CBA

CBA/CaOlaHsd, CBA/JCrHsd

Developed in 1920 by Strong from a cross of Bagg albino female and DBA male. Strain C3H also originated from this cross. Strain CBA was selected for a low mammary tumor incidence and C3H for a high incidence.

CBA/CaOlaHsd

In 1932, to Haldane and Grüneberg, Department of Genetics, University College, London, UK. Then to Carter via Royal Cancer Hospital, London and British Empire Cancer Campaign, London in 1947. To Atomic Energy Research Establishment, Harwell circa 1953. Obtained by Laboratory Animal Centre, Carshalton from Atomic Energy Establishment, Harwell in 1956 and then to OLAC (Harlan). Harlan became Envigo in 2015, then Envigo was acquired by Inotiv in 2021.

CBA/JCrHsd

From Jackson Laboratories, Bar Harbor, Maine, to National Cancer Institute, Frederick, Maryland in 1983. To Harlan Laboratories in 1987. Harlan became Envigo in 2015, then Envigo was acquired by Inotiv in 2021.

CHARACTERISTICS

The CBA mouse is widely distributed, and used as a general-purpose strain. There are several substrains recognized, and the differences between these substrains are probably too large to be accounted for by mutation.

Anatomy

Low brain weight (Storer, 1967). Large forebrain volume and neocortex (Wimer *et al*, 1969). Small brain/body weight ratio (Roderick *et al*, 1973). Low testes weight (Shire and Bartke, 1972). Large kidney/body weight ratio (Schlager, 1968). Low thyroid weight (Mendoza *et al*, 1967). Small heart/body weight ratio (Mokler and Iturrian, 1973). Large pituitary (Sinha *et al*, 1975). Low total leukocyte count, high erythrocyte count (Russell *et al*, 1951). Few bristles on foot pads (Festing, 1974). Third molars small and one or more absent in about 18% of the individuals (Hummel *et al*, 1966). Inner ear morphology in CBA/Ca mice in relationship to noise and age has been described by Hultcrantz and Li (1993).

Behavior

Low spontaneous bar-pressing activity, low tail rattling during aggressive encounters, high social grooming during aggressive encounters, low intrastrain aggression (Southwick and Clark, 1966). Low locomotor activity (Davis and King, 1967). Low locomotor activity when single, but intermediate when grouped (Davis *et al*, 1967). Low spontaneous locomotor activity (Nikulina *et al*, 1991). Low shock avoidance learning (Bovet *et al*, 1966; Bovet *et al*, 1969). High shock avoidance learning in Ca substrain but not in J substrain (Wahlsten, 1973). Highly susceptible to "pinch-induced" catalepsy (excessive freezing), possibly due to a single recessive autosomal gene (Kulikov *et al*, 1993).

Drugs

Resistant to urethane-induced lung tumors (Falconer and Bloom, 1962). Susceptible to skin ulceration by DMBA (Thomas *et al*, 1973). Susceptible to induction of leukemia and liver tumors by neonatally administered DMBA (Flaks, 1968).

Susceptible to X-irradiation (Roderick, 1963), but resistant to `CNS syndrome' with high doses of X-irradiation (Yuhas, 1968). Susceptible to hyperbaric oxygen, showing central nervous system manifestations (Hill *et al*, 1968). Sensitive to lethal effect of ozone (Goldstein *et al*, 1973), but resistant to ozone-induced decreases of tracheal potential (Takahashi *et al*, 1995). Sensitive to teratogenic effect of acetazolamide (Green *et al*, 1973; Hackman and Hurley 1983), but resistant to induction of cleft palate in embryos by cortisone (Kalter, 1965). Insensitive to insulin (Brown, 1965). Long survival on Warfarin (Lush and Arnold, 1975). High

ED50 to behavioral effects of nicotine (Marks *et al*, 1989). Susceptible to weight loss induced by cocaine, but this is attenuated by anisomycin (cf C3H, SJL) (Shimosato *et al*, 1994). More resistant to acute toxic effects of aflatoxin B-1 than strain C57BL/6 (Almeida *et al*, 1996).

Genetics

Coat color genes

- *A, B, C, D* : agouti (wild type).

Histocompatibility

- *H-2*k.

Biochemical markers:

CBA/CaOlaHsd

- *Apoa-1*^{a}, *Car-2*^{a}, *Es-1*^{b}, *Es-2*^{b}, *Es-3*^{c}, *Gpd-1*^{b}, *Gpi-1*^{b}, *Hbb*^{d}, *Idh-1*^{b}, *Ldr-1*^{b}, *Mod-1*^{b}, *Pep-3*^{b}, *Pgm-1*^{b}, *Trf*^{a}.

CBA/JCrHsd

- *Apoa-1*^{b}, *Car-2*^{b}, *Es-1*^{b}, *Es-2*^{b}, *Es-3*^{c}, *Gpd-1*^{b}, *Gpi-1*^{b}, *Hbb*^{d}, *Idh-1*^{b}, *Ldr-1*^{a}, *Mod-1*^{b}, *Pep-3*^{b}, *Pgm-1*^{a}, *Trf*^{a}.

Skin grafts between CBA/Ca and CBA/J are rejected. (Green and Kaufer, 1965). Genetic polymorphism within CBA sublines has been described by Whitmore and Whitmore (1985). This strain carries the *Mus musculus musculus* Y-chromosome, while others have the *M. m. domesticus* type (Nishioka, 1987).

Immunology

Low lymphocyte phytohemagglutinin response (Heiniger *et al*, 1975). Good immune response to low doses of bovine gamma-globulin (Levine and Vaz, 1970). Poor splenic PFC immune response to pneumococcal polysaccharide in CBA/J and CBA/H (Amsbaugh *et al*, 1972). Good immune response to ovomucoid, but poor response to ovalbumin (Vaz *et al*, 1971). Resistant to induction of antigen-induced arthritis (contrast most other strains). (Brackertz *et al*, 1977). Non-responder to synthetic polypeptide Glu^{57}, Lys^{38}, Ala^{5} (Pinchuck and Maurer, 1965). Discriminator between `H' and `L' sheep red blood cells (McCarthy and Dutton, 1975). Erythrocytes have a high agglutinability (Rubinstein *et al*, 1974). Low responder to dextran (Blomberg *et al*, 1972). Low immune response to ganglio-series gangliosides (Kawashima *et al*, 1992). High natural killer cell response to the immuno-stimulent 7-allyl-8-oxoguanosine (Pope *et al*, 1994).

Diminished expression of neutral glycosphingolipid GgOse(4)Cer in concanavalin A stimulated T lymphoblasts in J substrain (Muthing, 1997). Long peptides have the advantage of covering all potential T cell epitopes, and may represent novel and safe tools for the therapy of allergic diseases (Astori *et al*, 2000).

Infection

Resistant to infection by *Salmonella typhimurium* strain C5 (Plant and Glynn, 1974). Susceptible to infection by liver fluke Opisthorchis felineus (Zelentsov, 1974). Good plateau harvest of *Mycobacterium leprae* 8 months after infection (Shepard and Habas, 1967). Low immune response to *Mycobacterium lepraemurium* is associated with an impaired macrophage function (Saito and Natori 1985). Resistant to infection by *Helicobacter felis* with only mild gastritis in the antrum and no atrophy seen over time (cf BALB/c, contrast 4 other strains) (Sakagami *et al*, 1996). Resistant to induction of diabetes mellitus by encephalomyocarditis virus (Boucher *et al*, 1975). Highly susceptible to measles virus (Rager-Zisman *et al*, 1976). Ca and N substrains carry no detectable endogenous ecotropic MuLV DNA sequences (Jenkins *et al*, 1982).

Administration of cadmium results in a high incidence of activation of latent herpes simplex virus infections. This is not seen in other strains, and does not correlate with cadmium toxicity (Fawl *et al*, 1996). J substrain resistant to the induction of dental caries due to infection with *Streptococcus mutans* (Kurihara *et al* 1991). Resistant to murine herpes virus (Kapoor *et al* 1992). Resistant to intra-vaginally inoculated *Neisseria gonorrhoeae* (Johnson *et al*, 1989). Develop severe lesions following infection with *Candida albicans* (Ashman *et al*, 1993). This correlates with low induction of Candida-specific gamma interferon (Ashman and Bolitho, 1993). CBA/J resistant, with low amylase response to the fungus *Paracoccidioides brasiliensis* (Xidieh *et al*, 1994). J substrain is susceptible to several clinical isolates of penicillin-susceptible and resistant strains of *Streptococcus pneumoniae*, and may be a useful model for evaluating antibiotic efficiencies against this bacterium (Tateda *et al*, 1996).

Resistant to *Leishmania major* (contrast BALB/c) (Laskay *et al*, 1995). Ca substrain susceptible to *L. major mexicana*, and vaccination against the parasite using liposomes with parasite membrane antigens was effective (cf C57BL/6 but contrast C57BL/10) (Lezama-Dávila, 1997). Infection with larval *Echinococcus multilocularis* by transportal injection of hyatid homogenate results in well-developed protoscoleces (Nakaya *et al*, 1997).

Life-span and spontaneous disease

Median life-span in CBA/J mice for both sexes 17.6 months (Storer, 1966). Median life-span 16.2 months in CBA/Ca males and 27.5 months in CBA/Ca females. Short median life-span of males associated with a high incidence of hemothorax, suggesting a high sensitivity to vitamin K deficiency in SPF conditions (Festing and Blackmore, 1971). Median life-span 25.0 months in CBA/J males and 21.2 months in CBA/J females (Smith *et al*, 1973). Median life-span 30.4 months in CBA/ males (Sharp *et al*, 1975).

High gross tumor incidence (Storer, 1966). Overall tumor incidence 29% in males, 55% in females, including lymphoma 6% in males, 15% in females, hepatoma 24% in males, zero in females and mammary tumors 33% in females and zero in males (Smith *et al*, 1973). Lung adenomas 2-11% in BrA substrain, leukemia 4-10% (Muhlbock and Tengbergen, 1971). Resistant to the induction of atherosclerosis by a high-fat and high-cholesterol diet (Roberts and Thompson, 1976). Develop a mild hearing loss with onset late in life (contrast C57BL/6J) (Li, 1992, Willott *et al*, 1993, Li *et al*, 1993, Li and Borg, 1993). Do not carry any of the single recessive genes found in BALB/cBy, C57BL/6 and WB/ReJ, causing age-related hearing loss. All three genes are present in DBA/2 (Willott *et al*, 1995). The musculature of aging lungs has been studied by Heppleston (1961). The occurrence of epithelial and non-epithelial tumors in aging mice is described by Kawada and Ojima (1977).

The J substrain is carrier of the retinal degeneration (*Pde6b*^{rd1}) mutation.

Miscellaneous

Recommended host for transplantable rhabdomyosarcoma BW 10139 (Kaliss, 1972). High rate of spontaneous mutations (Schlager and Dickie, 1967). Characteristics of the CBA strain have been described by Festing (1997) and Lyon *et al*, (1996).

Physiology and biochemistry

High systolic blood pressure (Schlager and Weibust, 1967). Low Na/K ratio in erythrocytes and in plasma (Waymouth, 1973). High serum ceruloplasmin levels in males of Ca and J substrains, high level in females of Ca substrain but intermediate in J substrain (Meier and MacPike, 1968). Low calcium uptake by the heart (Mokler and Iturrian, 1973). High proportion of the time spent sleeping, with large percentage of slow-wave sleep and low percentage of paradoxical sleep (Valatx and Bugat, 1974). Low percentage of paradoxical sleep (Pagel *et al*, 1973). Low metabolic rate according to Storer (1967), but high metabolic rate according to Pennycuik (1967). High cell turnover in J substrain as estimated by rapid clearance of DNA-bound radioactivity (Heiniger *et al*, 1972). High peripheral nerve conduction velocity (Hegmann, 1972). High brain glutamic acid decarboxylase (Gaitonde and Festing, 1976).

Low hypoxanthine-guanine phosphoribosyl transferase in thalamus, but high level in hypothalamus (Suran, 1973). High brain monoamine oxidase and low level of catechol-O-methyltransferase activity (Tunnicliff *et al*, 1973). Low brain tyrosine hydroxylase activity (Ciranello *et al*, 1972). Low peptidyl proline hydroxylase activity in mammary gland, foot pad and tumors (Cutroneo *et al*, 1973). High sensitivity to thyrotropin in J substrain (Levy *et al*, 1965). High coumarin hydroxylating ability (Lush and Arnold, 1975). High hepatic 3 aminolevulinic acid synthetase activity after DDC treatment (Gross and Hutton, 1971). High porphyrin content in Harderian gland (Margolis, 1971). High hind foot pad temperature (Shepard and Habas, 1967). Have only about 20% of the maltase (gamma-glucoamylase) activity found in other strains, though there is no evidence for any gross metabolic abnormality resulting from this defect (Quezada-Calvillo *et al*, 1993). The adrenal and renal functions have been described by Shire (1968).

Reproduction

Good breeding performance, colony output 1.15 young/female/week, litter size at weaning 5.8, (Festing 1976). Intermediate breeding performance, litter size 5.4, sterility 5.2% (Nagasawa *et al*, 1973). Good litter size, depending on parity), but low proportion of females produce four or more litters (Fernandes *et al*, 1973). Low percentage pre-implantation loss of embryos (Leonard *et al*, 1971). Females have a high rate of fetal resorption when mated with DBA/2 males, but this can be dramatically reduced by immunization with BALB/c, but not DBA/2J spleen cells. This may provide an animal model for the prevention of fetal death by vaccination (Chaouat *et al*, 1985). Maturity of the cytoplasm in oocytes is acquired earlier than in those of the KE or other strains of mice so far studied. (Polanski 1990)

REFERENCES

1. Almeida RMA, Correa B, Xavier JG, Mallozzi MAB, Gambale W, Paula CR (1996) Acute effect of aflatoxin B-1 on different inbred mouse strains. Mycopathologia 133, 23-29.
2. Amsbaugh DF, Hansen CT, Perscott B, Stashak PW, Barthold DR, Baker PJ (1972) Genetic control of the antibody response to type III pneumococcal polysaccharide in mice. I. Evidence that an X-linked gene plays a decisive role in determining responsiveness. J. Exp. Med. 136, 931-949.
3. Ashman RB, Bolitho EM (1993) Strain differences in the severity of lesions in murine systemic candidiasis correlate with the production of functional gamma interferon by Candida-activated lymphocytes in vitro. Lymphokine and Cytokine Research 12, 471-476.
4. Ashman RB, Bolitho EM, Papadimitriou JM (1993) Patterns of resistance to Candida albicans in inbred mouse strains. Immunology and Cell Biology 71, 221-225.
5. Astori M, Von Garnier, C, Kettner A, Dufour N, Corradin, G, Spertini F (2000) Inducing tolerance by intranasal administration of long peptides in naïve and primed CBA/J mice. J. Immunol. 165, 3497-3505.
6. Blomberg B, Geckeler WR, Weigert M (1972) Genetics of the antibody response to Dextran in mice. Science 177, 178-180.
7. Boucher DW, Hayashi K, Rosenthal J, Notkins AL (1975) Virus-induced diabetes mellitus. III. Influence of sex and strain of host. J. Infect. Dis. 131, 462-466.
8. Bovet D, Bovet-Nitti F, Oliverio A (1966) Effects of nicotine on avoidance conditioning of inbred strains of mice. Psychopharmacologia 10, 1-5.
9. Bovet D, Bovet-Nitti F, Oliverio A (1969) Genetic aspects of learning and memory in mice. Science 163, 139-149.
10. Brackertz D, Mitchell GF, Vadas MA, Mackay IR, Miller JFAP (1977) Studies on antigen-induced arthritis in mice. II. Immunological correlates of arthritis susceptibility in mice. J. Immunol. 118, 1639-1644.
11. Brown AM (1965) Pharmacogenetics of the mouse. Lab. Anim. Care 15, 111-118.
12. Chaouat G, Kolb J.-P, Kiger N, Stanislawski M, Wegmann TG (1985) Immunologic consequences of vaccination against abortion in mice. J. Immunol. 134, 1594-1598.
13. Ciranello RD, Barchas R, Kessler S, Barchas JD (1972) Catecholamines: strain differences in biosynthetic enzyme activity in mice. Life Sci. 11, 565-572.
14. Cutroneo KR, Guzman NA, Liebelt AG (1973) Elevation of peptidylproline hydroxylase activity and collagen synthesis in spontaneous primary mammary cancers of inbred mice. Cancer Res. 32, 2828-2833.
15. Davis WM, King WT (1967) Pharmacogenetic factor in the convulsive responses of mice to flurothyl. Experientia 23, 214-215.
16. Davis WM, King WT, Rabbini M (1967) Placebo effect of saline on locomotor activity in several strains of mice. J. Pharmaceut. Sci. 56, 1347-1349.
17. Falconer DS, Bloom JL (1962) A genetic study of induced lung tumors in mice. Brit. J. Cancer 16, 665-685.
18. Fawl RL, Gesser RM, Valyinagi T, Fraser NW (1996) Reactivation of herpes-simplex virus from latently infected mice after administration of cadmium is mouse-strain-dependent. J. Gen. Virol. 77, 2781-2786.
19. Fernandes G, Yunis EJ, Good RA (1973) Reproductive deficiency of NZB male mice. Possibility of a viral basis. Lab. Invest. 29, 278-281.
20. Festing MFW (1974) Footpad bristles: a convenient metric character in mice. Genet. Res. 24, 315-321.
21. Festing MFW (1976) Breeding performance of mouse colonies at the MRC Laboratory Animals Centre. Unpublished data.
22. Festing MFW (1997) Inbred Strains of mice. Mouse genome 95, 519-686.
23. Festing MFW, Blackmore DK (1971) Life span of specified-pathogen-free (MRC category 4) mice and rats. Lab. Anim. 5 179-192.
24. Flaks A (1968) The susceptibility of various strains of neonatal mice to the carcinogenic effects of 9, 1 0-dimethyl- 1, 2-benzanthracene. Eur. J. Cancer 4, 579-585.
25. Gaitonde MK, Festing MFW (1976) Brain glutamic acid decarboxylase and open field activity in ten inbred strains of mice. Brain Res. 103, 617-621.
26. Goldstein BD, Lai LY, Ross SR, Cuzzi-Spada R (1973) Susceptibility of inbred mouse strains to ozone. Arch. Environ. Health 27, 412-413.
27. Green MC, Azar CA, Maren TH (1973) Strain differences in susceptibility to the teratogenic effect of acetazolamide in mice. Teratology 8, 143-145.
28. Green MC, Kaufer KA (1965) A test for histocompatibility between sublines of the CBA strain of mice. Transplantation 3, 767-768.
29. Gross S, Hutton J (1971) Induction of hepatic -aminolevulinic acid synthetase activity in strains of inbred mice. J. Biol. Chem. 246, 606-614.
30. Hackman RM, Hurley LS (1983) Interaction of dietary zinc, genetic strain and acetazolamide in teratogenesis in mice. Teratology 28, 355-368.
31. Hegmann JP (1972) Physiological function and behavioral genetics. I. Genetic variance for peripheral nerve conduction velocity in mice. Behav. Genet. 2, 55-67.
32. Heiniger HJ, Chen HW, Meier H, Taylor BA, Commerford LS (1972) Studies on the genetic control of cell proliferation. 1. Clearance of DNA-bound radioactivity in 19 inbred strains and hybrid mice. Life Sci. 11, 87-98.
33. Heiniger HJ, Taylor BA, Hards EJ, Meier H (1975) Heritability of the phytohemagglutinin responsiveness of lymphocytes and its relationship to leukemogenesis. Cancer Res. 35, 825-831.
34. Heppleston AG (1961) The musculature of the aging mouse lung. J. Gerontol. 16, 106-109.
35. Hill GB, Osterhout S, O'Fallon WM (1968) Variation in response to hyperbaric oxygen among inbred strains of mice. Proc. Soc. Exp. Biol. Med. 129, 687-689.
36. Hultcrantz M, Li HS (1993) Inner ear morphology in CBA/Ca and C57BL/6J mice in relationship to noise, age and phenotype. European Archives of Oto-Rhino-Laryngology 250, 257-264.
37. Hummel KP, Richardson FL, Fekete E (1966) Anatomy. In: Biology of the laboratory mouse. (Green EL, ed). New York: McGraw-Hill, 2nd ed., pp 247-307.
38. Hummel KP, Richardson FL, Fekete E (1966) Anatomy. In: Biology of the Laboratory Mouse. 2nd ed. (Green EL ed). New York: McGraw-Hill, pp 247-307.
39. Jenkins NA, Copeland NG, Taylor BA, Lee BK (1982) Organization, distribution and stability of endogenous ecotropic murine leukemia virus DNA sequences in chromosomes of Mus musculus. J. Virol. 43, 26-36.
40. Johnson AP, Tuffrey M, Taylor-Robinson D (1989) Resistance of mice to genital infection with Neisseria gonorrhoeae. J. Med. Microbiol. 30, 33-36.
41. Kaliss N (1972) Transplanted tumors. Jax Notes 410, Jackson Laboratory, Bar Harbor, Maine.
42. Kalter H (1965) Interplay of intrinsic and extrinsic factors. In: Teratology (Wilson JG and Warkany J, eds). Chicago: University of Chicago Press.
43. Kapoor AK, Nash AA, Wildy P, Phelan J, Henney S, Rebello P, Blaskovic D (1992) Relative role of B and T lymphocytes in pathogenesis of a murine herpes virus. Ind. J. Exp. Biol. 30, 690-695.
44. Kawada K, Ojima A. (1977) Various epithelial and non-epithelial tumors spontaneously occurring in long-lived mice of A/St, CBA, C57BL/6 and their hybrid mice. Acta Path. Jap. 28, 25-39.
45. Kawashima I, Nakamura O, Tai T (1992) Antibody responses to ganglio-series gangliosides in different strains of inbred mice. Molecular Immunology 29, 625-632.
46. Kulikov AV, Kozlachkova EY, Maslova GB, Popova NK (1993) Inheritance of predisposition to catalepsy in mice. Behav. Genet. 23, 379-384.
47. Kurihara Y, Naito T, Obayashi K, Hirasawa M, Kurihara Y, Moriwaki K (1991) Caries susceptibility in inbred mouse strains and inheritance patterns in F1 and backcross (N2) progeny from strains with high and low caries susceptibility. Caries Res. 25, 341-346.
48. Laskay T, Diefenbach A, Rollinghoff M, Solbach V (1995) Early parasite containment is decisive for resistance to Leishmania major infection. Eur. J. Immunol. 25, 2220-2227.
49. Leonard A, Deknudt G, Linden G (1971) Ovulation and prenatal losses in different strains of mice. Exp. Anim (France) 4, 1-6.
50. Levine BB, Vaz NM (1970) Effect of combinations of inbred strain, antigen and antigen dose on immune responsiveness and reagin production in the mouse. Int. Arch. Allergy 39, 156-171.
51. Levy RP, McGuire WL, Shaw RK, Bartsch GE (1965) Effect of species differences of mice on the bioassay of thyrotropin. Endocrinol. 76, 890-894.
52. Lezama-Dávila CM (1997) Vaccination of different strains of mice against cutaneous leishmaniosis: Usefulness of membrane antigens encapsulated into liposomes by intraperitoneal and subcutaneous administration. Archives of Medical Research 28, 47-53.
53. Li HS (1992) Genetic influences on susceptibility of the auditory system to aging and environmental factors. Scandinavian Audiology, Supplement 21, 1-39.
54. Li HS, Borg E (1993) Auditory degeneration after acoustic trauma in two genotypes of mice. Hearing Research 68, 19-27.
55. Li HS, Hultcrantz M, Borg E (1993) Influence of age on noise-induced permanent threshold shifts in CBS/Ca and C57BL/6J mice. Audiology 32, 195-204.
56. Lush IE, Arnold CJ (1975) High coumarin 7-hydroxylase activity does not protect mice against Warfarin. Heredity 35, 279-281.
57. Lyon MF, Rastan S, Brown SDM (1996) Genetic variants and strains of the laboratory mouse. 2 Volumes. Oxford, New York, Tokyo: Oxford University Press.
58. Margolis FL (1971) Regulation of porphyrin biosynthesis in the Harderian gland of inbred mouse strains. Arch. Biochem. Biophys. 145, 373-381.
59. Marks MJ, Stitzel JA, Collins AC (1989) Genetic influences on nicotine responses. Pharmacol. Biochem. Behav. 33, 667-678.
60. McCarthy MM, Dutton RW (1975) The humoral response of mouse spleen cells to two types of sheep erythrocytes. J. Immunol. 115, 1316-1321.
61. Meier H, MacPike AD (1968) Levels and heritability of serum ceruloplasmin activity in inbred strains of mice. Proc. Soc. Exp. Biol. Med. 128, 1185-1190.
62. Mendoza LA, Hamburg M, Fuld H (1967) Differences in thyroid activity in several inbred strains of mice. Anat. Rec. 158, 275-280.
63. Mokler CM, Iturrian WB (1973) Strain differences in subcellular calcium distribution in striated muscle of the mouse. Proc. Soc. Exp. Biol. Med. 142, 919-923.
64. Muhlbock O, Tengbergen WP Jr (1971) Instability of characteristics in inbred strains of mice. In: Defining the laboratory animal (Schneider HA, ed). Proc. IV ICLAS Symposium, pp 230-249.
65. Muthing J (1997) Neutral glycosphingolipids and gangliosides from spleen T lymphoblasts of genetically different inbred mouse strains. Glycoconjugate Journal 14, 241-248.
66. Myers DD (1978) Review of disease patterns and life span in aging mice: Genetic and environmental interactions. Birth defects: Original article series 14, 43-51.
67. Nagasawa H, Miyamoto M, Fujimoto M (1973) Reproductivity in inbred strains of mice and project for their efficient production. Exp. Animals (Japan) 22, 119-126.
68. Nakaya K, Nakao M, Ito A (1997) Echinococcus multilocularis: Mouse strain difference in hydatid development. J. Helminthology 71, 53-56.
69. Nikulina EM, Skrinskaya JA, Popova N. K (1991) Role of genotype and dopamine receptors in behavior of inbred mice in a forced swimming test. Psychopharmacology 105, 525-529.
70. Nishioka Y. (1987) Y-chromosomal DNA polymorphism in mouse inbred strains. Genet. Res. 50, 69-72.
71. Pagel J, Pegram V, Vaughn S, Donaldson P, Bridgers W (1973) The relationship of REM sleep with learning in mice. Behav. Biol. 9, 383-388.
72. Pennycuik PR (1967) A comparison of the effects of a variety of factors on the metabolic rate of the mouse. Aust. J. Biol. Med. Sci. 45, 331-346.
73. Pinchuck P, Maurer PH (1965) Antigenicity of polypeptides (poly alpha amino acids). XVI. Genetic control of immunogenicity of synthetic polypeptides in mice. J. Exp. Med. 122, 673-679.
74. Plant J, Glynn AA (1974) Natural resistance to Salmonella infection, delayed hypersensitivity and Ir genes in different strains of mice. Nature 248, 345-347.
75. Polanski Z (1990) Different response of maturing oocytes from two inbred strains of mice to sperm penetration. Folia Biol. 38, 13-19.
76. Pope BL, Chourmouzis E, MacIntyre JP, Lee S, Goodman MG (1994) Murine strain variation in the natural killer cell and proliferative responses to the immunostimulatory compound 7-Allyl-8-oxoguanosine: Role of cytokines. Cell. Immunol. 159, 194-210.
77. Quezada-Calvillo R, Senchyna M, Underdown BJ (1993) Characterization of intestinal gamma-glucoamylase deficiency in CBA/Ca mice. American Journal of Physiology - Gastrointestinal and Liver Physiology 265, G1150-G1157.
78. Rager-Zisman B, Ju G, Udem S (1976) Resistance and susceptibility of mice to infection with measles virus. Fed. Proc. 35, 391.
79. Roberts A, Thompson JS (1976) Inbred mice and their hybrids as an animal model for atherosclerosis research. In: Atherosclerosis Drug Discovery (Day CE, ed). New York: Plenum Press, pp. 313-327.
80. Roderick TH (1963) The response of twenty-seven inbred strains of mice to daily doses of whole-body X-irradiation. Radiation Res. 20, 631-639.
81. Roderick TH, Wimer RE, Wimer CC, Schwartzkroin PA (1973) Genetic and phenotypic variation in weight of brain and spinal cord between inbred strains of mice. Brain Res. 64, 345-353.
82. Rubinstein P, Liu N, Strenn EW, Decary F (1974) Electrophoretic mobility and agglutinability of red blood cells: a `new' polymorphism in mice. J. Exp. Med. 139, 313-322.
83. Russell ES, Neufeld EF, Higgins CT (1951) Comparison of normal blood picture of young adults from 18 inbred strains of mice. Proc. Soc. Exp. Biol. Med. 78, 761-766.
84. Saito N, Natori T (1985) Low responsiveness to MLM bacilli associated with an impaired macrophage function in CBA/JK mice. Exp. Clin. Immunogenet. 2, 24-35.
85. Sakagami T, Dixon M, ORourke J, Howlett R, Alderuccio F, Vella J, Shimoyama T, Lee A (1996) Atrophic gastric changes in both *Helicobacter felis* and *Helicobacter pylori* infected mice are host dependent and separate from antral gastritis. Gut 39, 639-648.
86. Schlager G (1968) Kidney weight in mice: strain differences and genetic determination. J. Hered. 59, 171-174.
87. Schlager G, Dickie MM (1967) Spontaneous mutations and mutation rates in the house mouse. Genetics 57, 319-330.
88. Schlager G, Weibust RS (1967) Genetic control of blood pressure in mice. Genetics 55, 537-549.
89. Sharp JG, Riches AC, Littlewood V, Thomas DB (1975) Spontaneous hepatomas in old male CBA mice. A potential model for the study of immunological surveillance. Anat. Rec. 181, 477.
90. Shepard CC, Habas JA (1967) Relation of infection to tissue temperature in mice infected with Mycobacterium marinum and Mycobacterium leprae. J. Bacteriol. 93, 790-796.
91. Shimosato K, Saito T, Marley RJ (1994) Genotype-specific blockade of cocaine-induced weight loss by the protein synthesis inhibitor, anisomycin. Life Sciences 55, PL293-PL299.

92. Shire JGM (1968) Genetics and the study of adrenal and renal function in mice. In: Progress in Endocrinology. Proceedings of the Third International Congress of Endocrinology, Mexico. pp 328-332.

93. Shire JGM, Bartke A (1972) Strain differences in testicular weight and spermatogenesis with special reference to C57BL/10J and DBA/2J mice. J. Endocrinol. 55, 163-171.

94. Sinha YM, Salocks CB, Vanderlaan WP (1975) Prolactin and growth hormone levels in different inbred strains of mice: patterns in association with estrous cycle, time of day and perphenazine stimulation. Endocrinol. 97, 1112-1122.

95. Smith GS, Walford RL, Mickey MR (1973) Lifespan and incidence of cancer and other diseases in selected long-lived inbred mice and their F1 hybrids. J. Natl. Cancer Inst. 50, 1195-1213.

96. Southwick CH, Clark LH (1966) Aggressive behavior and exploratory activity in fourteen mouse strains. Am. Zool. 6, 559.

97. Storer JB (1966) Longevity and gross pathology at death in 22 inbred strains of mice. J. Gerontol. 21, 404-409.

98. Storer JB (1967) Relation of lifespan to brain weight, body weight and metabolic rate among inbred mouse strains. Exp. Gerontol. 2, 173-182.

99. Suran AA (1973) Hypoxanthine-guanine phorphoribosyl transferase in brains of mice. Regional distribution in seven inbred mouse strains. Life Sci. 13, 1779-1788.

100. Takahashi M, Kleeberger SR, Croxton TL (1995) Genetic control of susceptibility to ozone-induced changes in mouse tracheal electrophysiology. American Journal of Physiology - Lung Cellular and Molecular Physiology 269, L6-L10.

101. Tateda K, Takashima K, Miyazaki H, Matsumoto T, Hatori T, Yamaguchi K (1996) Noncompromised penicillin-resistant pneumococcal pneumonia CBA/J mouse model and comparative efficacies of antibiotics in this model. Antimicrobial Agents & Chemotherapy 40, 1520-1525.

102. Thomas PE, Hutton JJ, Taylor BA (1973) Genetic relationship between aryl hydrocarbon hydroxylase inducibility and chemical carcinogen induced skin ulceration in mice. Genetics 74, 655-659.

103. Tunnicliff G, Wimer CC, Wimer RE (1973) Relationships between neurotransmitter metabolism and behavior in seven inbred strains of mice. Brain Res. 61, 428-434.

104. Valatx JL, Bugat R (1974) Facteurs génétiques dans le determinisme du cycle veille-sommeil chez la souris. Brain Res. 69, 315-330.

105. Vaz NM, Phillips-Quagliata JM, Levine BB, Vaz EM (1971) H-2 linked genetic control of immune responsiveness to ovalbumin and ovomucoid. J. Exp. Med. 134, 1335-1348.

106. Wahlsten D (1973) Contribution of the genes albinism (c) and retinal degeneration (rd) to a strain-by-training procedure interaction in avoidance learning. Behav. Genet. 3, 303-316.

107. Waymouth C (1973) Erythrocyte sodium and potassium levels in normal and anemia mice. Comp. Biochem. Physiol. 44A, 751-766.

108. Whitmore AC, Whitmore SP (1985) Subline divergence within Strong's C3H and CBA inbred strains. A review. Immunogenetics 21, 407-428.

109. Willott JF, Aitkin LM, McFadden SL (1993) Plasticity of auditory cortex associated with sensorineural hearing loss in adult C57BL/6J mice. J. Comp. Neurol. 329, 402-411.

110. Willott JF, Erway LC, Archer JR, Harrison DE (1995) Genetics of age-related hearing loss in mice. II. Strain differences and effects of caloric restriction on cochlear pathology and evoked response thresholds. Hearing Research 88, 143-155.

111. Wimer RE, Wimer CC, Roderick TH (1969) Genetic variability in forebrain structures between inbred strains of mice. Brain Res. 16, 257-264.

112. Xidieh CF, Singer-Vermes LM, Calich VLG, Burger E (1994) Plasma amylase levels as a marker of disease severity in an isogenic murine model of paracoccidioidomycosis. Journal of Medical and Veterinary Mycology 32, 37-45.

113. Yuhas JM (1968) The central nervous system syndrome of the mouse: effects of strain, age and conditioning exposure. Radiation Res. 35, 714-721.

114. Zelentsov AG (1974) Susceptibility of inbred mice to helminths. II. Development of Opisthorchis felineus in A/He, CBA/Lac, CC57W/Mv, C57BL/6J, DBA/2J and SWR/J mice [in Russian]. Med. Parazit (Mosk.). 43, 95-98.