Abstract for general public

The blueprint of life is genetic material that is passed on by our fore fathers to us, which we will pass on to the future generations. This genetic material is called Deoxyribo Nucleic Acid and is popularly known as DNA. The DNA contains every information that is needed virtually for every aspect of life. For instance, in most animals, it determines the gender of the offspring, the colour of skin and hair etc., and in certain instances, if a given offspring is susceptible to deadly diseases such as cancer. We produce thousands of different proteins and the information to produce these proteins is derived from DNA. In essence, some parts of the DNA "codes" for proteins. However, only a tiny fraction of our DNA, estimated at just 2%, codes for proteins. Importantly, majority of our DNA, about 50%, is comprised of elements or segments called Transposable Elements (TEs) and "repetitive sequences", otherwise also known as "repeats". Interestingly, the TEs and repeats are the remnants of thousands of viruses that have attacked us in the past.

The TEs and repeats are pieces of DNA that can move across the genetic material "jumping" from one location to another (transposition), taking advantage of the host's cellular machinery. Transposition of the TEs or repeats could be devastative and can result in more than 75 human diseases including cancer. For instance, if a TE moves into the segment that codes for an important protein, the production of that protein is affected for ever, and that could be lethal. If such a transposition happens in germ cells (sperm or egg), it will be passed onto the future generations, which is deleterious and not desirable. Hence, the TEs and repeats are kept mostly silenced. Though the TEs were discovered more than 70 years ago, we do not yet comprehensively understand various factors required for such silencing and their mechanism of action. A deeper knowledge about their silencing mechanisms could be harvested for the benefit of mankind, for instance, to treat diseases such as cancer.

However, it is difficult, time consuming and expensive to study about TE and repeats silencing mechanisms in widely used model organisms such as mice and is impossible to study in humans. Hence, I plan to use a simple, soil dwelling non-pathogenic nematode, *Caenorhabditis elegans* as a model organism to understand TE silencing and genome maintenance. *C. elegans* is a transparent animal that can be grown in large numbers in a short span of time (3-5 days) using bacteria as a food source and most importantly about 60% of the genes expressed in humans are also expressed in this organism. Using an unbiased genetic screen, I have identified a novel factor, called *picd-1* required for TE and repeat silencing and with the aid of the NCN grant OPUS, I wish to explore its function/s and mechanism of action.