



Zoology and Ecology >

Volume 28, 2018 - [Issue 3](#)

149 | 0 | 2
Views | CrossRef citations to date | Altmetric

Article

Spatial and temporal separation between the golden jackal and three sympatric carnivores in a human-modified landscape in central Bulgaria

Hiroshi Tsunoda , Kairi Ito, Stanislava Peeva, Evgeniy Raichev & Yayoi Kaneko

Pages 172-179 | Received 27 Mar 2018, Accepted 23 Jul 2018, Published online: 05 Sep 2018

 Cite this article  <https://doi.org/10.1080/21658005.2018.1504406>



Sample our
Environment & Agriculture
Journals
>> **Sign in here** to start your access
to the latest two volumes for 14 days

 Full Article  Figures & data  References  Citations  Metrics

 Reprints & Permissions

Read this article

 Share

ABSTRACT

The range of the golden jackal (*Canis aureus*) in Europe has expanded from southern regions northward and westward, raising concerns of increased competitive interactions with other carnivores. In Europe, the jackal is most common in Bulgaria, where it co-occurs with several other carnivore species. We investigated the spatial occurrence and daily activities of golden jackals and three smaller sympatric carnivores: the red fox (*Vulpes vulpes*), the European badger (*Meles meles*) and the stone marten (*Martes foina*). Using camera trapping in spring and summer in a human-modified landscape of central Bulgaria, we ascertained that red foxes were separated from jackals spatially, whereas badgers and martens were active at different times of the day. We suggest that differences in resource partitioning between jackals and the three smaller

carnivore species were associated with a variation in resource use patterns (e.g., food or microhabitats). Our findings indicate that spatial/temporal separation allows smaller species to avoid direct confrontations and agonistic competitions with jackals, resulting in successful co-occurrence.

KEYWORDS:

[Canis aureus](#) [competition](#) [ecological niche](#) [intra-guild interaction](#) [spatial niche](#) [temporal niche](#)

Acknowledgments

The authors would like to thank two anonymous reviewers for their fruitful comments on the draft and Enago (www.enago.jp) for the English language review.

Disclosure statement

No potential conflict of interest was reported by the authors.

Additional information

Funding

The study was conducted as an international partnership agreement between Trakia University and Tokyo University of Agriculture and Technology. The study was supported by Japan Society for the Promotion of Science [JSPS KAKENHI JP26257404] for HT and YK.

Related Research Data

[Diet composition of the golden jackal, *Canis aureus* in an agricultural environment](#)

Source: *Folia Zoologica*

[Diet, Morphology, and Interspecific Killing in Carnivora](#)

Source: The American Naturalist

Annual and circadian activity patterns of badgers (*Meles meles*) in Białowieża Primeval Forest (eastern Poland) compared with other Palaearctic populations

Source: Journal of Biogeography

Does a top predator suppress the abundance of an invasive mesopredator at a continental scale?

Source: Global Ecology and Biogeography

Comparing the summer diet of stone martens (*Martes foina*) in urban and natural habitats in Central Bulgaria

Source: Ethology Ecology & Evolution

The Reliance of the Golden Jackal (*Canis aureus*) on Anthropogenic Foods in winter in

Related research

People also read

Recommended articles

Cited by

Information for

[Authors](#)

[R&D professionals](#)

[Editors](#)

[Librarians](#)

[Societies](#)

Opportunities

[Reprints and e-prints](#)

[Advertising solutions](#)

[Accelerated publication](#)

[Corporate access solutions](#)

Open access

[Overview](#)

[Open journals](#)

[Open Select](#)

[Dove Medical Press](#)

[F1000Research](#)

Help and information

[Help and contact](#)

[Newsroom](#)

[All journals](#)

[Books](#)

Keep up to date

Register to receive personalised research and resources by email



Sign me up



Copyright © 2026 Informa UK Limited [Privacy policy](#)

[Cookies](#) [Terms & conditions](#) [Accessibility](#)

Registered in England & Wales No. 01072954
5 Howick Place | London | SW1P 1WG



Taylor & Francis
by **informa** •••