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SPECIES OF NOCTUIDAE (LEPIDOPTERA) FAMILY FOUND IN THE FORESTS OF BUYUKADA (MARMARA SEA)

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ABSTRACT

This study was conducted to determine the species of Noctuidae (Lepidoptera) in Büyükada in the Marmara Sea between 2017 and 2018. Robinson-type light traps were used to collect butterfly samples. As a result of the study, 51 species belonging to 12 subfamilies from Noctuidae family were identified.

KEYWORDS:
Büyükada, Lepidoptera, Noctuidae

INTRODUCTION

Genus of Lepidoptera ranks second after genus of Coleoptera in terms of species richness. In the world, there are more than 25000 species of Noctuidae family of this genus [1]. The Noctuidae family, known as moths, is one of the most striking families since it involves many harmful species economically [2, 3]. The vast majority of caterpillars of butterflies belonging to the Noctuidae (Lepidoptera) family have been the subject of researchers for many years by drawing attention with their various damages in forestry and agriculture [4, 5, 6, 7, 8, 9]. The members of the Noctuidae family, like many butterflies, also destroy the assimilation organs of the plants on which they happen, with few exceptions. Some species may cause trees to become completely bare and even dry through mass reproduction [10]. Most of the larvae of Noctuidae family feed on leaves. They are polyphagous, hide between the leaves during the day and start feeding at night or in the evening. This study was conducted to determine the species of Noctuidae (Lepidoptera) in Büyükada, one of the islands in the Marmara Sea, between 2017 and 2018.

MATERIALS AND METHODS

Adalar district of Istanbul is located within the provincial borders of İstanbul between 40°52'31" north and 29°05'40" east coordinates. Adalar district consists of 9 islands. The largest one of them is Büyükada with a total surface area of 538.63 hectares (Figure 1). 317.72 hectares of this area consist of forested land.

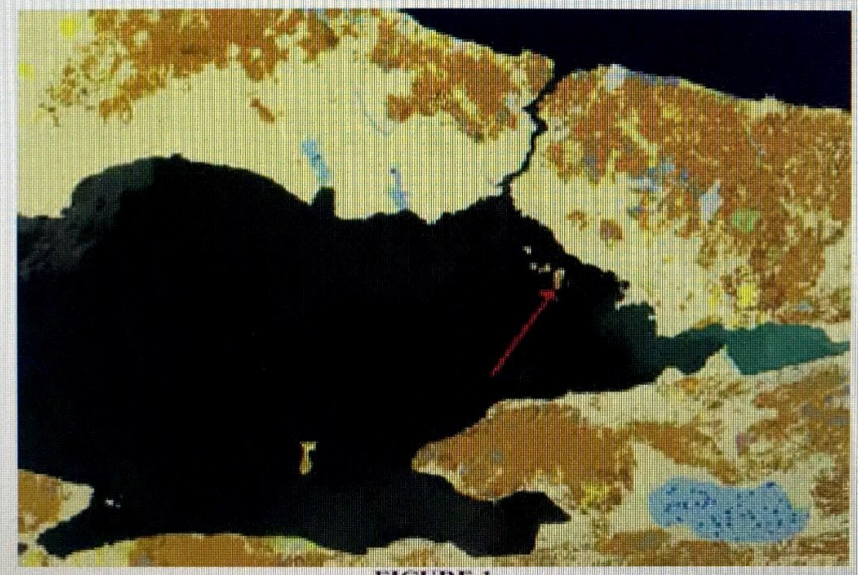


FIGURE 1
Büyükada in the Marmara Sea

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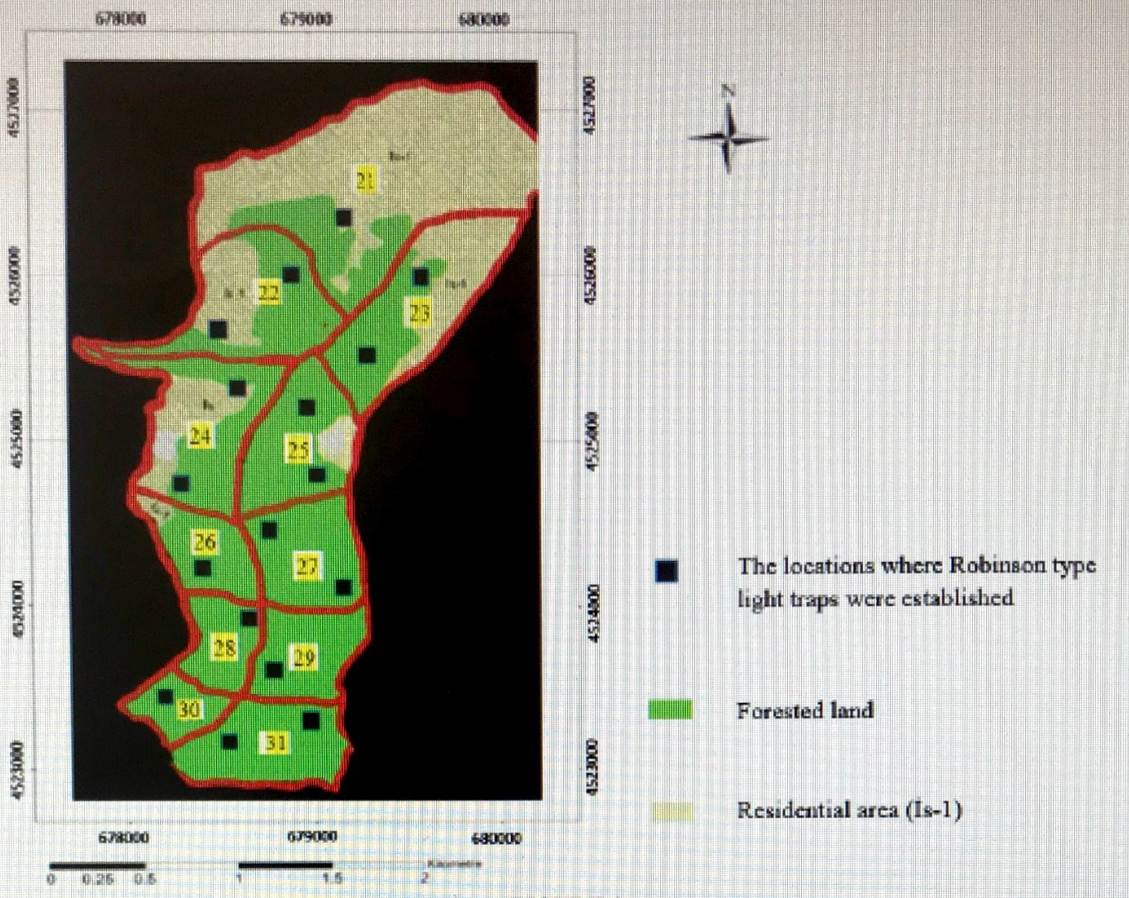


FIGURE 2
Map showing the divisions (locality) and the locations where traps were established.

With respect to vegetation cover, there are tree species such as *Pinus brutia, Pinus pinea, Cupressus sempervirens, Cupressus arizonica, Picea orientalis, Picea excelsa, Cedrus atlantica, Cedrus deodora, Abies bornmülleriana, Taxus baccataşThuja orientalis, Aesculus hippocastaneum, Fraxinus excelsior, Fraxinus ornus, Robinia pseudoacacia, Tilia argentea, Phoenix canariensis, Platanus orientalis, Cercis siliquastrum, Quercus coccifera* and also many shrubby plant species in Büyükada [11-12].

This study was initiated by performing a general literature review on the species of Noctuidae. The papers on Noctuidae species living in Turkey were reviewed. The locality of Noctuidae species detected in Büyükada forests was given according to management plan division numbers prepared by the Forest Management (Figure 2). Robinson-type light traps placed at different points of the research area were used for the collection of samples. The killing bottle prepared with ether aceticus was placed at the bottom of these light traps. The butterflies caught in light traps were then pinned in accordance with the technique, stretched on specially prepared stretching boards and made ready for identification [13, 14, 15].

The identification of butterflies prepared in the laboratory was performed by means of Spuler [16], Stokoe and South [17], Keyder [10], Forster and Wohlfahrt [18] and Poole [19]. Furthermore, the identified samples available in the museum of İstanbul University- Cerrahpaşa, Faculty of Forestry, Department of Forest Entomology and Conservation were also used.

RESULTS

As a result of the studies, 51 species belonging to 12 subfamilies of Noctuidae (Lepidoptera) family living in the forests of Büyükada were identified.

SUBFAMILY: NOCTUINAE
Genus: Noctua; Linnaeus, 1758
1.*Noctua comes* (Hübner, 1813)
Material: 20.07.2017/ Locality 26. Division, 24.08.2017/ Locality 24. Division, 20.08.2018/ Locality 22. Division.
2.*Noctua pronuba* (Linnaeus, 1758)
Material: 25.05.2017/ Locality 22. Division, 12.06.2017/ Locality 21. Division, 03.08.2018/ Locality 25. Division

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3.*Noctua orbona* Hüfnagel, 1766

Material: 29.04.2017/ Locality 30. Division, 12.07.2018/ Locality29. Division

4.*Noctua fimbriata* Schreber, 1759

Material: 28.06.2017/ Locality 25. Division, 03.08.2017/ Locality 28. Division

Genus: Agrotis; Ochsenheimer, 1816

5.*Agrotis ipsilon* (Hüfnagel, 1766)

Material: 23.07.2017/ Locality 21. Division, 07.08.2018/ Locality 21. Division, 30.08.2018/ Locality 30. Division

6.*Agrotis trux (*Hübner, 1824)

Material: 16.07.2017/ Locality 25. Division, 01.08.2017/ Locality 28. Division

7.*Agrotis tritici* (Linnaeus, 1761)

Material: 28.06.2018/ Locality 22. Division, 03.07.2018/ Locality 30. Division, 30.07.2018/ Locality 22. Division

8.*Agrotis crassa* (Hübner, 1803)

Material: 05.09.2017/ Locality 24. Division, 23.09.2018/ Locality 27. Division

9.*Agrotis exclamationis* (Linnaeus, 1758)

Material: 26.06.2017/Locality 23. Division, 12.08.2017/ Locality31. Division, 04.09.2018/ Locality 25. Division

10.*Agrotis puta* (Hübner, 1803)

Material: 05.09.2017/ Locality 24. Division, 10.10.2018/ Locality 27. Division

Genus: Peridroma; Hübner, 1821

11.*Peridroma saucia* (Hübner, [1808])

Material: 10.08.2017/ Locality 22. Division, 02.10.2018/ Locality 28. Division

Genus: Xestia; Hübner, 1818

12.*Xestia c-nignum* (Linnaeus, 1758)

Material: 25.05.2017/ Locality 22. Division, 07.08.2018/ Locality 21. Division

Genus: Cerastis; Ochsenheimer, 1816

13.*Cerastis rubricosa* (Denis and Schiffermüller,1775)

Material: 26.06.2017/ Locality 23. Division

Genus: Thalpophila; Hübner, 1820

14.*Thalpophila matura* (Hüfnagel, 1766)

Material: 03.08.2017/ Locality 22. Division, 05.09.2018/ Locality 25. Division

SUBFAMILY: PLUSIINAE

Genus; Autographa; Hübner, 1821

15.*Autographa gamma* (Linnaeus, 1758)

Material: 10.08.2017/ Locality 22. Division, 16.08.2017/ Locality 23. Division, 05.09.2017/ Locality 24. Division, 07.08.2018/ Locality 21. Division, 11.10.2018/ Locality 28. Division

Genus: Trichoplusia; McDunnough, 1944

16.*Trichoplusia ni* (Hübner, 1803)

Material: 28.06.2018/ Locality 22. Division, 03.07.2018/ Locality 30. Division

Genus: Chrysodeixis; Hübner, 1821

17.*Chrysodeixis chalcites* (Esper, 1789)

Material: 10.08.2017/ Locality 26. Division, 03.09.2018/ Locality 27. Division

SUBFAMILY: CATOCALINAE

Genus: Catocala; Schrank, 1802

18.*Catocala conversa* (Esper, 1783)

Material: 03.08.2017/ Locality 28. Division, 07.08.2018/ Locality 21. Division, 30.08.2018/ Locality 30. Division

19.*Catocala elocata* (Esper, 1787)

Material: 30.08.2018/ Locality 30. Division, 03.09.2018/ Locality 23. Division, 03.09.2018/ Locality 24. Division

Genus: Dysgonia; Hübner, [1823]

20.*Dysgonia algira* (Linnaeus, 1767)

Material: 20.07.2017/ Locality 26. Division, 12.07.2018/ Locality 29. Division, 30.08.2018/ Locality 30. Division

Genus: Grammodes; Guenee, 1852

21.*Grammodes stolida* (Fabricius, 1775)

Materials: 05.09.2017/ Locality 24. Division, 05.10.2018/ Locality 30. Division, 05.10.2018/ Locality 27. Division

SUBFAMILY: HADENINAE

Genus: Orthosia; Ochsenheimer, 1816

22.*Orthosia cruda* (Denis and Schiffermüller, 1775)

Materials: 25.05.2017/ Locality 22. Division, 12.06.2017/ Locality 21. Division, 28.06.2017/ Locality 25. Division ,28.06.2018/ Locality 22. Division

23.*Orthosia stabilis* (Denis and Schiffermüller, 1775)

Material: 30.04.2017/ Locality 24. Division, 05.05.2018/ Locality 28. Division

24.*Orthosia gothica* (Linnaeus, 1758)

Material: 25.05.2017/ Locality 22. Division, 26.06.2017/ Locality 23. Division

25.*Orthosia incerta* (Hufnagel, 1766)

Material: 12.06.2017/ Locality 30. Division, 05.05.2018/ Locality 31. Division

Genus: Discestra; Hampson, 1905

26.*Discestra trifolii* (Hufnagel, 1766)

Material: 24.08.2017/ Locality 24. Division,03.08.2018/ Locality 27. Division, 30.08.2018/ Locality 25. Division

Genus: Mythimna; Ochsenheimer, 1816

27.*Mythimna vitellina* (Hübner, 1808)

Material: 28.06.2017/ Locality 25. Division

28.*Mythimna pallens* (Linnaeus, 1758)

Material: 02.10.2018/ Locality 28. Division, 03.10.2018/ Locality 21. Division

29.*Mythimna sicula* (Treitschke, 1835)

Material: 05.11.2017/ Locality 26. Division

Genus: Dasycampa; Guenee, 1837

30.*Dasycampa erythrocephala* (Denis and Schiffermüller, 1775)

Material: 25.08.2017/ Locality 26. Division, 05.09.2017/ Locality 22. Division

Genus: Papestra; Sukhareva, 1973

31.*Papestra biren* (Goeze, 1781)

Material: 29.04.2017/ Locality 30. Division

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Genus: Leucania; Ochsenheimer, 1816
32.*Leucania loreyi* (Duponchel, 1827)
Material: 05.11.2018/ Locality 24. Division

SUBFAMILY: CUCULLIINAE
Genus: Agrochola; Hübner, 1821
33.*Agrochola macilenta* (Hübner, 1809)
Material: 05.11.2018/ Locality 21. Division, 17.12.2018/ Locality 23. Division
Genus: Conistra; Hübner, 1821
34.*Conistra rubiginea* (Denis and Schiffermüller, 1775)
Material: 26.02.2017/ Locality 23. Division, 23.03.2018/ Locality 26. Division
Genus: Litophae; Hübner, 1821
35.*Litophae ornitopus* (Hufnagel, 1766)
Material: 28.06.2017/ Locality 25. Division, 03.10.2018/ Locality 21. Division ,05.11.2018/ Locality 21. Division
Genus: Episema; Ochsenheimer, 1816
36. *Episema glaucina* (Esper, 1789)
Material: 12.08.2017/ Locality 21. Division, 03.10.2018/ Locality 21. Division
Genus: Aporophyla; Guenee, 1841
37. *Aporophyla australis* (Boisduval, 1829)
Material: 05.09.2017/ Locality 22. Division, 05.11.2018/ Locality 21. Division

SUBFAMILY: CHLOEPHORINAE
Genus: Bena; Bilberg, 1820
38.*Bena prasinana* (Linnaeus, 1758)
Material: 23.07.2017/ Locality 21. Division, 01.08.2017/ Locality 28. Division, 30.08.2018/ Locality 30. Division, 04.09.2018/ Locality 25. Division
Genus: Hylophilina; Warren, 1913
39.*Hylophilina bicolorana* (Fuessly, 1775)
Material: 24.08.2017/ Locality 24. Division, 07.08.2018/ Locality 21. Division, 03.09.2018/ Locality 27. Division

SUBFAMILY: ACRONICTINAE
Genus: Acronicta; Ochsenheimer, 1816
40. *Acronicta rumicis* (Linnaeus, 1758)
Material: 12.06.2017/ Locality 21. Division, 20.07.2017/ Locality 26. Division, 23.09.2018/ Locality 27. Division, 05.10.2018/ Locality 30. Division
41. *Acronicta megacephala* (Denis and Schiffermüller, 1775)
Material: 01.08.2017/ Locality 28. Division, 12.08.2017/ Locality 31. Division, 04.09.2018/ Locality 25. Division
Genus: Apatele; Hübner, 1808
42. *Apatele psi* (Linnaeus, 1758)
Material: 03.07.2018/ Locality 30. Division, 07.08.2018/ Locality 21. Division
Genus: Gortyna; Ochsenheimer, 1816
43.*Gortyna flavago* (Denis and Schiffermüller, 1775)
Material: 22.09.2018/ Locality 26. Division

SUBFAMILY: HELIOTHINAE
Genus: Heliothis; Ochsenheimer, 1816
44.*Heliothis peltigera* (Denis and Schifffermüller, 1775)
Material: 16.07.2017/ Locality 25. Division, 23.07.2017/ Locality 21. Division, 03.07.2018/ Locality 30. Division
Genus: Helicoverpa; Hardwick, 1965
45.*Helicoverpa armigera* (Hübner, 1805)
Material: 01.08.2017/ Locality 28. Division 23.09.2018/ Locality 27. Division

SUBFAMILY: AMPHIPYRINAE
Genus: Amphipyra; Ochsenheimer, 1816
46.*Amphipyra livida* (Denis and Schiffermüller, 1775)
Material: 04.09.2018/ Locality 25. Division, 03.10.2018/ Locality 21. Division, 05.11.2018/ Locality 21. Division
Genus: Spodoptera; Guenee, 1852
47.*Spodoptera littoralis* (Boisduval, 1833)
Material: 28.06.2017/ Locality 25. Division, 23.07.2017/ Locality 21. Division
48.*Spodoptera exiqua* (Hübner, 1808)
Material: 12.06.2017/ Locality 21. Division, 07.08.2018/ Locality 28. Division

SUBFAMILY: HYPENINAE
Genus: Hypena; Schrank, 1802
49.*Hypena lividalis* (Hübner, 1796)
Material: 22.09.2018/ Locality 26. Division, 05.10.2018/ Locality 30. Division

SUBFAMILY: ACONTIINAE
Genus: Acontia; Ochsenheimer, 1816
50.*Acontia lucida* (Hufnagel, 1767)
Material: 26.04.2017/ Locality 24. Division, 05.05.2017/ Locality 27. Division, 18.05.2018/ Locality 24. Division

SUBFAMILY: OPHIDERINAE
Genus: Tyta; Billberg, 1820
51.*Tyta luctuosa* (Denis and Schiffermüller, 1775)
Material: 05.10.2018/ Locality 30. Division

As a result of the study, the most identified subfamilies of the Noctuidae (Lepidoptera) family in Büyükada were Noctuinae, Plusiinae, Catocalinae, Hadeninae, Cuculliinae, Amphipyrinae and Acronictinae (Figure 3).

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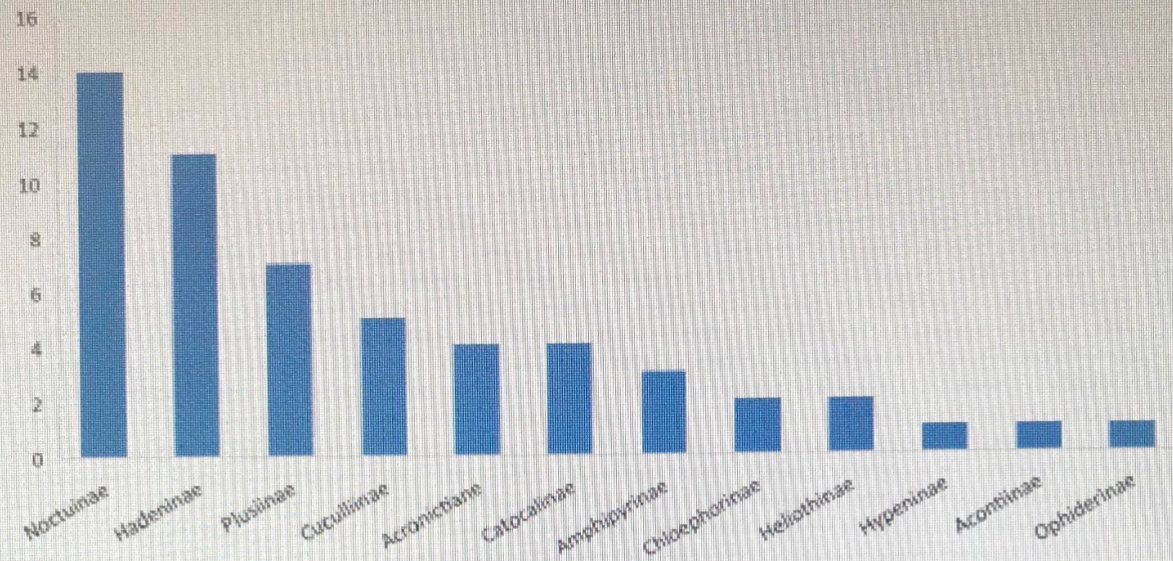


FIGURE 3
Number of species in each subfamily

CONCLUSIONS

While some of Noctuidae species we identified may cause great dangers for our forests if they are reproduced, some of them cannot be expected to be harmful on an economic scale since they mostly live with meadow, herbaceous and woody plants. The species that may be harmful in our forests are *Agrotis ipsilon* (Hufn.), *Agrotis tritici* (L.), *Orthosia cruda* (D.S.), *Orthosia stabilis* (D.S.), *Orthosia gothica* (L.), *Acronicta megacephala* (D.S.), *Catocala conversa* (Esp.), *Catocala elocata* (Esp.), *Bena prasinana* (L.), *Hylophilina bicolarana* (fues.), *Autographa gamma* (L.). [18, 4, 21-25]. With respect to *Autographa gamma* (L.), Kurir [26] indicates that this butterfly has been growing periodically by mass reproduction in Central Europe for 150 years and that the damages occurring especially during hot and dry years have reached a great extent. According to Kurir (1978) [26], *Orthosia cruda* (D.S.) is found in almost every part of Europe and common especially in oak and alder stands. According to Keyder [10], *Orthosia stabilis* (D.S.) caterpillars cause damages especially in oak and beech trees. Mol [4] reported that *Bena prasinana* (L.) caterpillars quite intensively fed on oak and beech leaves and also happened on birds between June and September. According to Forster and Wohlfahrt [14], *Catocala conversa* (Esp.) especially prefer oaks from among forest trees.

It was found out that the insect species we identified in terms of tree-insect relationships mainly preferred leafy species compared to coniferous trees. The species preferred especially from among forest trees are *Quercus, Carpinus, Fraxinus, Tilia, Ulmus, Salix, Populus, Betula, Acer* and *Fagus*. The coniferous species preferred by these insects are *Pinus* and *Picea* [20].

Some of Noctuidae species may go to both forest trees and agricultural areas. For instance, *Autographa gamma (L.)*, which causes damages to forest trees, is also an important culture destructor in the cultivation of fields, vegetables, fruits and ornamental plants. The host plants of *Agrotis ipsilon* (Hufn.) consist of especially *Pinus* and *Acer* species of forest trees, field crops and horticultural crops [21].

It has been found that the species with a high tendency to spread epidemic identified in Büyükada forests have no significant damage to this region for today. However, these species need to be carefully monitored through regular surveys.

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