

APPENDIX

Winners of the Nobel Prize in Physiology or Medicine, their celebrated discoveries, and their principal model systems. The listed information is based mainly on compilations by the National Research Council (1985) and the Nobel Foundation (<https://www.nobelprize.org/prizes/lists/all-nobel-laureates-in-physiology-or-medicine/>). Please note that most of the winners worked with multiple model systems, not all of which are listed here.

Year	Winner(s)	Discovery or Research Area	Experimental System(s)
1901	von Behring	Serum therapy	Guinea pig
1902	Ross	Mechanisms of malaria	Mosquito, human, diverse birds
1903	Finsen	Light radiation therapy	Bacteria (various)
1904	Pavlov	Physiology of digestion	Dog
1905	Koch	Mechanisms of tuberculosis	Cattle, sheep
1906	Golgi, Cajal	Fine structure of the nervous system	Human, other mammals, birds, reptiles
1907	Laveran	Protozoa as causes of disease	Human, protozoa, mammal, bird, fish
1908	Metchnikov, Ehrlich	Immune mechanisms	Guinea pig
1909	Kocher	Thyroid gland function and disease	Human
1910	Kossel	Proteins and nucleic acids	Bird
1911	Gullstrand	Dioptrics of the eye	Human
1912	Carrel	Blood vessel and organ transplantation	Dog
1913	Richet	Anaphylaxis	Dog, rabbit
1914	Barany	Vestibular physiology and pathology	Human
1919	Bordet	Immunity	Guinea pig, horse, rabbit
1920	Krogh	Regulation of capillary flow	Frog
1922	Hill, Meyerhof	Muscle physiology	Frog

(continued)

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1923	Banting, Macleod	Insulin	Dog, rabbit, fish
1924	Einthoven	Electrocardiogram	Human, dog, frog
1926	Fibiger	<i>Spiroptera carcinoma</i> (a parasitic roundworm)	Rat, cockroach
1927	Wagner-Jauregg	Malaria inoculation to treat dementia paralytica	Human
1928	Nicolle	Typhus	Monkey, chimpanzee, pig, rat, mouse
1929	Eijkman, Hopkins	Antineuritic and growth-stimulating vitamins	Bird
1930	Landsteiner	Human blood groups	Human
1931	Warburg	Respiratory enzymes	Yeast
1932	Sherrington, Adrian	Neuron function	Frog, dog, cat
1933	Morgan	Role of chromosomes in heredity	Fruit fly
1934	Whipple, Minot, Murphy	Liver therapy in cases of anemia	Human, dog
1935	Spemann	Organizer effects in embryonic development	Amphibian
1936	Dale, Loewi	Chemical transmission by neurons	Cat, mammal, frog, reptile, bird
1937	Szent-Gyorgyi Nagyrapolt	Cellular combustion and vitamin C	Potato, pepper, lemon
1938	Heyman	Neural regulation of breathing	Dog
1939	Domagk	Antibacterial effects of prontosil	Mouse, rabbit
1943	Dam, Doisy	Vitamin K	Rat, mouse, dog, chick, alfalfa, fish meal
1944	Erlanger, Gasser	Properties of single nerve fibers	Frog, cat
1945	Fleming, Chain, Florey	Penicillin	<i>Penicillium</i> bacteria
1946	Muller	Mutations produced by X-ray irradiation	Fruit fly
1947	Cori, Cori, Houssay	Catalytic conversion of glycogen	Frog, toad, dog
1948	Müller	DDT as a an insecticide	Beetle, fly, aphid, gnat
1949	Hess, Moniz	Hypothalamus; prefrontal lobotomies	Cat, human
1950	Kendall, Reichstein, Hench	Adrenal cortical hormones	Cattle, dog, human
1951	Theiler	Yellow fever	Monkey, mouse
1952	Waksman	Streptomycin against tuberculosis	Guinea pig
1953	Krebs, Lipmann	Citric acid cycle; coenzyme A	Pigeon
1954	Enders, Weller, Robbins	Cultivation of the polio virus	Monkey, human, mouse, polio virus
1955	Theorell	Oxidation enzymes	Horse
1956	Cournand, Forssmann, Richards	Cardiovascular pathology and heart catheterization	Human
1957	Bovet	Antihistamines	Dog, rabbit
1958	Beadle, Tatum, Lederberg	Genetic analysis of metabolism; bacterial genetics	Fruit fly, snapdragon, neurospora, <i>Escherichia coli</i>

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1959	Ochoa, Kornberg	Biological synthesis of nucleic acids	<i>Azotobacter</i> , <i>E. coli</i> , snake, mycobacterium, bacteriophage T2, calf
1960	Burnet, Medawar	Acquired immune tolerance	Rabbit, cattle, mouse, sheep, chick
1961	von Bekesy	Mechanisms of cochlear function	Guinea pig
1962	Wilkins, Watson, Crick	Structure and function of nucleic acids	Turnip yellow mosaic virus, tobacco mosaic virus, <i>E. coli</i>
1963	Eccles, Hodgkin, Huxley	Ionic basis of neuronal signaling; neuronal inhibition	Cat, frog, squid, crab
1964	Bloch, Lynen	Cholesterol and fatty acid metabolism	Rat, yeast
1965	Jacob, Lwoff, Monod	Genetic control of enzyme and virus synthesis	Bacteriophage, <i>E. coli</i>
1966	Rous, Huggins	Tumor-inducing viruses; hormonal treatment of prostate cancer	Rat, chicken, rabbit, virus, dog, rat
1967	Granit, Hartline, Wald	Visual processing in eyes	Frog, rabbit, snake, eel, horseshoe crab, fish, squid, chicken
1968	Holley, Khorana, Nirenberg	Interpretation of the genetic code; protein synthesis	Rat, <i>E. coli</i> , yeast, virus, frog, guinea pig
1969	Delbrück, Hershey, Luria	Viral genetics	Bacteria, bacteriophage
1970	Katz, von Euler, Axelrod	Neurotransmitter storage, release, and inactivation	Squid, Frog, Cat, Rat
1971	Sutherland	Hormone action	Mammalian liver
1972	Edelman, Porter	Chemical structure of antibodies	Guinea pig, human, rabbit
1973	von Frisch, Lorenz, Tinbergen	Organization and elicitation of behavior patterns	Bee, wasp, bird, fish
1974	Claude, de Duve, Palade	Cellular organization	Chicken, guinea pig, rat
1975	Baltimore, Dulbecco, Temin	Tumor viruses	Poliovirus, monkey, virus, mouse, chicken
1976	Blumberg, Gajdusek	Origin and transmission of infectious diseases	Human, chimpanzee
1977	Guillemin, Schally, Yalow	Peptide hormones in the brain; peptide radioimmunoassays	Sheep, pig, human
1978	Arber, Smith, Nathans	Restriction enzymes	Bacteria
1979	Cormack, Hounsfield	Computer-assisted tomography	Human, pig
1980	Benacerraf, Dausset, Snell	Immune reactions to cell surface complexes	Human, guinea pig, mouse
1981	Sperry, Hubel, Wiesel	Functional lateralization and visual processing of the cerebral cortex	Human, cat, monkey
1982	Bergstrom, Samuelson	Prostaglandins	Soybean, sheep, rabbit
1983	McClintock	Mobile genetic elements	Corn
1984	Milstein, Kohler, Jerne	Monoclonal antibody production	Mouse, plasma cells
1985	Brown, Goldstein	Regulation of cholesterol metabolism	Human cells

(continued)

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1986	Cohen, Levi-Montalcini	Growth factors	Bird, mouse, in vitro
1987	Tonegawa	Generating antibody diversity	Mouse, in vitro
1988	Black, Elion, Hitchings	Drug treatment principles	Human, guinea pig, mouse, rat, bacteria, in vitro
1989	Bishop, Varmus	Retroviral oncogenes	Virus, chicken
1990	Murray, Thomas	Organ and cell transplantation	Human
1991	Neher, Sakman	Functions of single ion channels	Mammalian cells
1992	Fischer, Krebs	Reversible protein phosphorylation	In vitro
1993	Roberts, Sharp	Split genes	Adenovirus
1994	Gilman, Rodbell	G-proteins and signal transduction	In vitro
1995	Lewis, Nüsslein-Vollhard, Wieschaus	Genetic control of embryonic development	Fruit fly
1996	Doherty, Zinkernagel	Cell-mediated immune defense	Virus, mouse, in vitro
1997	Prusiner	Prions	Human, hamster, mouse
1998	Furchgott, Ignarro, Murad	Nitric oxide signaling in the cardiovascular system	Rabbit, cattle, rat, in vitro
1999	Blobel	Intracellular transport signals	In vitro
2000	Carlsson, Greengard, Kandel	Neuronal signal transduction	Human, mouse, rat, <i>Aplysia</i>
2001	Hartwell, Hunt, Nurse	Cell cycle regulation	Yeast, sea urchin
2002	Brenner, Horvitz, Sulston	Genetic regulation of development; programmed cell death	<i>Caenorhabditis elegans</i>
2003	Lauterbur, Mansfield	Magnetic resonance imaging	Magnets and analytical techniques
2004	Axel, Buck	Odorant receptors	Rat, mouse
2005	Marshall, Warren	<i>Helicobacter pylori</i> , gastritis, and peptic ulcers	<i>Helicobacter</i> , human
2006	Fire, Mello	Gene silencing by double-stranded RNA	<i>C. elegans</i>
2007	Capecchi, Evans, Smithies	Targeted modification of genes in embryonic stem cells	Mouse, mammalian cells
2008	zur Hausen, Barré-Sinoussi, Montagnier	Link between human papilloma virus and cancer; human immunodeficiency virus	Viruses, human
2009	Blackburn, Greider, Szostak	Telomere function and regulation	Protozoa (<i>Tetrahymena</i>), yeast, human
2010	Edwards	In vitro fertilization	Human
2011	Beutler, Hoffmann, Steinman	Activation of innate immunity	Fruit fly, mouse
2012	Gurdon, Yamanaka	Reprogramming of cells to pluripotency	Frog, mouse
2013	Rothman, Schekman, Südhof	Regulation of intracellular vesicle trafficking	Yeast, rat, cow, mammalian cells

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2014	O'Keefe, Moser, Moser	Hippocampal place cells	Rat
2015	Campbell, Omura, Youyou	Roundworm infection therapy	Bacteria, human, mammals, plant (<i>Artemisia</i>)
2016	Ohsumi	Mechanisms of autophagy	Yeast
2017	Hall, Rosbach, Young	Molecular mechanisms of circadian rhythms	Fruit fly
2018	Allison, Honjo	Cancer immune checkpoint therapy	Mouse, human
2019	Kaelin, Ratcliffe, Semenza	Oxygen sensing by cells	Mouse, mammalian cells
2020	Alter, Houghton, Rice	Hepatitis C virus	Virus, human, chimpanzee

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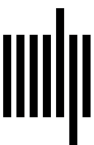
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