Origin of the ostracod fauna in the Okinawa Islands, southern Japan, inferred from the two genera Loxoconcha and Xestoleberis (Arthropoda:Crustacea)

（課程博士・様式７）（Doctoral qualification by coursework,Form 7）

学 位 論 文 要 旨

Abstract of Doctoral Thesis

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論文題目：

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論文要旨：

Abstract：

This study was discussed with origin of the ostracod fauna in the Okinawa Islands, southern Japan, dealing with the two Recent genera Loxoconcha (Loxoconchidae) and Xestoleberis (Xestoleberididae). The genus Loxoconcha is one of the most diverse extant ostracod genera. Species of this genus are distributed in low to middle latitude areas of marine and brackish waters. The genus Xestoleberis is presently distributed in tropical to temperate zones worldwide. The total 22 species of the genus Loxoconcha and 13 species of the genus Xestoleberis were found around the coast of the Okinawa Island. In which, eight species of the former and seven species of the later were already described and published. Result of examination of maxillulan ontogeny in Loxoconcha noharai, L. sesokoensis and L. japonica shows the difference in the number of setae on the maxillula among three species starts in the instar A-4.

This character suggests to show the phylogenetic relationship of the genus Loxoconcha. The Loxoconcha species have been divided into three lineages based on the distributional pattern of the pore systems below eye tubercle, which is regarded as a highly reliable phylogenetic index. In these lineages, the Groups A and B were defined by Ishii et al. (2005) and the Group C was defined by Le & Tsukagoshi (2014).

The chaetotaxy on the maxillula in 17 species and dimensions of hinge elements of the left valve in 24 species of the genus Loxoconcha were also examined in the present study. From the fossil records and the tendencies of change in the total number of the chaetotaxy of three endites on the maxillula and the dimension of posterior tooth of hingement of the left valve, geological age of the Group A is considered as the oldest (average of 12.6 setae and 22.6 μm), the Group B as the median (average of 16.5 setae and 13.1 μm) and the Group C as the youngest (average of 16.8 setae and 11.5 μm). It is suggested that there are close relationships between the evolutionary process and the number of setae of three endites on the maxillula, and the size of posterior tooth of

hingement of left valve in the genus Loxoconcha. The younger evolutionary origin of Loxoconcha species gets the more setae of three endites on its maxillula and the smaller dimension of posterior tooth of its left valve; while, the older evolutionary origin of the species bears the fewer setae of three endites of its maxillula and the longer posterior tooth of its left valve. Obviously, there are remarkable differences of these characters in the Groups B and C from the Group A, but only slight differences are shown between the Groups B and C. Moreover, the presence of an intermediate state of the pore distributional pattern below eye tubercle between the Groups B and C was observed in the species Loxoconcha sp. Y. Therefore, it is strongly suggested that the two groups are closely related phylogenetically each other.

The total of 22 species of the genus Xestoleberis have been subdivided into three species groups (Groups A, B and C) based on types of pores on the carapace by Sato & Kamiya (2007). The fossil records and the tendency of change in the number of setae of the first podomere of maxillulan endopodite and the third podomere of mandibular endopodite indicate that the Groups A and B are older than the Group C.

In the genus Loxoconcha, the Group A is widely distributed all over the world, whereas the Groups B and C are distributed from Vietnam to Japan and from Australia to the Okinawa Islands, respectively. In the case of the genus Xestoleberis, the Group A is known to broadly inhabit at the coast from Australia to Japanese Island Arc, the Group B is found along the coast from Australia to the Okinawa Islands, and the Group C only along the coast around Japanese Island Arc (Sato & Kamiya, 2007). The distributional models of species groups of the two genera Loxoconcha and Xestoleberis remarkably show that the species of these genera from the Okinawa Islands are phylogenetically close to those from southern western Pacific (i. e., Vietnam, the Philippines and Australia) rather than Japanese Island Arc. These facts strongly reveal that the species of the two genera of the Okinawa Islands are established based on invasion of southern faunas and then these species continue to migrate to, speciate and colonize in Japanese Island Arc. The historical data about paleogeography, paleomarine climate (e. g., temperature, sea water level and currents), marine ecosystems and geographical distributions of other ostracods indicate that the invasion tendency from the south to the north applies not only for the genera Loxoconcha and Xestoleberis, but also for the general ostracod faunas in the Okinawa Islands and Japanese Island Arc. The present geographical distributional model of the three groups of the genus Loxoconcha also indicates that the area from Vietnam to the Okinawa Islands is an overlap area of the three Groups A, B and C. The historical data suggests the area from the Okinawa Island to Australia possesses the highest ostracod biodiversity and many ostracod species were originated from this area. Since this area can be said the “hot spot” of ostracod biodiversity in the western Pacific and plays an important role for study on the ostracod biodiversity.

Key words: Loxoconcha, Xestoleberis, species groups, chaetotaxy of maxillula, hingement, maxillulan ontogeny, ostracod origin, the Okinawa Islands