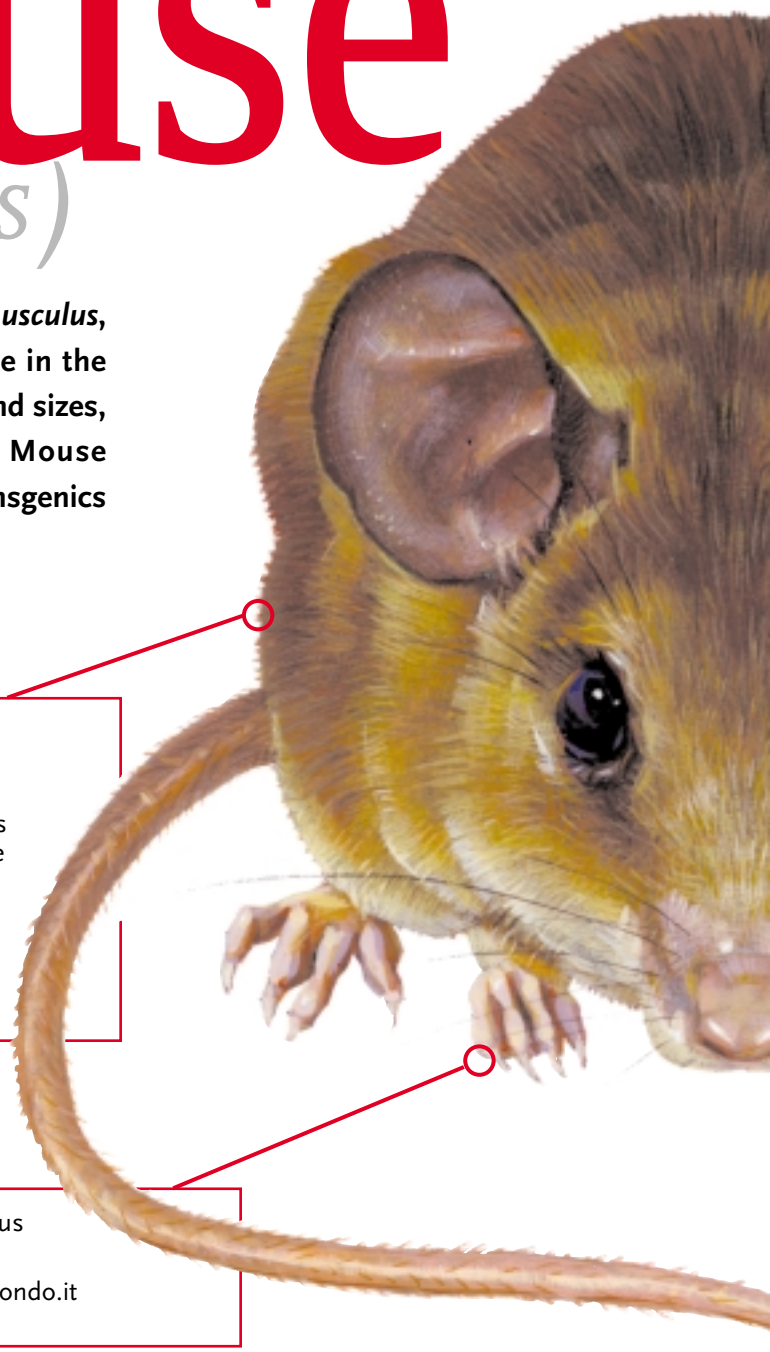
The Mouse (*Mus musculus*)

"Thou will

Naturally comfortable in fields and in kitchens, *M. musculus*, for the last century, has been virtually indispensable in the research lab. This animal now appears in all shapes and sizes, as researchers consistently produce new strains. Mouse production is a $200 million-a-year business, with transgenics accounting for a third of the new mice created.



'Omics

Genome size: ~2,600 Mb

Chromosomes: 19 autosomes, plus X and Y

Number of genes: ~30,000; 96% of euchromatic chromatin is sequenced

Average gene: 40 kb; 8.3 exons per gene

Human homologs: Less than 1% have no detectable homolog in humans

Diverged from human lineage: Estimated 75 million years ago

Web Sites

Mouse genome server: www.ensembl.org/Mus_musculus
Jax Mice: (describing 2500+ strains) jaxmice.jax.org
EMBL Mouse Biology Programme: www.embl-monterotondo.it

Illustration: Tammy Irvine, Rear View Illustration

1901–1908
William Castle studies Granby mice

1909
DBA, the first inbred strain, is created

1915
First linkage study conducted

1928
Strain 129 is bred

1929
Jackson Laboratory is founded in Bar Harbor, Maine

1937
Peter Gorer describes *H-2* locus (later known as *MHC* locus)

Late 1940s
George Snell breeds first congenic strains with differences at the *H-2* locus

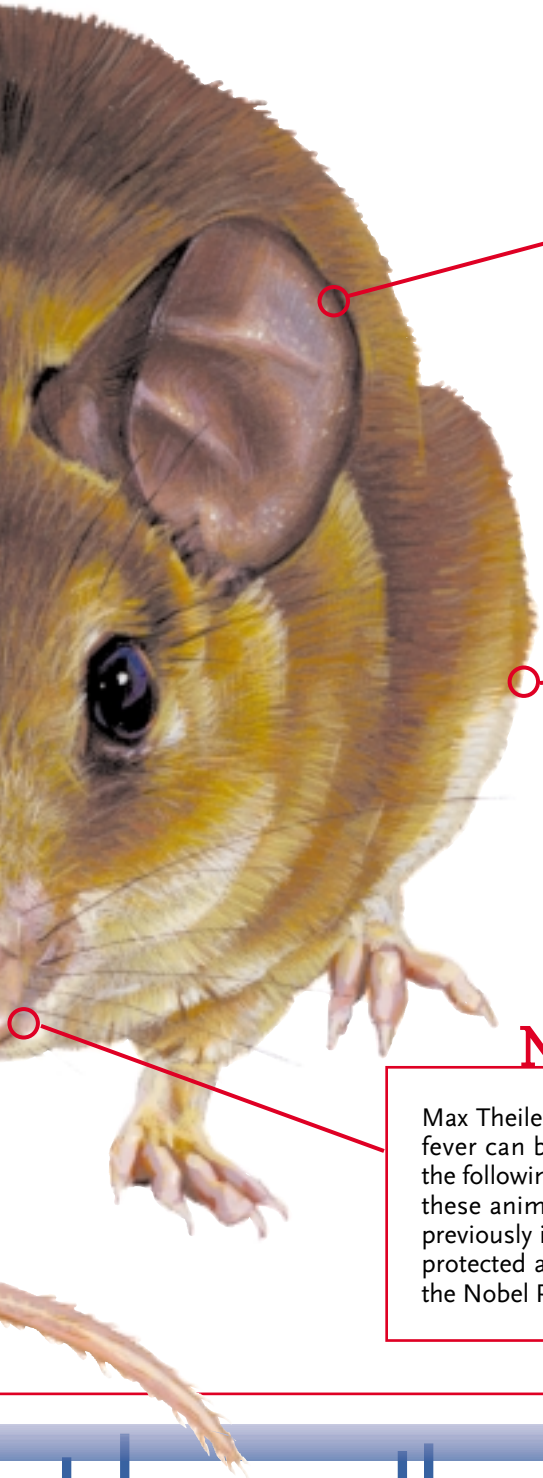
1954
Leroy Stevens develops ovary transplantation

1961
X-inactivation proposed in mice

1962
Nude mouse strain discovered; lack of thymus noted in 1968

be as valiant as the wrathful dove
or most magnanimous mouse."

—William Shakespeare (1564–1616), *Henry IV*



Stats

Weight: 20 g

Life span: 1.3–3 years

Diet: Anything not in the mousetrap

Body temperature: 36.9° C

Sexual maturity: After 4 weeks of age

Estrus cycle: Every 4–5 days

Gestation: Averages 19–21 days; 1–10 pups

Feature Technology

Conditional Transgenics: A suite of approaches exists to manipulate gene expression, including conditional transgenics, which provide an in vivo method of controlling spatial and temporal gene regulation. Employing tissue-specific or developmentally restricted promoters to drive expression of the transgene or Cre recombinase, conditional transgenics provide greater precision than conventional knockouts, allowing researchers to see the effects of loss of a gene in a particular tissue.

Nobel Moment

Max Theiler, in 1930, discovered that yellow fever can be transmitted to white mice. In the following year, Theiler demonstrated that these animals, inoculated with serum from previously infected humans or monkeys, are protected against infection. Theiler received the Nobel Prize in medicine in 1951.

1971 Donald Bailey develops first recombinant inbred strain

1976 Rudolph Jaenisch shows germ-line integration of Moloney leukemia virus

1979 ENU described as most powerful mouse mutagen

1980 First transgenic mouse created by pronuclear injection of fertilized eggs

1981 First murine embryonic stem cell line created

1983 SCID mouse strain discovered

1987 First knockout mouse

1992 MIT and Baylor College of Medicine describe *p53* knockout mouse

1998 Ryuzo Yanagimachi clones mice from stem cells

2002 Mouse genome sequenced