



**Name in English:** Tao-Chiuh Hsu  
**Name in Chinese:** 徐道觉 [徐道覺]  
**Name in Pinyin:** Xú Dàojué  
**Gender:** Female  
**Birth Year:** 1917-2003  
**Birth Place:** Shaoxing, Zhejiang, China  
**Philanthropy:** Yes

### **Pioneer in Human Chromosome Research**

**Profession(s):** Cell Biologist, Geneticist, Scientist, Professor

**Education:** B.S., Entomology, 1941, Zhejiang University; Postgraduate studies at Zhejiang University; Ph.D., Preventive Medicine and Community Health, 1951, University of Texas at Austin

**Awards:** 1980, Ernst W. Bertner Memorial Award, M. D. Anderson Cancer Center and Bertner Foundation; Award of Excellence, The International Center in New York; 1996, Distinguished Alumnus Award, University of Texas Medical Branch, Graduate School of Biomedical Sciences

**Contributions:** For over 50 years, Tao-Chiuh Hsu (known as T.C. Hsu) performed groundbreaking work in the study of chromosomes and cytogenetics, the branch of genetics that studies the cell. Work that earned him the affectionate title of “Father of Mammalian Cytogenetics.” Dr. Hsu was the 13<sup>th</sup> president of the American Society for Cell Biology from 1973 to 1974.

Shortly after earning his Ph.D., he worked at a laboratory at the University of Texas Medical Branch. In his first year, he discovered a rinsing solution pre-treatment method for preparing, or “spreading,” chromosomes so that they could be examined individually in detail. In 1953, he published his famous paper in *The Journal of Heredity* on the spreading technique of human chromosomes. The rinsing solution Dr. Hsu used, or the hypotonic pretreatment procedure, has become a routine step in preparing mammalian chromosomes. This improved method led to the accurate identification of 23 pairs of chromosomes in each human somatic cell. This improved method revolutionized the field of mammalian and human cytogenetics.

Among Dr. Hsu’s contributions was his early work mapping the salivary gland chromosomes of *Drosophila virilis*, a species of fruit fly useful in a wide variety of genetic experiments because its rapid reproduction rate enabled scientists to see the results of engineered genetic changes almost immediately. In addition, he determined the haploid chromosome number of human beings. A normal human being has 23 chromosomes in their egg or sperm depending upon their sex. These are combined in a child to give the familiar 46 chromosomes of a normal human cell. He also determined human karyotype, the observable characteristics of the human chromosomes. This is

used today to identify Down's Syndrome and certain types of cancer among other chromosomal abnormalities. The system is now also used to trace evolutionary differences over time, useful when tracing the origin of someone's genetic ancestors. Dr. Hsu published these findings in a historic paper in 1952. In the early 1970s, along with another scientist, Dr. Hsu helped develop C-banding, or the chromosome banding technique, an innovative staining procedure that allowed scientists to identify different chromosomes.

In 1955, Dr. Hsu started his own laboratory at the University of Texas M.D. Anderson Hospital and Tumor Institute where he continued his work until his death in 2003. His lab became a center for mammalian cytogenetics, and scientists around the world would come to Hsu's lab to learn new techniques. As someone who admitted to being "addicted to looking at chromosomes," Hsu influenced and mentored scores of scientists leaving behind a rich legacy in scientific achievements and a passion for cytogenetics.

**Philanthropy:** When Hsu first moved to Galveston, Texas, his friends Robert and Peggy Wagner knew he was penniless and voluntarily loaned him \$4,000 with the stipulation that when his financial situation improved, Hsu would use this fund to help other Chinese scholars in similar straits. Dr. Hsu kept this promise to pay it forward and had since loaned money to Chinese scholars in financial need.

**Publications/Patents:** Hsu has written over 300 publications. Most well-known are these:

1952, Chromosomal variation and evolution in the virilis group of *Drosophila*

1952 Mammalian chromosomes *in vitro* - the karyotype of Man

1953 Mammalian chromosomes *in vitro*. Method of spreading the chromosomes of cells in tissue culture

1979 Human and Mammalian Cytogenetics: A Historical Perspective

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