

BRIEF COMMUNICATION

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Construction of a Roller Device for the Collection of Hair and Fiber Evidence

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ABSTRACT: The discovery of hair and fiber evidence can be of critical importance in the investigation of crimes, particularly violent crimes. A procedure is described for the construction and assembly of a roller device that utilizes readily available components and single-sided adhesive tape. The advantages over previously described roller devices include decreases in both the potential for contamination and the time required for construction of the device, as well as the ability to disinfect all of the roller components.

KEYWORDS: forensic science, criminalistics, evidence collection, hairs, fibers, tape lift

The use of adhesive tape for the collection of hair and fiber evidence is a well established practice in many forensic laboratories. Flinn (1) described a device that uses a polyvinyl chloride (PVC) sleeve and adhesive beds made from double-sided tape. Fong (2) described a device that uses a paint roller fitted with double-sided tape. This paper describes the construction of a device that uses properties of each but offers advantages over either design. First, this design uses readily available components and therefore requires very little time for construction. Second, the device can be disassembled and its components disinfected. This is of great importance when contamination by biological agents is a concern, as is often the case when examining evidence from violent crimes.

Materials and Methods

Construction of the Roller Sleeve

Construction of the roller sleeve requires a length of 1¹/₂ in. schedule 40 PVC pipe, a hacksaw or hand drill fitted with a cutting blade and 220 grit sandpaper. The PVC pipe was cut into 4 in. lengths with the hacksaw or drill. A slot approximately 1/8 in. wide was cut lengthwise into each length of pipe (Fig. 1). All rough edges were smoothed with 220 grit sandpaper.

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Assembly of the Roller Device

The remaining components of the roller device are commercially available. They include a roll of 4 in. wide clear packaging tape (Consolidated Plastics Co. Inc., Twinsburg, OH, catalog #87644KM) and a paint roller frame designed for use with a 3 in. or 4 in. paint roller. The free end of the packaging tape is inserted through the slot in the roller sleeve and adhered to the inside of the sleeve. The roller sleeve is then rotated so that the adhesive side of the tape faces out and the non-adhesive side faces the sleeve. Rotation is continued until the tape overlaps itself by approximately 1/4 in. The tape is then cut from the roll and the sleeve slid onto the paint roller frame. This comprises the finished roller device (Fig. 2).

Use of the Roller Device

The assembled device is rolled over the item of evidence, making sure to cover all areas. When the tape begins to lose its tack it is cut through the slot in the roller sleeve with a new razor blade. If a hair or fiber lies across the slot it is advisable to move it to one side with a pair of forceps to avoid damaging it. Once cut, the tape is free from the roller device and can be stored adhesive side down on a clear plastic sheet. Care must be taken to avoid trapping bubbles under the tape.

Depending on the situation, we use this method to replace or supplement manual collection of trace evidence using forceps. As a supplement, it enables the collection of overlooked and microscopic trace evidence (3).

The choice of tape is of great importance and should be evaluated carefully. Tapes with a strong adhesive will remove too many background fibers from the item being examined while tapes with a weak adhesive may not collect all foreign trace evidence. Our laboratory evaluated several tapes before making a decision and applying this method to casework.

The adhesive tapings are examined while still secured to the plastic sheet. The location of suspect hairs or fibers can be recorded on the sheet with a felt tipped marker. Suspect hairs and fibers are removed from the tape by cutting its surface with a new razor blade and pulling the hair or fiber out with forceps. It may be necessary to moisten the tip of the forceps with xylene to loosen the tape adhesive. The suspect hair or fiber can then be transferred to a microscope slide and examined in more detail.

The use of this roller device has proven more efficient than previous methods and substantially reduces potential damage to hair.

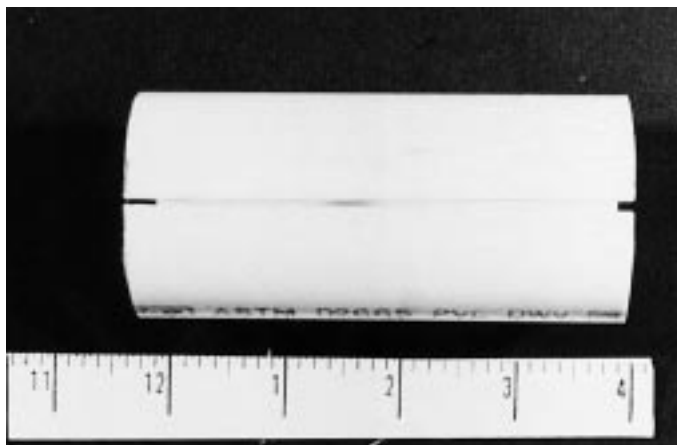


FIG. 1—Roller sleeve.

This is of great importance not only for an examination of the hair's physical characteristics but also for mitochondrial or nuclear DNA analysis of the hair root which often follows.

As Flinn (1) noted, every effort must be made to avoid contamination of any of the roller's components. Even though the potential for contamination has been reduced by the use of a tape with one adhesive side, contamination of the edges of the tape roll is still possible. For that reason we store our tape rolls in plastic bags when not in use. Our roller frames and sleeves are disinfected with a 10% bleach solution followed by 70% ethanol after each use. Once disinfected, the frames and sleeves are stored in plastic bags until used again.

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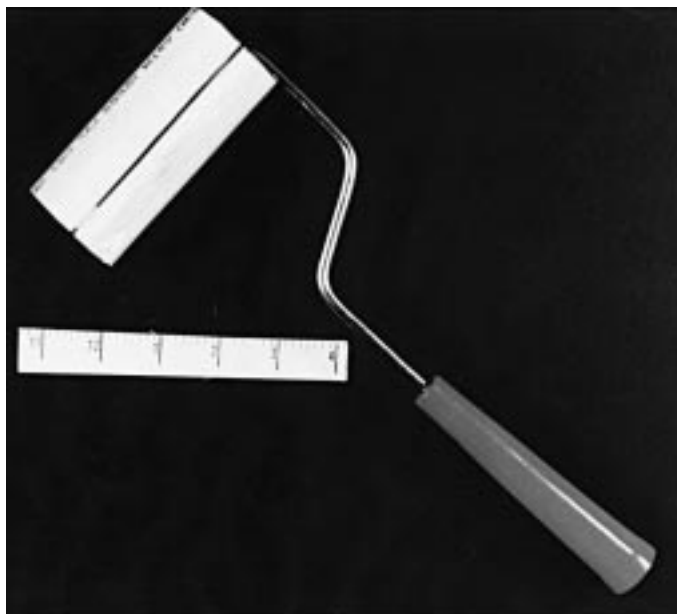


FIG. 2—Assembled roller device.

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