CELL MOVEMENTS IN VIVO: PROBLEMS AND PERSPECTIVES.
J.P. Trinkaus (New Haven, USA)

Until recently the locomotion of tissue cells has been studied mainly in vitro and, although we do not yet know how cells move under these conditions, we now have some good ideas, based on an expanding array of fact. Yet, even when we come to understand how cells move in vitro this may not tell us how they move in vivo, where the cellular environment is different, in particular in so far as extracellular materials are concerned. It seems clear that if we are to learn how cells engage in locomotion within organisms they must be studied there. There have been several attempts to study cell locomotion in vivo recently and, although all must be regarded as preliminary, considerable information has been gained. Cells surely possess the same locomotory machinery in vivo as they do in vitro; however, they appear to use it in different ways when confronted with their normal tissue environment. Although they may move by means of spreading lamellipodia, like cells on a planar substratum in culture, their predominant modes of movement appear to involve either the contraction of long adhering filopodia or extensive cytoplasmic flow. These different modes of movement may well depend on the three-dimensional extracellular matrix through which cells move in vivo, and this can be tested in part by culturing cells in collagen gels. Such a dual approach, observing the same cells in vivo where they show normal locomotory behavior, and in vitro, where the environment can be controlled, is precisely the approach that is necessary, if we are one day to understand the normal mechanism of tissue cell movement, and, with this, how cells move directionally during morphogenesis and invasively during the spread of cancer.