Poeciliid Research

One hundred years of guppy genetics

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Abstract. This note is a brief overview of pioneering studies conducted a hundred years ago by Danish researchers Johannes Schmidt, Øjvind Winge and Esben Ditlevsen at the Carlsberg Laboratory in Copenhagen, Denmark.
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The Carlsberg Laboratory in Copenhagen was founded in 1875 by J. C. Jacobsen, the founder of the Carlsberg Brewery, for the sake of knowledge and development of knowledge of biochemistry and other natural sciences (Figure 1). The laboratory's research focused in particular on the brewing process. The laboratory was divided in two departments, a chemistry department and a physiology department. In 1972, the laboratory was renamed the Carlsberg Research Center and specialized exclusively in the science of brewing.

In the history of this laboratory there was a scientist named Ernst Johannes Schmidt (2 January 1877 – 21 February 1933). He was a Danish biologist credited with discovering in 1920 that European eels migrate to the Sargasso Sea to spawn (Jarvis 2020).

Schmidt was also dedicated to his laboratory work. The Carlsberg Laboratory had a biobase for physiology and genetic experiments, including a large number of pure strains of guppy fish (*Poecilia reticulata*) that Schmidt maintained and observed for several generations. In 1920, exactly 100 years ago, Schmidt published a scientific paper entitled "Racial investigations. IV. The genetic behavior of a secondary sexual character". Although the terminology seems to have Nazi connotations, the paper actually deals with the first observations on the heredity and sexuality of guppy fish. The material was published in the annals of the Carlsberg laboratory (Comptes Rendus des Travaux de Laboratoire Carlsberg).

Shortly after the publication of the article, his younger Danish colleague Øjvind Winge (who was a pioneer in yeast genetics, May 19, 1886 - April 5, 1964) took over the research on guppy fish strains and developed new experimental programs on the sexuality and classical genetics of vertebrates, using the guppy fish as a model organism. During his work at Carlsberg Laboratory, Winge published a number of important papers on sex chromosomes (Winge 1922ab, 1934; Winge & Ditlevsen 1938, 1947) and even tried to approximate the location of eighteen genes observed in *P. reticulata* (Winge 1927).

Winge tracked down the hereditary transmission of several characters of color and shape in guppy, which he called "morphs" (Figure 2). Many researchers, as well as aquarium hobbyists, imported guppy strains from the Carlsberg Laboratory biobase at

the end of Winge's career. They continued Winge's research with great passion and objectivity.

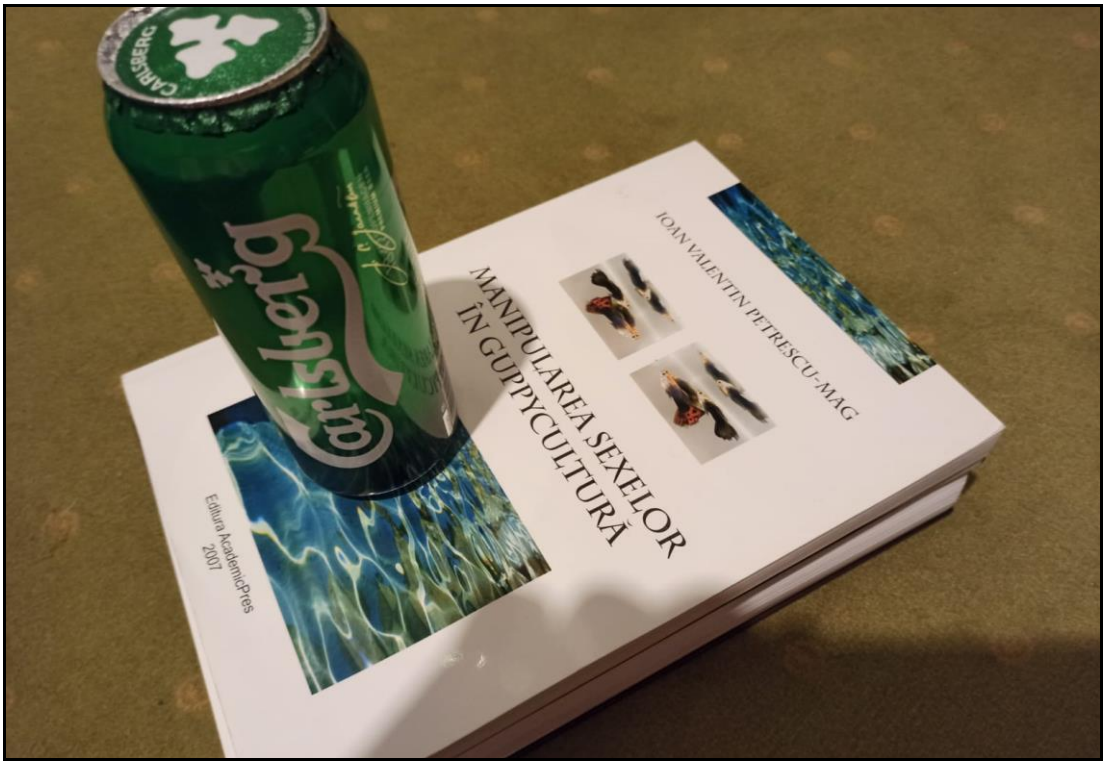

Figure 1. Carlsberg Laboratory: beer, hobby and science with echo today.

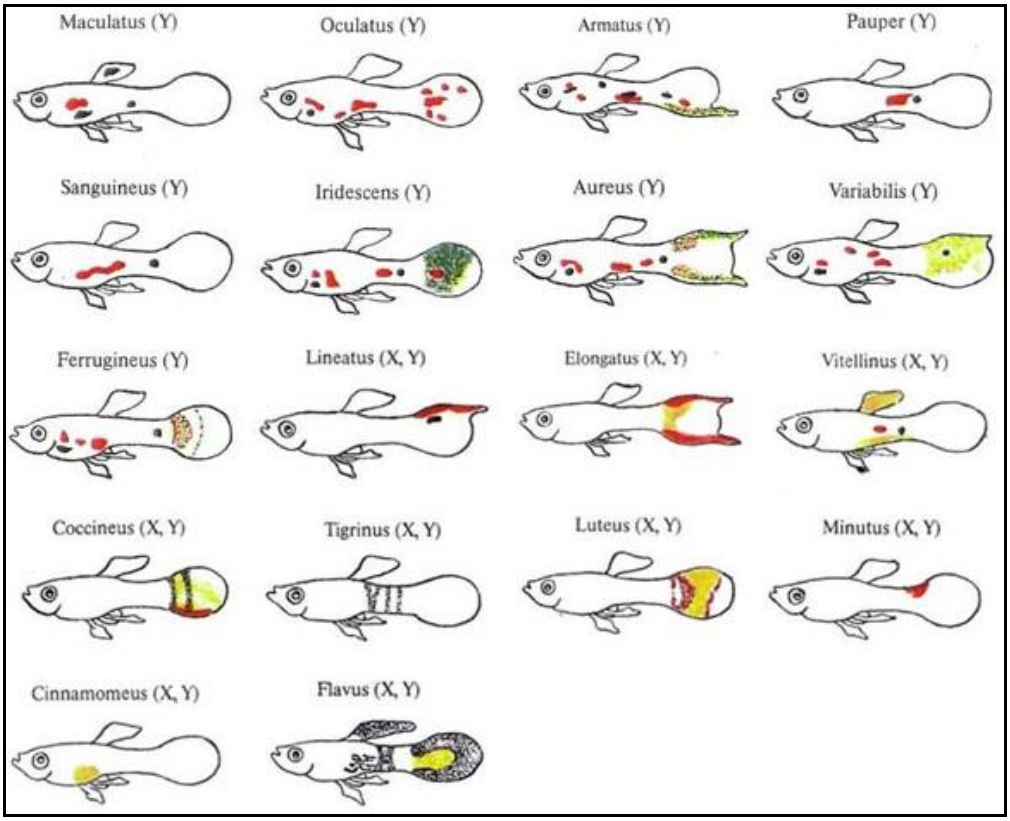

Figure 2. Guppy "morphs", studied by Winge one hundred years ago (source: Guppy Labs 2006).

Conflict of interest. Authors declare no conflict of interest. This article is not intended for advertising.

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