# P-19: Evaluation of Flocked Nylon Swabs (Copan ESwab) vs Rayon Fibre Swabs (Copan Venturi Transystem) for Bacterial Culture

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## ABSTRACT

**Objective:** The recovery of potential pathogens from swabs used to collect clinical specimens is of critical importance in the laboratory diagnosis of infections. It is estimated that only 10-15% of the organisms collected on traditional swabs, composed of spun fibres, can be recovered from cultures. Nylon flocked swabs, composed of open nylon fibres, potentially release a much higher percentage of trapped organisms. The purpose of this study was to evaluate the performance of Nylon flocked swabs compared to standard spun Rayon swabs for recovery of bacteria from mocked specimens.
**Methods:** Nylon flocked ESwabs in liquid Amies transport medium were compared to spun Rayon swabs in Amies agar gel transport medium. Serial dilutions of *Neisseria gonorrhoeae, Neisseria meningitidis, Haemophilus influenzae, Streptococcus peumoniae, Streptococcus pyogenes*, *Peptostreptococcus anaerobius, Fusobacterium nucleatum,* and *Bacterioides fragilis* were prepared in 0.85% saline. 100ul aliquots of the suspensions were transferred to microtiter plates, and swabs were inoculated by dipping them in the wells of the microtiter plates. Each inoculated swab was placed into transport medium and either cultured immediately or after storage for 24 or 48h at room temperature or 4C. All testing was done in triplicate.
**Results:** The recovery of bacterial pathogens from nylon flocked swabs was generally equivalent or superior to the recovery from Racron swabs at room temperature and 4C at both 24 and 48h. Nylon flocked swabs were superior for recovery of two pathogens, results were approximately equivalent for four pathogens, and Rayon swabs were possibly superior for recovery of two organisms.
**Conclusions:** Nylon flocked ESwabs in liquid Amies transport medium are at least equivalent to traditional Rayon swabs in Amies agar gel transport medium for recovery of bacteria commonly found in clinical specimens. The liquid transport medium used with the nylon flocked swabs provides a suspension of sample material that offers potential advantages for inoculation of multiple media and slides.

## INTRODUCTION

Nylon flocked swabs have the potential to improve culture results due to release of a much higher percentage of collected specimens than traditional spun fibre swabs. The purpose of this study was to evaluate nylon flocked swabs compared to traditional swabs for recovery of bacterial pathogens from suspensions. The distribution of sample on nylon flocked vs spun fibre swabs is shown below along with an actual example of the flocked swab.

## METHODS

**Swabs and Transport Media:**
Nylon flocked swabs were Copan ESwabs in liquid Amies transport medium.
Rayon swabs were Copan Venturi Transystem swabs in agar gel transport medium.

**Organisms:**
*Streptococcus pneumoniae* (ATCC 49619)
*Streptococcus pyogenes* (19615)
*Hemophilus influenzae* (10211)
*Neisseria meningitides* (13090)
*Neisseria gonorrhoeae* (ATCC 43069)
*Peptostreptococcus anaerobius* (27337)
*Fusobacterium nucleatum* (25586)
*Bacteroides fragilis* (25285)

**Bacterial Suspensions:**
Isolated colonies were picked after 18-24h incubation under conditions appropriate for each organism, and 0.5 McFarland standardized suspensions were prepared in normal saline. Serial 10-fold dilutions were prepared for each suspension, and the diluted suspensions were transferred to sterile, round bottom, microtiter plates.

**Viable Counts:**
Swabs were inoculated with each organism by dipping in the microtiter wells and then immediately placed into the transport system for each type of swab. The inoculated swabs were plated on appropriate media immediately (Time 0) or after holding in the transport systems for 24 or 48h at room temperature or 4ºC. All testing was done in triplicate. The number of colonies on each of the three plates for each organism and condition was counted, and the viable count was determined using the dilution that provided a count in the range of 275-450cfu as much as possible. The suspensions in the microtiter plates were cultured after completion of the sampling to test for purity, and all were pure cultures of the intended organism.

**Data Presentation:**
The viable counts at time 0 are presented for each organism and each type of swab, and the percentage of the time 0 counts recoverable from the nylon and Rayon swabs under each condition is presented for each organism.

## RESULTS

| | | | Percent Recovery | | | |
|---|---|---|---|---|---|---|
| | | | 24h | | 48h | |
| Organism | Swab | Time 0 (cfu) | RT | 4C | RT | 4C |
| *S. pneumo* | Nylon | $9.0x10^4$ | 5 | 8 | 0 | 0 |
| " | Rayon | $2.7x10^5$ | 22 | 74 | 3 | 52 |
| *S. pyogen* | Nylon | $3.2x10^5$ | 100 | 100 | 100 | 100 |
| " | Rayon | $3.6x10^5$ | 28 | 64 | 30 | 36 |
| *H. influ* | Nylon | $8.0x10^5$ | 55 | 80 | 4 | 59 |
| " | Rayon | $3.5x10^5$ | 19 | 16 | 4 | 43 |
| *N. mening* | Nylon | $5.4x10^5$ | 26 | 6 | 6 | <1 |
| " | Rayon | $3.3x10^5$ | 12 | 12 | 9 | 2 |
| *N. gono* | Nylon | $2.0x10^5$ | >100 | 100 | >100 | >100 |
| " | Rayon | $5.8x10^4$ | >100 | 69 | >100 | >100 |
| *P. anaerob* | Nylon | $2.0x10^5$ | 1 | 65 | 4 | 40 |
| " | Rayon | $8.0x10^2$ | 0 | 62 | 0 | 25 |
| *F. nucleat* | Nylon | $9.0x10^2$ | 0 | 56 | 0 | 0 |
| " | Rayon | $5.0x10^3$ | 80 | >100 | 0 | >100 |
| *B. fragilis* | Nylon | $8.8x10^5$ | 82 | 58 | 94 | 61 |
| " | Rayon | $3.6x10^5$ | >100 | 100 | 86 | 58 |

## DISCUSSION AND CONCLUSIONS

- Nylon flocked swabs allowed greater recovery immediately after sampling of the bacterial suspensions for five of the eight organisms tested; Rayon swabs gave better initial recovery of two organisms, and recovery of one organism was essentially the same for the two types of swabs.
- After 24h at room temperature, the nylon swabs provided superior recovery of three organisms, the Rayon swabs were superior for three organisms, and the performance was approximately equivalent for two organisms.
- After 48h at room temperature, the recovery from the nylon swabs was superior for two organisms and equivalent to that from Rayon swabs for six organisms; Rayon swabs did not give superior performance for any organisms.
- After 24h at 4C, nylon swabs were superior for recovery of three organisms, Rayon swabs were superior for four organisms, and the two types of swabs were equivalent for one organism;
- After 48h at 4C, the nylon swabs gave superior recovery of four organisms, Rayon swabs were superior for two organisms, and recovery was equivalent for two organisms.
- Overall, nylon swabs were superior for recovery of *S. pyogenes* and *H. influenzae*, but Rayon swabs were superior for recovery of *S. pneumoniae* and *Fusobacterium nucleatum*, and the two types of swabs were essentially equivalent for the other four organisms tested.
- In conclusion these results suggest that nylon flocked swabs in liquid transport medium are equivalent to Rayon swabs in agar gel transport medium for bacterial culture. Liquid transport medium may offer advantages for inoculation of multiple media, preparation of smears, PCR, etc.