# Cultures for breeding zooplankton

## *Brachionus plicatilis*

strain Bra-9 (L-type, large)

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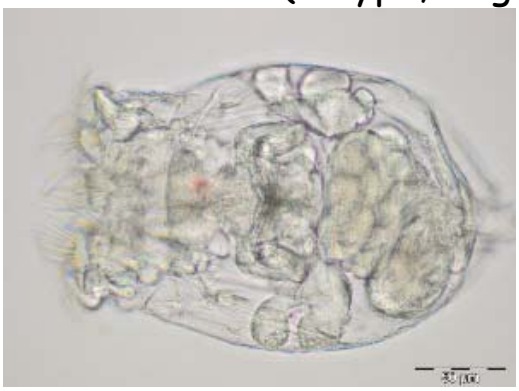
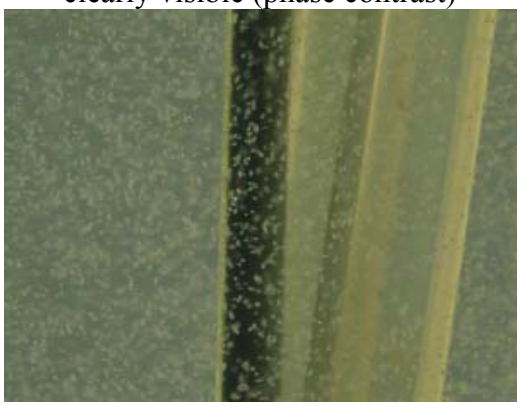


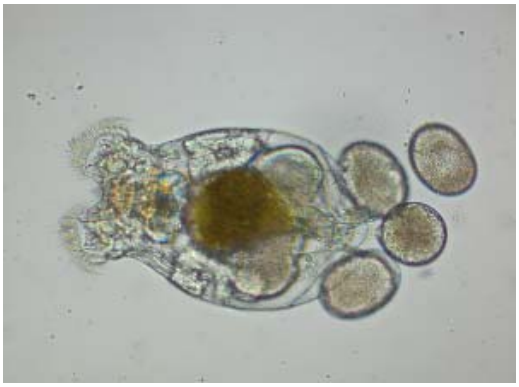
*Brachionus plicatilis,* Bra-9, L-type (bright field)

*Brachionus plicatilis,* Bra-9, L-type, with subitan egg: the red eye spot in the egg is clearly visible (phase contrast)

*Brachionus plicatilis,* Bra-9, L-type, fed with *Phaeodactylum tricornutum* (phase contrast)



*Brachionus plicatilis*, Bra-9, L-type in mass culture (ca. 250 animal per ml), raised in the AquaCare zooplankton tube and fed with *Nannochloropsis salina*.



*Brachionus plicatilis,* Bra-9, L-type, with four eggs (one just detached)

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| Version | 11.2010 |
| Species | *Brachionus plicatilis* strain Bra-9, L-type<br>Because of the many different species and the fact that most experiments are done under the name *B. plicatilis*, there are no clear indications about breeding - especially temperature and salinity range differs by the species and you must do your own experiences for best breeding. Instructions by AquaCare are valid only for the marked strain (e.g. Bra-9). |
| Family | Rotatoria (rotifers);<br>a splitting into three differnet species is possible: *B. plicatilis* (Müller) = L-type, *B. rotundiformis* (TSCHUGUNOFF) = S-type, *B. ibericus* (CIROS-PÉREZ et al.2001)<br>*B. plicatilis* (numbers of chromosome 2n=22), *B. rotundiformis* (2n=25), SS-type is probable subspecies of *B. rotundiformis* (KOREA-US AQUACULTURE)<br>GÓMEZ et al. 2002 investigate with nucleus and ribosome DNA analysis 9 species in the complex of *B. plicatilis*;<br>maybe more than 14 species |
| General discription | oval body, in the back a food for paddling or holding on a substrate; carries one to two seldomly four subitane eggs outside of its body in the near of the food; in the front is a ciliary collar = wheel organ (in situ it looks like rotating wheels), that ends in the buccal tubus; red eye spot;<br><br>The food is uptaken by the external cilia and is transfered by the cilia of the buccal tubus to the mastax. *Brachionus* identifies particles of the wrong size or already digested but not crushed particles (e.g. yeast cells) and spits them out. Afterwards accepted particles will be crushed by the mastax (gizzard) and directed through the oesophagus into the stomach. 2 minutes later the sphincter musle opens and the stomach content reaches the midgut = intestinum. After another 10-20 minutes the gut content is discharged through the anus; new stomach content reaches the midgut. Following passages throught the disgestive tract are faster. Starving animals (> 48 h without food) need more time for digesting (30-90 min). (LINDEMANN 2001)<br><br>Exact discription see STORCH & WELSCH 2009.<br><br>*Brachionus* is used as a indicator for environmental toxins (acute toxicity after ASTM) |
| Size | the size depends on factors like salinity and from type of strain;<br>strain Bra-9, L-type: 200...400 µm (AquaCare)<br>S-type: 99-281 µm (THEILACKER & MCMASTER 1971) |
| Ingredients | *Brachionus* has less nutrients but it is a ideal transport containter for essential substances. If *Brachionus* is fed with valuable food, e.g. micro algae, or if it is enriched with essential substances you get high quality food for your larvae. 16% of the brought in nitrogen is neede for growth and reproductioin, the rest is excreted (TANAKA 2007) |
| Colour of culture | depending on food from white to coloured turbid |
| Effort of cultivation | Bra-9: very less, very rigid against environmental changes |

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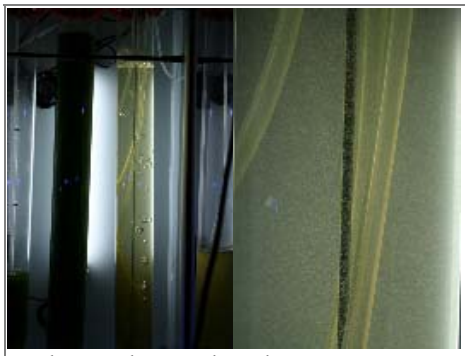
| Characteristic of cultivation | *Brachionus* is contaminating very easily other cultures like algae cultures. Bacteria and fungi that may harm will establish very easily if *Brachionus* is fed with non-algae food.<br>Do not starve Brachionus too long; best feed them daily - next day the food turbidity should be disappered (you see it easily if you feed algae: if the colour of the algae is disappeared you can feed *Brachionus* again, see pictures below).<br>Brachionus cultures produce lot of detritus (excrements, dead animals, agglutinated algae): it is best to suck all sediments daily (very easily to do with a zooplankton tube with paddle scraper.<br>The higher the particle density and the lower the *Brachinous* density the better the intake of particles (LINDEMANN 2001).<br>If you feed bakery yeast take 0.2 g with 30 ml sea water, mix it well; feed only as much that the turbidity is gone next day; aerate the culuture well.<br><br>Possible rotifer densities:<br>In AquaCare 4 litre zooplankton tube (see picture below) at room temperature and daily harvesting of 400 ml (10% per day) densities of 100...150 / ml are easily possible - so you can get 40,000...60,000 animals per day.<br>200-700/ml (LINDEMANN 2001);<br>500-1,500/ml (PFEIFFER & LUDWIG 2007);<br>20,000/ml (KOREA-US AQUACULTURE); |
| |  <br>*Brachionus* fed with *Nannochloropsis salina*: green turbidity |
| |  <br>24 hours later: the algae are eaten; the white turbidity (small white dots) is induced by *Brachionus* |
| Cultivation in | Zooplankton aquarium<br>Zooplankton tube (recommended) |
| Lighting | Not absolutely necessary but lights make sense if you feed micro algae: the algae take in the excreted nitrogen and phosphate, additional the algae produces oxigen for Brachionus. A lighted culure fed with algae is more stabel. Avoid UV radiation (direct sun light). |
| Aeration / circulation | less ... medium |
| Range of pH value | at pH 6.0 hardly activity, above 7.0 Brachionus are eating (LINDEMANN 2001);<br>avoid pH oscillations;<br>at pH 6.5...8.5 any differences in activity and respiration; too high pH values have worse effects than too low. (KOREA-US AQUACULTURE); |
| Range of temperature | At 20...25°C the stomach is filled after 5 minutes, at 10...15°C it needs 120 minutes, at 5°C considerably longer, at 0°C food is not uptaken and damages |

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| | occure; above 30°C *Brachionus* stops eating, too. (LINDEMANN 2001).<br>max. growths at 30...34°C (THEILACKER & MCMASTER 1971);<br>avoide temperature oscillations;<br>temperature maximum for *B. rotundiformis* higher tha for *B. plicatilis* (KOREA-US AQUACULTURE);<br>temperature minimum for *B. Rotundiformis* 20°C, *B. plicatilis* 10°C (KOREA-US AQUACULTURE); |
| Range of salinity | 59...957 m-osmol/l, equates to: 2...32/1000 (converted by WEAST 1985); the inner salt concentration of the animal equals the salt concentration of the medium (EPP & WINSTON 1977);<br>Bra-9: 35/1000 (AquaCare) |
| Range of oxigen | > 1 mg/l (KOREA-US AQUACULTURE); |
| Kind and concentration of medium | Sea water with the same salt concentration as the feeder algae, but not without the range of its tolerance (see range of salinity).<br>Heterotrophic growths with glucose possible; glucose is intaken actvly by the animal (LI et al. 1993); |
| Backup culture | Backup culture fed with micro algae (no additional organic substances), to prevent contamination with bacteria and fungi;<br>The generation of mictic eggs depends on e.g. population density: > 0.1 female per ml (STELZER & SNELL 2003) |
| Suitable for feeding | medium and large fish larvae; the quality of *Brachionus* depends extremely on kind of food and method of enrichment |