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Chauncy, the Copper Thermal Manikin

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Chauncy, a thermal manikin (Fig. 1) now on display at the National Museum of Health and Medicine (NMHM) in Silver Spring, Maryland, near Washington, DC, may not appreciate the role he and his manikin counterparts had in saving lives over the course of half a century; but if he did, we hope he would be proud of his accomplishments.

At the onset of World War II, the War Department became quickly concerned with the inadequacies of military clothing, uniforms, and boots. Cold weather conditions contributed to thousands of trench foot and frostbite casualties when U.S. forces were engaged in recapturing the Aleutian Islands from Japan in 1943. Scientific studies of military clothing markedly increased in the months afterward, in advance of winter campaigns in Europe.

"Chauncy," the first of a new generation of thermal manikins, and named by its developer Dr. Harwood Belding at the Harvard Fatigue Laboratory in Boston, was designed by Connecticut sculptor Leopold Schmidt and incorporates heating elements manufactured by electric blanket maker General Electric.[1] The manikin's form was based on the physical characteristics derived from an anthropometric study of nearly 3,000 Army Air Force cadets to more closely mimic the average physical dimensions of a young American service member.

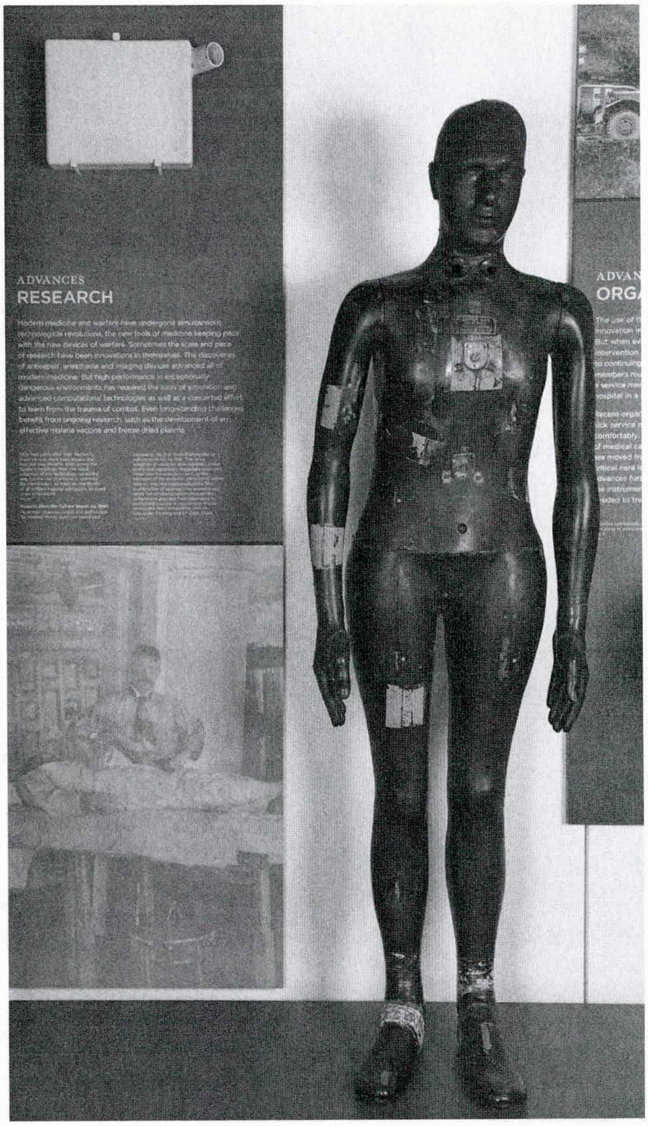

FIGURE 1. Manufactured by General Electric in the late 1940s and early 1950s, this manikin was named Chauncy by its developers at the Harvard Fatigue Laboratory in Boston and U.S. Army Research Institute for Environmental Medicine in Natick, Massachusetts. The manikin is made of copper that could be heated to maintain a constant skin temperature. They used the manikin to evaluate thermal insulating properties of military garments and headgear. (2011.0054.1) (Disclosure: This image has been spotted and cropped to emphasize the subject.) (National Museum of Health and Medicine photo/Released).

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FIGURE 2. Left to right: James Bogart, a technician in the Physiology Branch of the Military Ergonomics Division; the water "immersion" (nose only) manikin; Harwood (Woody) Belding, PhD, Professor at the University of Pittsburgh, Pennsylvania School of Public Health, the inventor of these manikins; his manikin, Chauncy; Ralph F. Goldman, PhD, Founder and Director of the Military Ergonomics Division, who conceived of the cotton skin to make a "sweating" manikin, and also conceived of the need for a walking manikin to study the effects of the "pumping" of clothing by body motion; a "sweating" copper manikin; J. Robert Breckenridge, MS, head of the Biophysics Branch of the Military Ergonomics Division of the US Army Research Institute of Environmental Medicine in Natick, Massachusetts. This photograph was taken in 1972, on the occasion of USARIEM's purchase of Belding's manikin, Chauncy; the other two manikins, which had been used at Wright Patterson Air Force Base, were on permanent loan from the U.S. Air Force.[3]

Delivered in 1946, Chauncy is made of copper and features conductive circuits that uniformly heat the copper shell while allowing for variable temperatures of the hands and feet. He has connectors for power, thermostat control, and skin temperature sensors in the area of what would be the human navel. (Other thermal manikins have such connections through the "eyes" to facilitate submerged testing conditions.) The skin sensors are placed in 0.22 caliber bullet cartridge cases inserted into the "skin" at appropriate sites to measure the temperature of each section of the manikin.[2]

Before being accessioned by NMHM in 2011, Chauncy was among the tools in use by researchers at the U.S. Army Research Institute for Environmental Medicine (USARIEM), in Natick, Massachusetts. USARIEM is an element of the U.S. Army Medical Research and Materiel Command. USARIEM used Chauncy and other manikins to evaluate thermal insulating properties of military garments and headgear (Fig. 2).

Science such as that done by USARIEM with tools such as Chauncy continues to ensure that the modern warfighter will be better protected even when operating in extreme conditions. Data from thermal manikin studies have also provided input into human performance predictive models.[1]

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