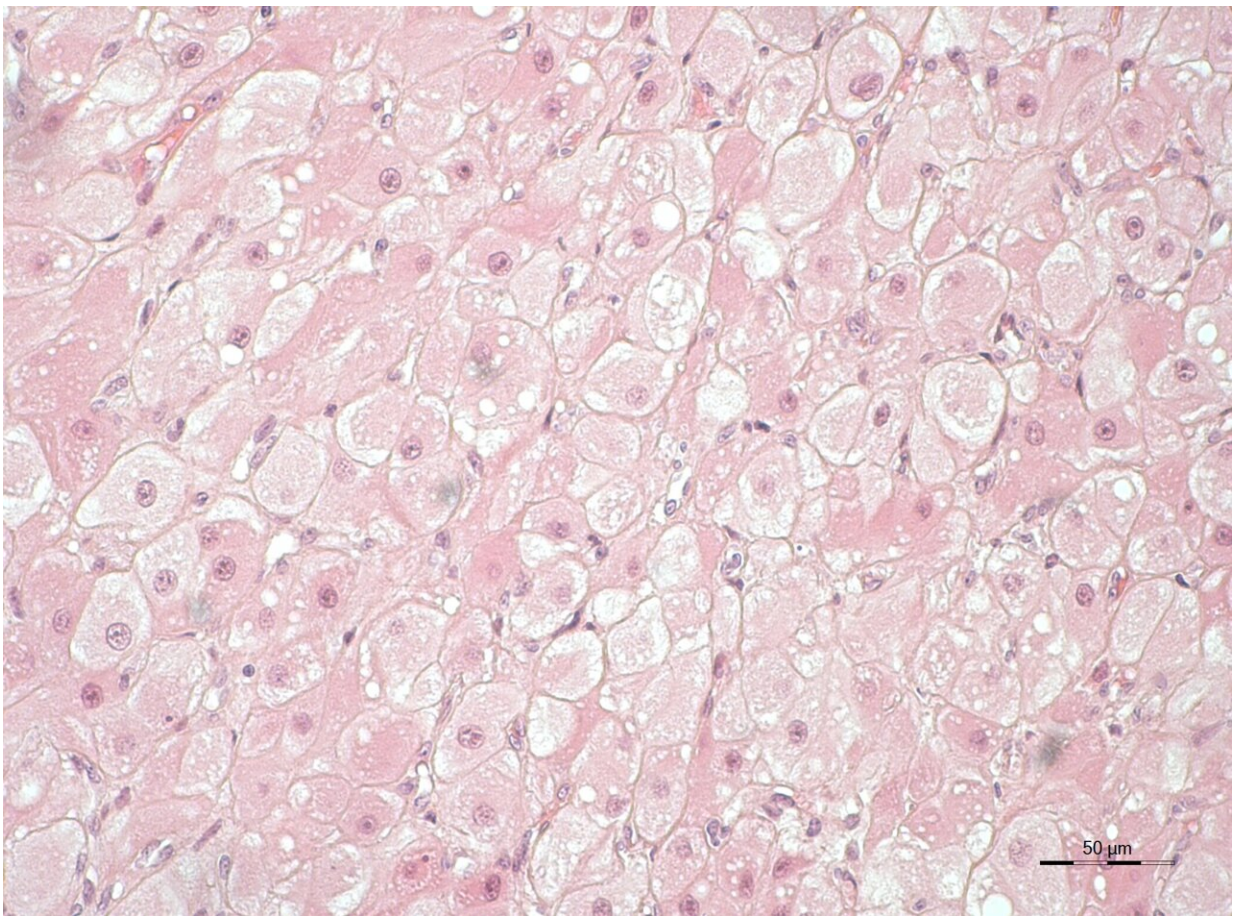


Unravelling the mysteries of seasonal reproduction in lynx: New insights into mechanisms of corpus luteum in cats

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Corpus luteum of domestic cat . Credit: Leibniz-IZW

Most of the existing 39 cat species are threatened. Successful reproduction under breeding conditions is hindered by a lack of knowledge and appropriate techniques. But now scientists from the German Leibniz Institute for Zoo and Wildlife Research (Leibniz-IZW) have succeeded in testing the influence of selected hormones on cell cultures of domestic cats and translated the methods to wild cat species. This is a further milestone in studying the reproductive mechanisms of wild cat species and will help to improve assisted reproduction techniques. The scientific findings are published in the journals *Biology of Reproduction* and *Animals*.

A successful reproduction that produces sufficient offspring is essential to ensure the persistence of any biodiversity. Some [mammalian species](#) are so depleted in their populations that their continued viability and conservation depends on the success of reproduction efforts under breeding conditions.

A core component of successful reproduction in mammals is the completion of gestation through giving birth to healthy young. An important role in gestation is fulfilled by the corpus luteum. This is a temporary gland formed on mammalian ovaries after ovulation, which communicates with the uterus and the rest of the body through the "language of hormones." The corpus luteum produces a pregnancy-maintaining hormone (progesterone), which among other things, helps the uterus carry young to term. The rest of the body also receives the signal "we are pregnant" and adjusts to it. If the corpus luteum is too weak to produce enough progesterone, the pregnancy will prematurely end. Conversely, corpus luteum activity can also prevent new pregnancies to develop. Interestingly, three lynx species apparently use this principle as a natural "contraceptive" outside the breeding season. This control of seasonal reproductive activity is unique in the animal kingdom, and in terms of lynx conservation, it complicates the use of assisted reproduction techniques.

Functional studies of corpus luteum activity in live animals are very difficult and hardly possible. In addition, they are not in line with the working ethics of the Leibniz-IZW, whose aim is to use, wherever possible, mainly non-invasive or minimally invasive techniques. The next best option is therefore to study related species where sufficient individuals still exist and where procedures and insights can be accomplished to establish good laboratory methods to improve our understand of the mechanisms involved.

"We succeeded in isolating and culturing cells from the corpus luteum of domestic cats which were functionally active in the sense that they produced progesterone. This allowed us to measure the regulatory effects of different hormones on these cells," says Beate Braun, Leibniz-IZW head of the study. The cell culture methodology allows studies to be conducted without having to directly perform experiments on the animals themselves, be they domestic or wild. In the studies, the effect of a potentially corpus luteum-preserving hormone (LH—luteinizing hormone) and a potentially corpus luteum-degrading hormone (PGF2 α - prostaglandin F2 α) were tested. The team showed that the cultured cells responded to the chosen hormones and produced more or less progesterone, depending on the hormone used and the developmental stage of the corpus luteum from which they were isolated.

"We first established our technique in the domestic cat. We then succeeded to adjust the method and apply it to our rare sample material from wild cat species, including African and Asiatic lions, Asiatic golden cats and Java leopards. This shows that it is possible to use related animal species to obtain the necessary knowledge and then translate the newly developed techniques to endangered species," explains Michał Hryciuk, who will use these successful studies to complete his doctoral thesis in reproductive biology. The next goal of the scientists will be to also target lynx corpus luteum cells to study the mechanisms which ensure luteal longevity.

Translating scientific laboratory methods from domestic animals to wildlife species is not easy, as there is often a lack of biological material. The wildlife samples are obtained from dead or castrated animals from zoological institutions and become only rarely available. "Systematic studies, a basic requirement in science, are therefore hardly possible. This is why we establish our cell cultures based on model animals. The domestic cat lends itself to this, since ovaries are constantly available from veterinary practices after castration. Using this material in this way, we are ready when a special sample comes along," says Prof. Katarina Jewgenow from the Leibniz-IZW. "As part of the Felid Gamete Rescue Project, we are collaborating with international zoological institutions so that we can then make good use of the rare biological material. Our partnership with the Scandinavian Lynx Project and the Ex situ conservation breeding program of the Iberian lynx will also give us access to corpora lutea of these European cat species in the future."

For a long time, Leibniz-IZW scientists have been interested in the functioning of corpora lutea. The catalyst for this was the most endangered cat species worldwide, the highly endangered Iberian lynx (*Lynx pardinus*) from the Iberian Peninsula. This lynx species gives birth to young only once a year, and its population had already dwindled to less than 200 individuals in the wild by the turn of the millennium, when a conservation program for the Iberian lynx was initiated. The program works with international cooperation partners such as Leibniz-IZW and is responsible for the fact that today more than 1,000 animals roam the expanses of the Iberian Peninsula again. Scientific research into reproductive mechanisms has been a very important part of this endeavor and contributes to the persistence of this threatened wild cat species.

Leibniz-IZW belongs to the Forschungsverbund Berlin e.V. and is a member of the Leibniz Association. The goal is to understand the adaptability of wildlife in the context of global change and to contribute

to the conservation of healthy wildlife populations. The current research results contribute to the understanding of the reproductive mechanisms of highly threatened cat [species](#) in order to improve the success of reproduction in breeding facilities such as zoological gardens.

More information: Michał M. Hryciuk et al, Luteinizing Hormone Effect on Luteal Cells Is Dependent on the Corpus Luteum Stage in Felids, *Animals* (2021). [DOI: 10.3390/ani11010179](https://doi.org/10.3390/ani11010179)

Michał M Hryciuk et al, Cloprostenol, a synthetic analog of prostaglandin F2 α induces functional regression in cultured luteal cells of felids†, *Biology of Reproduction* (2021). [DOI: 10.1093/biolre/ioab070](https://doi.org/10.1093/biolre/ioab070)

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