

Abstract

Some cellular processes and mechanisms of the thelytokous parthenogenesis have been clarified in a viviparous scorpion, *Liocheles australasiae*. In Part 1, the parthenogenetic reproduction was made more certain through four successive generations and through repeated pregnancies in the individual females under the separate rearing, and at the same time, a number of specimens were obtained for the studies in Part 2. In Part 2, the processes and mechanisms of the egg maturation and parthenogenetic start of embryogenesis were examined by means of the histological, karyological, and DNA quantificational methods.

About 18 days after the last parturition, the first maturation division took place in the primary oocyte to produce a secondary oocyte and a first polar body. The second maturation division succeeded in the secondary oocyte to produce a mature egg nucleus and a second polar body nucleus, not followed by the cytoplasmic fission. Successively, these two nuclei came close to fuse with each other into an embryonic nucleus. The single cell-embryo soon began to develop in total equal cleavages. The second maturation division sometimes took place in the first polar body to produce two second polar bodies. A first polar body or two second polar bodies derived from the first polar body were found adjacent to each early

embryo, showing their no role on the start of embryogenesis.

Several meiotic figures, 27-32 in chromosome number, were found in the ovarian diverticula of about the 18th day after the last parturition among many mitotic figures, 54-64 in chromosome number, showing reduction of the chromosome number at the egg maturation. The reduction division and fusion between the mature egg nucleus and the sister second polar body nucleus were supported by a series of changes in DNA contents of female germ cells and embryonic cells. DNA content doubled up to 4C in the primary oocyte just before the first maturation division, reduce into 2C in the secondary oocyte and the first polar body, reduced again into C in the mature egg nucleus and second polar body nucleus, and recovered up to 2C in the embryonic cells.

These results have made the processes and mechanisms of egg maturation and parthenogenetic start of embryogenesis in *Liocheles australasiae* clearer, to be compared with those in other animals.