





Dealing with cannibalism in fisheries management: A Case Study of European Hake in the Atlantic Iberian Waters

Santiago Cerviño¹; Anxo Paz¹; Marta Cousido-Rocha¹; Gustav Delius²; James Rimmer²;
Irene Rabanal¹; Francisco Velasco¹; Izaskun Preciado¹; Maria Grazia Pennino¹

¹Instituto Español de Oceanografía (IEO-CSIC)
²University of York

 Santiago.cervino@ieo.csic.es

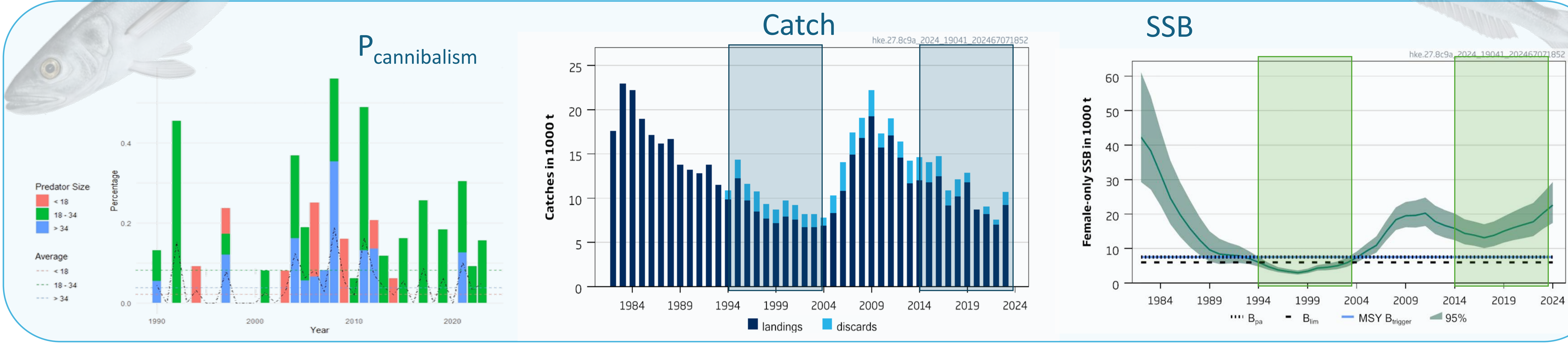
 @SantiagoCervino
@MERVEXgroup_IEO_

 <https://mervex-group.github.io/MERVEX/proof/FRESCO.html>

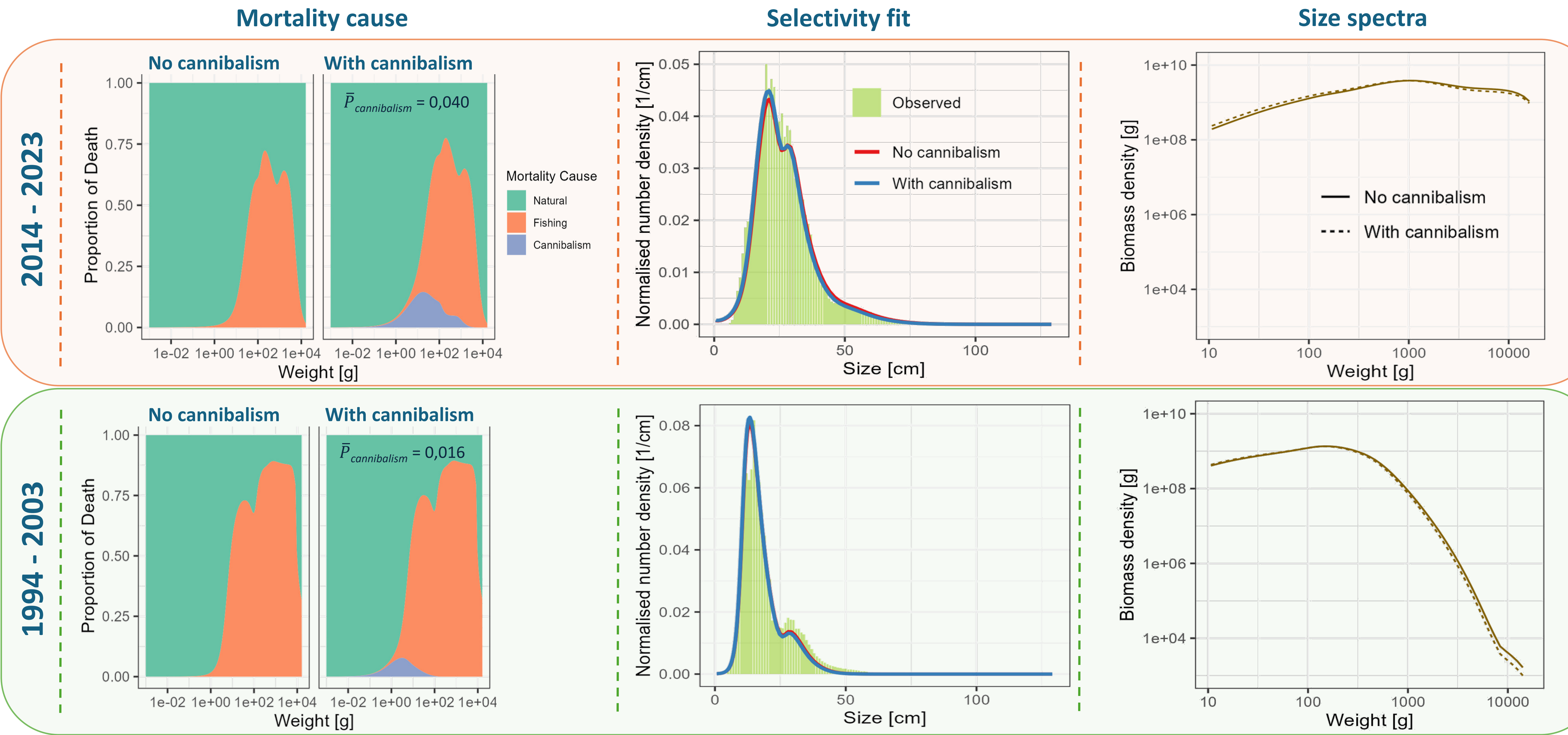
Marine ecosystems are increasingly affected by multiple stressors, such as climate change, nutrient availability and fishing pressure, which influence ecosystem structure, biogeochemical processes and resilience. Understanding the interactions between stressors and fish communities is essential for improving environmental management strategies and supporting **Ecosystem-Based Fisheries Management (EBFM)**. Stock assessment models vary in complexity, from data-limited models to highly detailed spatiotemporal approaches. Balancing ecological realism with practical applicability is essential, as overly complex models may introduce greater uncertainty. The **Multi-Species Size Spectrum Modelling package in R (Mizer)** offers a framework for integrating ecological interactions, such as size-dependent predation and cannibalism, into fisheries management. Models like Stock Synthesis (SS3), used for European hake (*Merluccius merluccius*) in Atlantic Iberian waters, do not explicitly model cannibalism but include it within natural mortality. This study uses Mizer to compare stock dynamics behavior when cannibalism is explicitly modeled versus treated as part of overall mortality, assessing its impact under different exploitation scenarios.

HAKE'S SINGLE-SPECIES MODEL

HAKE DATA

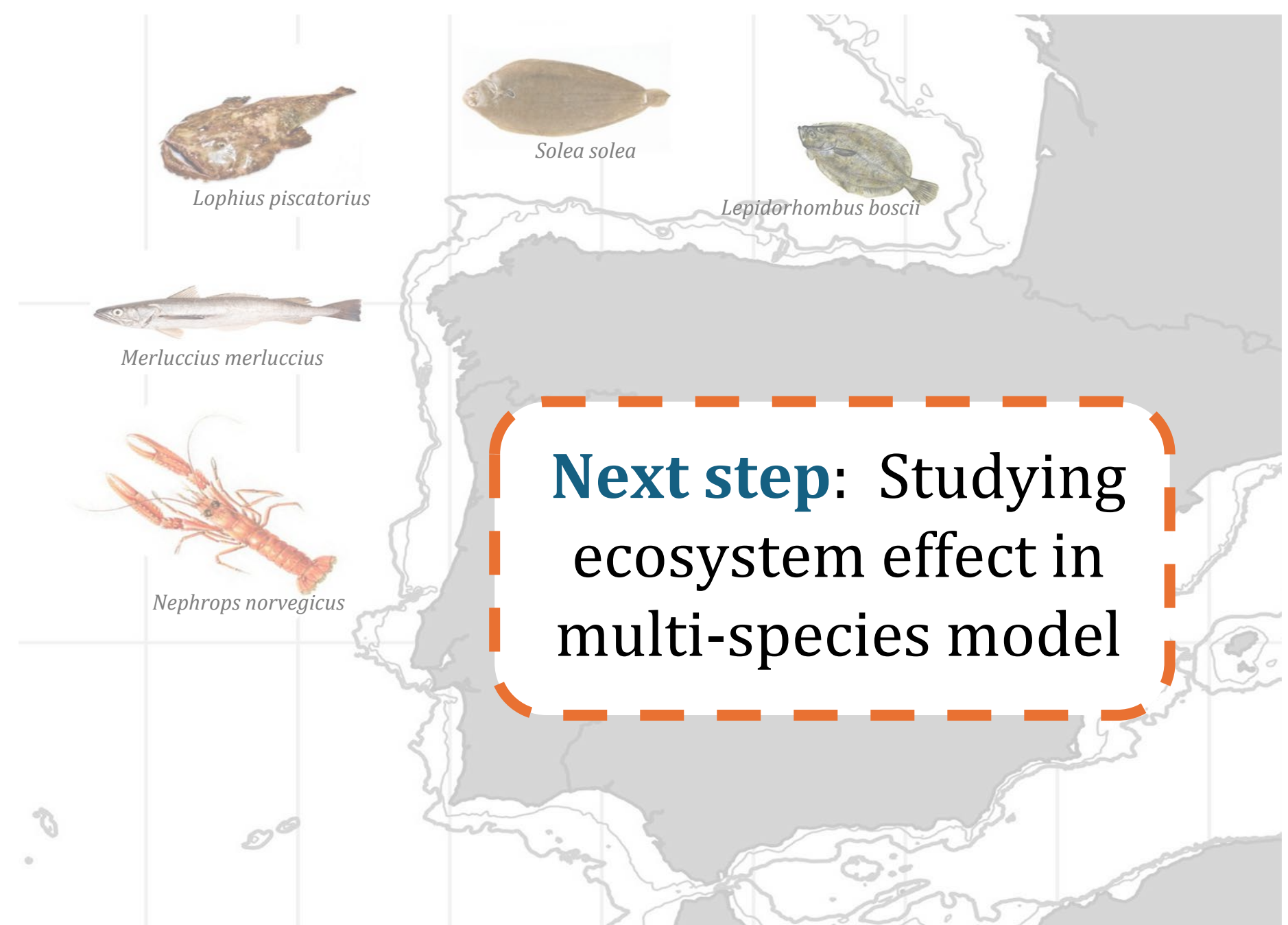


MIZER RESULTS



CONCLUSIONS

- Explicitly modelling cannibalism produces a more plausible size structure and defined mortality attribution, improving biological realism even when catch-at-length fits are similar.
- In practice, this means the population dynamics are being explained by more realistic ecological processes rather than by an undifferentiated background mortality.
- Improving hake evaluation models inputs (natural mortality) using Mizer outputs should be possible.



Next step: Studying ecosystem effect in multi-species model

This communication is part of the research project PID2022-1402900B-I00 funded by MCIN/AEI/10.13039/501100011033/ and by “ERDF A way of making Europe”.

ACKNOWLEDGMENTS