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Emerging Area of Aging Research Long-Lived Animals with “Negligible Senescence”

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ABSTRACT: Field observations have suggested for quite some time that certain fish, turtles, and invertebrates have extremely long maximum life span potential. Age validation techniques have since confirmed these observations, but scientific analysis to understand the genetic and biochemical basis of this longevity has occurred only recently. The Centenarian Species and Rockfish Project now encompasses 13 pilot research projects, including such diverse investigations as histology, a cDNA library, and mitochondrial mutation analysis. In this document, the term “negligible senescence” is defined, and its background is given; age validation techniques are listed, and the various projects to date, including research results, are summarized.

KEYWORDS: centenarian; long-lived animals; negligible senescence

Aging research has advanced dramatically in the last several years, with much new information available on biochemical and genetic components of aging. However, curiously, one potential area of study for aging research identified at least 70 years ago has not advanced until recently: the analysis of long-lived animals. In the 1930s, it was proposed that some fish do not show signs of senescence.¹ Even though biological tools such as histology existed at that time, no known efforts were made to examine these animals.

The Centenarian Species and Rockfish Project was founded in 1995 to uncover the mechanisms that appear to retard aging in very long-lived animals such as rockfish, turtles, and whales. This new area of study in biomedical gerontology has the potential to reveal the genetic and biochemical processes involved in slow aging that then could be applied for human benefit. The project now incorporates 13 lines of research at several universities and laboratories in the United States and Europe. Although rockfish (genus *Sebastes*) have been the focus to date, biochemical profiling of turtle blood serum has started recently (see the turtle pilot study below), and whales are under consideration. Leonard Hayflick, discoverer of the “Hayflick limit” of cellular senescence and an advisor to this project, states “Guerin’s project is not only unique, but probes an area of almost total neglect in biogerontology yet an area with more promise to deliver valuable data than, perhaps, any other.”

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Ann. N.Y. Acad. Sci. 1019: 518–520 (2004). © 2004 New York Academy of Sciences.
doi: 10.1196/annals.1297.096