

New publication from The Royal Danish Academy of Sciences and Letters on models for measuring the behaviour of animals

Iven Reventlow: *Attempted Solution to a Fundamental Psychobiological Problem. How to Determine Individual and Milieu Parameters from Species-Typical Behaviour of Animals in Their Natural Environments.*

Edited and translated by Arne Friemuth Petersen. With a Commentary and a Postscript by Jens Mammen.

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The book sets out to find descriptive models for hierarchically organized behaviour using the relatively simple behavioural repertoire of the three-spined stickleback (*Gasterosteus aculeatus* L.) as a test case, but with potential generalizations to other species, including humans. In collaboration with statistician Georg Rasch, Reventlow arrived at determining quantitatively, for the first time in the study of behaviour, the relative effect upon a resulting, observed behaviour from the animal's sensitivity, motivation etc. (individual parameters) on the one hand, and those of the natural environment (milieu parameters) on the other.

Of special interest for the psychobiology of sticklebacks are his results concerning the motivational systems, that ethologists presume control two kinds of overt behaviour, as he presents experimentally based arguments for the existence of a third autonomous motivation-system for the male stickleback's building and maintenance of its nest which, together with the previously established two primary systems for mating and territorial defence, better explains the existing results than the ethologists' two-system's motivational hierarchy alone seems to be able to do.

As something also new, compared to traditional ethological methods, Reventlow presents a mathematical two-parameter model for the temporal development of motivation during an ongoing activity for the individual fish.

The ensuing Commentary and Postscript by Professor Jens Mammen address a number of problems inherent in the employed model and concludes that a 'waiting-time' model of the Weibull-type would be more advantageous for calculating the parameters and thereby quantifying the interaction between the individual and the milieu.

In fact this issue was intensely debated at the time in connection with the empirical investigations and raised some basic questions about demands to mathematical models and to collaboration between mathematicians and other scientists which were not fulfilled, leading to suboptimal conditions for the research project.

In the Postscript possible causes to these problems are discussed, building on available sources, including some biographical material. Also a simple way to use the proposed Weibull-model, applicable on both the original and possible new data, is presented.