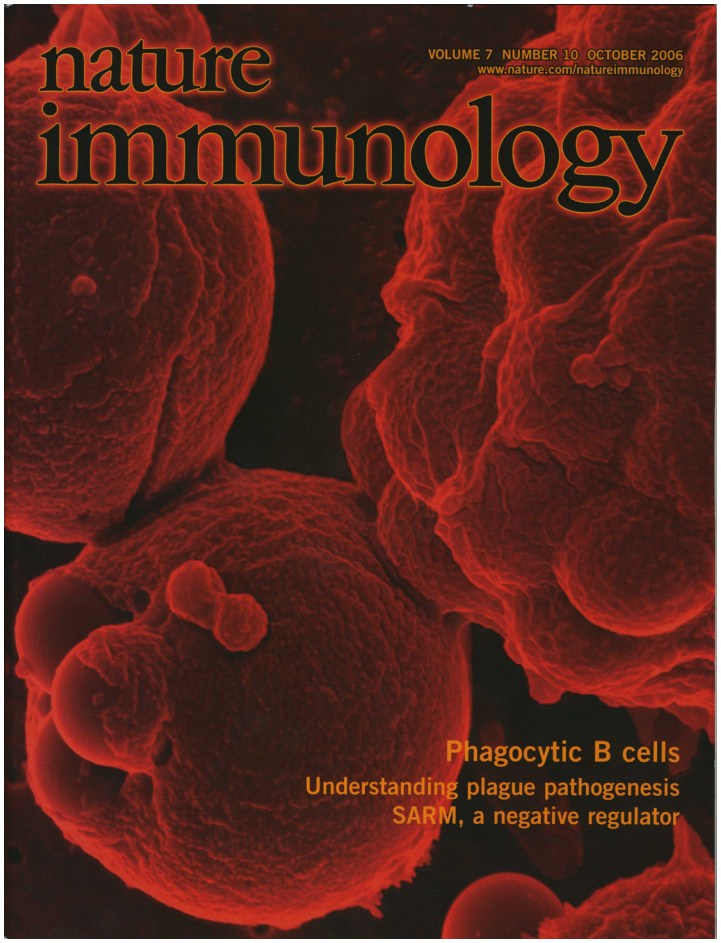
Cover Stories:
Major Scientific Publications Featuring NRI-Funded Research

National Research Initiative
Competitive Grants Program

United States Department of Agriculture

Cooperative State Research, Education, and Extension Service

2007 No. 12



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Jun Li, Daniel R Barreda, Yong-An Zhang, Hani Boshra, Andrew E. Gelman, Scott LaPatra, Lluis Tort & J Oriol Sunyer, 2006. B Lymphocytes From Early Vertebrates Have Potent Phagocytic And Microbicidal Abilities, *Nature Immunology*, 7(10), 1116-1124.

Phagocytosis, the engulfment of large particles by immune cells, plays an essential role in the ingestion and destruction of pathogens. In mammals and fish cells, phagocytosis is primarily carried out by professional phagocytic cells of myeloid origin that include polymorphonuclear cells (PMNs), monocytes, and macrophages. It is widely believed that B lymphocytes are incapable of performing phagocytosis. The results of this study, however, indicate B cells in bony fish, such as rainbow trout and catfish, have potent phagocytic and bactericidal capabilities. Thus, B lymphocytes comprise a major fraction of the professional phagocytes in these species. This is the first time that such phagocytic activity has been described in the B cells from any animal species. The results from this study support the idea that B cells evolved from ancient phagocytic/inflammatory cells and that fish B cells have retained the ancient phagocytic and inflammatory potential unlike mammalian B cells that lost this function.

Most farmed fish species in the United States and worldwide are bony fish and, similar to rainbow trout and catfish, are likely to contain phagocytic B cells. Aquaculture is the fastest growing animal food sector and disease and health management problems are the major hurdles for developing this agricultural industry. Most strategies for designing fish vaccines are based on vaccine approaches designed to work in mammalian species. While some of these strategies have been successful, many have proven a failure. The identification of this novel immune function in fish B lymphocytes will enable to apply this new knowledge towards the design of novel vaccines and therapeutics that play to the strengths of fish immunity. This in turn will lead to healthier fish communities, increased yield, and a thriving sector in agriculture.

This research was supported by the National Research Initiative's Animal Protection and Biosecurity Programs Unit of the USDA Cooperative State Research, Education, and Extension Service. This research was conducted at the Department of Pathobiology, School of Veterinary Medicine, and Hematology and Oncology, School of Medicine, University of Pennsylvania, Philadelphia, Pennsylvania.