Semiochemical signalling (signaling with the use of chemical substances carrying specific information) is one of the oldest means of communication used by organisms of all taxa. This kind of communication plays an important role in initiating and modifying many types of behavior. Understanding of animal semiochemical signalling has crucial importance for better understanding and more efficient control of animal behavior.. According the current knowledge V.N.O. (vomeronasal organ) is the organ responsible for detection of semiochemical substances. Although V.N.O. was discovered by Frederik Ruysch already in 1732 and later described in detail by Ludwig Jacobson in many species in 1813, for a long time its function was not clearly identified. V.N.O. localized between palate and nasal cavity is also responsible for the detection of pheromones, including sex pheromones. Those species-specific compounds are able to modify both the behavior of animals and their physiology. It has been proved that detection of specific sex pheromones stimulates the secretion of LH (luteinizing hormone) which leads to the stimulation of the ovaries and could be responsible for induction of the new ovarian cycle.

The aim of the proposed study is the attempt of identification of sex pheromones in the domestic dog. Although that kind of studies was performed previously, in the light of current knowledge we can say with certainty that previous obtained results are no more valid.

Methods applied in this study involve two main pathways: isolation and identification of the putative pheromones and verification of the presence of semiochemical activity of those substances. The first step will be achieved by the use of chemical evaluation of the secretions of the females (comparing the compositions of secretions collected during and out of the heat), with the use of very sophisticated chemical analysis (GC/MS, HPLC/MS, UPLC/MS). During the second step synthethic artificial analogs of those substances suspected to act as sex pheromones will be examined in the context of induction of specific reactions in the organism of the recipient (male dog). This part of experiment will include the behavioral analyses, evaluation of the changes in physiological parameters (blood flow in the vessels supplying blood to the penis –erection, activity of the V.N.O. (fMRI /functional magnetic resonance imaging/ ). It is worth noting that participants of the research team are the high class specialists in the use of methods for which they will be responsible and that this team includes among others such well known specialists as prof. Tadeusz Jezierski and prof.Marek Sąsiadek and that the team has a top-quality equipment allows to carry out the proposed research (fMRI, hardware facilities of Universities and Wroclaw Research Center EIT +).. Moreover procedures involved in the proposed experiments were previously performed by the members of the project team, as documented in earlier publications.

The proposed experiment, will be helpful in filling the gaps in our knowledge concerning inter-individual animal communication and will contribute to better understanding of mechanisms underlying animal behaviour and communication. That could in turn improve the quality of coexistence of humans and dogs. Moreover, development of effective methodology of pheromones` identification would be also essential for the further studies dedicated to the other carnivores (domestic, captive and maybe also endangered wild living species ), but also other types of pheromones. Identification of dog sex pheromones which had been searched for many years would be also helpful in improving methods of breeding (attracting and/or repelling) and veterinary procedures.