

## ПРОСТРАНСТВЕННЫЕ МОДЕЛИ ПЬЕЗОБЕЛКОВ И СЕТЕЙ БЕЛОК-БЕЛКОВЫХ ВЗАИМОДЕЙСТВИЙ У ТРИХОПЛАКСА (ПЛАСТИНЧАТЫЕ)

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Морской свободноживущий организм трихоплакс (тип Пластинчатые) напоминает по форме и типу движения одноклеточную амёбу. Трихоплакс отделился от основного древа эволюции в неоптерозойскую эру и считается одной из простейших моделей многоклеточного животного, а также наглядным примером взаимодействия ансамбля клеток в едином организме при его развитии и движении. В результате поиска схожих последовательностей в базах данных NCBI у двух гаплотипов трихоплаксов, H1 и H2, обнаружено по одному ортологу белка Piezo1 мыши (6B3R). На основе структурного выравнивания по шаблону 6KG7 (Piezo2 мыши) созданы пространственные модели соответствующих белков: XP\_002112008.1 и RDD46920.1. Проведен анализ доменных структур и построен ограниченный граф белок-белковых взаимодействий гипотетического механосенсора XP\_002112008.1. Показана возможность проведения сигнала от механорецептора к мембранным комплексам, в цитоплазму и ядро клетки. Предполагается участие механосенсорных рецепторов трихоплакса в восприятии силовых воздействий соседних клеток и окружающей среды. На основании полученных данных предлагается использовать примитивный организм трихоплакс как простейшую многоклеточную модель механических и морфогенетических движений.

**Ключевые слова:** пьезобелки, механотрансдукция, белок-белковые взаимодействия, Placozoa

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## Spatial Models of Piezoproteins and Networks of Protein-Protein Interactions in *Trichoplax* Animals (Placozoa)

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The marine free-living organism *Trichoplax* (phylum Placozoa) resembles the unicellular amoeba in shape and type of movement. *Trichoplax* diverged from the main evolutionary tree in the Neoproterozoic Era and is one of the simplest models of a multicellular animal, as well as a strong example of the ensemble of interacting cells in an organism during its development and movement. Two orthologs of mouse Piezo1 protein (6B3R) were found in two *Trichoplax* haplotypes H1 and H2 as a result of a search for similar sequences in the NCBI databases. Spatial models of the corresponding proteins, XP\_002112008.1 and RDD46920.1, were created based on the structural alignment using a 6KG7 (mouse Piezo2) template. The analysis of domain structures was performed, and a limited graph of protein–protein interactions of the hypothetical mechanosensor XP\_002112008.1 was constructed. The possibility of signal transduction from the mechanoreceptor to membrane complexes, cytoplasm and cell nucleus was shown. It is assumed that mechanosensory receptors of *Trichoplax* are involved in the perception of force stimuli between neighboring cells and the environment. Based on the obtained data, we propose to use the primitive *Trichoplax* organism as the simplest multicellular model for mechanical and morphogenetic movements.

**Keywords:** piezoproteins, mechanotransduction, protein–protein interactions, Placozoa