VESICLE FORMATION FROM THE NUCLEAR ENVELOPE IN AMPHIBIAN OOCTYES*

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With 9 Figures in the Text

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Introduction

Information obtained by electron microscopy has been accumulating relative to the ultramorphology of the nuclear envelope and its structural relationship with other cytoplasmic elements. Thus it has been established that the dark line seen with the light microscope at the nucleocytoplasmic interphase is in reality made up of two membranes (Callan and Tomlin 1950). At many points both membranes unite, resulting in circular discontinuities which interrupt the membrane (Wischnitzer 1958, Watson 1959, Merriam 1961). It has also been shown that the nuclear membrane is not a static structure, serving only as a physical barrier between the nucleus and cytoplasm, but rather is probably actively involved in intracellular physiological activities (Wischnitzer 1960). This paper reports on a new phenomenon which reflects the dynamic character of the nuclear envelope in amphibian ooctyes. This phenomenon is related to the formation of the large vesicles found in the cytoplasm. It appears that these organelles may be formed by small outpocketings from the nuclear envelope which subsequently become detached. Electron microscopic evidence for such a concept will be presented.

Materials and Methods

The material used consisted of immature ooctyes obtained from Triturus viridescens. Ovaries from a decapitated animal were excised and placed in 0.1 M NaCl. Small clusters of yolk-free ooctyes were isolated from the ovary and placed in the fixative which consisted of 1% OsO₄ in 0.7% NaCl adjusted to pH 7.4 with McIlvaine's standard buffer solution (0.05%). After fixation for about 2 hours, at room temperature, the material was dehydrated by passage through a graded

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Vesicle formation from the nuclear envelope

Fig. 1. A low power electron micrograph of an amphibian oocyte. A dense, oval nucleolus (n) is the only structural entity distinguishable within the nucleus (NUC). An undulating nuclear envelope (ne) is evident, adjacent to which are a few vesicles (v). The bulk of the cytoplasm (CYT) is filled with a homogeneous ground substance and is devoid of any organelles except for a few isolated vesicles (v). Numerous mitochondria (m) and vesicles (v) are present in the cortical region of the cytoplasm. A portion of a follicle cell nucleus (fcn) is also evident. 7200 x.