



Sex-bias of core intestinal microbiota in different stocks of Chinese mitten crabs (*Eriocheir sinensis*)



Su Jiang, Xinping Guo, Xiaobin Qian, Xianhui Ning, Cong Zhang, Shaowu Yin, Kai Zhang
College of Marine Science and Engineering, Nanjing Normal University

Introduction

The intestinal microbiota is synergistically shaped by internal factors of the host and external factors associated with survival processes. The core microbiota plays a key role in intestinal stability. The average Variation Degree (AVD) index can be used to evaluate the stability of the intestinal microbial community. The smaller the AVD index, the higher is the stability.

Gender, as one of the internal factors of the host, plays a remarkable role in shaping the differences and uniqueness of intestinal microbiota.

The composition of the intestinal microbiota of different stocks of Chinese mitten crabs varies significantly due to differences in internal characteristics and external reproduction conditions. However, the core composition of intestinal microbiota and gender differences have not been reported.

Materials and methods

A total of 215 healthy and active Chinese mitten crabs were randomly selected from six regions: Chongming, Dongying, Gaochun, Panjin, Wuxi and Xinghua, including 105 female crabs and 110 male crabs.

The contents of five Chinese mitten crabs of the same sex in the same area were randomly mixed and placed in a frozen tube, recorded as a sample.

Intestinal microbiota sequencing technology: 16S rRNA

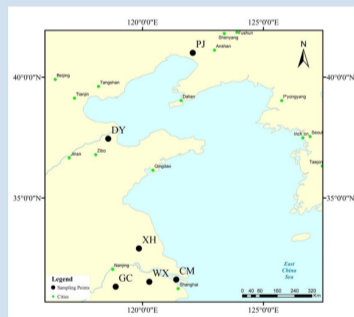


Fig. 1 Map of sampling points.

Results

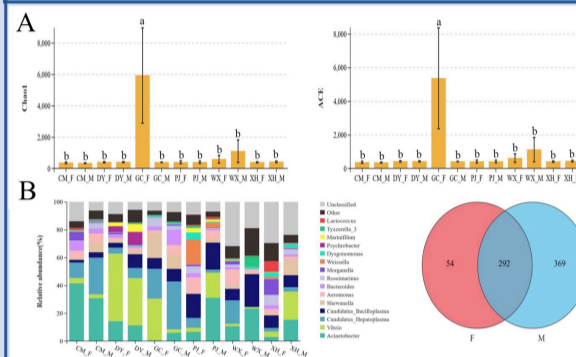


Fig.2 (A) Alpha diversity analysis showed that the Chao 1 index and ACE index of GC_F were significantly higher than those of the other stocks ($P < 0.05$).

(B) Composition of intestinal microbiota and indicator species. Proteobacteria, Tenericutes, Bacteroidetes and Firmicutes were the dominant phyla. The OTUs of intestinal microbiota of crabs of different genders were significantly different.

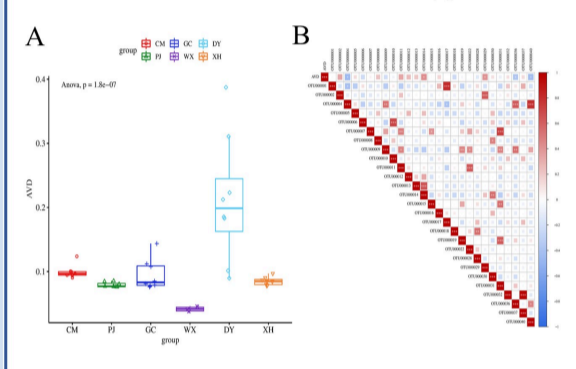


Fig.3 Correlation analysis between intestinal core microbiota and stability.

(A) There were significant differences in the AVD index of intestinal microflora among the six stocks ($P < 0.05$).

(B) The core OTUs of four stocks of Chinese mitten crabs in the Yangtze River system play an important role in maintaining intestinal stability.

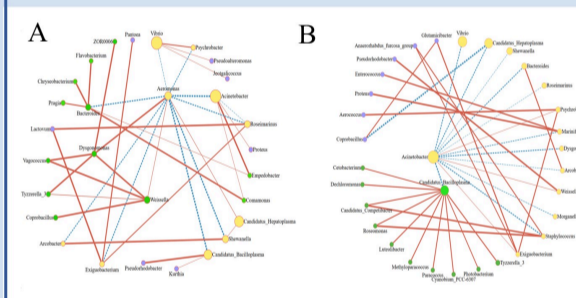


Fig.4 Species correlation network diagram of the intestinal microbiota.

(A) The *Bacteroides*, *Dysgonomonas*, and *Weissella* in female crabs were positively correlated with other microbiota, and *Aeromonas* was negatively correlated.

(B) *Candidatus_Bacilloplasma* and *Acinetobacter* were the main microbiota with high connectivity in male crabs.

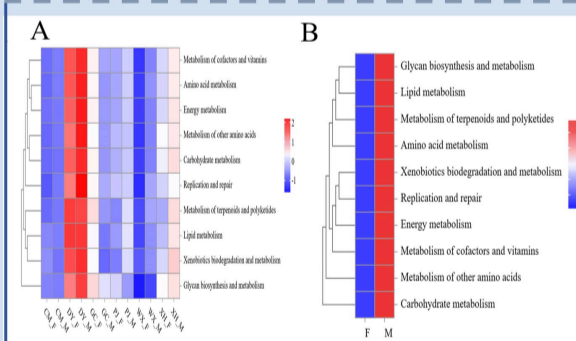
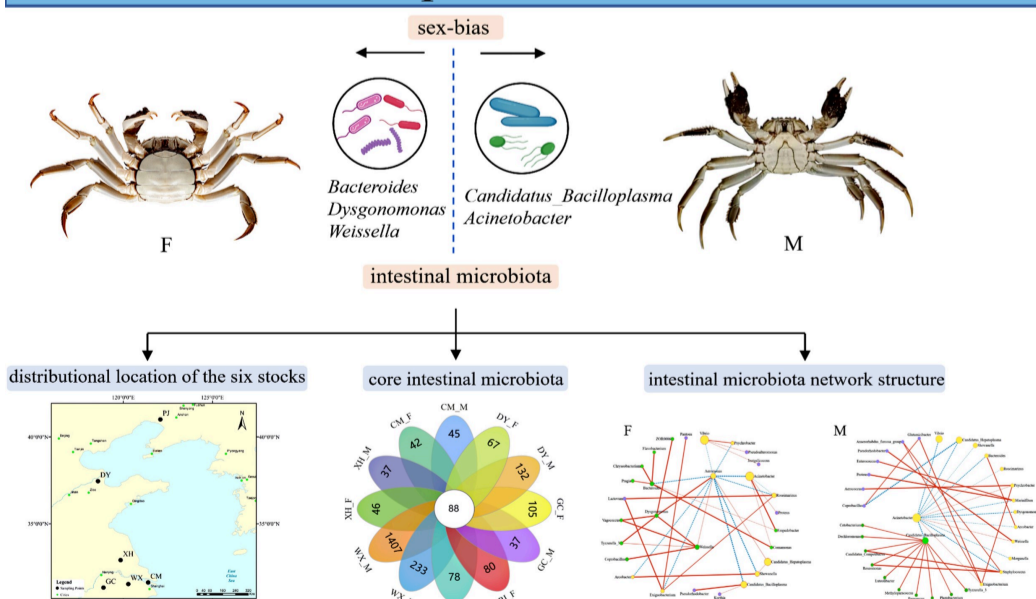


Fig.5 Functional analysis of KEGG.

(A) The intestinal microbiota was mainly enriched in the “Metabolic” and “Genetic Information Processing” pathways.

(B) Sex plays an important role in pathway enrichment, and the role of male crab intestinal microbiota in functional enrichment is more obvious.

Graphical abstract



Conclusion

- Six stocks of Chinese mitten crabs have different intestinal microbial structure.
- The core intestinal microbiota was significantly sex-biased.
- The core intestinal microbiota played an important role in intestinal homeostasis.

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海洋科学与工程学院
COLLEGE OF MARINE SCIENCE AND ENGINEERING



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