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**Cleavage and Cell Movement in the Early Development of  
*Marinogammarus finmarchicus***

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with the technical assistance of D. L. Wachtel (1953)

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Utilizing the techniques of vital staining and the selective destruction of blastomeres, cleavage and cell movement in the early embryology of *M. finmarchicus* were studied. Cleavage is holoblastic, unequal and determinate. The first two cleavages are meridional and the third latitudinal. The eight cell stage consists of four unequal micromeres and four unequal macromeres. The fourth cleavage is meridional and the fifth latitudinal. At approximately 32 cells, ingression of certain macromeres and micromeres occurs. Eleven of the cells on the surface at the 32 cell stage are beneath the surface at the completion of the ingression. The subsequent role of these cells is unknown. The yolk-free cells which form the ventral shield aggregate on the macromere side of the egg. Destruction of the macromeres at the eight cell stage results in absence of cells characteristic of the ventral shield. However, following destruction of the micromeres at the same stage, the appearance and aggregation of ventral shield cells takes place at the same time as in unoperated controls indicating that the majority of the cells of the ventral shield are the progeny of macromeres. Further observations concerning the formation of the ventral shield were made.

**Photodynamic Action of Toluidine Blue on Sperm and Eggs of  
*Echinarachnius parma***

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A study was made of photodynamic action of toluidine blue on sperm and eggs of *Echinarachnius parma*. Sperm were placed into  $1.1 \times 10^{-7}M$  toluidine blue in sea water ( $15^{\circ}C$ ) and exposed to a 250 watt lamp at 15 in. from 2-30 minutes. Such treated sperm when used to fertilize normal eggs caused an increase of the interval of fertilization to first cleavage. Subsequent cleavages were not affected. This delay in cleavage was proportional to the length of exposure of the dye+sperm to the light and did not occur when the dye+sperm were kept in darkness for comparable periods. Concentrations of the dye greater than  $1.6 \times 10^{-5}M$  were toxic to the sperm.

Eggs were treated with  $1.63 \times 10^{-5}M$  toluidine blue in sea water for

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