

This Week's Citation Classic

CC/NUMBER 42
OCTOBER 17, 1983

Pandian T J. Intake, digestion, absorption and conversion of food in the fishes *Megalops cyprinoides* and *Ophiocephalus striatus*. *Mar. Biol.* 1:16-32, 1967.
[Zoological Lab., Univ. Madras, India and Biologische Anstalt Helgoland, Federal Republic of Germany]

Using energy and protein as indices, energetics components of food intake, absorption, and conversion were estimated in fishes of different weight (age) classes. Age does not affect absorption efficiency but depresses both rate and efficiency of food conversion. [The *SCI*[®] indicates that this paper has been cited in over 700 publications since 1967.]

T.J. Pandian
School of Biological Sciences
Madurai Kamaraj University
Madurai 625 021
India

August 19, 1983

"This contribution represents a part of my doctoral dissertation at the University of Madras. In the 1960s, most Indian university laboratories were equipped with meagre facilities, and graduate students had to largely depend on British-trained research supervisors. The 1960s also witnessed the birth of several new universities and consequently the supervisors were frequently moved from the parent to the new universities. To cite an extreme example, as a student I had been transferred to four different supervisors within three years. Yet there was no dearth of talent nor could these handicaps deter. Instead, they helped us to think independently, develop new ideas, and design simple but meaningful experiments. Perhaps few of my supervisors could have inspired me as much as Brody,¹ Gerking,² Kinne,³ and Winberg⁴ have. In fact, wanting to write up a masterpiece such as Brody's *Bioenergetics and Growth*, for fishes, was even then foremost on my mind.

"One or the other of the following may have caused the frequent citation of this

paper: feeding and growth estimates are regarded as a more reliable index of metabolism, as these are measured under less restrictive conditions, and the study offers scope for long-term observation of the same individual and facilitates deduction of total metabolism inclusive of energy demanded for partial or total anaerobiosis. Though time-consuming, I have chosen to study fish metabolism from the angle of food intake-conversion efficiency; indeed, many leading respiration physiologists have switched over to this approach to energetics.

"Until the dawn of the 1960s, hundreds of papers were written separately on feeding, digestion, growth, or respiration of fishes; thus, the research accumulated in the English-speaking countries remained piecemeal. I was perhaps the first to undertake an integrated study covering almost all the components of fish energetics.

"In the tropics, where the water temperature may not fluctuate remarkably, body size (age) and food availability must act as potent factors on fish productivity. This paper reports how fishes of different age classes utilize food. Among others, Weatherley⁵ predicted that this paper would have many implications for aquaculture. By 1975, aquaculture had become the current topic of most aquatic biologists and Weatherley's prediction did not go wrong.

"My guru, Otto Kinne, was the first to recognize the merit of the paper and to arrange for its speedy publication. Besides invoking many letters of appreciation, this paper became the cornerstone of my career. At the age of 37, I was offered a chair, awarded the Hooker Prize by the vice president of India for outstanding research work on fish energetics, and recently elicited an invitation from Academic Press to jointly edit a book series on animal energetics. I look back on this paper with pleasure, as this was my very first publication and it made me realize the enjoyment of research work under trying situations."

1. Brody S. *Bioenergetics and growth*. New York: Reinhold, 1945. 1023 p.
2. Gerking S D. The protein metabolism of the sunfishes of different ages. *Physiol. Zool.* 25:358-72, 1952.
3. Kinne O. Growth, food intake and food conversion in a euryplastic fish exposed to different temperatures and salinities. *Physiol. Zool.* 33:288-317, 1960. (Cited 120 times.)
4. Winberg G G. Rate of metabolism and food requirements of fishes. (Whole issue.) *Fish. Res. Board Can. Transl. Ser.* (194), 1960. 253 p.
5. Weatherley A H. *Growth and ecology of fish populations*. New York: Academic Press, 1972. p. 101.