Turkish Journal of Bioscience and Collections
Volume 7, Issue 1, 2023
E-ISSN: 2601-4292

SHORT COMMUNICATION

A Possible Biomass Contribution to Fauna of Finike Seamounts by Terrestrial Insects

İrem Kısmet[1], Fatih Dikmen[1]

[1]Istanbul University, Faculty of Science, Department of Biology, Istanbul, Turkiye

ORCID: İ.K. 0000-0001-5132-3406; F.D. 0000-0001-8251-5881

Received: 09.01.2023
Revision Requested: 10.01.2023
Last Revision Received: 27.02.2023
Accepted: 06.03.2023
Published Online: 06.04.2023

Correspondence: Fatih Dikmen
fatih.dikmen@istanbul.edu.tr

Citation: Kismet I. & Dikmen F. (2023). A Possible Biomass Contribution to Fauna of Finike Seamounts by Terrestrial Insects. *Turkish Journal of Bioscience and Collections, 7*(1), 35–38. https://doi.org/10.26650/tjbc.1231281

Abstract
Although insects are defined as terrestrial organisms, they can occasionally be encountered in samples taken from the sea. What makes it special in our study is that terrestrial insects were caught from the open sea while sampling the planktons. As a result of our study, insect samples were collected from 8 different stations by using the plankton traps. These specimens found in the fauna of Finike Seamounts were not aquatic insects but terrestrial and were considered specimens that accidentally drifted away into the sea. This causes us to evaluate the possibility that they may have the potential to make a biomass contribution to the marine ecosystem. Further investigation of the subject and revealing possible insect biomass contributions in the sea constitute an important horizon for future studies.
Keywords: Marine insects, Diptera, Homoptera, Biodiversity, Finike, SEPA, Plankton trap

Introduction

Insects are a kind of special animal group that contains the largest amount of biodiversity on earth. However, they are dominantly known in terrestrial habitats. Only 25,000-30,000 species of insects (nearly 3% of all insect species) have aquatic life stages (Cheng, 1976). Among these, only several hundred species are associated with marine habitats (Cheng, 1976; Springer, 2009). However, many of the tiny insects can be drifted away even by weak breezes and they may travel hundreds of kilometers. (Bowden & Johnson, 1976). Moreover, some storms and other atmospheric events may also help some insects to be dispersed among continents or islands (Peck, 1994). Such passive dispersal of insects may have caused them to sink into marine habitats so that insects can be sampled from the sea (Bowden & Johnson, 1976). Even though it has not been thoroughly evaluated or calculated, Bowden and Johnson (1976) have reported that this type of biomass contribution may have a significant impact on the marine ecosystem.

In the eastern Mediterranean Sea (Levantine Basin), Finike (Anaximander) Seamounts are located off the southern coast of Turkey and west to Cyprus Island. The peaks are 700-1100 m deep, elevating from the sea floor at 1500-2000 m deep. The Finike Seamounts have peculiar ecosystem characteristics, such as cold seeps, hydrothermal chimneys, and mud volcanoes, where chemosynthesis takes

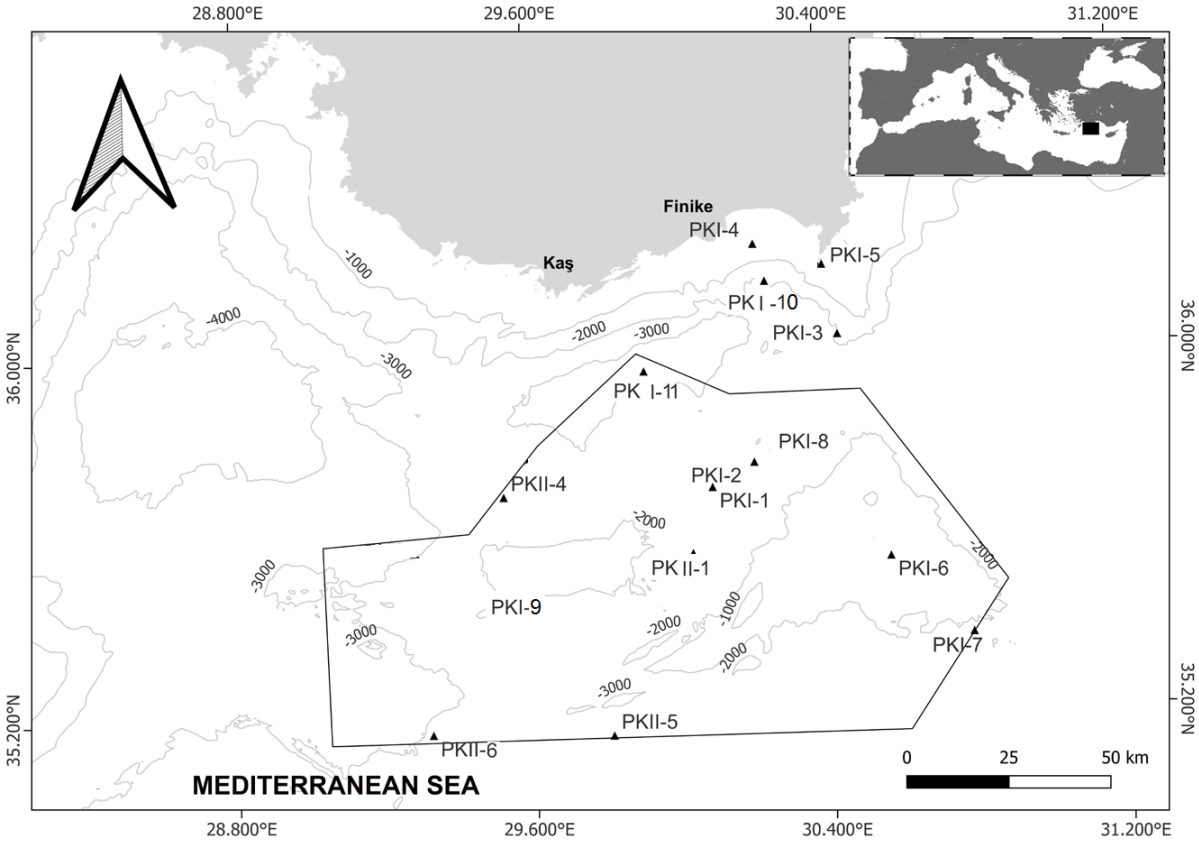

Figure 1. The map of the sampling stations for the plankton traps.

place in the dark deep sea. This is particularly important for the biodiversity of the eastern Mediterranean Sea but there are limited studies available about the marine biodiversity of the Finike Seamounts. The area was declared a "Finike Seamounts SEPA (Special Environment Protected Area)" on 16 August 2013 by the Turkish government due to its biological and ecological importance. Some cetaceans, benthic and other pelagic species such as sea birds, sea turtles, and large migratory fishes were recorded previously in the Finike Seamounts SEPA (Öztürk, 2022; Onmuş *et al*. 2022). To elaborate an effective management plan for the protection of this SEPA, research, and monitoring have been initiated in the area as well as in its surrounding water by the Turkish Ministry of Environment, Urbanization and Climate Change (TMEUC).

Table 1. The data and the coordinates of sampling stations.

Date	Sampling stations	Coordinates	
14.05.2021	PK(I)-1	35^{0}42'46.20''K	30^{0}05'60.60''D
14.05.2021	PK(I)-2	35^{0}45'45.10''K	30^{0}12'41.64''D
14.05.2021	PK(I)-3	36^{0}02'11.50''K	30 26'58.44''D
15.05.2021	PK(I)-4	36^{0}14'31.40''K	30^{0}13'24.18''D
16.05.2021	PK(I)-5	36^{0}11'36.91''K	30^{0}24'38.46''D
19.05.2021	PK(I)-6	35^{0}32'54.10''K	30^{0}34'14.00''D
19.05.2021	PK(I)-7	35^{0}22'14.00''K	30^{0}47'16.26''D
20.05.2021	PK(I)-8	35^{0}46'24.00''K	30^{0}15'21.00''E
20.05.2021	PK(I)-9	35^{0}10'58.60''K	30^{0}12'28.40''D
24.05.2021	PK(I)-10	35^{0}55'44.22''K	30^{0}12'11.00''D
26.05.2021	PK(I)-11	36^{0}01'23.10''K	30^{0}54'18.20''D
16.09.2021	PK(II)-1	36°40'00.39''K	28°02'73.92''D
18.09.2021	PK(II)-2	35°39'30.44''K	29°04'96.27''D
25.09.2021	PK(II)-3	35°10'33.30''K	29°19'26.04''D
25.09.2021	PK(II)-4	35°34'07.38''K	29°03'63.88''D
26.09.2021	PK(II)-5	35°09'75.11''K	29°48'45.23''D
27.09.2021	PK(II)-6	35°01'61.89''K	30°27'36.31''D

Figure 2. Terresterial insects that found in plankton traps. A: Aphididae (Homoptera), B: Pentatomidae (Hemiptera), C-D: Hymenoptera, E: Chrysomelidae (Coleoptera) F: Carabidae (Coleoptera). Scale represent 1 mm.

We present here some very limited but sporadic data on terrestrial insects that were blown out to sea and eventually deposited in the Finike Seamounts (Fig. 1). Insects sampled in this study are reported for the first time from the area. The accumulation of such records would provide us with information about a potential biomass contribution to marine ecosystems.

Materials and Methods

In the framework of monitoring studies in the Finike Seamounts as a "Special Environmental Protection Area" in the Mediterranean Sea, two surveys on a research vessel YUNUS-S, Faculty of Aquatic Sciences, Istanbul University, were carried out in May and September 2021.

Plankton samplings were carried out in the pelagic zone by RV YUNUS-S in May and September 2021 (Table 1). The plankton net had a mesh size of 300 µ, 133 cm in diameter, and 280 cm in length. Terrestrial insect samplings were obtained from the surface with the plankton net in the pelagic zone. Sampled insects were separated from other arthropods and were identified to the order or family categories.

Results

Among 22 sampling stations (Table 1), seven of them were containing insect specimens (Table 2). The most encountered insect groups were Homoptera members (some aphids), Coleoptera members (some carabids), Lepidoptera members, Diptera members (some culicids), and Hymenoptera members (Fig. 2). The abundance of encountered taxa did not been considered. Only the presence of the groups was recorded (Table 3).

Table 2. The list of the insects and arachnids observed among the research area.

Sampling Stations	Samples
PK(I)-4	Diptera
PK(I)-9	Homoptera
PK(I)-10	Coleoptera, Homoptera
PK(1)11	Coleoptera, Homoptera, Hymenoptera, Diptera, Lepidoptera
PK(II)-1	Diptera
PK(II)-4	Arachnida, Hemiptera, Homoptera
PK(II)-6	Diptera, Homoptera

Table 3. The presence data of the insects that was found from the sampling stations.

Sampling Stations	Number of different groups	Homoptera	Coleoptera	Hymenoptera	Arachnida	Hemiptera	Diptera	Lepidoptera
PK(I)-2	0							
PK(I)-3	0							
PK(I)-4	1						X	
PK(I)-5	0							
PK(I)-6	0							
PK(I)-7	0							
PK(I)-8	0							
PK(I)-9	1	X						
PK(I)-10	2	X	X					
PK(I)-11	5	X	X	X			X	X
PK(II)-1	1						X	
PK(II)-4	3	X			X	X		
PK(II)-5	0							
PK(II)-6	2	X					X	

Discussion

The result of our study was parallel with the findings of Cheng & Birch (1977). It was reported that the terrestrial insect samples from the sea comprise the members of Homoptera, Coleoptera, Lepidoptera, Diptera, and Hymenoptera. The majority of the successful samplings consist of the same insect orders.

Insects blown out to sea may provide a considerable amount of organic matter to the surface water. Bowden & Johnson (1976) estimated that at a time of maximum diurnal insect activity, 560 million aphids, or about 2200 million insects per km^2, may be available over the land to be blown over the western part of the North Sea. We cannot have concrete data to make a comparison with this estimation however these insects, especially aphids and bugs (Fig. 2A-B) can be abundant on land and have the potential to be drifted away by the winds. Springtime in Mediterranean habitats is the bloom season for many insect groups. Especially aphids may colonize host plants with thousands of members at that period. And since they are very tiny, they can be easily dispersed by strong wind currents and thus might throw them into the sea. Afterward, sea currents may distribute this organic biomass thorough hundred kilometers away from the shore. So, they can be collected with a plankton net. The distribution of terrestrial insects over the sea may depend on the season, the wind speeds, the marine currents, and the size of the insects as well. It is also possible that these insect species, which were dragged into the sea by various factors, were eaten or fragmented by different living communities. Considering this possibility, it is obvious that the diversity of insects drifting into the seas and affecting the ecosystem may be more than we found. However, lack of data concerning the contribution of such biomass content, more systematic attempts to measure such deposition should be made in the future.

Acknowledgements: Authors thank to Dr. Bayram Öztürk and Dr. Onur Gönülal for their kind help and providing the materials which were sampled within the project "Cetacean Diversity in the Finike Seamounts Special Environment Protection Area" supported by the project Turkish Ministry of Environment, Urbanization and Climate Change. This study was partly presented at the International Symposium on Fisheries and Aquatic Sciences "SOFAS 2022" with the title "A possible biomass contribution to fauna of Finike Seamounts by terrestrial insects", held on 25-27 October 2022, Trabzon, Türkiye.

Peer Review: Externally peer-reviewed.

Conflict of Interest: The authors have no conflict of interest to declare.

Financial Disclosure: The authors declared that this study has received no financial support.

Author Contributions: Conception/Design of Study- F.D., İ.K.; Data Acquisition- İ.K.; Data Analysis/Interpretation- F.D., İ.K.; Drafting Manuscript- F.D.; Critical Revision of Manuscript- F.D.; Final Approval and Accountability- F.D., İ.K.; Material and Technical Support- İ.K.; Supervision- F.D.

References

Bowden, J. & Johnson, C. G. (1976). *Migrating and other terrestrial insects at sea*. In: Cheng L (ed) Marine Insects. North Holland, Amsterdam, pp 97-117.

Cheng, L. (1976). *Insects in marine environments*. In: Cheng L (ed) Marine Insects. North Holland, Amsterdam, pp 1–4.

Cheng, L. & Birch, M. C. (1977). Terrestrial Insects at Sea. *Journal of the Marine Biological Association of the United Kingdom*, 57(4): 995-997.

Onmuş, O., Tonay, A. M., Öztürk, A. A., Özsandıkçı, U., Dede, A. (2022). Preliminary study on ornithofauna of Finike (Anaximander) Seamounts region and adjacent waters in the eastern Mediterranean Sea. *J. Black Sea/Mediterranean Environment,* 28(2): 252-263.

Öztürk, B. (2022). Editor's Note to the issue dedicated to the Finike Seamounts (Anaximander) Special Environmental Protection Area, the eastern Mediterranean Sea. *J. Black Sea/Mediterranean Environment*, 28()2: 127-138.

Peck, S. B. (1994). Aerial dispersal of insects between and to islands in the Galapagos Archipelago, Ecuador. *Annls. Entomol. Soc. Am.,* 87(2): 218-224.

Springer, M. (2009). *Marine Insects*. In: Wehrtmann, I.S., Cortés, J. (eds) Marine Biodiversity of Costa Rica, Central America. Monographiae Biologicae, vol 86. Springer, Dordrecht. pp 313–322 https://doi.org/10.1007/978-1-4020-8278-8_29