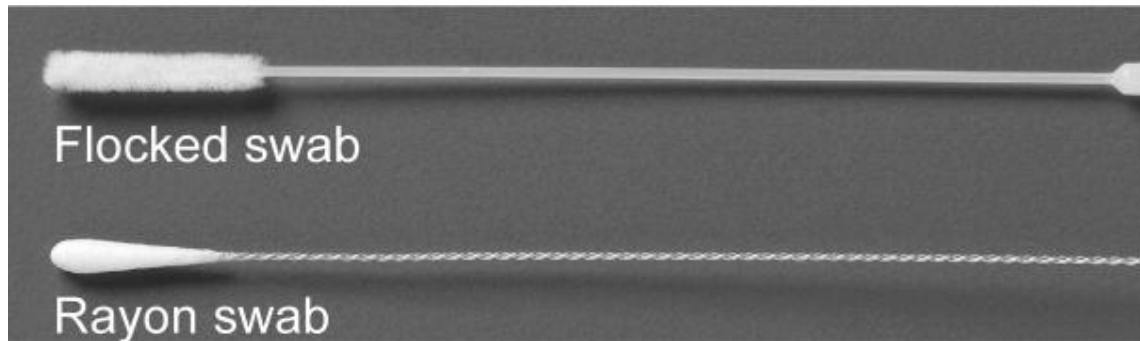




# Swabs

## Study:

Daley et al., 2006, Comparison of Flocked and Rayon Swabs for Collection of Respiratory Epithelial Cells from Uninfected Volunteers and Symptomatic Patients, J Clin Microbiol.



**Ideal swab:**  
collects many cells and allows for their release into media

The flocked swabs utilize an extensive spray-on nylon flocked fiber technology. The perpendicular nylon fibers act like a soft brush to allow the improved collection and release of patient samples

- Significantly more epithelial cells were collected by flocked swabs than by rayon swabs, providing better clinical specimens for diagnosis (2-3 fold increase in cell yield)
- **IMPORTANT:** additionally viral transport medium (aqueous storage buffers that simultaneously stabilize nucleic acids, while ensuring rapid cell lysis), the duration and temperature of transport, and extraction method affects test results

## Studies:

Druce et al., 2012, Evaluation of Swabs, Transport Media, and Specimen Transport Conditions for Optimal Detection of Viruses by PCR, J Clin Microbiol.

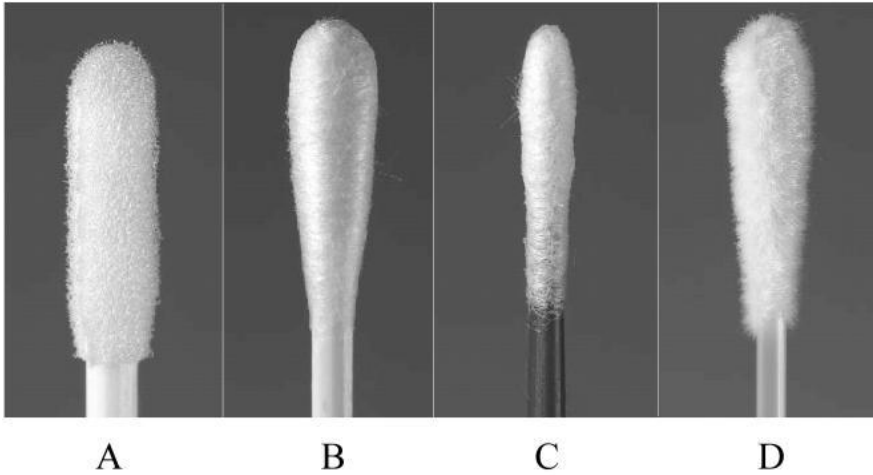
Brownlow et al., 2012, A Comparison of DNA Collection and Retrieval from Two Swab Types (Cotton and Nylon Flocked Swab) when Processed Using Three QIAGEN Extraction Methods, Forensic Sciences



# Swabs

## Study:

Chernesky et al., 2006, Use of Flocked Swabs and a Universal Transport Medium To Enhance Molecular Detection of *Chlamydia trachomatis* and *Neisseria gonorrhoeae*, J Clin Microbiol



Swabs from NAAT kits for *C. trachomatis* and *N. gonorrhoeae*: Becton Dickinson ProbeTec ET (A), Roche Amplicor (B), GenProbe Aptima (C), and Copan flocculated swab (D).

The flocculated swabs absorb and release both cellular and cell-free material more effectively than comparator swabs

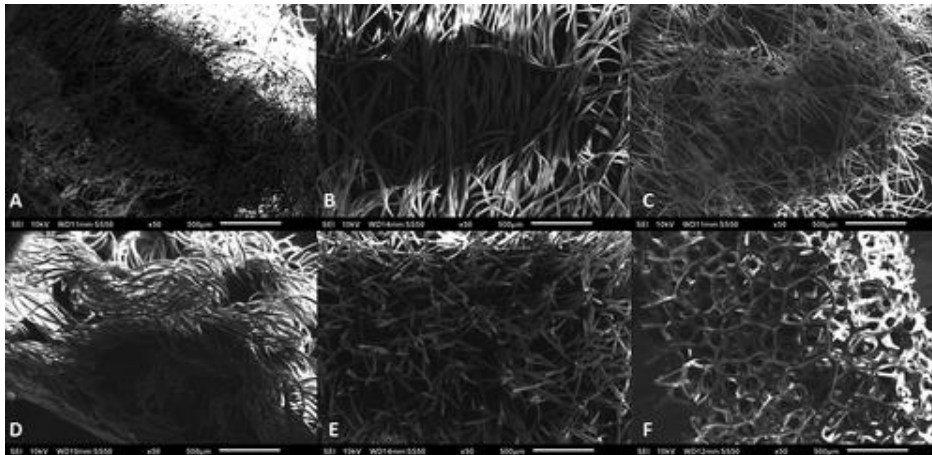
- the flocking process, inside a flocking chamber, attaches short nylon fiber strands to the glued end of molded plastic applicators of a desired shape. The strands are electrostatically charged and are propelled at high velocity, so that their polar ends strike the adhesive to bond them at right angles to the surface, resulting in a hydrophilic layer of nylon pile with efficient collection and release of particulate matter. The flocculated swabs enhanced the analytical sensitivity of each of the assays
- fiber materials can be rendered hydrophilic by applying binders carrying hydrophilic groups (-OH or -COOH groups) onto them or adding water-insoluble cellulose ethers (> 50% by weight). Addition of such functional groups results in higher water absorption and retention of large amounts of bound water. Absorption capacity of a swab plays an important role to extract microorganisms from the collection site (Harry et al., Comparison of physical characteristics and collection and elution performance of clinical swabs, African Journal of Microbiology Research)



# Swabs

## Study:

Bruijns et al., 2018, The Extraction and Recovery Efficiency of Pure DNA for Different Types of Swabs, J Forensic Sci



Scanning electron microscope images of a selection of the tested swab materials. (A) Cotton swab (Eurotubo, #1), (B) Rayon swab (Transwab, #3), (C) Polyester swab (Absorbond, #7), (D) Polyester swab (Honeycomb, #9), (E) Nylon Flocked swab (4N6FLQSwab Crime Scene, #13) and (F) Foam swab (Foam Tipped Applicator, #14).

The nylon flocked swabs performs the best

- the performance of a swab depends not only on swab tip material, but also on the volume and the porosity of the sorbent material, as well as on how tightly the material is wound onto the swab shaft
- **IMPORTANT:** the chemical interaction of DNA molecules with the swab surface functional groups might lower the maximum amount of DNA yield after extraction



# Swabs

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## Clinical specimen guidelines for COVID-19:

<https://www.cdc.gov/coronavirus/2019-nCoV/lab/guidelines-clinical-specimens.html>

Use only synthetic fiber swabs with plastic shafts. **Do not use calcium alginate swabs or swabs with wooden shafts, as they may contain substances that inactivate some viruses and inhibit PCR testing.** Place swabs immediately into sterile tubes containing 2-3 ml of viral transport media. In general CDC is now recommending collecting only the nasopharyngeal swab. If both swabs are used, nasopharyngeal and oropharyngeal specimens should be combined at collection into a single vial. Oropharyngeal swabs remain an acceptable specimen type.

**Nasopharyngeal swab:** Insert a swab into nostril parallel to the palate. Swab should reach depth equal to distance from nostrils to outer opening of the ear. Leave swab in place for several seconds to absorb secretions. Slowly remove swab while rotating it.

**Oropharyngeal swab (e.g., throat swab):** Swab the posterior pharynx, avoiding the tongue.

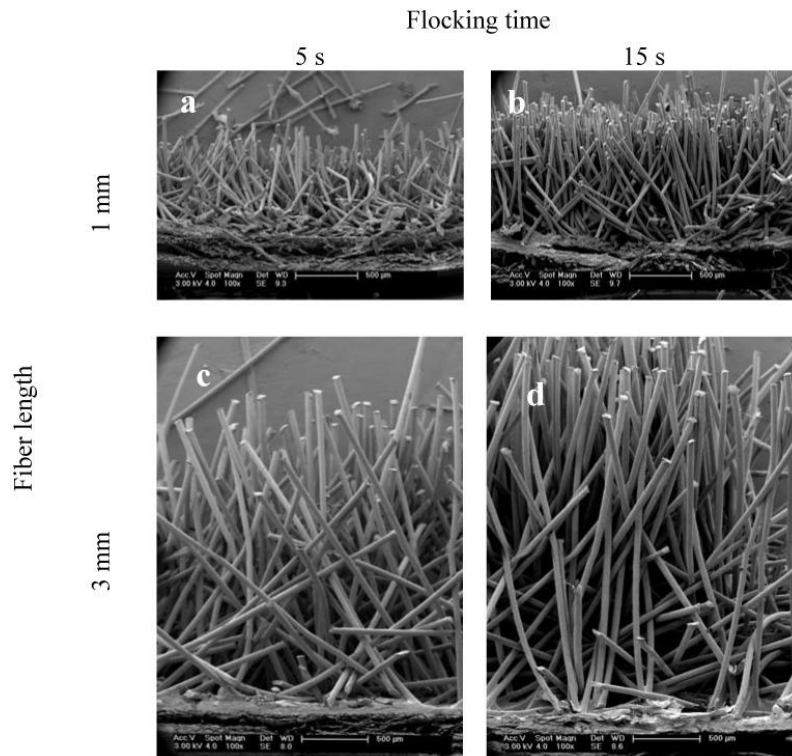


# Flocking for tissue engineering

## Studies:

Walther et al., 2012, Novel Textile Scaffolds Generated by Flock Technology for Tissue Engineering of Bone and Cartilage, Materials

Gossia et al., 2016, Electrostatic flocking of chitosan fibres leads to highly porous, elastic and fully biodegradable anisotropic scaffolds. Acta Biomater



→ Cells easily attached to the flock scaffolds and spread on as well as between the fibers. Due to the highly interconnected pores with adequate pore size cells can easily distribute over the scaffolds. Otherwise the distance between the fibers is also small enough for the cells to spread and build bridges between the fibers

→ Scaffolds produced by flock technology offer an oriented and open pore structure with a high surface-to-volume ratio that allows for easy seeding and migration of cells into the constructs

→ No real difference in