Real-time detection of CFU growth with the ScanStation® smart incubator expedites the environmental monitoring process.

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In a time when an increasing number of laboratories are turning to rapid methods for their analysis, the responsibility is often on the end-user to validate an alternative method (eg. PCR, mass spectrometry) against the traditional, manually counted sample-on-agar cultures. INTERSCIENCE developed the ScanStation® (ISS) in the aim of providing advanced results, while still utilizing the traditional method (approved by the European Pharmacopoeia and the FDA).

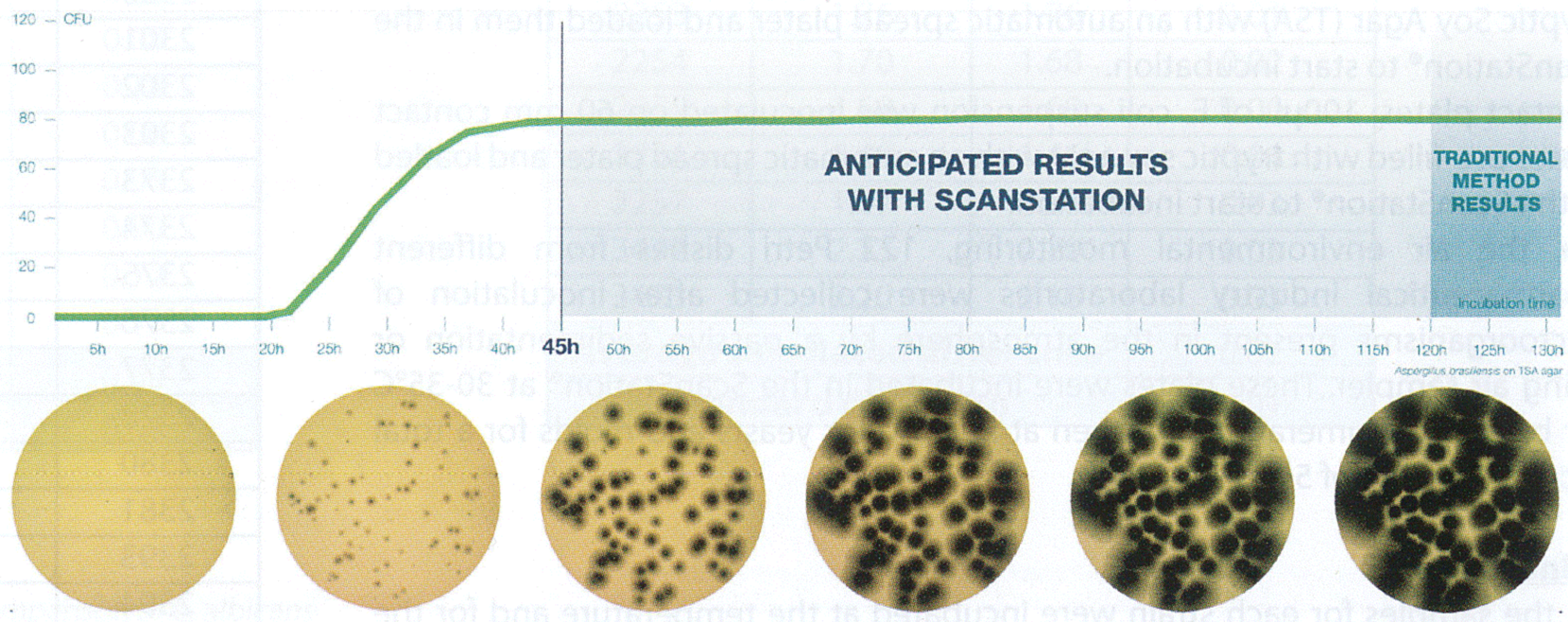

Figure 0: Example of report for A. brasiliensis on TCA medium by the ScanStation®. Above - growth curve established by CFU count in real time. Below - six pictures taken at different intervals of the 130-hour incubation period.

This system is an innovation based on the technology of end-point colony counters that have been used in labs for over forty years1,2. By placing such a device inside of the incubation chamber, and automating the reading process, the culture growth monitoring in real time is now possible.
The ScanStation® collects images of each sample every 30 or 60 minutes during the whole duration of the incubation period. Those images, once analyzed by the monitoring software, are used to display a curve of the bacterial growth kinetics, available to the user in real-time. An example of this reporting is presented in Figure 0.

Real-time monitoring of bacterial and fungal growth affords a number of advantages beyond the advanced detection of colonies: switching from end-point to real time counting also increases the accuracy of the enumeration. Firstly, the use of a "T0" image captured at the beginning of the incubation and effectively used as a "tare" for all subsequent counts reduces the number of false positives in case of debris/particles in the matrix, or writings on the plate, which are often falsely counted as CFUs during end-point enumeration (manual or automatic). Secondly, the detection and marking of colonies as soon as they appear on the Petri dish means that subsequent overgrowth or confluent growth are less likely to lead to false negatives.
The aim of this study is three-fold. First, we wish to assess the performance of the ISS by comparing the real manual with the automatic enumeration of pure cultures of the five organisms commonly tested for environmental monitoring in the pharmaceutical sector (*Staphylococcus aureus, Escherichia coli, Pseudomonas aeruginosa, Candida albicans and Aspergillus brasiliensis*). Here it is important to note that, in order to avoid any inter- and intra-operator variation, which is very common with end-point counting3,4, we are comparing the automatic ISS counts to a manual count based not on the traditional reading of the plates at the end of the incubation, but rather on the timelapse created by all the images collected during incubation. In a similar fashion as with replay footage in sports, the operator

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