

# Analysis of the Morphometric Characters of the Kuruma Shrimp (*Penaeus japonicus*) in the East China Sea and the Taiwan Strait

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## ABSTRACT

Morphometric variation was used to examine the stock structure of the kuruma shrimp in the East China Sea and the Taiwan Strait. Nine samples were collected, one from the north of the East China Sea, two from the south of the East China Sea, three from the inshore areas of Taiwan, and three from the middle of the Taiwan Strait. The 11 measurements made for each individual were size-standardized by Burnaby's method, and resulting measurements were used in the canonical variate analysis and cluster analysis by sexes. The results showed that all sampling areas were clustered into three distinct groups for each sex, the first group included the north of the East China Sea, the second group included inshore areas of Taiwan, the third group included the other areas. Shrimps often migrate from inshore to offshore as they grow to specific size, so the second group (the smaller individuals) was considered as the unrecruiting offspring of the third group (the larger ones). The morphometric variation between the second and the third groups could be attributed to different life stage. We, therefore, suggest that the kuruma shrimp in the East China Sea and the Taiwan Strait can be discriminated into two stocks. One is in the north of the East China Sea, and the other is in the south of the East China Sea and the Taiwan Strait. The present study demonstrates that the utility of morphometric characters for defining stocks of kuruma shrimp is available, but further verification of the stock structure (e.g., genetic evidence) is essential.

**Key words:** Morphometric variation, Stock structure, Canonical variate analysis, Cluster analysis.

## INTRODUCTION

Knowledge of stock structure is essential for rational exploitation and management of exploited species. Morphological variability among different geographical populations could be attributed to different genetic structure of populations and to different environmental conditions prevailing in each geographic area (Mamuris *et al.*, 1998). The animals, therefore, with the same morphometric measurements are often assumed to constitute a stock (Waldmen *et al.* 1988), and that has been used widely in fishery stock differentiation stud-

ies (Avsar, 1994).

Multivariate analysis of a set of morphometric characters is regarded as a more appropriate method than the use of a single character to identify different stocks (Thorpe, 1987). Morphometric variation is often confounded by size factor, so morphometric data analyzed should be free from the effects of size variation. Several methods can be used to obtain size-free morphometric data, such as regression technique (Reist, 1985), shearing principal components analysis (Humphries *et al.*, 1981) and Burnaby's method (Bookstein *et al.*, 1985).