Mass Culture of Euryhaline Cladoceran *Diaphanosoma celebensis* and its feeding to marine fish larvae

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Objective

- **Occasional instability in *Artemia* cyst harvests, prices and quality**

- **To seek for other crustacean plankton as an alternative to *Artemia.***
- **To develop intensive mass culture method.**

Cladoceran species for intensive mass culture

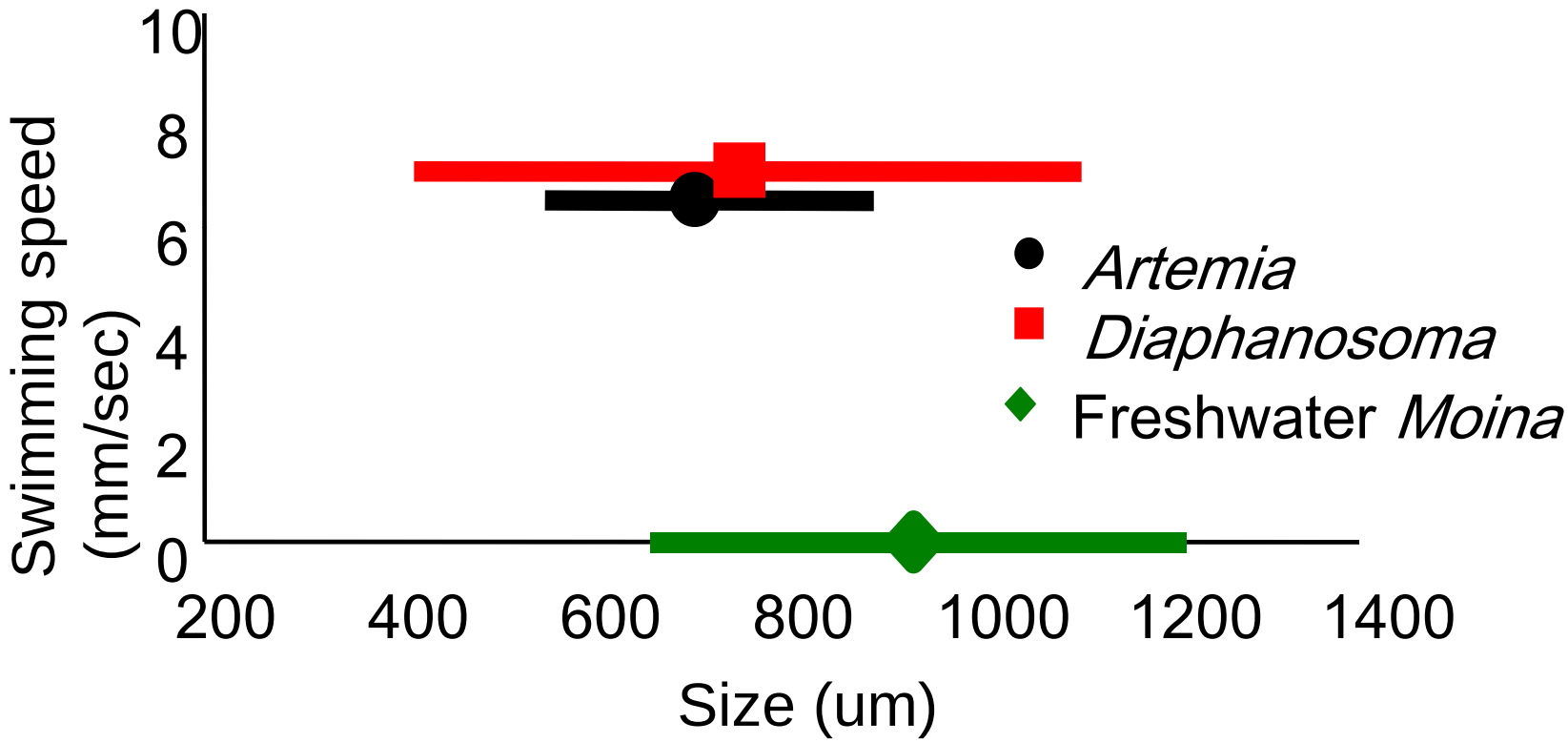
Moina macrocopa
(Nakamoto et al.,2007,2008)

Diaphanosoma celebensis
(Segawa & Yang, 1987;
de la Pena et al., 2001;

Marcial & Hagiwara, 2007)

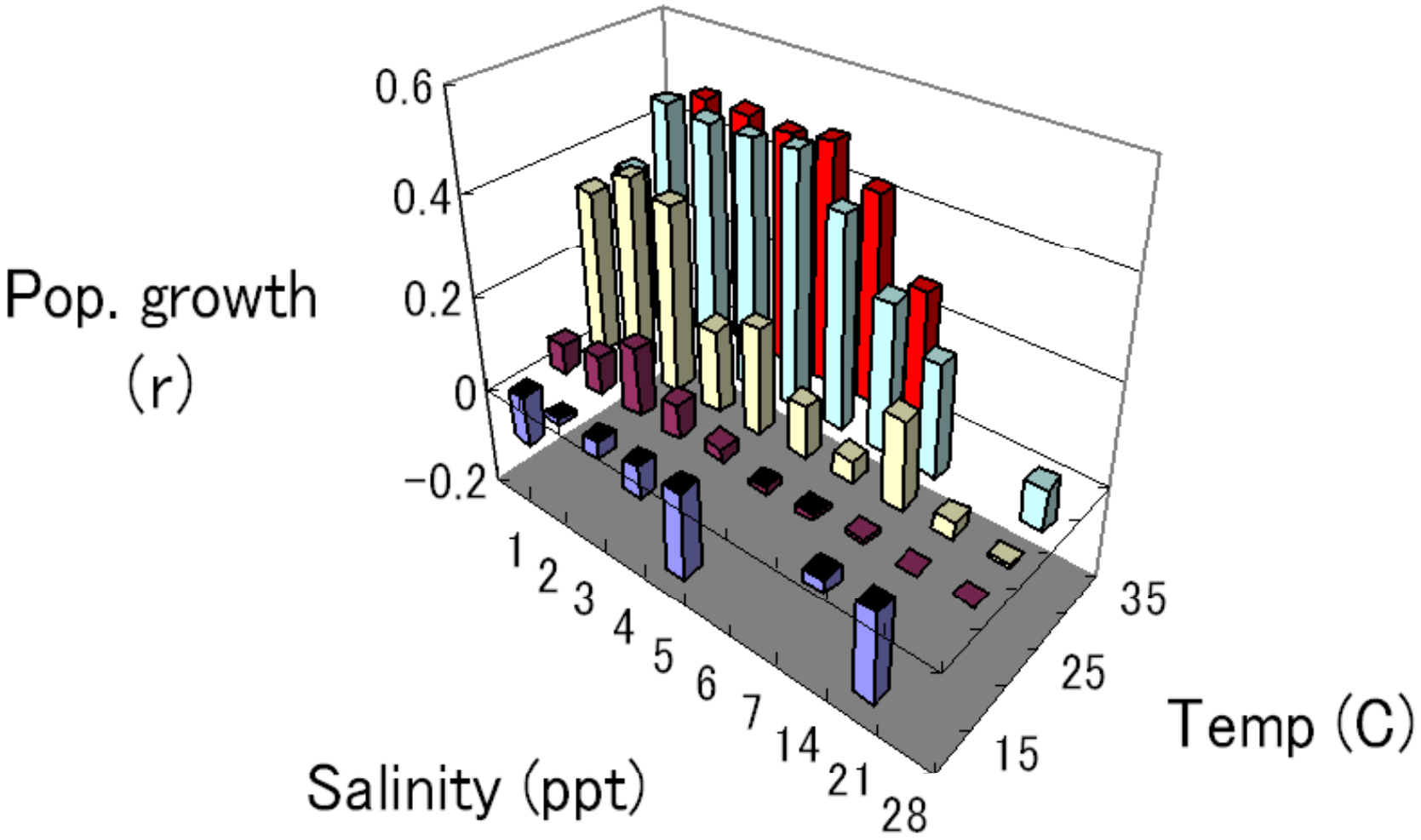
Moina mongolica (He et al., 2001; Wang & Lee, 2004)

Total length ± range (um) of *Artemia* and cladoceran, and swimming speed after they are transferred to larval rearing tank (33 ppt in salinity)

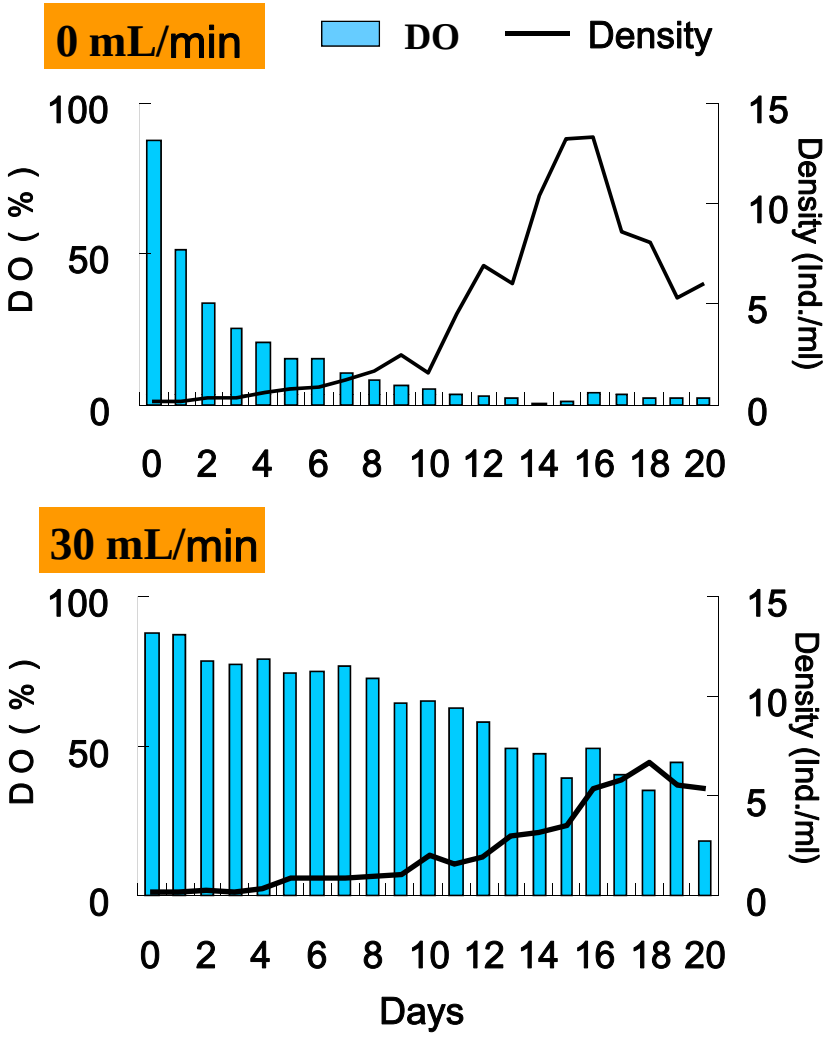


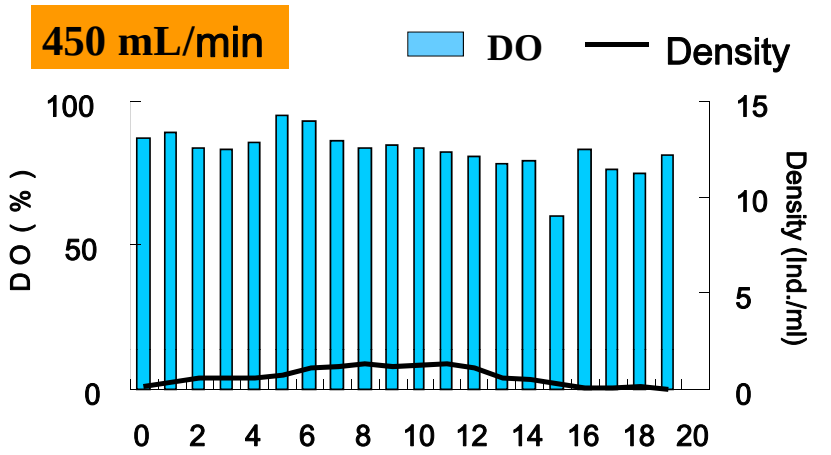
Larger size variation of cultured cladoceran will give better food environment for fish larvae by enhancing food selectivity of larvae (Tanaka et al., 2005)

Effect of temperature and salinity on the population growth of *D. celebensis* (n=6)



Effect of aeration rate on the dissolved oxygen concentration and population growth of *D. celebensis*





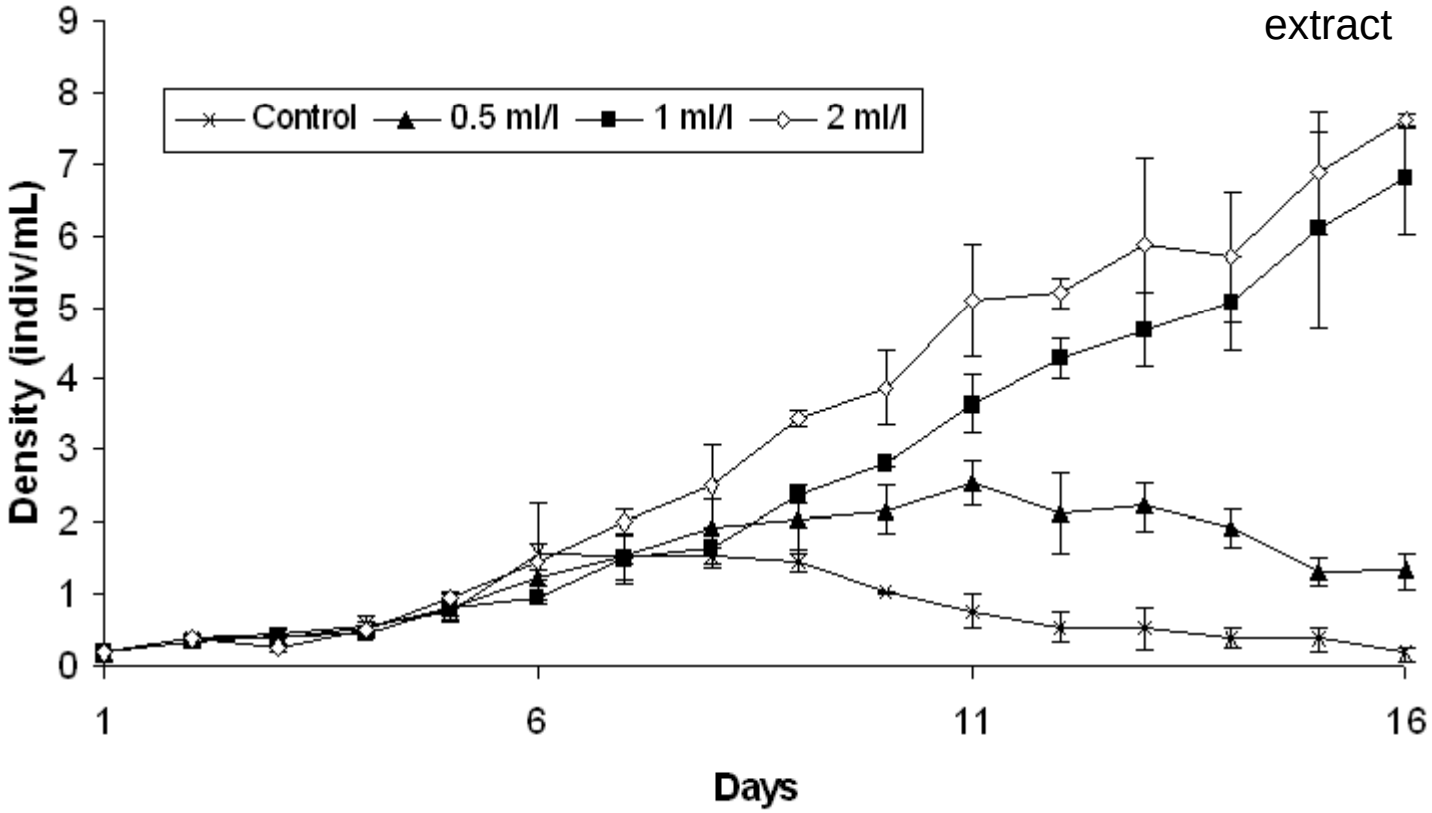
450 mL/L

0, 30 mL/L

Swimming pattern

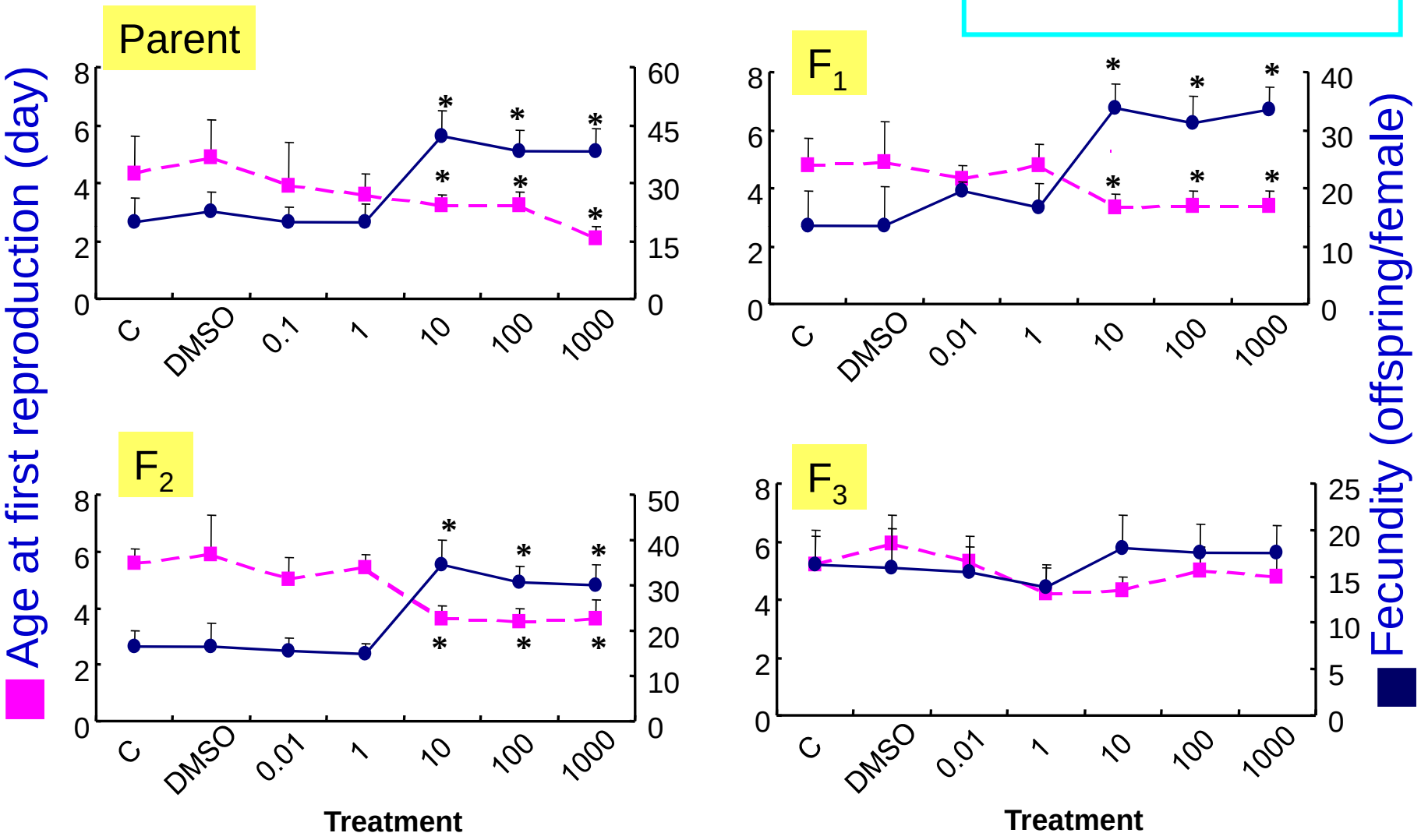
Effect of the addition of chicken manure extract on the population growth of D. celebensis (mean±SD, n=3)

Chicken manure extract



Reproduction on *D. celebensis* exposed to 17β-estradiol (ug/l) (Marcial and Hagiwara, 2007)

Dunnett's test* $p<0.05$
$n = 8$



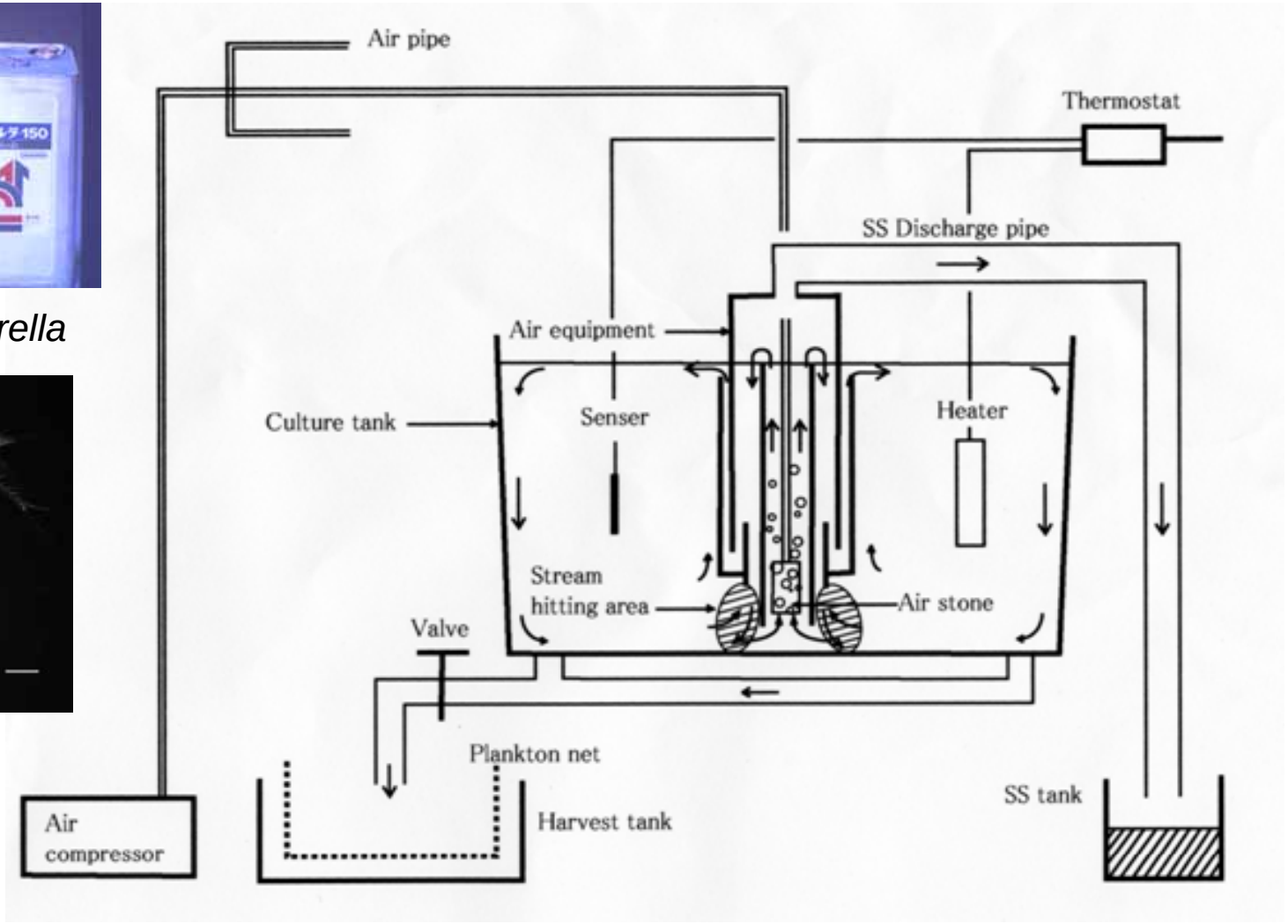
Sex hormones in chicken manure extract (CME) and *D. celebensis*

	CME-1	CME-2	CME-3	*D. celebensis*
17alpha-estradiol	0.13	ND	0.19	ND
17beta-estradiol	0.62	0.22	0.91	ND
Estron	0.71	2.2	4	ND
Estriol	ND	ND	ND	ND
Progesterone	ND	ND	ND	ND
Testosteron	ND	ND	ND	ND
Methyltestosterone	ND	ND	ND	ND

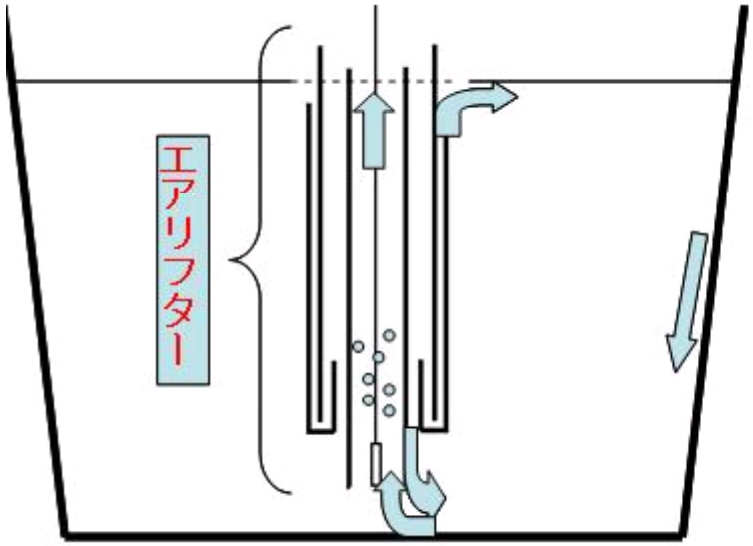
M. macrocopa Mass Culture System using triple pipe aeration equipment (Nakamoto et al., 2007)

Condensed *Chlorella*

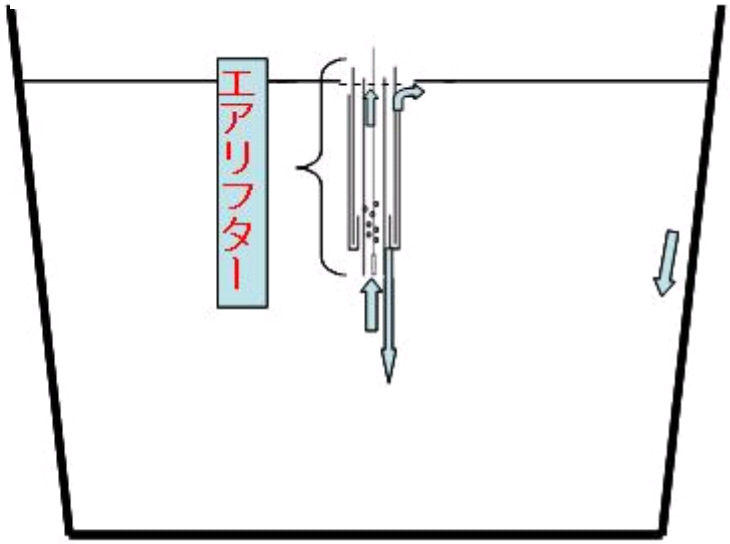
M. macrocopa



M. macrocopa culture system



Improved system for *Diaphanosoma* using oxygen supply



Highest density 62.4 ind./ml (100L tank)

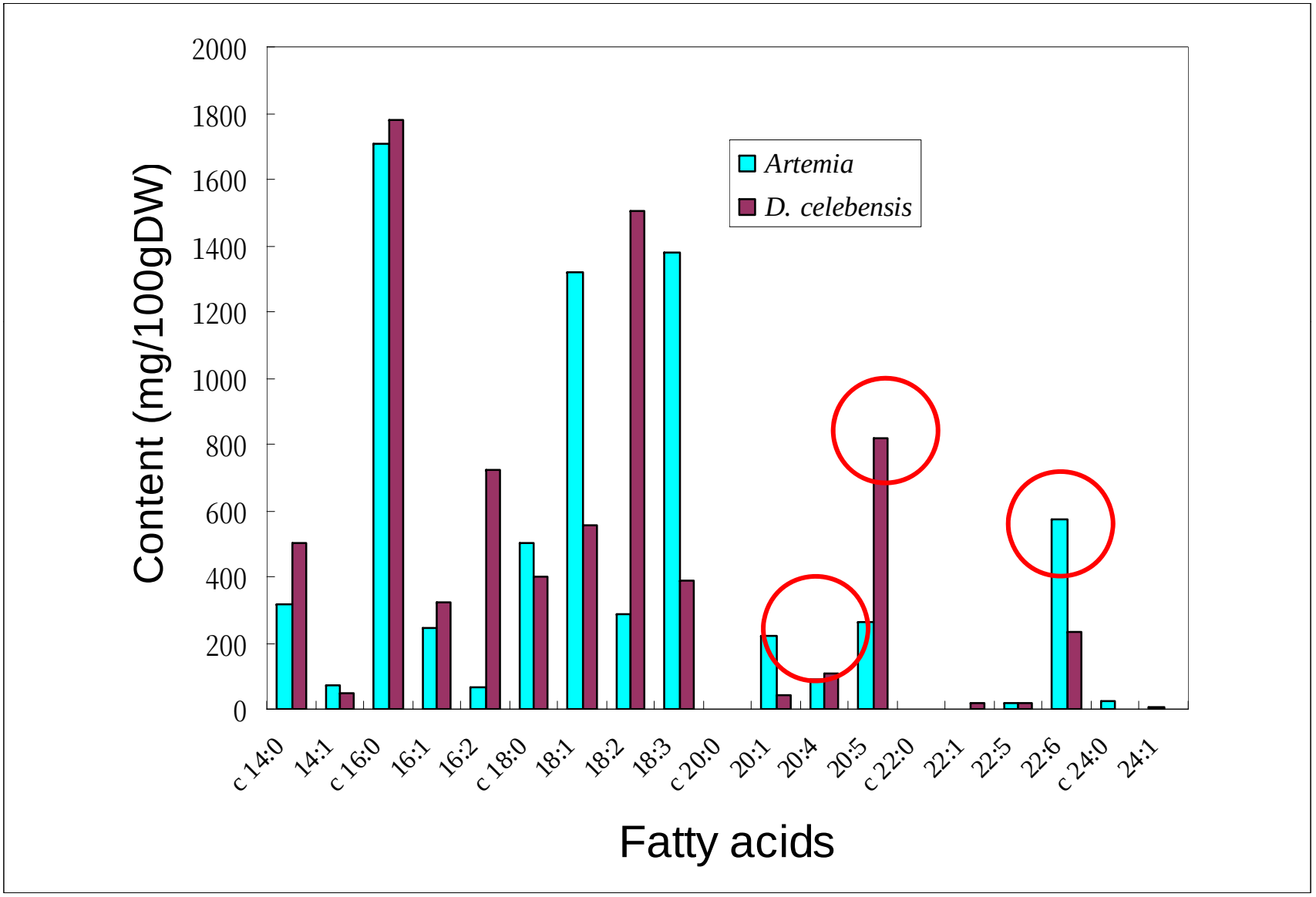
1950 g wet weight

D. celebensis Mass Culture Systems

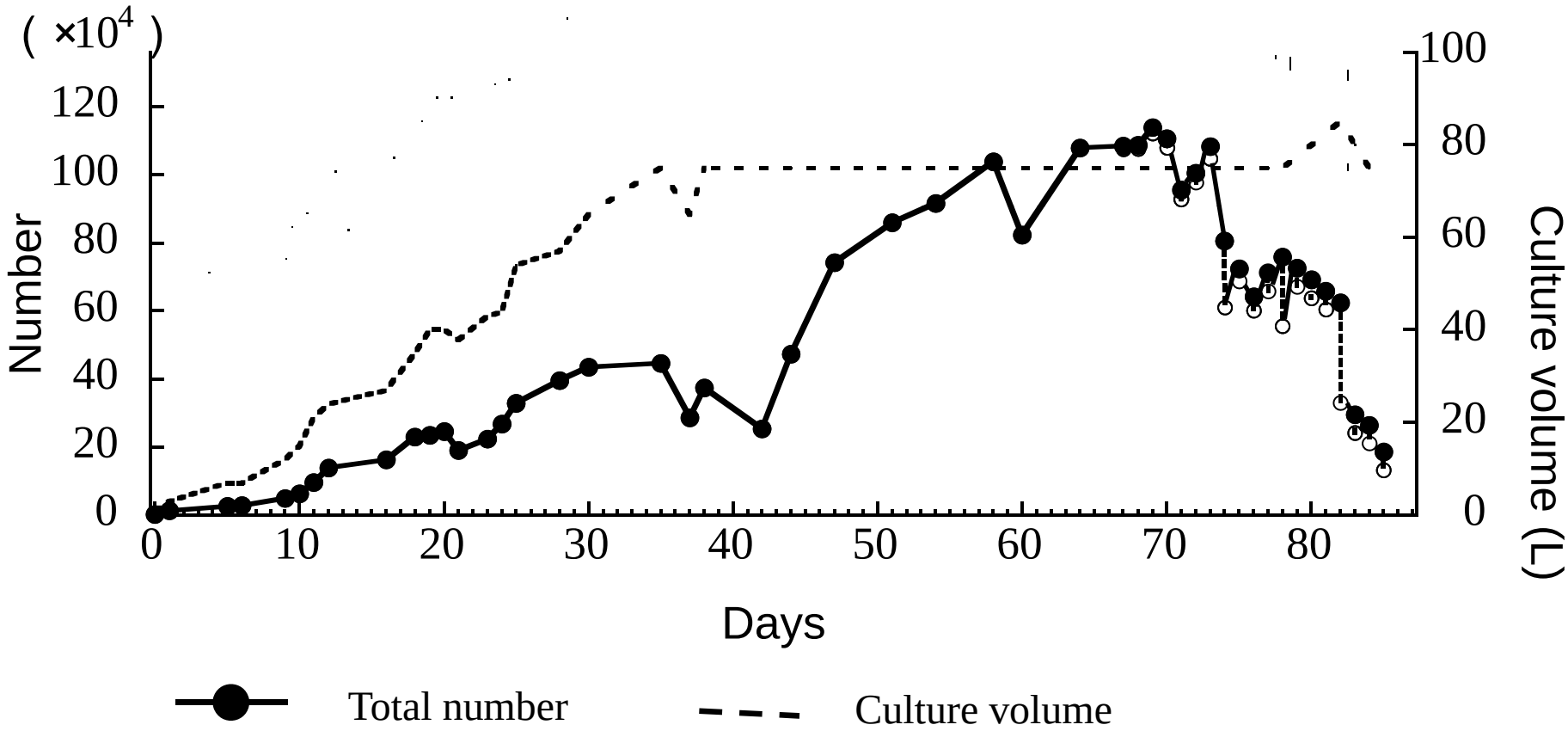
Batch culture system using 100 L tank

Closed recirculating system

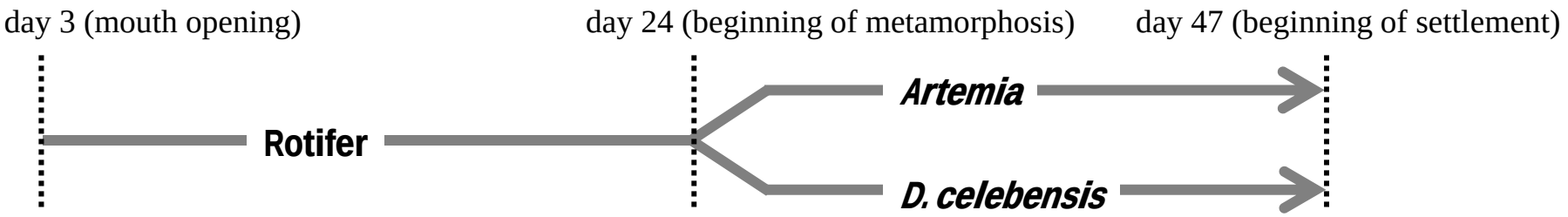
Enrichment by *Schizochytrium* for 6 h



Population growth of D. celebensis in 30 L culture for feeding fish larvae



Trial with Japanese flounder



100 L (44 cm diameter, 70 cm hight; Ruttanapornvareesakul et al. 2007 Aquacult. Res.)
18 ºC, 10L:14D, aeration rate 50 mL/min

Japanese flounder on day 47

	Artemia	*D. celebensis*
Survival (%)	71.4±9.5	67.1±11.7
Total length (mm)	15.8±0.9	16.0±1.6
Settlement (%)	21.3	19.5

Conclusion

- Highest density of *D. celebensis* in 100L culture was 62 ind./ml at 25C, 10ppt Sal., 0L:24D by feeding condensed freshwater *Chlorella.*
- Water flow management and chicken manure treatment was effective for successful mass culture.
- Larviculture of Japanese flounder was successfully conducted by feeding *D. celebensis.*
- Production cost was 11.3 Euro/ kg wet weight.

Thank you !