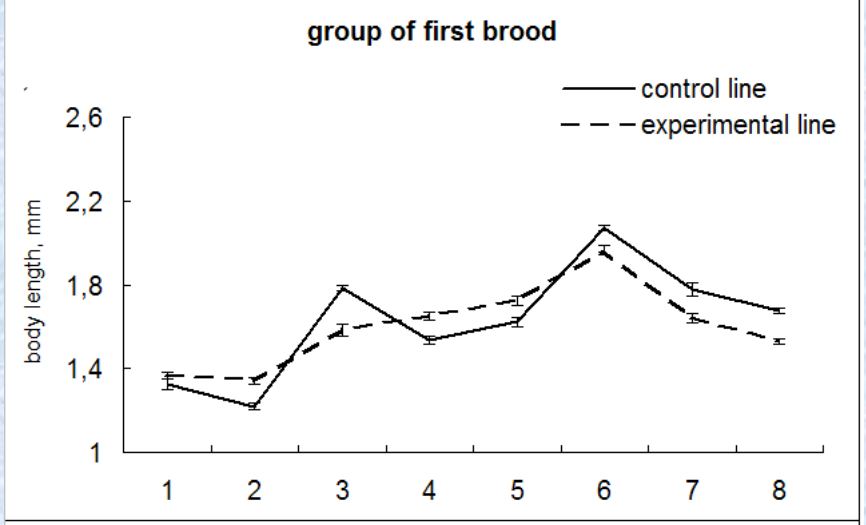


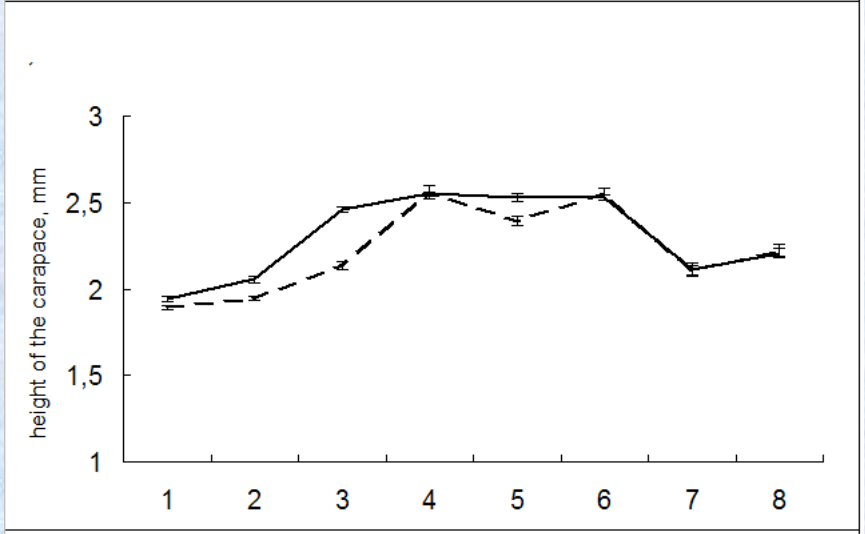
Dynamics of changing of abundance (a) and total biomass (b) in the experimental and control lines

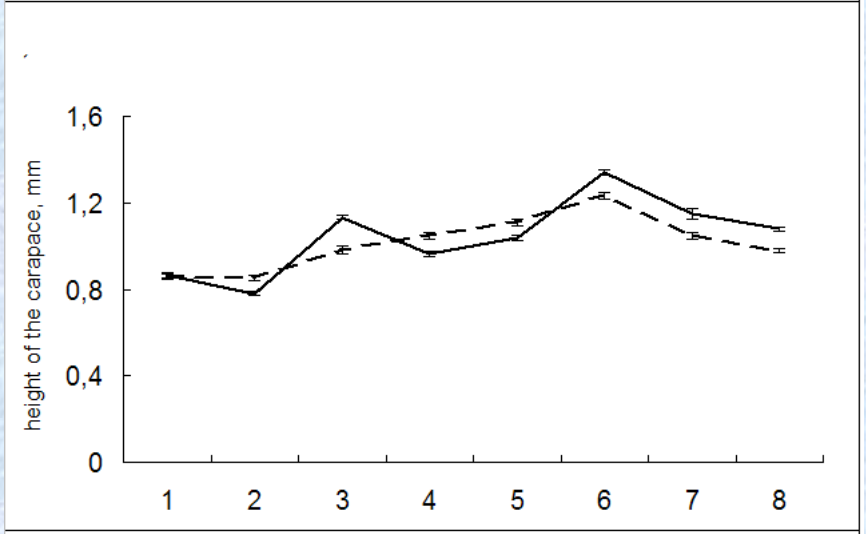


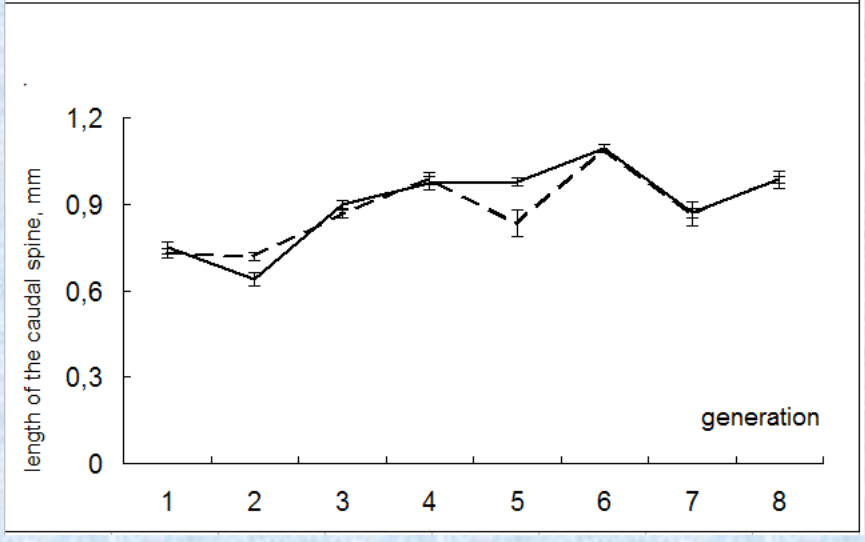
Dynamics of changing of morphometric features in the experimental and control lines

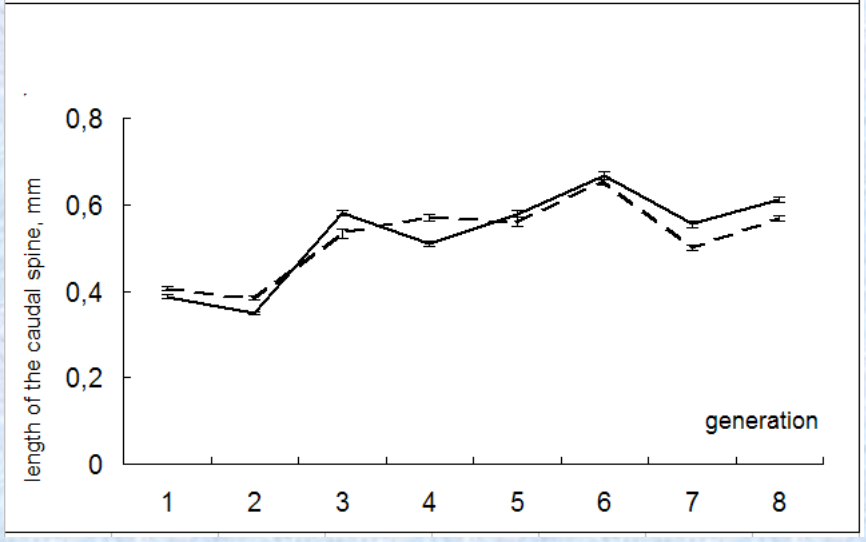




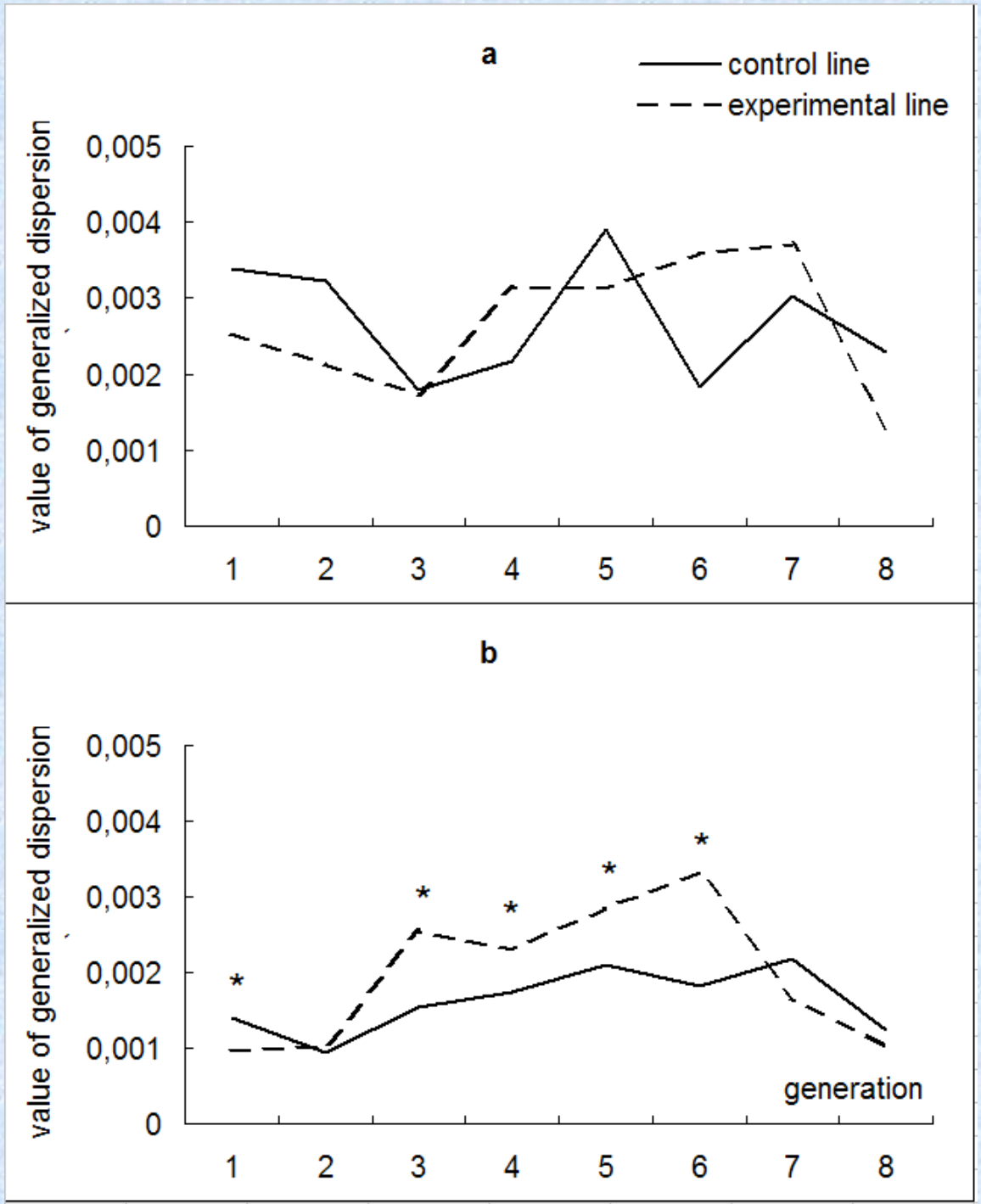




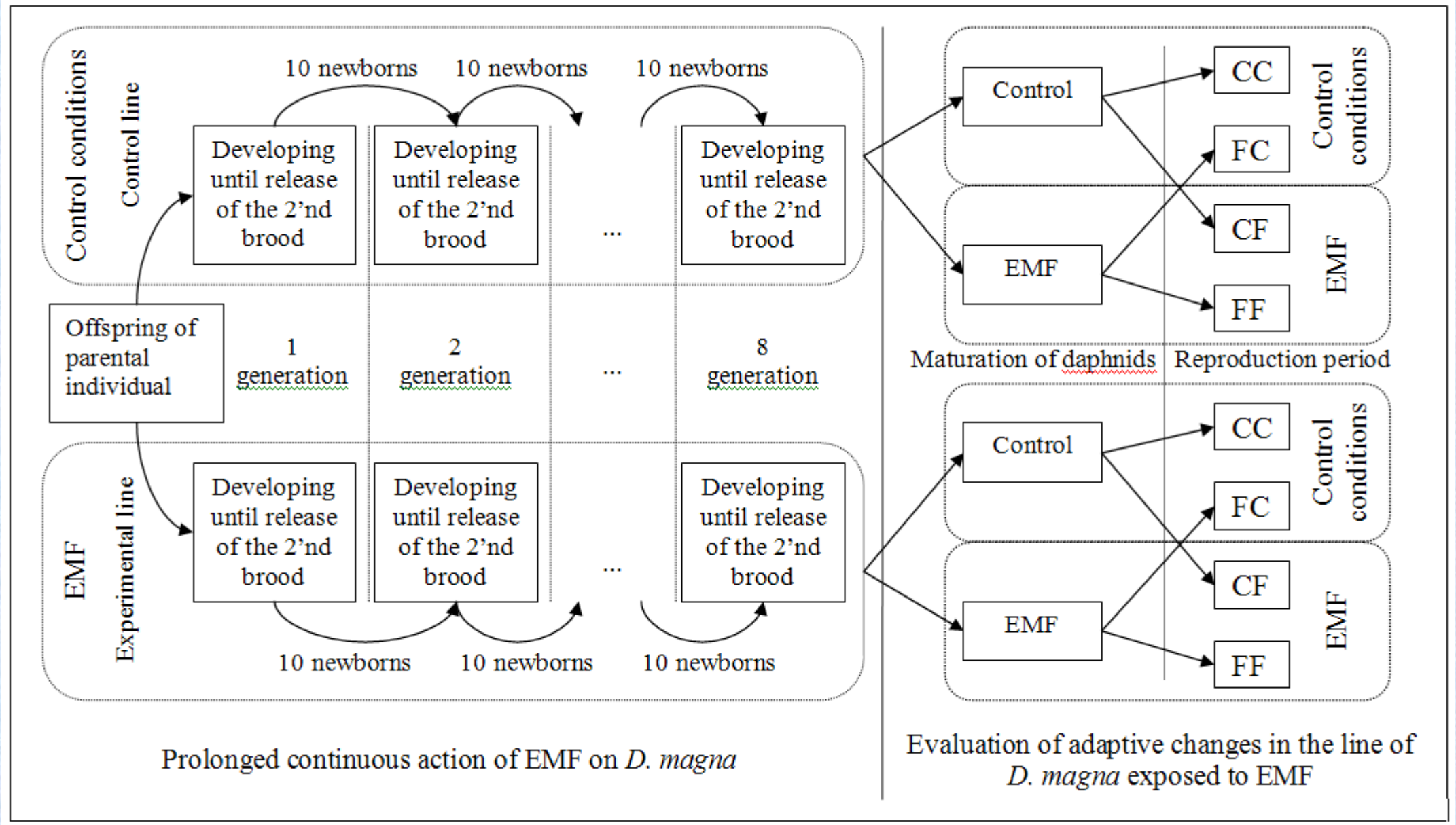




Dynamics of changing of generalized dispersion within the group of adult female (a) and the group of first brood (b) in the experimental and control lines.



Scheme of the experiments



Dimensions of viable offspring in the initial broods in tests with control and modified lines of *D. magna*, significant p-level was 0.017 using Bonferroni adjustment for each comparison

Variant	Nonviable offspring from the experimental line, %	n	Nonviable offspring from the control line, %	n	p-level [a]			
					CC	CF	FC	FF
CC	0,910±0,004	540	0,862±0,007	154	–	>0.017	<0.017	<0.017
CF	0,918±0,003	532	0,833±0,005	232	<0.017	–	<0.017	<0.05 >0.017
FC	0,878±0,003	562	0,838±0,006	183	<0.017	>0.017	–	<0.017
FF	0,928±0,003	548	0,832±0,006	192	<0.017	>0.017	>0.017	–

[a] Above diagonal of dashes – p-level of the abortive offspring percentage in the experimental line, below – p-level of abortive offspring percentage in the control line.

Percentage of nonviable offspring in initial broods in experiments with control and modified lines of *D. magna*, significant p-level was 0.017 using Bonferroni adjustment for each comparison

Variant	Nonviable offspring from the experimental line, %	n	Nonviable offspring from the control line, %	n	p-level [a]			
					CC	CF	FC	FF
CC	1.64	2873	0.78	638	–	>0.017	>0.017	<0.017
CF	1.17	2313	1.65	909	>0.017	–	<0.05 >0.017	<0.05 >0.017
FC	2.09	2680	0.38	783	>0.017	<0.017	–	<0.017
FF	0.58	2411	2.31	564	<0.017	>0.017	<0.017	–

[a] Above diagonal of dashes – p-level of the abortive offspring percentage in the experimental line, below – p-level of abortive offspring percentage in the control line.

Prolonged continuous action of EMF on *Daphnia magna* parthenogenetic line led to some changes. After exposure to EMF for 8 generations experimental line of *D. magna* showed an increase of newborn sizes and decrease of dead progeny in conditions of EMF action comparing with the control. Reproductive success of population in conditions of EMF action increased. Thus we can assume that the general biological mechanism of adaptive changes in response to action of effective weak low-frequency EMF is present.

Thanks for your attention!