

The Remains of Doctor Bass

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Under normal circumstances, one would expect a wandering throng of students to demonstrate animated displeasure upon encountering a human corpse in the woods; particularly a corpse as fragrant and festering as that which was found on an August afternoon in Knoxville, Tennessee. From a short distance the male figure almost appeared to be napping among the hummingbirds and squirrels, draped as he was over the pebbled ground. But something about his peculiar pose evoked a sense of grim finality—the body language of the deceased.

The students knelt alongside the slumped form, seemingly untroubled by the acrid, syrupy tang of human decay which hung in the air. They remarked on the amount of decomposition that had become evident since their last visit, such as the sloughed skin and distended midsection. The insects which feasted upon the decommissioned man were of specific interest, prompting a number of photographs and note-jottings. After surveying the scene to their satisfaction, the students strolled across the glade to examine a considerably more decayed corpse in the trunk of an abandoned car. Their lack of alarm wasn't altogether surprising, for they were part of the organization responsible for dumping these corpses—along with dozens more—throughout the otherwise serene forest. They were forensic anthropology students from the University of Tennessee.

Affectionately referred to as the *Body Farm*, the facility was founded in 1981 by Dr. Bill Bass, a professor of anthropology at the university. Before the Body Farm was established, information on human decay was astonishingly inadequate, leaving criminal investigators poorly equipped for determining abandoned bodies' time of death. On one occasion, Dr. Bass was asked to estimate the *post-mortem interval* of some human remains, and conventional methods indicated approximately one year given the moist flesh still clinging to the man's bones. When other evidence later revealed that the body had been occupying its coffin since the Civil War, a flummoxed Dr. Bass took it upon himself to finally fill the forensic gap.



In what must have been an animated conversation, the professor convinced the university administration to set aside over an acre of woodland for his pioneering decay research. Two wrecking-yard-style barriers were erected along the plot's perimeter: an inner wooden "privacy fence," and an outer layer of chain-link. For good measure, the chain-link was garnished with a coil of prison-grade razor wire. To discourage those whose curiosity is aroused by pungent breezes and formidable fences, a series of signs were installed to warn away would-be interlopers, broadcasting their unsettling all-caps pronouncements across the countryside: RESEARCH FACILITY. BIOHAZARD. NO TRESPASSING.

In the intervening years, many anthropology students at the University of Tennessee have been engrossed by the decay research at the Body Farm. A continuum of corpses occupy the facility thanks to unclaimed remains from the medical center, and persons who have donated their bodies to science. Owing to these selfless subjects, the stagnating field of forensic anthropology was rapidly revitalized.

As the lifeless subjects are interred into the grisly forest hideaway, each is assigned an anonymous identification number. Some are situated to provide interesting decomposition vectors, while others are used to reconstruct specific circumstances for police investigations. At any given time, several dozen perished persons are scattered around the hillside within automobiles, cement vaults, suitcases, plastic bags, shallow graves, pools of water, or deposited directly upon the earth. Except when clothing is necessary for a particular study, cadavers are disrobed, and frequently certain factors such as fire and chemicals are introduced to measure their effects. Grad students and professors return periodically to check on the subjects' progress, with occasional visits from police officers or FBI agents undergoing training.

One of the facility's first non-living participants was *Pig Doe*, a hog who was anesthetized and shot on the facility grounds. Within eighty-seven seconds a vigilant blow fly made berth upon the unfortunate animal and installed a cluster of eggs, thereby tipping the first domino of decomposition. The predictable timing of infestation waves represents the main thrust of the research at the Body Farm: *forensic entomology*, the examination of insects for law-enforcement purposes. When a human victim is found within twenty-four hours, the time of death can generally be determined by checking the potassium level in the gel of the eyes, or by taking a temperature reading. Beyond that point, it is up to the forensic anthropologists to examine the body and its bug collection.

Technically decomposition begins about four minutes after death, when cells are deprived of their usual supply of nourishment. Absent these food molecules, digestive enzymes begin gnawing upon the cells themselves, a process called *autolysis*. Within a few hours the chemicals that allow muscle fibers to slide freely are metabolized, causing a temporary profound stiffness known as *rigor mortis*. The body pales in color as its blood pools at the lowermost portions.

With the human immune system permanently off-line, the digestive bacteria in the gut gain the upper hand, causing an upset in the uneasy intestinal alliance. These bacteria begin nibbling on the body itself. As the host's cells steadily self-destruct from autolysis, their membranes rupture, spilling the nutrient-rich cell filling into the tissues. The bacteria thrive in this river of food, and they soon establish decomposition franchises at every extremity.

Meanwhile, back on the surface, scores of flies are drawn to the fresh-corpse scent from up to a mile away. They lay their eggs at every exposed opening, and soon the newborn maggots are making a meal of the cadaver's subcutaneous fat. Forensic entomologists can measure the size of these developing fly larvae to determine "time since colonization." Over several days the spongy brain will liquefy and leak from the ears and mouth, while blisters form on the skin which eventually evolve into large, peeling sheets. Often the skin from the hand will slough off in one piece, an effect known as *gloving*. Body Farm researchers have discovered that such skin can be soaked in warm water to restore its flexibility, and placed over a researcher's hand for the purposes of fingerprint identification.



By day four or so, the rigidity of *rigor mortis* has subsided, and the rapidly reproducing anaerobic bacteria have expelled enough gas that the skin takes on a green tinge. The sickly sweet smell of decay begins to saturate the air as bacterial byproducts such as *putrescine* and *cadaverine* become concentrated, and the abdomen, groin, and face begin to show noticeable swelling. Steadfast insects have thoroughly colonized the cadaver, with writhing mounds of maggots obscuring every orifice and a fog of flies swarming above. Maggot-hunting beetles and wasps may join the fray, adding another dimension of mortality; as well as another measurable milestone for the entomologists.

As the tenth day of decay approaches, the bacteria-induced bloating becomes pronounced. Sometimes this pressure is relieved via post-mortem flatulence, but occasionally an over-distended abdomen will rupture with a wet pop. Ants, moths, and mites begin to capitalize on the corpse cornucopia along with the other insects, while the single-celled citizens dutifully dissolve the internal organs. Soon the soil beneath the corpse is sodden with liberated liquids, while the skin—unappetizing to most insects—becomes mummified and draws in close to the bones. Natural soap

buildup might also be present due to the interaction of bodily fats and acids, a process known as *saponification*.

After about twenty days, several generations of maggots have matured or died out, leaving most of the leftovers to molds and flesh-eating beetles. But even after a couple of months, when the flesh is all but gone, forensic entomologists can interrogate the remaining maggots by extracting their juices; most toxins will linger in the fly larvae, so investigators can detect the presence of poisons, drugs, and other such chemicals. Additionally, the victim's race can sometimes be determined based on the amount of *melanin* skin pigment in the soil.

Although factors such as predators, toxins, age, and injuries may cause variations from this predictable progression, most corpses in the wild are skeletonized or mummified according to the formula $y = 1285/x$, where x is the average temperature in Centigrade, and y is the total number of days. When the decomposing donors have completed their stint at the Farm, their bones are steam-cleaned and added to the University of Tennessee skeletal archives, ready to return to the aid of science at a moment's notice.

Owing to the information harvested from the Body Farm, in a feat that is sure to impress at parties, any forensic entomologist worth their salt can now determine time of death when presented with a reasonably fresh unembalmed corpse— sometimes to within an hour. Using the results of numerous experiments, investigators have the data to properly adjust post-mortem interval estimates, taking into account conditions such as burying, embalming, and weather. One example of such variation was Dr. Bass' underestimated civil War remains, which were found to be contaminated with lead from the cast-iron casket. This effectively embalmed the body, making the meat unpalatable to tiny foragers.

Dr. Bass has since retired from teaching, but he has continued as head of the Forensic Anthropology Center with characteristic zeal. He has also written a number of books about his experiences at the Facility. Though the work he pioneered is patently unpleasant, the fruits of his research have since helped to solve countless crimes.

While the prospect of having one's naked, lifeless husk flung into the woods lacks general appeal— most people opting to decompose with dignity in the privacy of an overpriced crate— there is nevertheless an ever-growing waiting list of enthusiastic, not-yet-deceased Body Farm volunteers. Dr. Bass himself has stated that his hatred of flies compels him to decline the opportunity to rot for the benefit of science; but for some people, the idea of wasting a perfectly good corpse is just too horrible to contemplate.

Answer Questions in your notebook

QUESTIONS: Match the word with its definition/synonym (words are underlined in article)

- | | |
|---------------------|--------------------------|
| 1. ___ throng | a. puzzled, dumbfounded |
| 2. ___ sloughed | b. calm, tranquil |
| 3. ___ distended | c. mob, group |
| 4. ___ serene | d. shed, cast off |
| 5. ___ flummoxed | e. bloated, swollen |
| 6. ___ formidable | a. engaged, interested |
| 7. ___ engrossed | b. placed, positioned |
| 8. ___ deposited | c. impressive, large |
| 9. ___ vigilant | d. lessen, go down |
| 10. ___ subsided | e. alert, watchful |
| 11. ___ obscuring | a. distasteful |
| 12. ___ pronounced | b. hide, conceal |
| 13. ___ archives | c. consider, think about |
| 14. ___ unpalatable | d. records, files |
| 15. ___ contemplate | e. obvious, noticeable |

16. The main point of this article is:

- describe the research that occurs at the Body Farm
- convince readers to donate their bodies to science
- describe the steps of decomposition
- promote Dr. Bass' book

17. What data is most likely to determine the length of time a corpse has been dead if the corpse is found within 24 hours.

- | | |
|-------------------------|-----------------------------------------|
| a. temperature of body | b. amount of skin left on the corpse |
| c. weight of the corpse | d. type of insects living on the corpse |

18. What are the first organisms to begin decomposition?

- | | | |
|------------|-------------|------------------|
| a. insects | b. bacteria | c. small animals |
| d. viruses | | |

19. What causes the characteristic smell of a rotting body?

- | | |
|--------------------|-------------------|
| a. melanin | b. saponification |
| c. embalming fluid | d. putrescine |

20. On your paper, create a timeline of decomposition for bodies using the descriptions found in the article.

Scientific Method questions

- What was Dr. Bass attempting to investigate, understand or explain?
- What type of observations did Dr. Bass perform?
- What type of data did he collect (list as many as possible)
- What was Dr. Bass's hypothesis?
- Did Dr. Bass have controls? Variables? What were they?
- What was Dr. Bass's conclusion?
- How did he support it?