Validation of next generation microbial colony pickers using fluorescence in a complete workflow solution

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Introduction

The new QPix 400 series of microbial colony pickers has been developed and validated to meet the greater needs of today's researchers. New features include:

- Selective screening for rare clones using multi-channel fluorescence
- Intuitive software to permit use of platforms by anyone in the lab
- Automatic agar height sensor for gentle, accurate picking
- Data tracking of specific clones through the entire workflow
- Greater flexibility of plate combinations and increased capacity for re-arraying and replicating
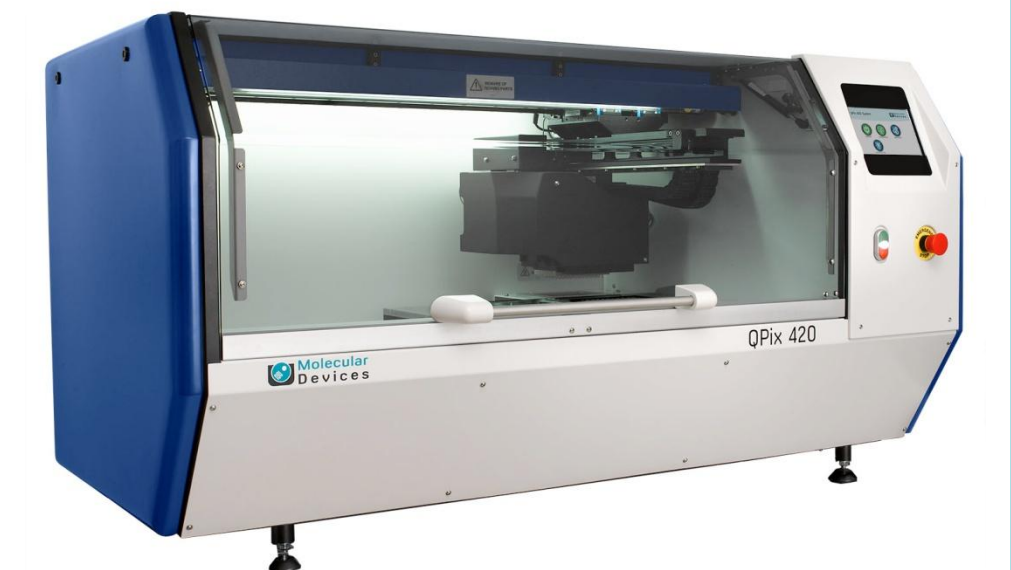
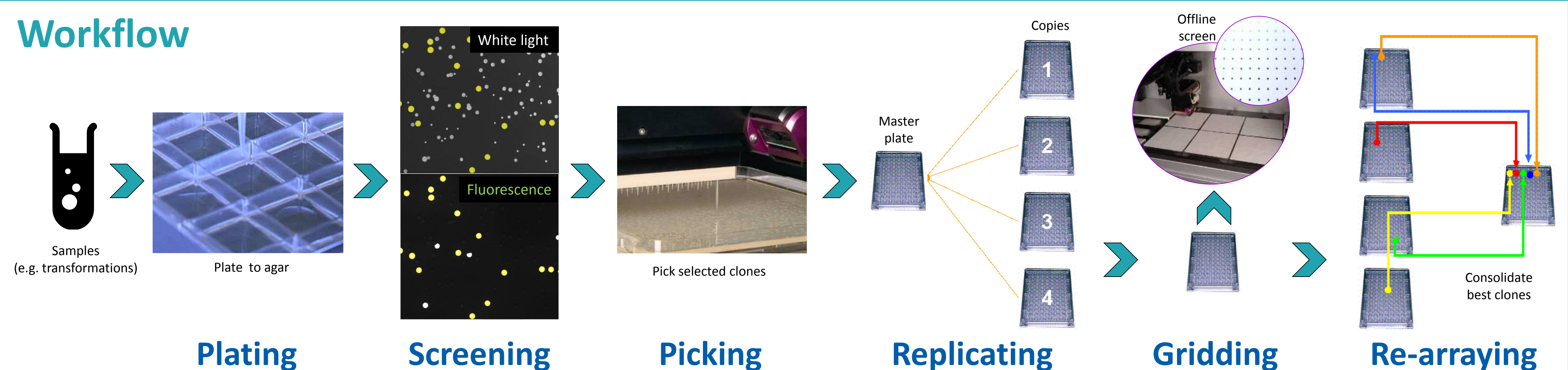## QPix 400 series
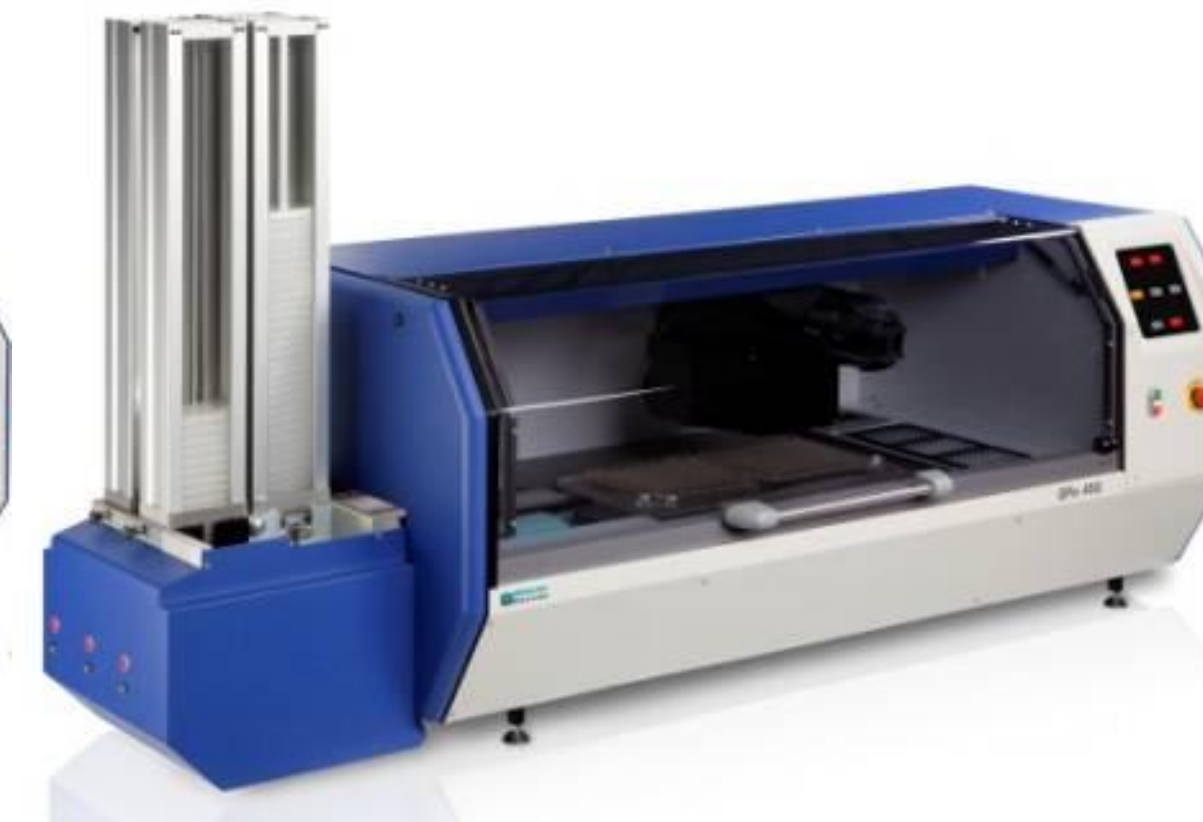
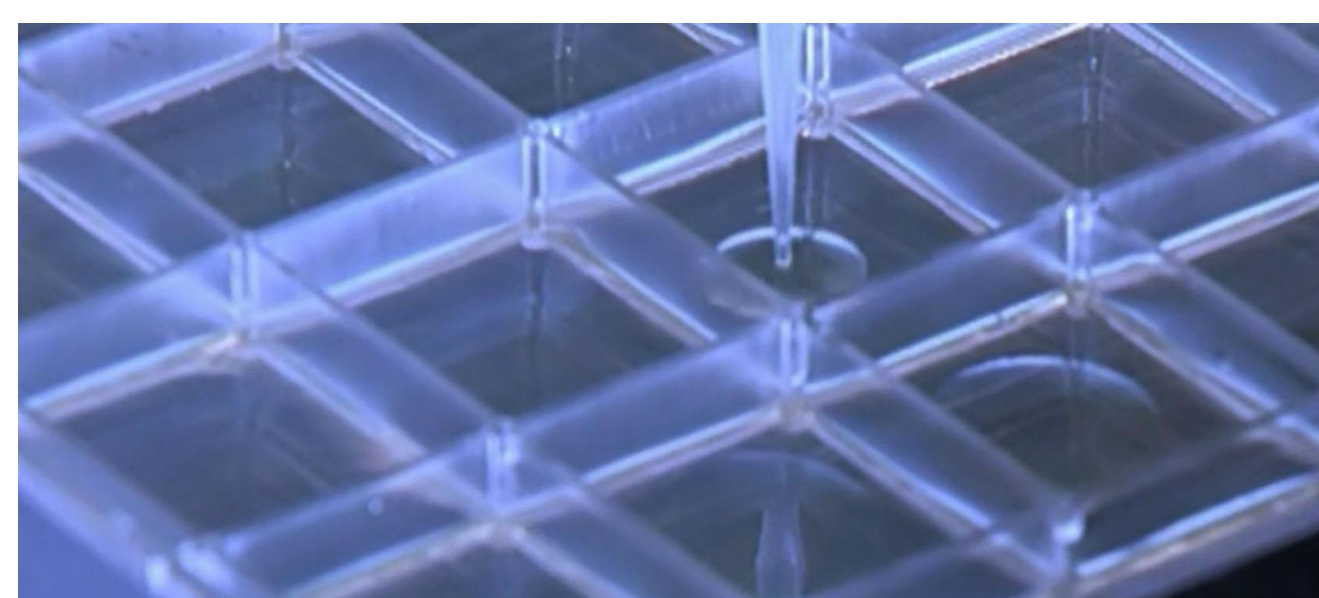QPix 460   QPix 450   QPix 420

Applications

- Protein engineering and enzyme evolution
- Protein expression and transformation
- Biofuels and renewable chemicals research
- Phage display
- Metagenomics
- Clone management and library screening

Workflow

Samples (e.g. transformations) → Plate to agar → White light / Fluorescence → Pick selected clones → Master plate → Copies 1 2 3 4 → Offline screen → Consolidate best clones

Plating   Screening   Picking   Replicating   Gridding   Re-arraying
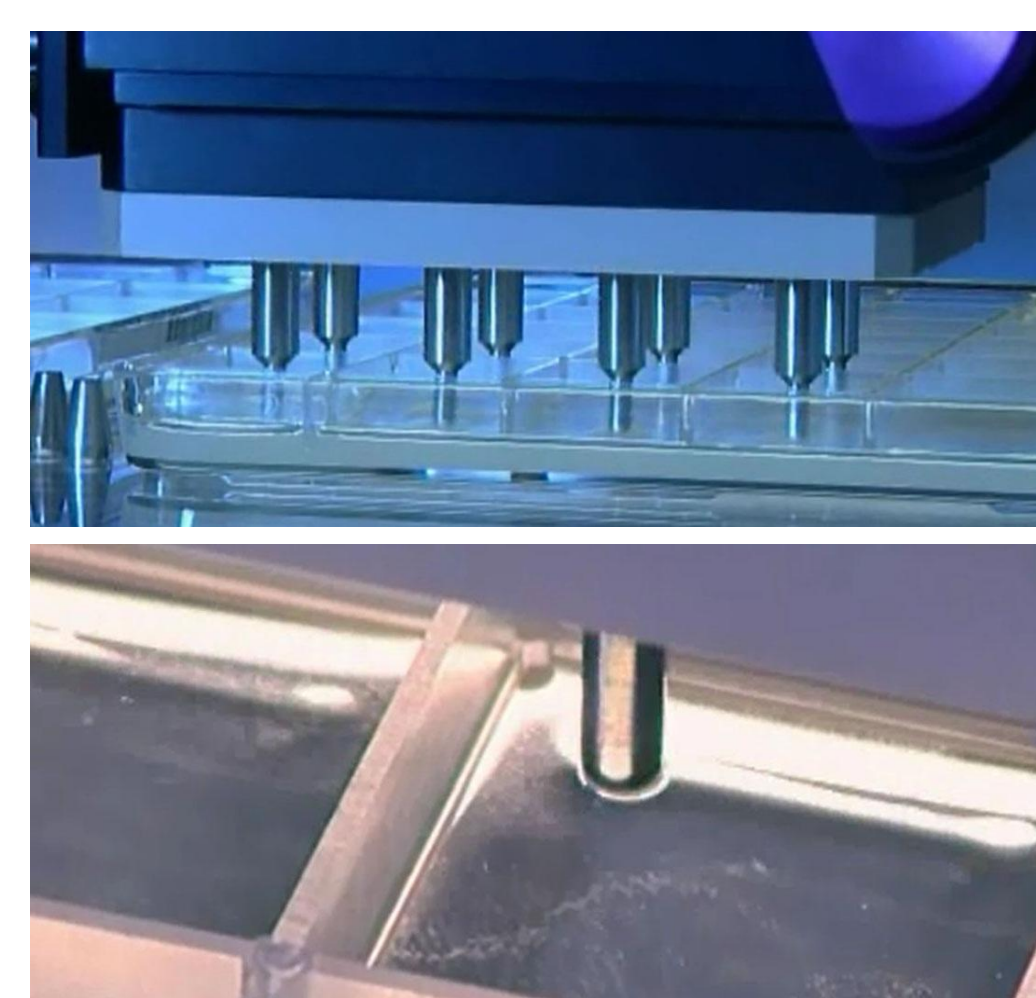
Plating

- Plates samples, e.g. transformations
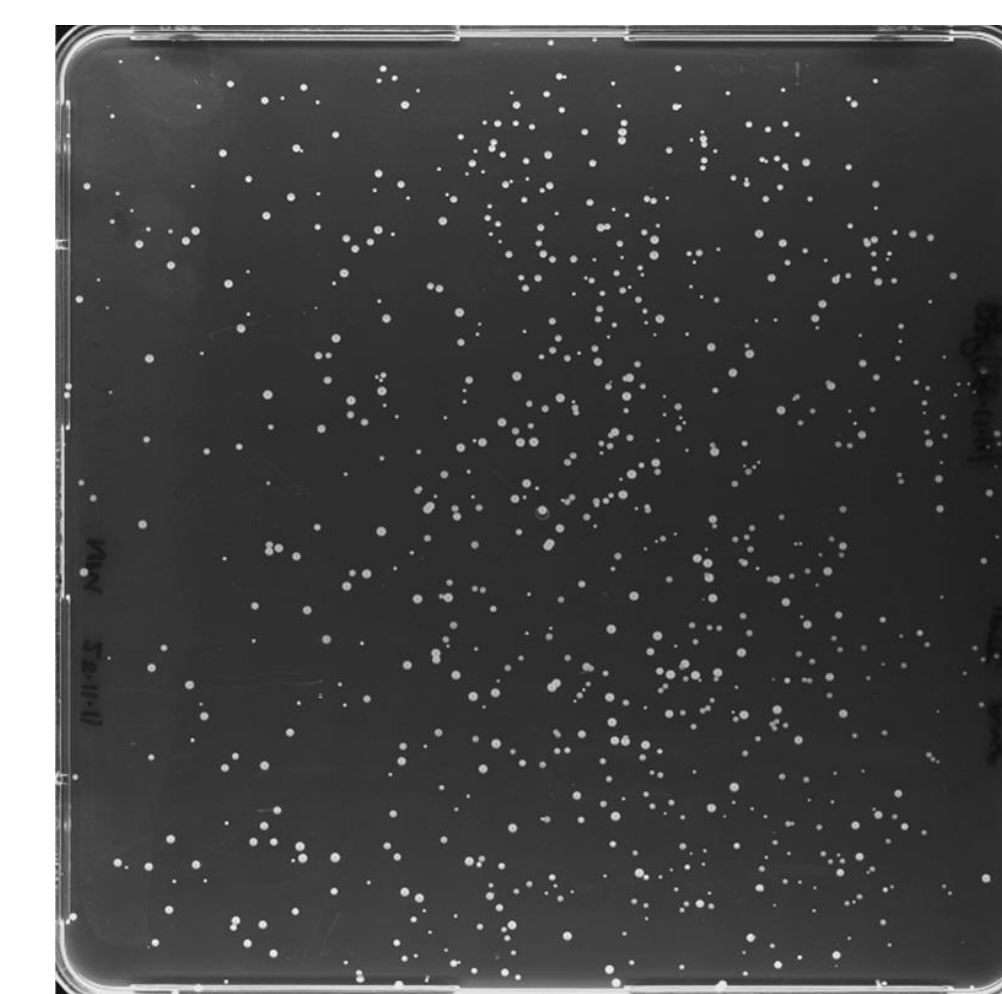- QPix 460 only
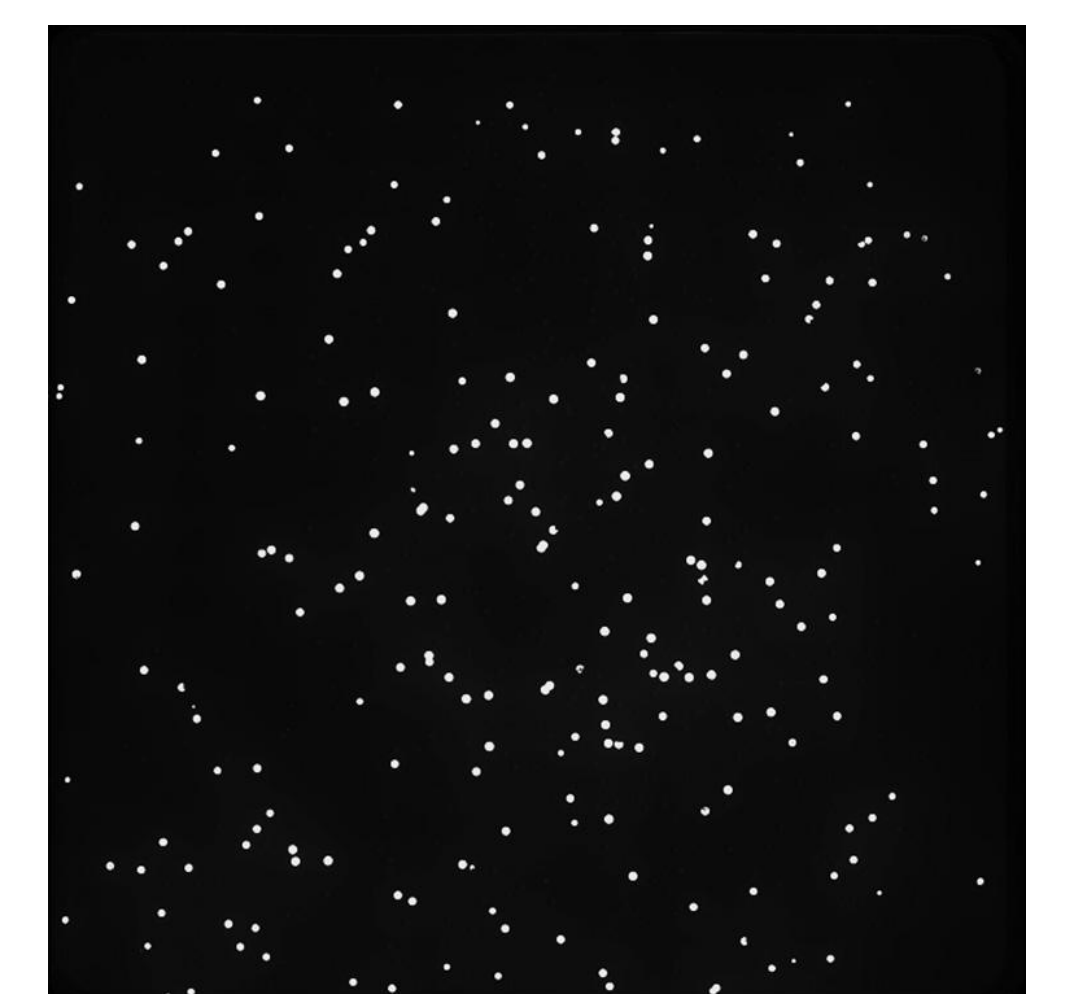

Automatic sample pipetting

Automatic sample spreading

Screening

- Selectively screen by
  - colony characteristics, e.g. size, shape, proximity
  - fluorescent expression of proteins, lipids, etc
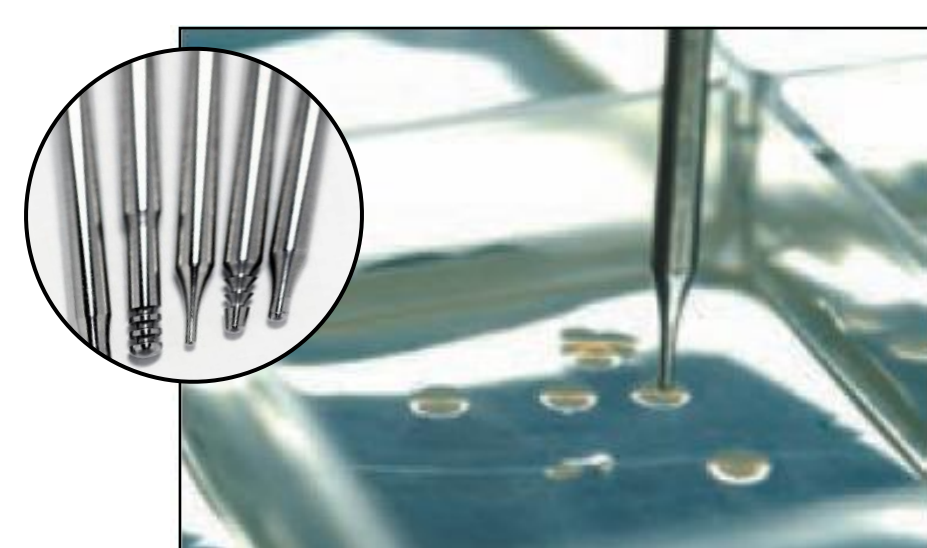- Review entire source plate or tray in a single view

White light composite image

Fluorescent composite image

Picking

- Standard picking: collect clones from one heterogeneous population
- Regional picking: collect clones from many different samples – up to 48 samples per QTray

Regional picking from 48-sector QTray

Validation test: E. coli

pick number expected	289
actual pick number	289
%	100.0
no pick expected	95
actual no pick	94
%	98.9

Fluorescent imaging head; picked to 384-well plate

Validation test: S. cerevisiae

pick number expected	289
actual pick number	282
%	97.6
no pick expected	95
actual no pick	95
%	100.0

Fluorescent imaging head; picked to 384-well plate

Replicating

- Make direct copies of plates (to same or different plate types)
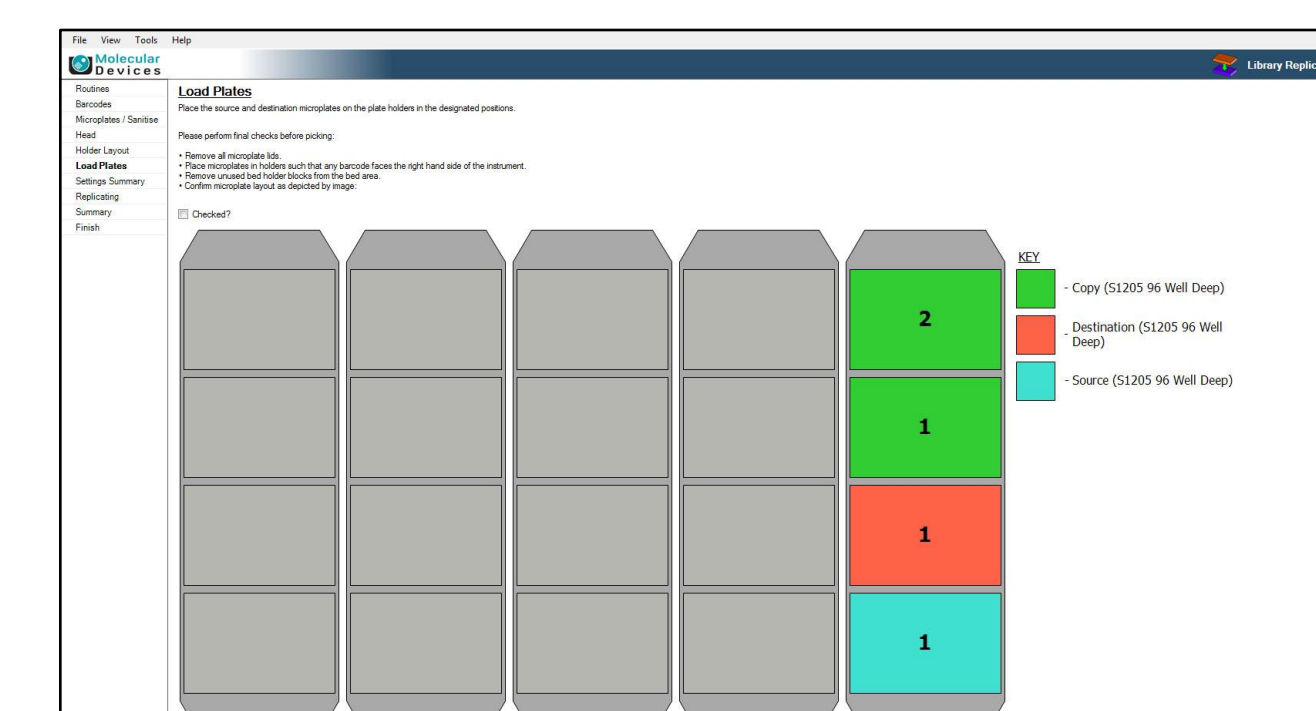
QPix420 bed layout showing source and destination plate locations

Validation test: E. coli

growth expected	128
actual growth	128
%	100.0
no growth expected	64
actual no growth	64
%	100.0

Fluorescent imaging head; copied 96-well plate to 96-well plate in duplicate

Gridding

- Array samples onto agar or membrane filters for offline screening, hybridization or blotting
- Compatible with microbes, phage, DNA, PCR products or proteins
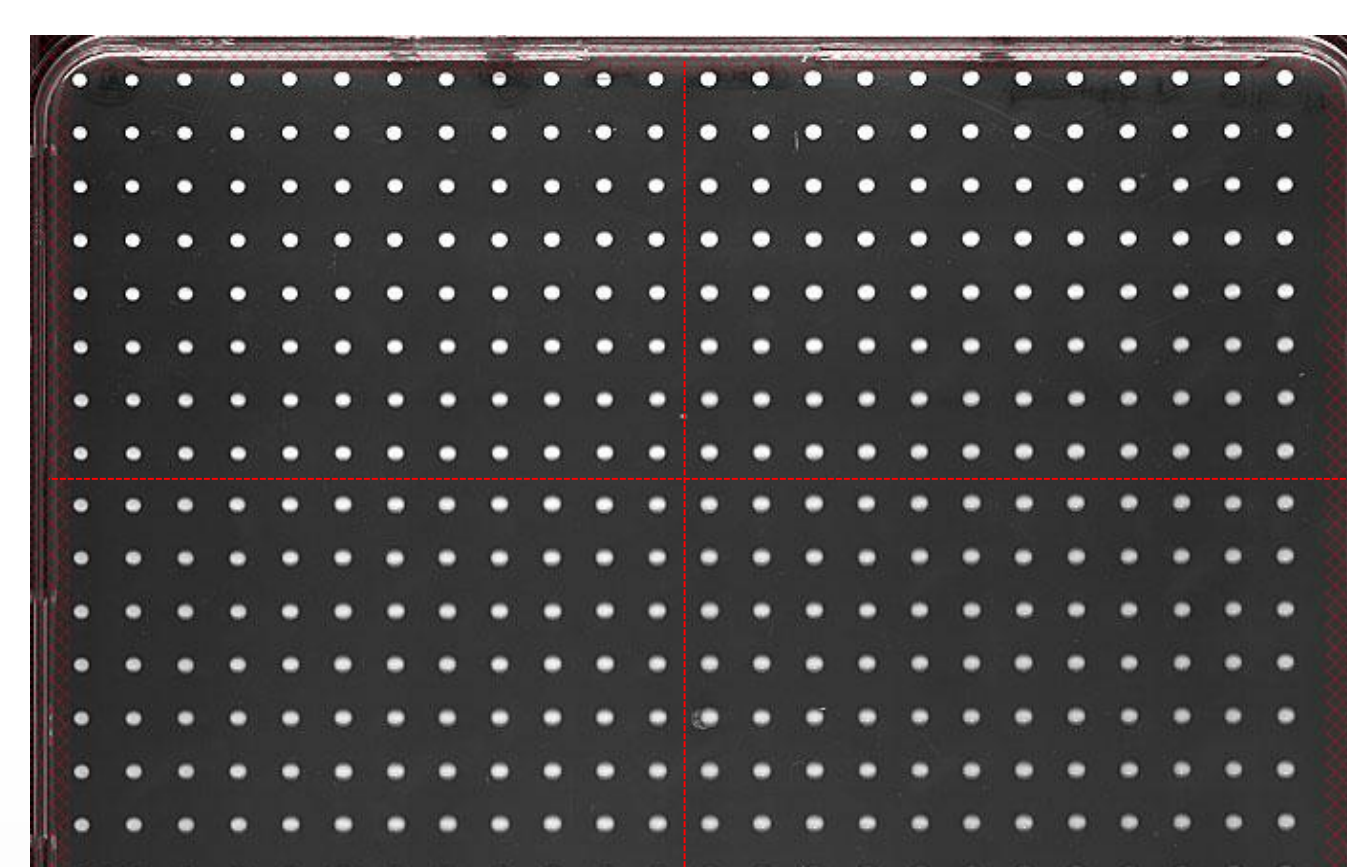
Array generated by gridding E.coli samples from microplates to agar using 96 pin gridding head and then incubating overnight to grow colonies. Red lines indicate grid zones. Part of QTray shown.

Re-arraying (hit-picking)

Source plates   Destination plates

Validation test: E.coli

Test result:

growth expected	97
actual growth	97
%	100.0
no growth expected	95
actual no growth	95
%	100.0

Samples in 2 deep well 96 well source plates were re-arrayed into 2x standard 96 well destination plates using a 96-pin head. Yellow highlights indicate positive wells picked. Well annotations in destination plates shows source origin.

Summary

- World's first range of microbial colony pickers with fluorescence-based screening capability
- QPix 400 series provides automated solutions for each step of the workflow
- Designed with intuitive, easy to learn software for use by everyone in the lab
- Validated for high rates of success and fidelity at each process

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