

Cell Cultures: Confused and Contaminated

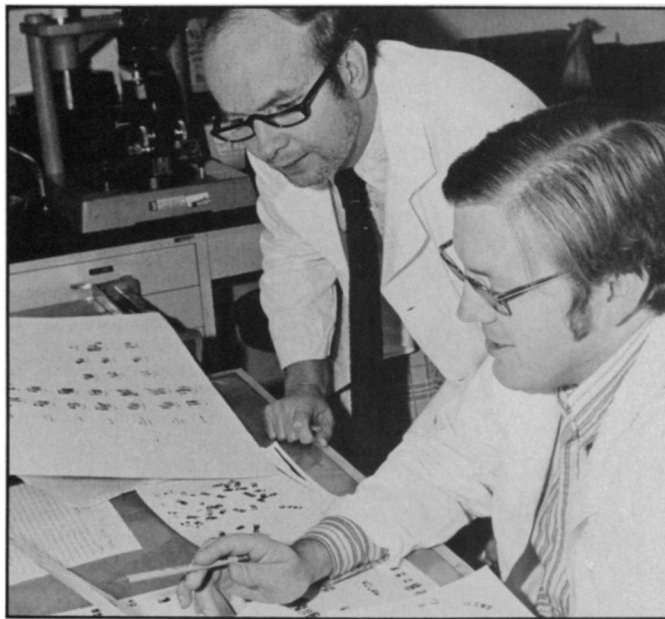
Twenty-five years after the death of a Baltimore woman, Henrietta Lacks, from cervical cancer, cells from that lesion have quietly taken over tissue cultures in research laboratories all over the world. These "HeLa" cells once held only promise for research—they grow luxuriantly, are a substrate for growing viruses in the laboratory and are a steady source of experimental tissue. But now, as they silently contaminate and overgrow cultures that once contained dozens of other human tissues from twice that many donors, the promise of HeLa seems more of a menace. Two research groups, tracing Mrs. Lacks's *in vitro* immortality, have reported the extent and implications of the takeover for cell research.

One team, Walter A. Nelson-Rees and Robert R. Flandermeyer of the University of California School of Public Health in Oakland, present in the Jan. 9 *SCIENCE* a list of 70 human cell lines once thought to be various types of human tissues but now known to have HeLa characteristics.

To set the scene, the list is a nearly illegible pastiche of abbreviations and acronyms—the shorthand names of cell lines such as "H.Ep.-2" and "NCTC 2544" and "HBT3" that make reports of cell research so impenetrable to the outside world. But the list means something very tangible to cell researchers. Work, sometimes done over several years on what was thought to be lung, kidney, amnion, prostate, skin, heart, breast, rectal and bladder tissues, was actually work done on HeLa cells. "In many instances, this invalidates the research," Nelson-Rees told *SCIENCE NEWS*, "and the researchers are going to have to acknowledge this in the literature."

Nelson-Rees has been tracing the spread of HeLa for several years. He and co-workers developed a set of chromosome staining and enzyme analysis techniques that will reveal the presence of HeLa characteristics. In 1974, they reported these techniques and the results of experiments on six HeLa-contaminated cell lines (SN: 6/15/74, p. 380). For the new list, Nelson-Rees and Flandermeyer not only analyzed and indicted 11 more cell lines but also compiled similar reports published by other researchers.

The new list indicts more than just cell lines, though. The investigators who originated these contaminated cultures have also been named, an action sure to be interpreted by some as unfriendly. "After the 1974 paper," Nelson-Rees explains, "some researchers analyzed cultures they had been using of the same type we 'fingered' and found them to be bonafide bladder carcinoma cells, or whatever. Therefore, the source of the



Nelson-Rees and Flandermeyer follow HeLa's tracks—chromosome markings specific to HeLa cells.

Guy Vinson / U. of Calif. Naval Biomedical Research Laboratory

contaminated cultures becomes an important piece of data, and I felt obligated to state from whence these cultures came and let the other shoe drop where it may." Although no one knows why HeLa cells grow so well, contamination is due, Nelson-Rees says, to sloppy laboratory technique, mislabeling of culture bottles and cross-culturing errors. "At this point," he says, half joking, "I'm going to go hide."

The second major report on HeLa contamination underscores this problem of investigator error. K.S. Lavappa, M.L. Macy and J.E. Shannon of the American Type Culture Collection (a major repository and distributor of tissue cultures in the United States) will report in an upcoming *NATURE* that 12 of their cell lines are also HeLa contaminated. ATCC has been sending these bogus cell lines out without knowing it, and is alerting researchers, through the *NATURE* paper, to the possibility that they are studying the wrong cells.

Of 63 refereed, characterized cell lines

in the collection, Lavappa says, 28 are now HeLa suspects. They contain a rare enzyme, G6PD type A, which occurs in only 30 percent of Negroes and not in Caucasians. Henrietta Lacks, a Negro, had that enzyme, but most of the cell lines come from Caucasian donors. The ATCC team has checked 12 of 28 suspects so far, and all 12 were found to be HeLa contaminants. "But they did not get contaminated here," Lavappa says. "They must have been contaminated when submitted here by the investigators for preservation." Submissions are now being scrutinized more closely, he says.

Closer scrutiny of cell cultures in general is necessary in light of the HeLa findings, Nelson-Rees says. "The use of cell cultures for research has snowballed in recent years, but much of the lab technique is very sloppy." Both groups emphasize the necessity of checking and rechecking cultures for possible contamination, and would like to see this be a prerequisite for publication of research. □

Virus linked to diabetes

Diabetes is far more serious and widespread than most people realize. It is the third-ranking killer in the United States after heart disease and cancer; the incidence has increased by more than 50 percent in the past decade. There are many forms of the disease, such as acute onset juvenile, maturity onset and obesity onset. And all that scientists are sure about all of them is that the hormone insulin is lacking or malfunctioning.

However, one possible cause for dia-

betes has come to light in recent months. Several studies have suggested that the disease might be due to improper binding of insulin to receptor sites on the membranes of target cells, or that there may be too few of these receptors for efficient insulin binding (SN: 10/19/74, p. 248; 8/16/75, p. 110; 1/10/76, p. 23). Now another study provides some of the strongest evidence to date that a virus might help trigger one form of diabetes.

This study was conducted by Roger