QPix Microbial Colony Pickers ensure sterility by preventing the risk of cross-contamination

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Introduction

The QPix® Microbial Colony Picker utilizes best-in-class technology to alleviate bottlenecks and reduce manual, repetitive tasks within the laboratory. It is widely used to screen genetic libraries rapidly, accurately, and efficiently. A key requirement for biologics production, in accordance with Good Manufacturing Practice (GMP) standards, is ensuring sterility to prevent cross-contamination. This study aims to demonstrate sterility during automated colony picking and plating with the QPix 420 system. The system incorporates several sterility features, including UV light for interior sanitization, pin washing stations, and halogen pin drying. These features not only ensure compliance with GMP standards but also provide economic benefits through pin reusability. The pins, subjected to multiple washing steps during each picking run, are thoroughly rinsed in three washing baths to remove microbial residues, followed by sterilization through halogen drying.

Benefits

- Demonstrated adherence to GMP standards by ensuring complete sterility throughout the colony picking and plating processes.
- Experience an economically sustainable advantage through the reusability of sanitized pins, significantly reducing operational costs.
- High-throughput and accurate screening of microbial colonies, enhancing laboratory efficiency and productivity.
- Offering flexibility in application, supporting rapid scaling and adaptation in microbiology research environments.

Picking

Methods

Picking was conducted using the samples, pin types, and sanitization profiles described in Table 1. Each experiment included control wells inoculated with a sanitized pin, which was then used to inoculate another well (Figure 1, red wells). All destination plates (96-well microplates) were analyzed for bacterial growth after overnight incubation at 37°C with agitation. The data, derived from validation studies across multiple QPix 420 format systems, assessed the efficiency of the QPix sanitization cycle based on the presence or absence of viable biological samples in the control wells (Figure 1, green and red wells, respectively).

Biological Sample	*E.Coli* (JM109 or BL21-GFP) grown on LB-Agar media, w/o antibiotics
Destination Media	LB media only, w/o antibiotics
Picking Pin Type	X4370, picking pin for *E.Coli*
Sanitization Profile	6 cycles (both directions) in wash bath containing 70% ethanol 5 seconds in halogen dryer 3 seconds wait time

Table 1.

Figure 1. Control wells: 45. These wells were inoculated using a pin that had previously picked a colony, deposited in Destination Plate 1, and underwent sanitization cycle.

Picking

Results

Across the different QPix instruments, a total of 497 control wells were inoculated, with no cross-contamination observed (Table 2).

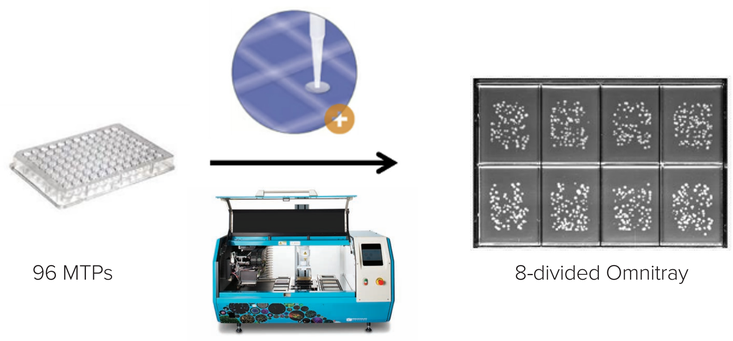
Instrument Model & Number	# of Control Wells Inoculated	# of Control Wells with Outgrowth	Cross-Contamination %
QPIX-LH-AWES #1	78	0	0
QPIX-LH-AWES #2	45	0	0
QPIX-LH-AWES #3	78	0	0
QPIX-LH-AWES #4	54	0	0
QPIX-LH-AWES #5	9	0	0
QPIX-SELECTHT-LH-AWES #1	5	0	0
QPIX-SELECTHT-LH-AWES #2	45	0	0
QPIX-SELECTHT-LH-AWES #3	78	0	0
QPIX-SELECTHT-LH-AWES #4	27	0	0
QPIX-SELECTHT-LH-AWES #5	78	0	0
Total	**497**	**0**	**0%**

Table 2.

Plating

Methods

The QPix 420 system can also automate the plating of samples onto agar-filled trays. A liquid sample in a 96-well microplate can be deposited and then streaked across the agar surface, enabling the automated plating of up to 96 samples in 30 minutes. Plating was conducted using the parameters outlined in Table 3. Each run utilized a pattern of inoculated source wells (Figure. 2, green wells) and LB media-only source wells (Figure. 2, yellow wells). Each experiment included control regions streaked with a pin that had previously streaked a biological sample, was sanitized, and then used to streak a region again with a media-only source sample (Figure. 2, control regions in red). All destination plates were analyzed for outgrowth after overnight incubation at 37°C. The data evaluated the QPix sanitization cycle's efficiency based on the presence or absence of viable biological samples in the control regions.



Biological Sample	*E.Coli* (JM109 or BL21-GFP strain) grown in LB media only, w/o antibiotics
Destination Media	LB-Agar media, w/o antibiotics
Picking Pin Type	X4330, streaking pin
Sanitization Profile	6 cycles (both directions) in wash bath containing 70% ethanol 5 seconds in halogen dryer 3 seconds wait time

Table 3.

Plating

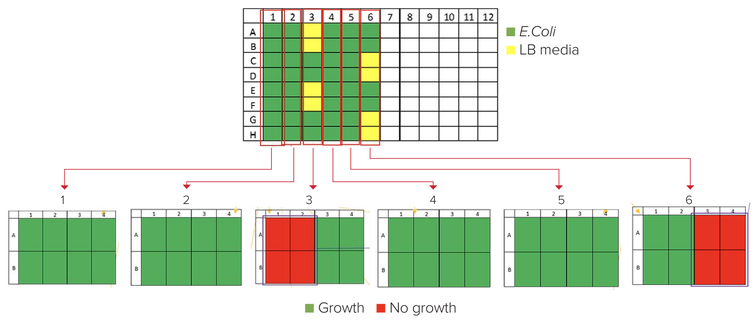


Figure 2. Control regions: 8 (red). These regions were streaked with an LB media only sample using a pin that had previously streaked an inoculated sample and underwent sanitization cycle.

Results

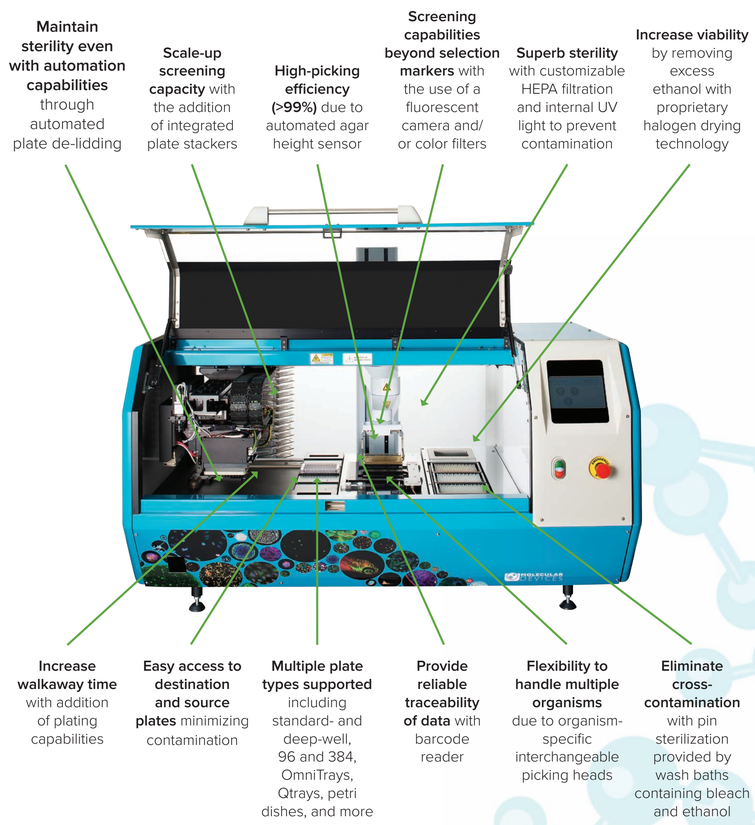
For each QPix instrument, eight control regions were inoculated for a total of 80 regions, and no cross-contamination was detected (Table 4).

Instrument	# of Control Regions Inoculated	# of Control Regions with Outgrowth	Cross-Contamination %
QPIX-LH-AWES #1	8	0	0
QPIX-LH-AWES #2	8	0	0
QPIX-LH-AWES #3	8	0	0
QPIX-LH-AWES #4	8	0	0
QPIX-LH-AWES #5	8	0	0
QPIX-SELECTHT-LH-AWES #1	8	0	0
QPIX-SELECTHT-LH-AWES #2	8	0	0
QPIX-SELECTHT-LH-AWES #3	8	0	0
QPIX-SELECTHT-LH-AWES #4	8	0	0
QPIX-SELECTHT-LH-AWES #5	8	0	0
Total	**80**	**0**	**0%**

Table 4.

Summary

Advanced algorithms facilitate rapid identification and high-throughput picking of microbial colonies with the desired phenotype. Optimized organism-specific pins ensure an efficient and accurate transfer, achieving over 98% efficiency. The QPix modular system's versatility supports a rapid scaling up of microbiology research, effectively eliminating the risk of cross-contamination.



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