OMB No. 0925-0001 and 0925-0002 (Rev. 10/2021 Approved Through 01/31/2026)

## BIOGRAPHICAL SKETCH

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NAME: Richard A. Goldsby

POSITION TITLE: Acting CEO, HasenTech, Inc.

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)*

| INSTITUTION AND LOCATION | DEGREE *(if applicable)* | Completion Date MM/YYYY | FIELD OF STUDY |
|---|---|---|---|
| University of Kansas | BA | 1957 | Chemistry |
| University of California at Berkeley | PhD | 1961 | Chemistry |

**Personal Statement**

Although trained in chemistry and biochemistry, from 1975, until my retirement in 2011and beyond, I have worked and taught in the area of immunology. In addition to basic studies of immunology, my laboratory has been involved in the use of hybridoma technology and monoclonal antibodies to study basic immunology and to create immunological technologies for the treatment of disease. I have also had the opportunity to teach immunology to legions of students in the classroom, to many American Association for the Advancement of Science/ Chautauqua workshops for college teachers and by the creation with coauthors of textbooks that have been widely used for the teaching of immunology and cancer biology. My career has also provided the experience of founding two immunologically based companies, first Hematech and then HasenTech, converting immunological discoveries to drugs.

**Positions, Scientific Appointments, and Honors**

1957-1958 Organic Chemist, Monsanto, St. Louis, MO
1961-1966 Research Biochemist, Central Research, DuPont, Wilmington DE
1966-1970 Assistant Prof. Biology, Yale, New Haven, CT
1970-1972 Associate Prof. Biology, Yale, New Haven, CT
1971-1972 Master of Pierson College, Yale, New Haven, CT
1972-1982 Professor of Chemistry, Univ. of Maryland, College Park, MD
1982-1987 Amanda and Lisa Cross Professor of Biology, Amherst College
1988-1992 Distinguished University Professor of Veterinary & Animal Science, University of Massachusetts at Amherst

1992-Present Adjunct Professor of Veterinary & Animal Science, University of Massachusetts at Amherst
1992-2010 Professor of Biology & Simpson Lecturer (an endowed chair), Amherst College, Amherst MA
1998-2005 Co-Founder and Member, Board of Directors, Hematech, LLC
2010-2011 Thomas B. Walton Jr. Memorial Professor of Biology, Amherst College, Amherst, MA
2022-Present Co-Founder & Acting CEO, HasenTech, INC

**Scientific Appointments**

1986-1988 Member, Allergy & Clinical Immunology Study Section, NIAID/NIH
1988-1992 Member, Board of Scientific Counselors, National Institute of Allergy and Infectious Diseases/NIH
1987-1996 Consultant on Hybridoma Technology to Bayer USA
1989-1994 Member of The Visiting Committee for the Harvard School of Public Health
1992-2003 Course Director, NSF-AAAS Chautauqua Immunology Short Course for College Teachers
1992-1996 Member, NSF Grant Review Panel: Signal Transduction, Division of Cell Biology
1996-1999 Member, Biological Sciences Advisory Committee, National Science Foundation
2008-2012 Member, Scientific Advisory Board, Massachusetts Life Sciences Center
2009-2015 Member Scientific Advisory Board, ImmunoGenes AG

**Recognition & Awards**

Named Chairs at Amherst College (Amanda & Lisa Cross Professor, Simpson Lecturer, Thomas B. Walton Jr. Memorial Professor)
Distinguished University Professor, University of Massachusetts
National Research Council Senior Associateship
American Society of Cell Biology E.E. Just Lecturer
American Association of Immunologists, Vanguard Lecturer
Fellow, the American Association of Immunologists
Phi Beta Kappa

**Contributions to Science Education**

**Books**

*Cells and Energy*, 1st ed., 1967; 2nd ed., 1977, Macmillan
*Race and Races*, 1st ed., 1971; 2nd ed., 1977, Macmillan
*Thinking AIDS* (with Mary Catherine Bateson) 1989, Addison Wesley
*Kuby Immunology* 4th edition (with T.J. Kindt & B.A. Osborne) 2000, W.H. Freeman
*Immunology* 5th edition (with T.J. Kindt & B.A. Osborne) 2003, W.H. Freeman
*Kuby Immunology* 6th edition (with T.J. Kindt & B.A. Osborne), 2007, W.H. Freeman
*Case Studies in Cancer* (with R.J. B. Lee & J. Abramson) 2018, Norton
*Thinking Race* (with Mary Catherine Bateson) 2019, Rowman & Littlefield
The Biology of Cancer 3rd Edition by Robert A. Weinberg 2023 (R.A. Goldsby contributed Chapters 15 & 16)

**Contributions to Science**

**Isolation and replica plating of animal cell clones**: The now simple procedure of isolating clonal populations from cell cultures was a seemingly intractable one until my student Edith Zipser and I published the paper cited below.
**Goldsby, R.A**. and Zipser, E. 1969. The isolation and replica plating of mammalian cell clones. *Experimental Cell Research* 54:271.

**The first report of T cell hybrids:** While on an extended sabbatical Barbara Osbone and I succeeded in generating and immortalizing cell lines with T cell characteristics, the first T cell hybridomas, by applying then established techniques of somatic cell hybridization to cultures of immunological interest.
**Goldsby, R.A**., Osborne, B.A., Simpson, E., Herzenberg, L.A. 1977. Hybrid cell lines with T cell characteristics. *Nature*, 267: 707.

**Pioneered use of monoclonal antibody antibody technologies to animals of veterinary interest**
My laboratory was among the earliest to apply the power of hybridoma and monoclonal antibody technologies to the study, characterization and assay of immunoglobulins produced in animals of veterinary interest.
Srikumaran, S., Guidry, A.J., **Goldsby, R.A**. 1983. Bovine x mouse hybridomas that secrete bovine immunoglobulin $G_1$. *Science*, 220: 522.
This paper reported the first generation of antibodies from single normal B cells of cattle, providing a way of producing bovine antibodies of a single molecular sequence for standardization.
**Goldsby, R.A**., Srikumaran S., Arulanandam, A.R.N., Hague, B., Ponce de Leon, A., Sevoian, M., & Guidry, A.J. 1987. The application of hybridoma technology to the study of bovine immunoglobulins. *Vet. Immunol. Immunopath.* 17: 25.
This paper summarizes the work of my lab generating monoclonal antibodies against bovine immunoglobulin classes and the production of monoclonal bovine immunoglogulin standards for assays.

**Control of Staphylococcus enterotoxin B (SEB) induced inflammation by an engineered chimeric antibody:** Systemic inflammation induced by bacterial enterotoxins is a serious and sometimes life threatening complication of Staphylococcus aureus infection. My student M. E. Tilahun played a key role in the derivation and engineering of a chimeric antibody that effectively incorporated the antigen binding sites of two synergistically activing neutralizing monoclonal antibodies. This was an early, and original at its time, approach to the use of chimeric antibodies as antibacterial agents, in this case directed against an inducer of systemic inflammation.
Tilahun, M. E., G. Rajagopalan, N. Shah-Mahoney, R. G. Lawlor, A. Y.Tilahun, C. Xie, K. Natarajan, D. H. Margulies, D. I. Ratner, B. A. Osborne, and **R. A. Goldsby**. 2010. Potent Neutralization of SEB by Synergistic Action of Chimeric Antibodies. *Infect. Immun.* 78:2801

**Formation of the first biotech startup to clone cows expressing human antibodies:** In 1999 Hematech was formed by three scientists, James Robl, Barbara Osborne and Richard Goldsby and James Barton, a lawyer. HemaTech's goal was to create genetically engineered cows that produced human antibodies in response to immunization.

Foundational paper: Kuroiwa Y, Kasinathan P, Choi YJ, Naeem R, Tomizuka K, Sullivan EJ, Knott JG, Duteau A, **Goldsby RA**, Osborne BA, Ishida I, Robl JM. Cloned transchromosomic calves producing human immunoglobulin. Nat Biotechnol. 2002 Sep;20(9):889-94.Epub 2002 Aug 12. PubMed PMID: 12172556.

Since antibodies are broadly neutralizing for many viruses and bacteria, we reasoned hat a large animal producing human polyclonal antibodies could serve as a valuable source of therapeutic antibodies, offering protection against or treatment of a wide variety of bacteria or viruses of biomedical interest. We took advantage of the cloning technology developed by Robl and produced dozens of cattle that lacked the genetic capability to produce bovine antibodies but had been genetically modified to express a repertoire of human antibodies. These cattle were further modified by deletion of the genetic locus that encodes susceptibility to BSE. Hematech and the three patents listed below undergirding the technology were sold by the founders to Kirin Pharmaceuticals in 2005.

a. Patent # 7,491,867 - issued 2/17/09
   Expression of xenogenous (human) immunoglobulins in cloned, transgenic ungulates
   Inventors: Robl; James M. (Brandon, SD), **Goldsby**; **Richard A**. (Leverett, MA), Ferguson; Stacy E. (Dallas, TX), Kuroiwa; Yoshimi (Sioux Falls, SD), Tomizuka; Kazuma (Gunma, JP), Ishida; Isao (Isehara, JP), Osborne; Barbara A. (Leverett, MA)

b. Patent # 7,414,170 - issued 8/19/08
   Transgenic bovines capable of human antibody production
   Inventors: Robl; James M. (Brandon, SD), Kasinathan; Poothappillai (Sioux Falls, SD), **Goldsby; Richard A**. (Leverett, MA), Kuroiwa; Yoshimi (Sioux Falls, SD), Tomizuka; Kazuma (Takasaki, JP), Ishida; Isao (Isehara, JP), Osborne; Barbara (Leverett, MA)

c. Patent # 7,074,983 - issued 7/11/06
   Transgenic bovine comprising human immunoglobulin loci and producing human immunoglobulin Inventors: Robl; James M. (Brandon, SD), ***Goldsby*; Richard A.** (Leverett, MA), Ferguson; Stacy E. (Dallas, TX), Kuroiwa; Yoshimi (Takasaki, JP), Tomizuka; Kazuma (Takasaki, JP), Ishida; Isao (Isehara, JP), Osborne; Barbara A. (Leverett, MA)