Macrocyclic compounds or *macrocycles* are chemical molecules that contain twelve or more atoms with at least one large ring. In the beginning of XX century, the synthesis or even the *existence* of macrocycles was questioned by most of the chemists. Only in 1923 famous chemist Leopold Ružička proved that *muscone* and *civetone*, scents obtained from the musk deer and the civet cat and valuable perfume ingredients are in fact *macrocyclic compounds.* Actually, these were the first natural products shown to have macrocyclic rings in their structure.

Despite enormous progress that has been made since the time of Ružička, macrocyclizations are still considered as challenging transformations if the substrate is unbiased. Even the most modern synthetic methods, such as the Nobel-winning *olefin metathesis reaction* are not free of this limitation. For almost 40 years preparation of medium and large rings by metathesis of unbiased dienes was always conducted under so-called high dilution conditions. At concentrations higher than recommended, a large amount of polymeric products is formed, making the yield of the desired macrocyclic product low. This makes, large scale production of macrocycles problematic, especially from the industrial perspective, due to the environmental and economic costs of purchasing, storing, transferring, and then at the end separating and disposing large volumes of solvents.

The goal of a research planed by our team is to utilize the inherent reversibility of olefin metathesis to produce valuable macrocyclic products at concentrations much higher than normally used for similar RCM macrocyclizations (ca. 5 mmol/dm³). Once the macrocycle is formed, we plan to distil it out of the reaction mixture under vacuum. Apparently, the key factor will be to understand the mechanism of this transformation and to choose or develop a proper catalyst possessing longevity combined with high activity.

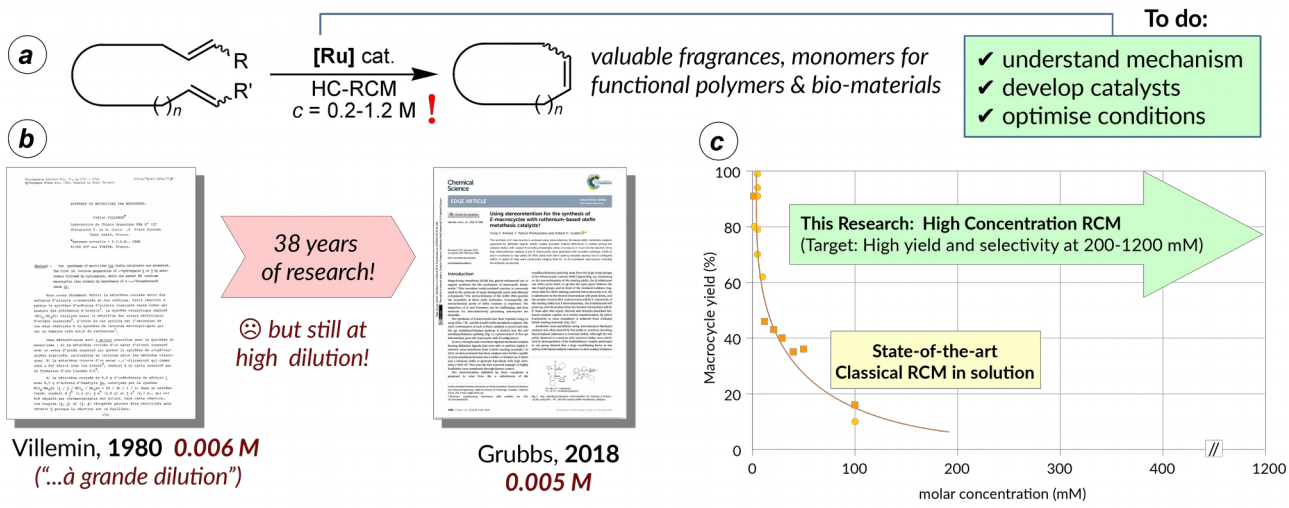

Fig. 1: (a) Macrocyclisation of unbiased dienes by HC-RCM. (b) Paradigm that high dilution is required for a successful macrocyclisation. (c) State of the art (yellow) and planned goals (green) to be achieved.

Our high-concentration ring closing metathesis (HC-RCM) method will be useful in production of a number of valuable products, for example an unsaturated analogue of elegant Firmenich *Exaltolide*® musk and stereochemically pure (*Z*)-*civetone*, a natural product from African civet. All these expensive products will be obtained by HC-RCM starting from cheap renewable plant sunflower oil as a substrate. But the applications of such obtained unsaturated macrocycles is not limited to flavours, as they can be used as precursors for speciality polymers, for example for biomedical applications, and more.

Before this will be possible a big deal of *basic research* on mechanism and decomposition pathways understanding, catalyst design, *etc.* must be done, and this is the goal of our OPUS project.