PoC - Point of Cooperation

Single Cell Sorting to support your research

Kristina Bayer and Ute Hentschel Humeida
GEOMAR Helmholtz Centre for Ocean Research Kiel, FB3 - Marine Ecology, FE Marine Symbiosis; PoF IV Topic 6.2

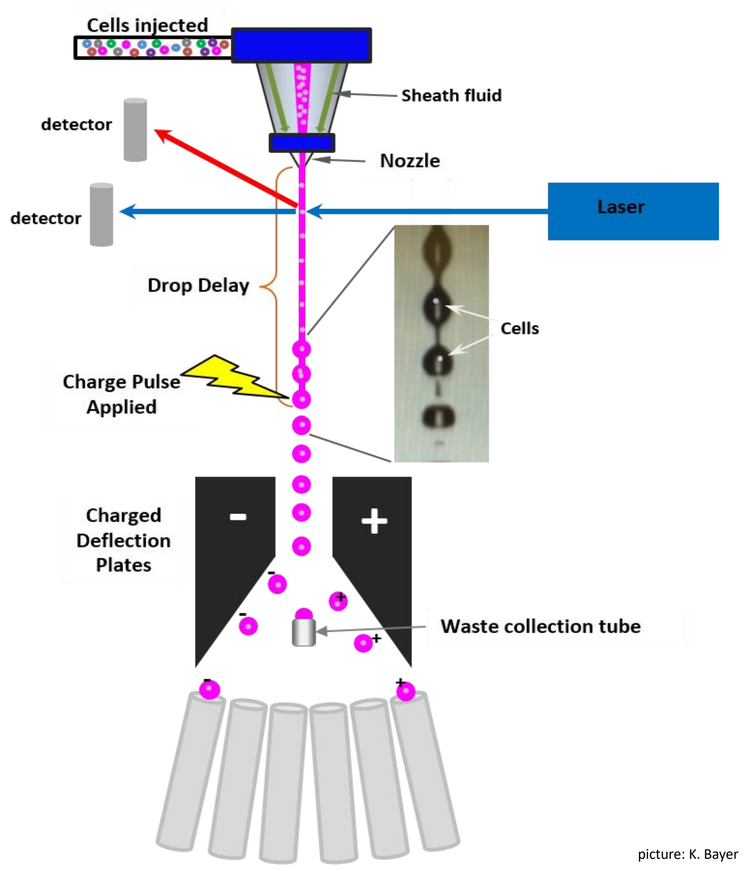
Abstract

In our research unit we are running the MoFlow Astrios EQ High-Speed Single Cell Sorter from Beckman Coulter which provides us with various possibilities to sort out specific cells (or particles) of interest from your sample at a validated performance of 70,000 sort decisions/second (>100,000 events/second acquisition rate validated performance). Equipped with 4 lasers (355nm, 488nm, 561nm, 642nm) we can detect up to 18 fluorescence parameters simultaneously.

The MoFlo Astrios EQ High Speed Cell Sorter from Beckman Coulter ©

We analyze your sample and sort up to six specific populations of interest, simultaneously in tubes, or in diverse formats from agar-, or well plates (up to 1536 well) or directly on microscopic slides. The sorted cells (as bulk or as single cells) can be used for downstream genomic, transcriptomic or proteomic applications or for culturing purposes. If you have specific applications we would love to collaborate with you on the possibilities the sorter provides.

Method

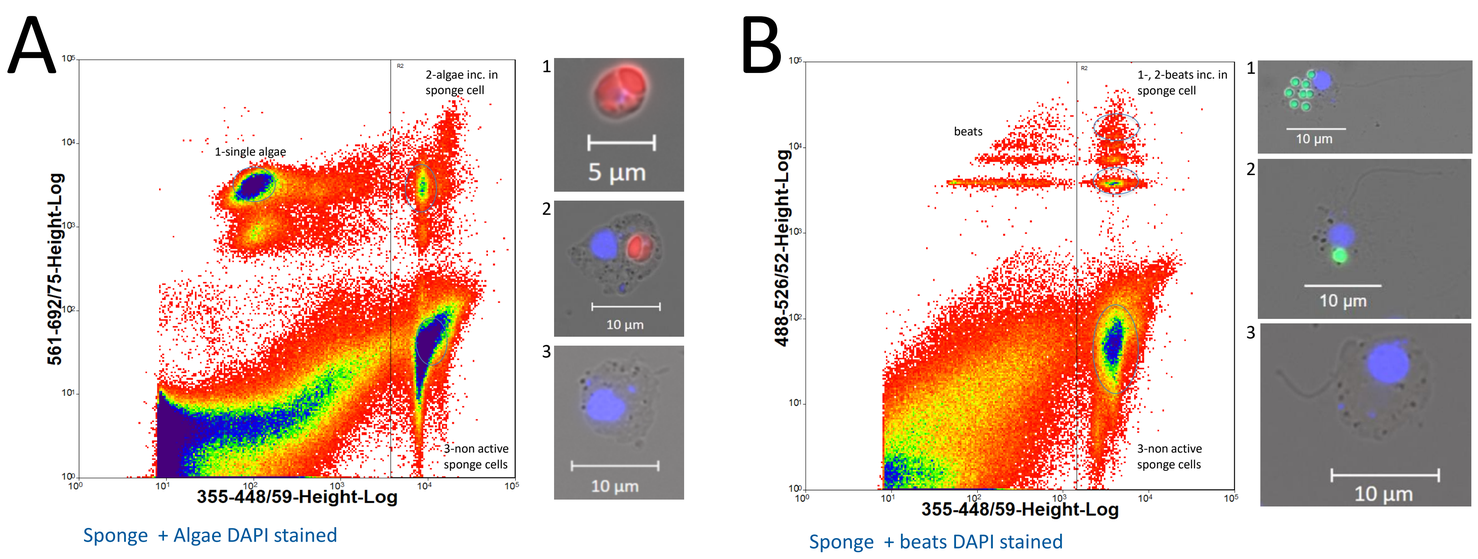


picture: K. Bayer

Based on your research question and analysis demand we can sort up to six populations of positively and negatively charged droplets containing the cells of interest, simultanously.

Research Examples

Sorting of phagocytic active sponge cells

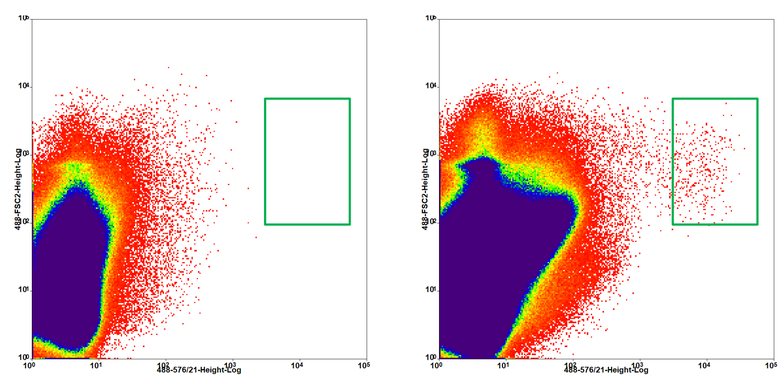


Sponge + Algae DAPI stained

Sponge + beats DAPI stained

Establishment of a phagocytosis assay for immune response research in sponge symbiosis.
Sponges (*Halichondria panicea* from the Kiel fjiord) were incubated with different particles [(A) algea or (B) beats]. Cells were dissociated, fixed and counterstained (DAPI) proir to flow cytometry analysis. The sorting of phagocytotic sponge cells (with and without incoporated particles) and microscopic inspection confirmed the results of flow cytometry data (A, B). Even the number of incooperated beats could be detected by their increased fluorescence signal per sponge cell (B), Marulanda *et al.* (in revision).

Sorting of GFP-expressing intestinal stem cells from *D. melanogaster*

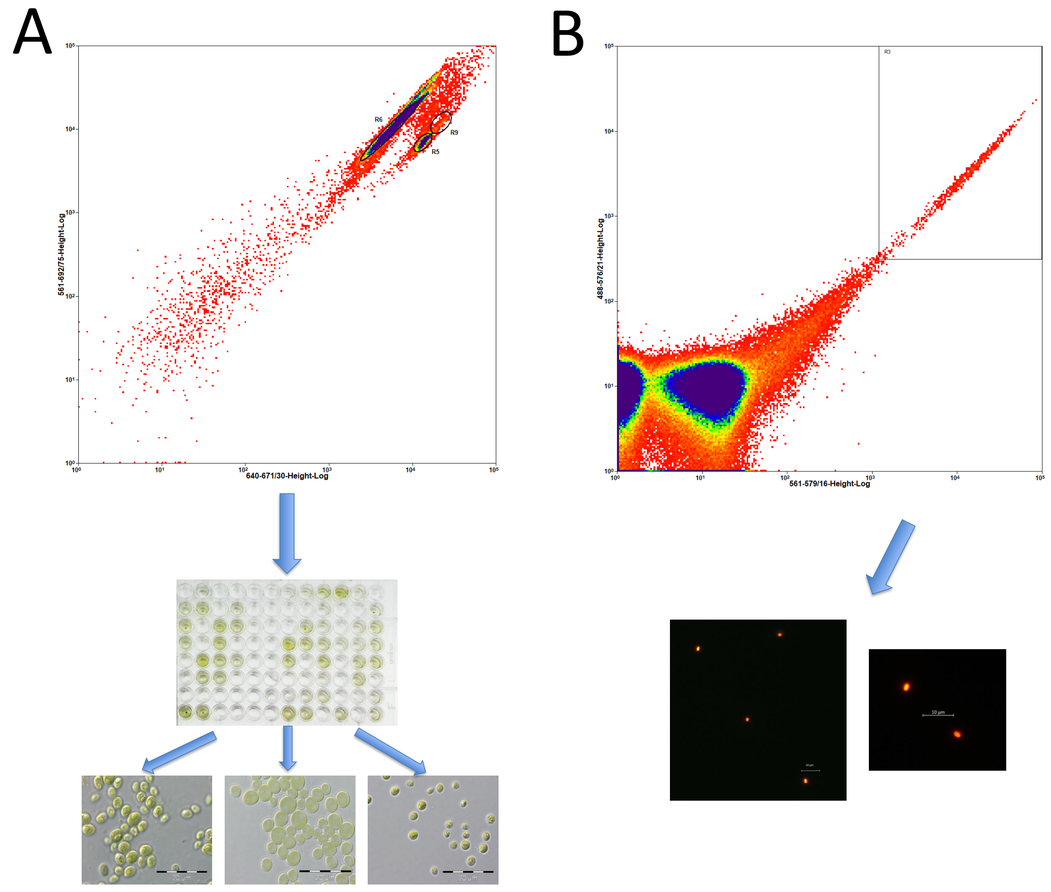


Intestinal cells from the control fly line

Cells from the GFP expressing fly line

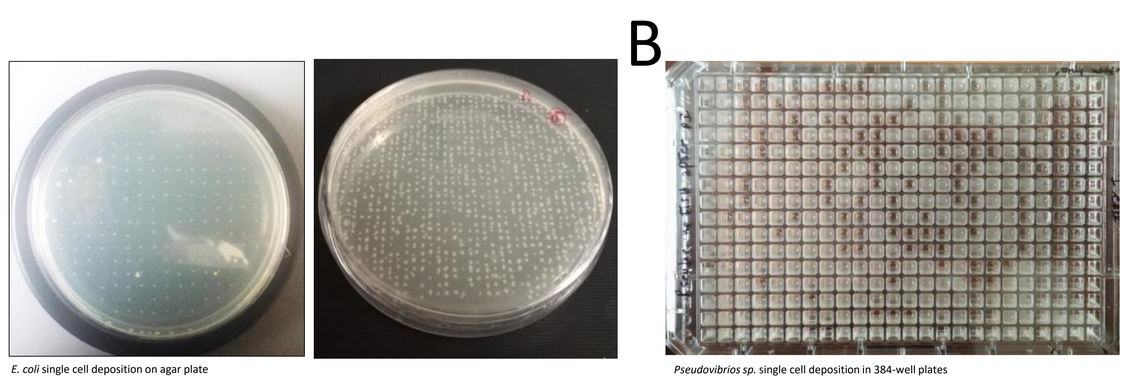
Drosophila as a model to study cancer and the immune response.
In co-operation with the research group of Prof. Thomas Roeder (Molecular Physiology, CAU Kiel) we sorted GFP-expressing stem cells of the intestional tract from *D. melanogaster* flies. Cells were sorted for RNA Seq and proteome analysis which will lead to new insights into the establishment of cancer and chronic diseases in this model organism.

Sorting of Phototroph organisms



Sorting of phototroph organisms from different sources for downstream applications.
(A) In co-operation with Louisa Lau (Plant Cell Physiology and Biotechnology, CAU Kiel) we sorted green algea from biogas plant surface water and sorted then into 96 well pates in order to gain pure algeal cultures for downstream applications, scale bar 20 µm. (B) Marine sponges habour complex microbial consortia including Cyanobacteria. From seven sponge species from the Mediterranean the Cyanobacteria populations were sorted based on their autoflourescence. DNA was extracted and sequenced for genomic comparison [in co-operation with Prof. Tal Dagan (Genomic Microbiology, CAU Kiel)].

Sorting of microorganisms for cultivation



E. coli single cell deposition on agar plate

Pseudovibrios sp. single cell deposition in 384-well plates

Single cell sorting of microorganisms in several variations.
In order to culture microorganisms in large scale, we can sort microbes (or other cells, single or bulk) directly on agar plates (A), into well plates (up to 1536 well plates validated), or in tubes. Recovery rates of *Pseudovibrio* sp. cells sorted into 384 well plates revealed a survival rate of <75% after sorting (B).

References

Marulanda A, Pita L, Bayer K, Hentschel U (in revision) A novel *in-vivo* phagocytosis assay to gain cellular insights on sponge-microbe interactions. *Frontiers in Marine Science*.

Batani G, Bayer K, Böege J, Hentschel U, Thomas T (2019) Fluorescence *in situ* hybridization (FISH) and cell sorting of living bacteria. *Scientific Reports 9*, 18618 DOI: 10.1038/s41598-019-55049-2.

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contact: kbayer@geomar.de