

TECHNICAL NOTE

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A Method for Articulating and Displaying the Human Spine

ABSTRACT: An inexpensive and effective method for articulating a dry human spine is described. By constructing a Styrofoam™ spine tray, analysts can now accurately position and align each vertebra in correct anatomical order, allow for gaps because of missing vertebrae, and lay out the spine for documentation and photography. The spine tray provides analysts with a quick, easy, and professional quality method for aligning and orienting the human spine in the field and laboratory.

KEYWORDS: forensic science, forensic anthropology, human spine, physical anthropology, human skeleton, vertebra

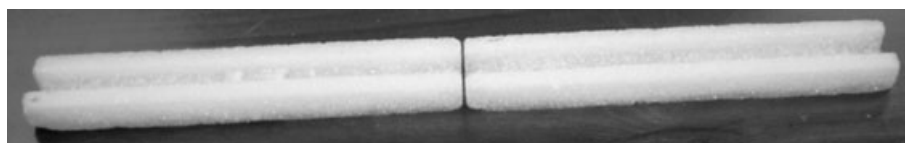


FIG. 1—Styrofoam™ tray(s) for articulating and aligning the bones of the spine.

One of the first tasks for a scientist analyzing a human skeleton is to lay out the bones in anatomical order such that each is in its proper sequence and alignment. To position the skull in anatomical order for photographing and prevent it from rolling during examination, for example, analysts frequently place it on a bean bag, cork “donut,” wooden triangle, or three-pronged stand that can be made at home or purchased from anatomical supply stores. While the rest of the skeleton can be laid out approximately in anatomical order on any flat surface, the unusual shapes of vertebrae present analysts with difficulty, as most have a rounded centrum and projecting spinous and transverse processes. These unusual shapes not only make it difficult to articulate vertebrae into a uniform column but also make it difficult to position the spine in proper alignment on a flat surface, such as a table, for photography. As a result, spines are often displayed in photographs, reports, and exhibitions at an unnatural angle of about 45° from the midline or less commonly, held together with string, rubber bands, or wax, or aligned with towels or rolled paper (1). The final photograph, therefore, results in a supine skeleton that may be less than visually pleasing, laid out in approximate anatomical order, with the exception of the spine. To correct this unnatural and inaccurate rendering of the spine, the author presents a new, easily constructed, accurate, and inexpensive method for articulating vertebrae.

Materials and Methods

Using a sharp knife, razorblade, or X-Acto blade, cut a rectangular piece of Styrofoam™ (Dow Chemical Company, Midland, MI) measuring 60 or 70 cm long, 6 cm wide, and 5 cm high (Fig. 1). Cut and remove a 3 × 2.5 cm (deep and wide) trough along the length of the Styrofoam™ for the spinous processes.

Discussion

Forensic anthropologists at the Joint POW/MIA Accounting Command (JPAC)—Central Identification Laboratory have been using this spine tray for several years and have had great success with it as a tool to align each vertebra and support the spine during analysis and photography. The genesis for developing this tray (Figs. 2 and 3), was the author’s own experience articulating and aligning fragmented and deteriorated vertebrae of US service members from past wars. Acidic soils, fluctuating environmental variables, and the effects of war (e.g., aircraft crashes) combine to deteriorate, fragment, and alter skeletal remains, making articulation or reconstruction difficult. A Styrofoam™ tray allows analysts to articulate all 24 or more of the vertebrae with the sacrum, resulting in an anatomically correct spine without unnatural twists or lateral rotation. Additionally, missing vertebrae can be represented by gaps in the column that are quickly and easily visible to the viewer, thus providing an accurate record of precisely which vertebrae were present and which were absent. Vertebrae can also be displayed with their ventral or anterior surface down if the analyst needs to display areas of trauma to the spinal canal, transverse process, or spinous processes. This lightweight tray can be easily transported

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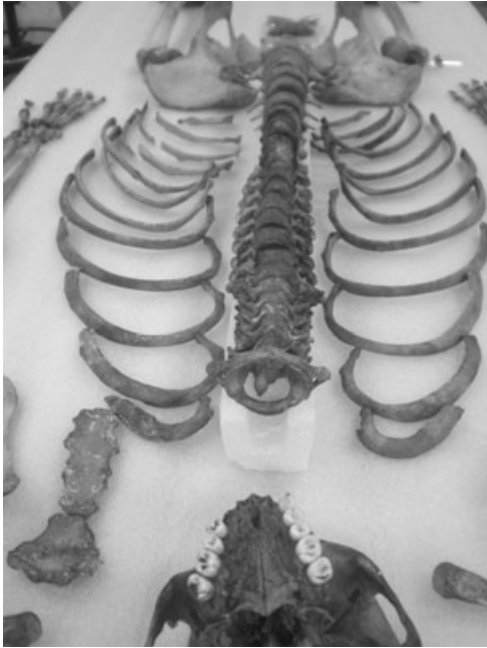


FIG. 2—Human skeleton laid out in approximate anatomical order using a spine tray. Note that the white spine tray blends in with the sheet of foam cushioning and covering the table.

and used in the field or the laboratory and can save time and maintain the sequence of vertebrae from the field to the laboratory. In conclusion, a cushioned and reusable spine tray provides



FIG. 3—Using a spine tray to articulate vertebrae during the process of sorting.

anthropologists, medical examiners, anatomists, and others with a visually pleasing method of displaying the spine in correct anatomical order, without damaging the bones or introducing unnatural twists or rotation of one or more vertebrae.

Reference

1. Burns KA. Forensic Anthropology Training Manual, 2nd edn. Upper Saddle River: Pearson Education, Inc., 2007.

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