



MASTER THESIS PROJECT

**PERSISTENT ORGANIC POLLUTANTS, STEROID
HORMONES AND BONE DENSITY OF POLAR BEARS
(*URSUS MARITIMUS*) FROM EAST GREENLAND 2016-2021**

MAI-BRIT SCHULTE

NTNU, Trondheim, Norway

KU, Copenhagen, Denmark

Summary

The research employed a comprehensive analysis of biological samples collected from East Greenland polar bears, focusing on the associations between circulating levels of steroid hormones and persistent organic pollutants (POPs) measured in blubber. Liquid chromatography tandem mass spectrometry (LC-MS/MS) was utilized to quantify the concentrations of seventeen steroid hormones, encompassing corticosteroids, androgens, estrogens, and progestagens. Principal component analysis (PCA) and orthogonal projections to latent structures (OPLS) modelling were employed to explore the relationships among hormone concentrations, POPs (including PFAS, PCBs, BFRs, and OCPs), various biological variables (e.g., age, body length, girth, skull bone density, baculum bone density), and fifteen trace elements.

The study revealed significant positive and negative interactions between POPs and steroid hormones, indicating a complex interplay between environmental pollutants and hormonal regulation in polar bears. These interactions suggest potential disruptions in endocrine function, highlighting the susceptibility of polar bears to anthropogenic contaminants. Moreover, significant associations were observed between POPs and bone density, with implications for skeletal integrity and overall health. Diverse patterns were identified among different subgroups, indicating sexual dimorphisms and variations in cellular-level calcium homeostasis. PFAS behaved distinctly from other POPs.

Given the East Greenland polar bear population's exposure to multiple anthropogenic contaminants and the ongoing challenges posed by climate change, this thesis emphasizes the urgent need for further research. Additional investigations should aim to corroborate and expand upon the present findings, providing deeper insights into the intricate dynamics involving pollutants, hormones, and bone density. Such knowledge is crucial for developing effective conservation strategies to safeguard the long-term survival of the East Greenland polar bear population.