

Validation of NCTC reference strains recommended by EUCAST as controls in the UK SMI Testing Procedures

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INTRODUCTION

Public Health England (PHE) has responsibility for operating the National Collection of Type Cultures (NCTC) and for developing the UK Standards for Microbiological Investigations (SMIs). NCTC was established in 1920 and holds more than 6000 historical and new strains of bacteria that have been implicated in human infection.

An important role of NCTC is providing authenticated reference bacteria for use in the clinical diagnostic laboratory as control strains. ISO 15189:2012 states that independent third party control materials should be considered where ever possible, in addition to those provided as part of a diagnostic kit or by the manufacturers of diagnostic instruments. NCTC provides reference bacteria as stipulated in EUCAST guidelines for control of antimicrobial susceptibility testing as well as bacteria listed in the UK Standards for Microbiology Investigations (UK SMI) testing procedures (TPs) as positive and negative controls.

PHE develops the TPs to help ensure equivalence of investigation strategies for microbial infections across the UK. The TPs describe commonly undertaken tests and include recommended control strains from NCTC. The use of controls provides essential information about the validity of the test results

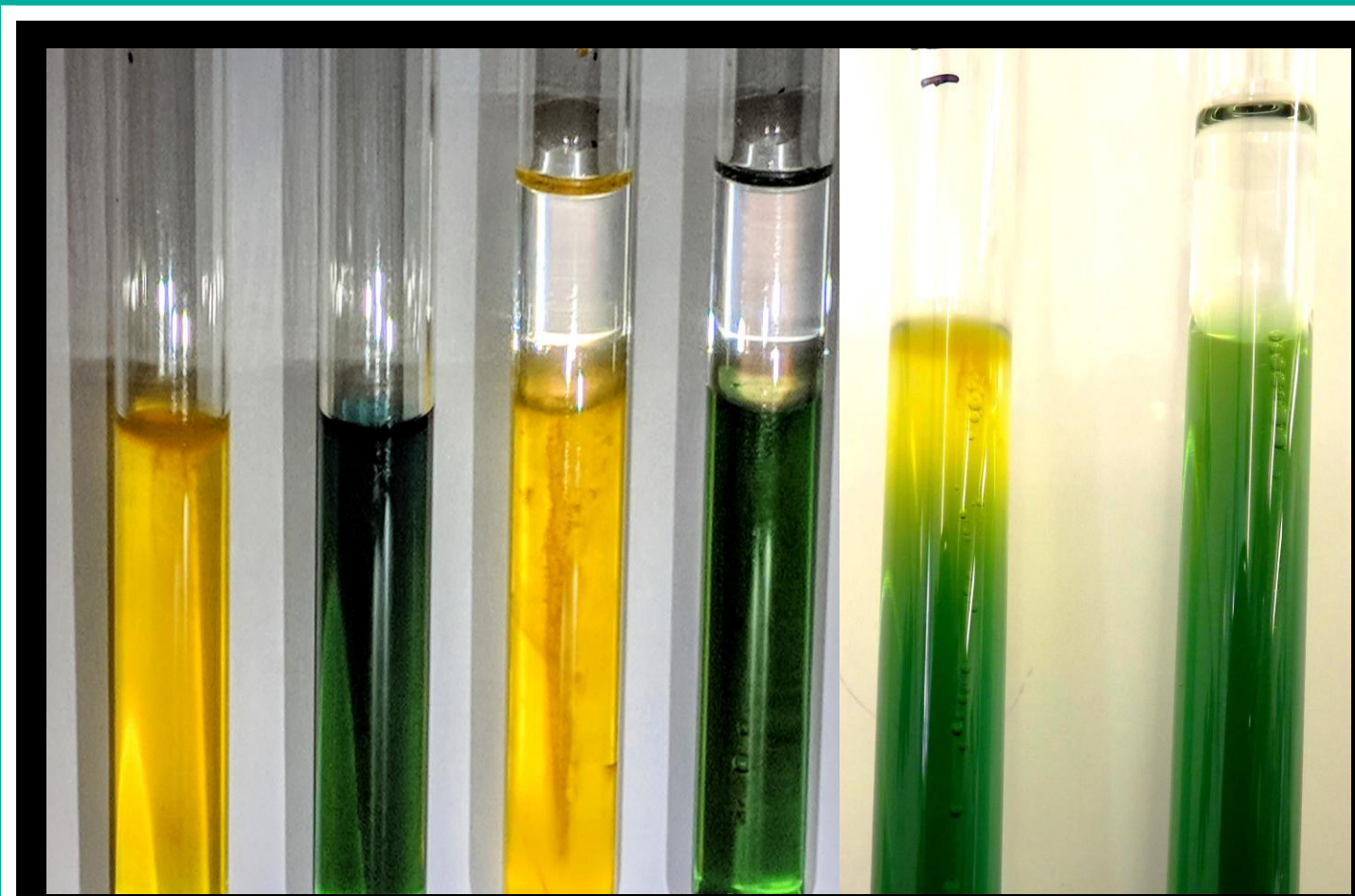

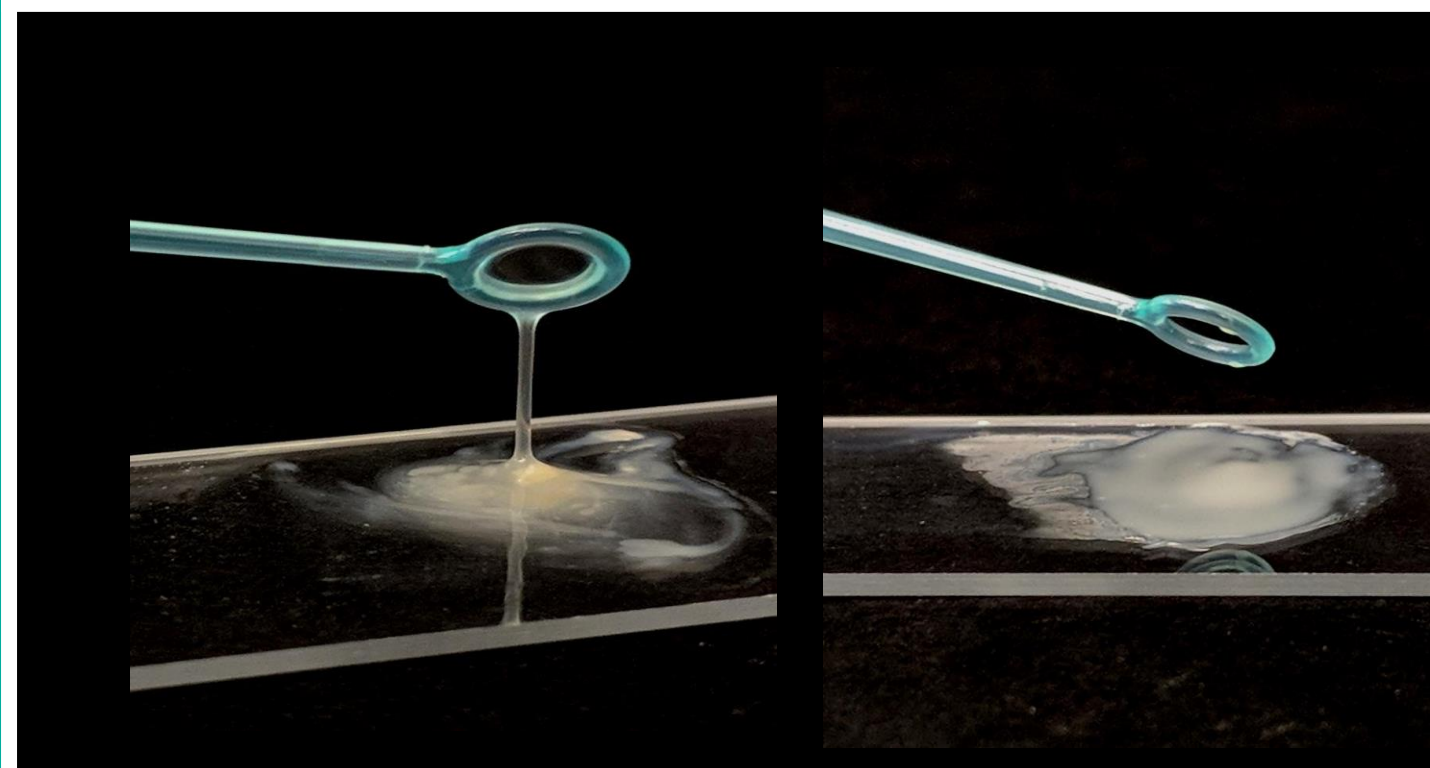
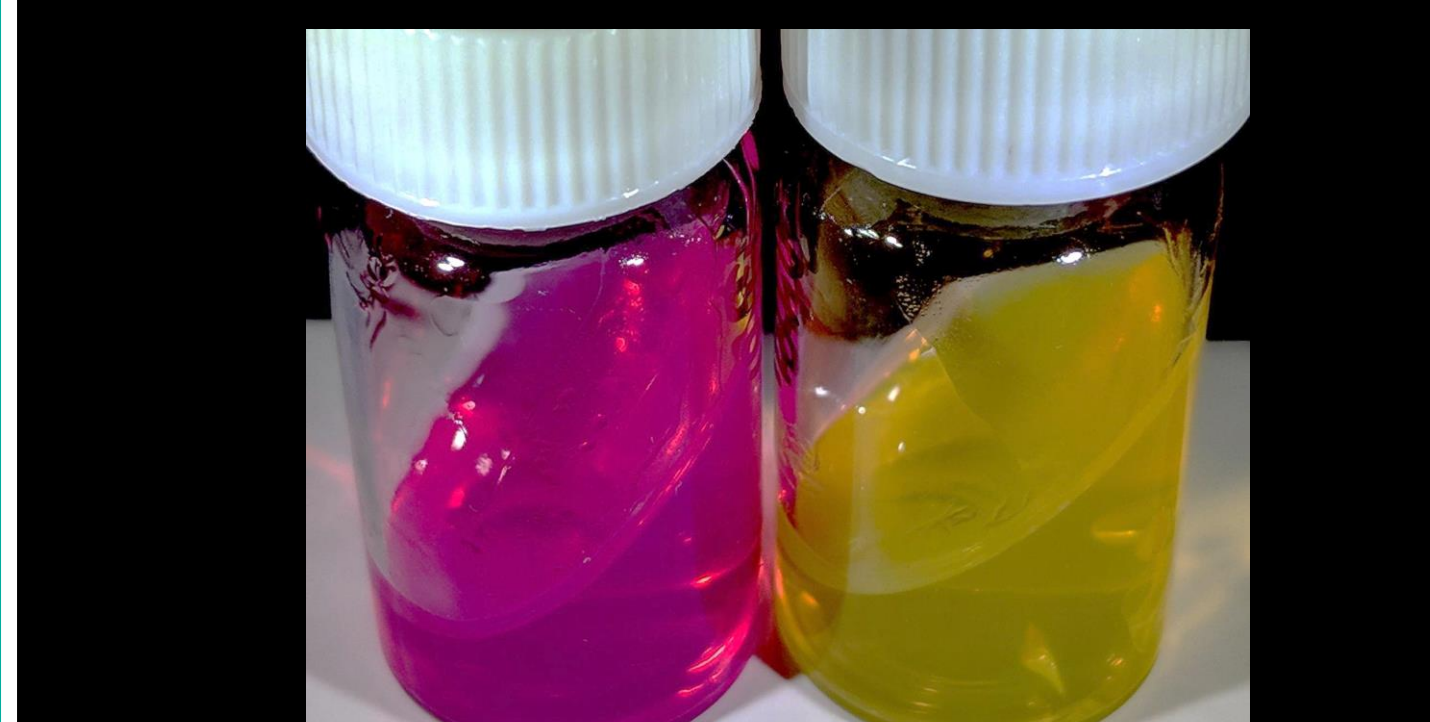
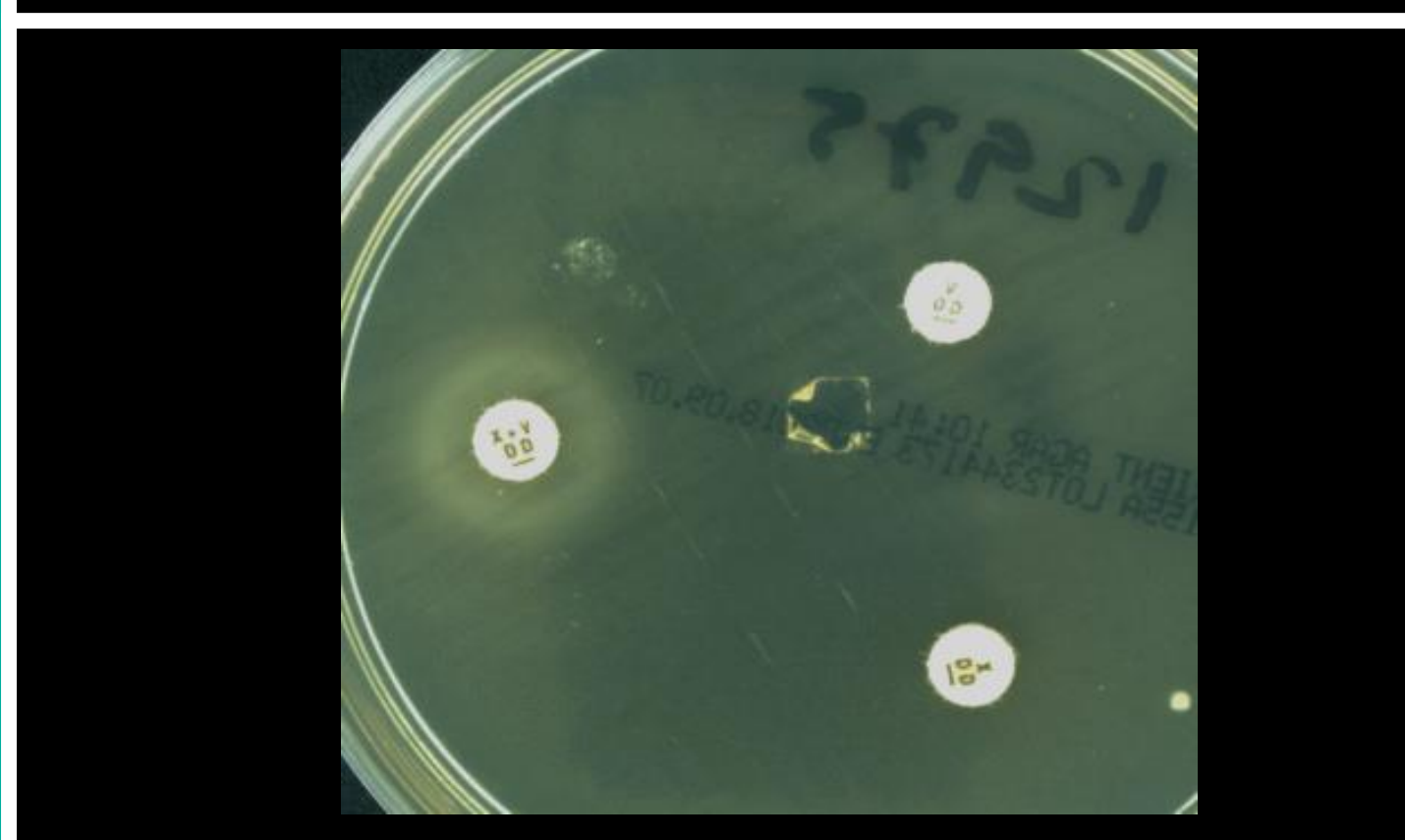
It is important that laboratories use control strains from recognised sources, such as NCTC, to ensure that the strains are fully characterised and authentic this also helps standardise the quality of testing across the country. Laboratories frequently prepare in house reference stocks of the control strains for daily use. Those reference stocks must be managed carefully to ensure the strains are not sub-cultured (passaged) too frequently because this may lead to genetic variation and/or contamination.

At present, the set of controls for both UK SMI and EUCAST are not concordant, meaning that diagnostic laboratories may have to purchase two different strains of the same species to use in separate tests. The aim of this project is to validate the bacterial strains stipulated in the EUCAST guidelines as alternatives for the equivalent species listed in the UK SMI testing procedures.

In total four strains covering 11 TPs were validated following the procedures stated. The guide below shows the reactions to be expected with NCTC cultures for UK SMI test procedures validated by NCTC.

SMI TEST PROCEDURES USING NCTC STRAINS AS CONTROLS

	<p>TP 8 Catalase Test</p> <p>Positive controls: NCTC 6571 (Left) NCTC 12973 (EUCAST) <i>Staphylococcus aureus</i></p> <p>Negative control: NCTC 10712 (Right) <i>Streptococcus mitis</i></p>
	<p>TP 10 Coagulase Test</p> <p>Positive controls: NCTC 6571 (Left) NCTC 12973 (EUCAST) <i>Staphylococcus aureus</i></p> <p>Negative control: NCTC 11042 <i>Staphylococcus haemolyticus</i></p>
	<p>TP 12 Deoxyribonuclease Test</p> <p>Positive controls: NCTC 6571 (Left) NCTC 12973 (EUCAST) <i>Staphylococcus aureus</i></p> <p>Negative control: NCTC 11042 (Right) <i>Staphylococcus haemolyticus</i></p>
	<p>TP 19 Indole Test</p> <p>Positive control: NCTC 10418 (Left) NCTC 12241 (EUCAST) <i>Escherichia coli</i></p> <p>Negative control: NCTC 10975 (Right) <i>Proteus mirabilis</i></p>
	<p>TP 24 ONPG Test – Enterobacteriaceae</p> <p>Positive control: NCTC 10418 (Left) NCTC 12241 (EUCAST) <i>Escherichia coli</i></p> <p>Negative control: NCTC 10975 (Right) <i>Proteus mirabilis</i></p>
	<p>TP 26 Oxidase Test</p> <p>Positive controls: NCTC 10662 (Left) NCTC 12903 (EUCAST) <i>Pseudomonas aeruginosa</i></p> <p>Negative controls: NCTC 10418 (Right) NCTC 12241 (EUCAST) <i>Escherichia coli</i></p>

	<p>TP 27 Gram Negative Rods O&F Test</p> <p>Positive for fermentation: NCTC 10418 (Tubes 1 & 3) NCTC 12241 (EUCAST) <i>Escherichia coli</i></p> <p>Positive for oxidation: NCTC 10662 (Tubes 5 & 6) NCTC 12903 (EUCAST) <i>Pseudomonas aeruginosa</i></p> <p>Negative control: NCTC 5866 (Tubes 2 & 4) <i>Acinetobacter lwoffii</i></p>
	<p>TP 29 Porphyrin Synthesis</p> <p>Positive control: NCTC 10665 (Left) <i>Haemophilus parainfluenzae</i></p> <p>Negative control: NCTC 11931 (Right) NCTC 12975 (EUCAST) <i>Haemophilus influenzae</i></p>
	<p>TP 30 Potassium Hydroxide Test</p> <p>Positive controls: NCTC 10418 (Left) NCTC 12241 (EUCAST) <i>Escherichia coli</i></p> <p>Negative controls: NCTC 6571 (Right) NCTC 12973 (EUCAST) <i>Staphylococcus aureus</i></p>
	<p>TP 36 Urease Test</p> <p>Positive control: NCTC 10975 (Left) <i>Proteus mirabilis</i></p> <p>Negative controls: NCTC 10418 (Right) NCTC 12241 (EUCAST) <i>Escherichia coli</i></p>
	<p>TP 38 X & V Factor Test</p> <p>X & V Factor: NCTC 11931 NCTC 12975 (EUCAST) <i>Haemophilus influenzae</i></p> <p>V Factor only: NCTC 10665 <i>Haemophilus parainfluenzae</i></p> <p>X Factor only: NCTC 8540 <i>Haemophilus haemoglobinophilus</i></p>

Other Testing Procedures for bacteriology that stipulate the use of control strains from the National Collection of Type Cultures are;

- TP 2 Aesculin hydrolysis
- TP 5 Bile Solubility
- TP 21 Motility Test
- TP 25 Optochin Test
- TP 34 Thermo-nuclease Test

FOR MORE INFORMATION

Please visit the Culture Collections Website: <http://www.phe-culturecollections.org.uk/> for more information.

For further information or to download any of the Standards for Microbiological Investigations go to:

<https://www.gov.uk/government/collections/standards-for-microbiology-investigations-smi>

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