Myxomycetes Diversity of Batman Province and Hasankeyf District

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ABSTRACT
This study was conducted on samples collected from 13 different localities in the province of Batman and Hasankeyf district between 2017-2019. The samples were consisted of various leaves, bark, decayed plant material and animal waste. All of the samples collected were cultured in moisture chamber technique to develop myxomycetes sporophore. In addition, myxomycetes were collected from natural area on materials. As a result of field and moist chamber collection, 33 taxa obtained and identified belonging to 5 ordo, 7 families and 12 genera and added to mycetozoa of Turkey.

INTRODUCTION
Myxogastria are expressed as plasmodial slime mold and simple eukaryotic creatures that reproduce by spores. They live mainly in wet and damp areas, on decaying vegetable or animal materials, on leaves and wood. In the vegetative stage, myxamoeba or myxoflagellates move. They do not have distinctive shapes and cell walls, are multi-core, one or more spore formations are observed (Everhart and Keller 2008).

The life cycle of myxomycetes is characterized by two different stages, vegetative and generative. In the vegetative phase, plasmodium occurs from the germinated spore, feeds, develops, sometimes with synchronized mitosis, it often turns into a large number of nuclei, spore and generative formation. In the generative phase, it turns into a structure similar to the sportive reproductive structures (fructification) of macrofungi. Identification of myxomycetes is based on the morphological features of these fructifications, which are completely fragile and small (usually less than 2 mm). There are many types of myxomycetes that can survive in very different habitats by showing a very cosmopolitan spread, as well as some species that can survive in specific habitats (Stephenson 2003).

The number of Myxomycetes defined in the world is about 1045 (Lado, 2005-2021). Turkey is located between mild and subtropical climates and surrounded by sea on three sides. The extension of the mountains and the diversity of the landforms led to the emergence of different climate types. This situation also provide richness in terms of vegetation, fauna, mycota and myxobiota. Myxogastria reported number is 290 in Turkey (Baba and Sevindik, 2019; Baba et al. 2021). There are limited studies only in provinces with some regions (Ocak and Hasenekoğlu, 2003; Yaşız and Aşyon, 2005; Ergül et al., 2005a; Ergül et al., 2005b; Ergül et al., 2016; Demirel et al., 2006). In this study, myxomycetes of Batman city center and Hasankeyf district (Turkey) were determined. This study considered as first in the Southeast Anatolia Region and in Batman.
MATERIAL and METHOD

Research Area:
Batman is located in Southeast Anatolia Region of Turkey. The northern region and northeast of Batman are high with steep and mountainous, and the southern region is mountainous and rugged. Batman province is located in the north of the province of Muş, Diyarbakır is in the west, Bitlis and Siirt in the east and Mardin in the south of the city (Figure 1). It has an land size of 4,477 km². Batman province is located between 41°10′-41°40′ East longitudes and 38°40′-37°50′ North latitudes. It has a altitude of 550 meters. Hasankeyf district belongs to Batman province. Its geographic location is 37°41′49″ North and 41°29′58″ East coordinates. Its land size is about 529 km². The Dicle River, which gives life to the region, also affects the climate of the region. The river ensures that the winter are mild (Alaeddinoglu 2010).

Figure 1. Research Area
Şekil 1. Araştırma Sahası

Terrestrial climate is generally dominant in Batman province and Hasankeyf district. The winter season in Batman is cool and rainy and the summer season is hot and dry. Rainfall is high in the form of snow and lowlands in the form of rain. The highest temperatures are experienced in the June-September period and the lowest temperatures in the December-March period. The average annual temperature of Batman is 25 °C, the highest average temperature is 43 °C, the lowest average temperature is between 6 °C. The average annual total precipitation is seen to be 487.5 mm for Batman. Provincial lands are covered with steppes and do not show richness in terms of vegetation. In high parts, there are forests mixed with oak (Quercus robur L.), juniper (Juniperus communis L.), plane-tree (Platanus orientalis L.) and wild peanut (Peanuts faram C.M. Schultz). At lower levels, steppe plants and river-sized, poplar (Populus sp.), and willow trees (Salix sp.) form natural vegetation (Alaeddinoglu 2010).

Collection and Identification of Samples:
By field trips samples were collected from the different regions of Batman city center and Hasankeyf district, to cover the four seasons of the year during 2017-2019. In field studies, myxomycetes samples were collected with substrate. Tree shells, pieces, leaves, branches, cones, fruit residues such as leaves, branches, cones, fruit residues that do not contain sporophore but are considered to contain myxomycet spores were placed in locked storage bags. The Moist Chamber Culture Technique developed by Gilbert and Martin (1933) was used isolation and identification of the species. Field samples collected in the sporophore stage or obtained from the moist chamber technique were dried in room temperature by laying a two layer of blotter paper in petri dishes and turned into fungarium material (Baba and Tamer, 2007). Identification of myxomycetes were made using Martin and Alexopoulos (1969), Farr (1976), Thind (1977), Farr (1981), Martin et al (1983), Neubert et al (1993, 1995, 2000), Stephenson and Stempfen (1994), Alexopoulos et al (1996), Alvarado and Stephenson (2017), Zümre et al. (2019); Baba and Sevindik (2019, 2020).

RESULT and DISCUSSION
As a result of the field studies conducted around Batman city center and Hasankeyf district in the 2017-2019, a total of 33 species were identified belonging 5ordo, 7 families and 12 genus. The taxa detected are listed below. In addition, the locality, altitude, substrate, collector number, frequency (F) of species (FC: Field Collection, MC: Moist Chamber technique) density data (D) and were determined respectively. If the ratio of the number of individuals of the species to the total number of individuals was less than 0.5%, it was expressed as rare (R), between 0.5-1.5% uncommon (O), between common 1.5-3% (C) and greater than plenty 3% (A) (Stephenson et al.,1993).

List of species
Eukaryota
Protozoa
Amoebozoa
Myctezoza
Myxogastria
Echinostellida
Echinosteliaceae
1- **Echinostelium minutum** de Bary  
**Syn:** Heimerlia hyalina Höhn.  
**Specimen examined:** Turkey: Batman Province, Zorköy, altitude 532 m, on wood, 01.11.2017, Altaş 265, F/4, MC, D/O.  
**Liceida**  
**Liceaceae**  
2- **Licea kleistobolus** G.W. Martin  
**Syn:** Kleistobolus pusillus C. Lippert  
**Orcadella pusilla** (C. Lippert) Hagelst.  
**Specimen examined:** Turkey: Batman Province, Zorköy, altitude 528 m, on wood and bark of *Vitis vinifera* L., 23.10.2017, Altaş 267, F/2, MC, D/O.  
3- **L. pescaderoensis** Chao H. Chung & C.H. Liu.  
**Specimen examined:** Turkey: Batman Province, Yeniköy, altitude 530 m, on bark of *V. vinifera* L., 02.06.2018, Altaş 39, F/1, MC, D/O.  
4- **L. scyphoides** T.E. Brooks & H.W. Keller  
**Syn:** Licea tanzanica Ukkola, Härk. & Gilert,  
**Specimen examined:** Turkey: Batman Province, Zorköy, altitude 532 m, leaf litter, 23.10.2017, Altaş 268, F/1, MC, D/O.  
**Reticulariaceae**  
5- **Reticularia lycoperdon** Bull  
**Syn:** Enteridiyum lycoperdon (Bull.) M.L. Farr  
**Fuligo lycoperdon** (Bull.) Schumach.  
**Specimen examined:** Turkey: Batman Province, Yeniköy, altitude 530 m, on *Salix* sp. trunk, 02.01.2017, Baba 264, F/1, FC, D/O.  
**Trichiida**  
**Arctiyaceae**  
6- **Arcyria cinerea** (Bull.) Pers.  
**Syn:** Arctiryis albida Pers.  
**Stemonitis cinerea** (Bull.) J.F. Gmel.  
**Trichia cinerea** Bull.  
**Specimen examined:** Turkey: Batman province, Hasankeyf, altitude 485 m, on wood, 14.05.2018, Altaş, 10, F/1, MC, D/O.  
7- **Perichaena pedata** (Lister & G. Lister) Lister  
**Syn:** Perichaena variabilis var. *pedata* Lister & G. Lister,  
**Specimen examined:** Turkey: Batman province, Yeniköy, altitude 530 m, on leaf litter, 19.05.2018, Altaş, 260, F/1, FC, D/O.  
8- **P. vermicularis** (Schwein) Rostaf  
**Syn:** Ophiotricha vermicularis (Schwein.) Massee  
**Physarum vermiculare** Schwein.  
**Specimen examined:** Turkey: Batman, Zorköy, altitude 532 m, on wood of *V. vinifera* L., 23.10.2017, Altaş, 263, Hasankeyf, altitude 485 m, on wood, 01.01.2017, Altaş, 250, F/2, MC, D/O.  
**Physarida**  
**Didymiaceae**  
9- **Didymium annulisporum** H.W. Keller & Schokn  
**Specimen examined:** Turkey: Batman Province, altitude 570 m, on leaf, 01.10.2017, Altaş 23, on bark, 02.06.2018, Altaş 13, Atatürk park, altitude 580 m, on leaf, 01.10.2017, Altaş, 26, High school, altitude 552 m, on leaf litter, 24.02.2018, Baba 87, Cemetery, altitude 575 m, on fallen twigs, 02.06.2018, Altaş 119, Hasankeyf, altitude 478 m, on twigs, 07.10.2017, Altaş 68, F/7, FC- MC, D/A.  
10- **D. bahiense** Gottsb.  
**Syn:** Didymium bahiense var. microsporum Hochg.,  
**Specimen examined:** Turkey: Batman Province, Atatürk park, altitude 580 m, on leaf litter, 15.11.2017, Baba 24, F/1, MC, D/O.  
11- **D. difforme** (Pers.) Gray  
**Syn:** Chondrioderma difforme (Pers.) Rostaf.  
**Diderma difforme** Pers.  
**D. nitens** Klotzsch  
**Physarum difforme** (Pers.) Link  
**Specimen examined:** Turkey: Batman Province, altitude 590 m, on leaf litter, 01.10.2017, Altaş 15, Atatürk park, altitude 580 m, on leaf litter, 03.01.2018, Baba 25, High school, altitude 552 m, on leaf litter, 24.01.2018, Altaş, 233, Yeniköy, altitude 530 m, on leaf litter, 19.05.2018, Altaş 230, School, altitude 530 m, on rash wood, 24.02.2018, Altaş, 98, Hasankeyf town, altitude 480 m, on rash wood, leaf, bark and filter paper, 07.10.2017, Altaş 12, 19, 21, 30, Balpınar, altitude 536 m, on rash grape, 26.10.2017, Altaş, 32, Zorköy altitude 530 m, on rash wood and leaf, 01.11.2017, Altaş, 20, 31, Bişkek, altitude 569 m, on plastic petri dishes, 02.06.2018, Altaş, 34, F/46, FC- MC, D/A.  
12- **D. dubium** Rostaf.  
**Syn:** Didymium wilczkii Meyl.,  
**Specimen examined:** Turkey: Batman province, Hasankeyf, altitude 476 m, on rash bARK, 07.10.2017, Altaş, 22, Zorköy, altitude 530 m, on rash wood, 23.10.2017, Altaş, 266, Cemetery, altitude 575 m, on decaying twigs and leaf, 21.04.2018, Altaş 138, 142, F/4, MC, D/O.  
13- **D. megalosporum** Berk. & M.A. Curtis  
**Syn:** Didymium fulvellum Massée,  
**Didymium discoideum** K.S. Thind & H.S. Sehgal,  
**Specimen examined:** Turkey: Batman province, altitude 582 m, on plastic petri dishes, 02.06.2018, Altaş, 50, Hasankeyf, altitude 476 m, on rash leaf, 01.01.2017, Altaş, 67, Hasankeyf town, altitude 478 m, on the bark and wood body, 07.10.2017, Altaş, 70, High school, altitude 552 m, on rash leaf, 12.03.2018, Altaş, 69, F/6, FC-MC, D/O.  
14- **D. melanospherum** (Pers.) T. Macbr.  
**Syn:** Cionium farinaceum Link  
**Diderma melanospherum** (Pers.) Fr.
Didymium farinaceum Schrad.
Physarum farinaceum (Schrad.) Pers.
P. melanospermum Pers.
Trichia farinacea (Schrad.) Poir.

**Specimen examined:** Turkey: Batman province, Balpınar village, altitude 540 m, on litter grape remains, 26.10.2017, Altaş, 32, F/1, MC, D/O.

15 - *D. squamulosum* (Alb.& Schwein.) Fr & Palmquist.
**Syn:** Clonium squamulosum (Alb. & Schwein.) Spreng.
*Didera squamulosum* Alb. & Schwein.
*Didymium effusum* Link
*Physarum effusum* Link

**Specimen examined:** Turkey: Batman province, altitude 577 m, on filter paper, 02.06.2018, Altaş, 51, High school, altitude 552 m, on rash wood and body, 06.02.2017, Altaş 33 K, Cemetery, altitude 575 m, on leaf and plastic petri dishes, 02.01.2018, Baba 139, Esentepe, altitude 650 m, on rash wood, 02.06.2018, Altaş 253, Hasankeyf, altitude 480 m, on rash thorn bush, School, altitude 490 m, on rash leaf, 17.05.2018, Altaş 64, School, altitude 490 m, on leaf litter, filter paper, and plastic petri dishes, 22.03.2018, Bıçakçı village, altitude 570 m, on leaf litter and wood, 02.06.2018, Altaş 270, 9, 97, 104, F/48, N- MC, D/A.

16 - *D. trachysporum* G. Lister
**Specimen examined:** Turkey: Batman province, Hasankeyf district, altitude 482 m, on leaf litter, 07.10.2017, Altaş, 66, F/1, FC, D/O.

**Physaraceae**

17 - *Badhamia dubia* Nann.-Bremek.
**Specimen examined:** Turkey: Batman Province, Cemetery, altitude 575 m, on pine cone, 02.01.2018, Altaş, 133, F/1, MC, D/O.

18 - *B. foliicola* Lister
**Syn:** Badhamia alpina G. Lister
**Specimen examined:** Turkey: Batman Province, altitude 575 m, plastic petri dishes, 25.04.2018, Altaş, 5, Hasankeyf, altitude 485 m, on litter thorns, 01.01.2017, Altaş 74, F/4, FC-MC, D/C.

19 - *B. panicea* (Fr) Rostaf.
**Syn:** Physarum paniceum Fr.
**Specimen examined:** Turkey: Batman province, High school, altitude 552 m, on plant debris, 14.05.2018, Altaş, 84, Hasankeyf, altitude 485 m, on litter bark, 01.01.2017, Altaş 73, F/2, FC-MC, D/O.

20 - *Fuligo septica* F.H. Wigg.
**Syn:** Aethalium septica (L.) Fr.
*A. septicum* (L.) Fr. f. *septicum*
*A. septicum* (L.) Fr. var. *septicum*
*F. septica* (L.) F.H. Wigg. f. *septaica*
*F. varians* Sommerf.
*Mucor septicus* L.
*Reticularia septica* (L.) With.

**Specimen examined:** Turkey: Batman province, Dilek village, altitude 625 m, on plastic petri dishes, 02.06.2018, Altaş, 192, F/1, MC, D/O.

21 - *Physarum album* (Bull.) Chevall.
**Syn:** Mucor albus (Bull.) Sobol.
*Sphaerocarpus albus* Bull.
*Stemonia lisiba* (Bull.) J.F. Gmel.
*Tilmadoche alba* (Bull.) T. Macbr.
*Trichia alba* (Bull.) Raeusch.

**Specimen examined:** Turkey: Batman province, Hasankeyf town, altitude 485 m, on rash wood, 14.05.2018, Baba, 77, F/1, MC, D/O. Baba, 77

22 - *P. cinerea* (Batsch) Pers.
**Syn:** Badhamia cinerea (Batsch) J. Kickx
*Didymium cinereum* (Batsch) Fr.
*Lignydium cinerea* (Batsch) Kuntze
*Lycoperdon cinereum* Batsch,

**Specimen examined:** Turkey: Batman province, Bıçakçı village, altitude 570 m, on litter thorns and fallen twigs, 02.06.2018, Altaş, 61, F/2, FC, D/O.

23 - *P. leucophaeum* Fr & Palmquist
**Syn:** Physarum nutans subsp. *leucophaeum* (Fr.) G. Lister
*P. nutans var. *leucophaeum* (Fr.) Lister
*Tilmadoche leucophaea* (Fr.) Fr.

**Specimen examined:** Turkey: Batman province, High school, altitude 552 m, on leaf litter, 17.05.2018, Altaş, 8, F/1, MC, D/O.

24 - *P. leucopus* Link
**Syn:** Didymium leucopus (Link) Fr.
*D. squamulosum* var. *leucopus* (Link) Berl.
*Lignydium leucopus* (Link) Kuntze

**Specimen examined:** Turkey: Batman province, Cemetery, altitude 575 m, on decaying bark, 21.04.2018, Altaş, 131: Yeniköy, altitude 530 m, on wood, 19.05.2018, Altaş, 261, F/4, MC, D/C.

25 - *P. notabile* Macbr.
**Syn:** Didymium connatum Peck,
*Physarum connatum* (Peck) G. Lister

**Specimen examined:** Turkey: Batman province, Yeniköy, altitude 530 m, on bark, 02.06.2018, Altaş, 30: Hasankeyf, altitude 485 m, on wood, 07.10.2017, Altaş, 28, F/2, MC, D/O.

26 - *P. robustum* (Lister) Nann-Bremek
**Syn:** Physarum nutans var. *robustum* Lister,

**Specimen examined:** Turkey: Batman province, altitude 575 m, on leaf litter, 01.10.2017, Altaş, 17: Cemetery, altitude 575 m, on leaf litter, 02.01.2018, Altaş, 140: Hasankeyf, altitude 485 m, on wood, 14.05.2018, Altaş, 11: School, altitude 497 m, on leaf litter, 10.11.2017, Altaş, 7, F/4, MC, D/O.

27 - *P. vernum* Sommerf.
**Syn:** Badhamia *vernum* (Sommerf.) Rostaf.
*Physarum styriacum* Gottsb.,
Specimen examined: Turkey: Batman province, Yeniköy, altitude 530 m, on fallen twigs, 19.05.2018, Altas, 215, F/1, MC, D/O.

28- *P. viride* (Bull.) Pers.

Syn: Physarum nutans var. viride (Bull.) Fr. P. nutans B viride (Bull.) Fr. P. viride (Bull.) Pers. P. viride (Bull.) Pers. f. viride Sphaerocarpus viridis Bull. Stemonitis viridis (Bull.) J.F. Gmel. Tilmadoche mutabilis Rostaf. var. mutabilis T. viridis (Bull.) Sacc. T. viridis (Bull.) Sacc. var. viridis Trichia viridis (Bull.) Rausch.

Specimen examined: Turkey: Batman province, Bıçakçı village, altitude 567 m, on leaf litter, 02.06.2017, Altas, 231, F/1, FC, D/O.

30- *C. laxa* Rostaf.

Syn: Stemonitis laxa (Rostaf.) Massee

Specimen examined: Turkey: Batman province, Atatürk park, altitude 580 m, on pine cone, 01.10.2017, Altas, 271, F/1, MC, D/O.

31- *C. nigra* (Pers. ex J.F.Gmel.) J.Schröt.

Syn: Comatricha obtusata Preuss, Comatrichoides nigra (Pers.) Hertel, Stemonitis atrofusca B nigra Pers. S. nigra Pers. ex J.F. Gmel. S. obtusata Fr. S. ovata var. atrofusca (Pers.) Alb. & Schwein. S. ovata var. nigra (Pers. ex J.F. Gmel.) Pers.

Specimen examined: Turkey: Batman province, Atatürk park, altitude 580 m, on pine cone, 25.04.2018, Altas, 29, F/1, MC, D/O.

32- *Lamproderma arcyrioides* (Sommerf.) Rostaf

Syn: Lamproderma violaceum Rostaf. L. violaceum var. arcyrioides (Sommerf.) Torrend Stemonitis arcyrioides Sommerf. S. violacea Fr.

Specimen examined: Turkey: Batman province, High school, altitude 552 m, on leaf litter, 24.01.2018, Altas, 75, F/6, FC, D/A.

33- *Stemonitopsis amoena* (Nann.-Bremek.)

Syn: Comatricha amoena Nann.-Bremek.

Specimen examined: Turkey: Batman province, Hasankeyf, altitude 485 m, on twigs, 14.05.2018, Altas, 11, F/2, MC, D/O.

Within the scope of this study conducted in Batman Central and Hasankeyf district, a total of 33 species belonging to 5 ordo, 7 families and 12 genus were determined. 702 substrate samples were collected from the research area and used to prepare moist chamber cultures in the laboratory. A total of 163 myxomycete recorded. Overall, 114 (70%) of these samples were obtained with the moist chamber technique. 49 species (30%) were from field collection. It is known that myxomycetes are mostly invisible and the collection rate in the land is low. In a study conducted in the forests of Istanbul, Belgrade, 251 myxomycete were collected and only 71 of them were collected from the natural environment (Oskay et al., 2006). In another study, 23% (7) of the species defined from Izmir were obtained from the natural environment and 77% (23) of them were from moist chamber culture studies (Oskay and Tüzün 2015). In other study, 7 of the samples identified from Hatay province were obtained from their natural habitats and 115 from moist chamber culture (Baba and Doğan 2018). The vast majority of the species obtained in this study were also obtained in the laboratory from the moist chamber culture.

In this study, 33 taxa belonging to 7 different families were obtained. Considering the distribution of these families, genus numbers were as follows Echinosteliaceae (1), Liceaceae (3), Reticulariaceae (1), Arcyriaceae (3), Didymiaceae (8), Physaraceae (12) and Stemonitidaceae (5). Among these, Physaraceae, Didymiaceae, Stemonitidaceae families contain 25 out of 33 taxa. These percentages of the related ordo and families are in line with the studies conducted in Turkey (Yağız and Afyon, 2005; Ergül and Akgül, 2011; Oskay and Tüzün, 2015; Baba, et al., 2019). The genus and species numbers detected in this research field are represented by Didymium 8, Physarum 8, Badhamia 3, Comatricha 3, Licea 3, Perichaena 2, Arcyria 1, Echinostelium 1, Fuligo 1, Lamproderma 1, Reticularia 1, Stemonitopsis 1 species.

In this study, only one species of the genus Echinostelium was determined. It was observed that this sample was less common in previous studies (Okan et al., 2006; Demirel et al., 2006; Yağız and Afyon, 2006; Baba et al., 2018). In this study, species of the genus Didymium and Physarum were found the most. In previous studies, it was also more common to examples of this breed in the world and Turkey. The world and the most common of the species known in Turkey, Didymium (world: 93, Turkey: 23) and Physarum (World: 149, Turkey: 38) is located within the genus (Baba and Sevindik, 2019; Lado, 2020). According to the results, the ratio of the number of species to the number of genera (S/G) is used as an indicator of taxonomic diversity. The low rate of this rate indicates that the taxonomic diversity is high, and the high rate is the indication that the taxonomic diversity is low.
diversity in the study is low (Stephenson et al., 1993). In this study, S/G ratio is 2.75. It was calculated as 2.24 for Southeast India and 4.13 for North America, in temperate or tropical regions S/G value has been reported to be between 2.2 and 4.6 (Stephenson and Stempen, 2000). In studies conducted in Turkey, the S/G ratio of 2.3 (Baba, 2015), 1.8 (Baba and Zümre, 2015), 2.7 (Baba et al., 2016), 2.38 (Baba and Atay 2019), 2.42 (Baba and Arslan 2017), 2.66 (Baba and Doğan 2018) and 2.04 (Baba et al 2019).

Density of each of the 33 taxa in 163 myxomycete record gives the degree of abundance of the taxa. Abundance estimates of the species are based on the ratio of the species to the total number of samples (Stephenson et al., 1993). Considering the abundance of samples, 24 of 33 species were found between 0.5-1.5% and rare (O), 4 of them between 1.5-3% and common (C), 5 of them were larger than 3% and abundant (A). Among the species obtained, Didymium annulissporum, D. difforme, D. megasporum, D. squamulosum and Lamproderma arcryioides were detected in almost all stations as abundant species. The reason for this may be that these species are cosmopolitan and their ecological tolerance is high. D. squamulosum was determined as the densest species with 48 record in 6 locations. The altitude value of the related sample has been found in different locations and different substrates. Apart from that, D. difforme (46) is the densest species after D. squamulosum.

CONCLUSION
As a result of the studies, 33 taxa belonging to 5 ordo, 7 families and 12 genera were determined and contributed to mycetozoa of Batman and Turkey. A total of 163 myxomycete recorded, 114 (70%) of were obtained with the moist chamber technique and 49 species (30%) are field collection. Among these, Physraceae, Didymiaeaceae, Stemonitidaceae families contain 25 out of 33 taxa. In this study, species of the genus Didymium and Physarum were found the most. Considering the abundance of samples, 24 of 33 species were found between 0.5-1.5% and rare (O), 4 of them between 1.5-3% and common (C), 5 of them were larger than 3% and abundant (A). In this study, S/G ratio is 2.75 and this rate indicates that the taxonomic diversity of myxobiota in Batman province is high.

Acknowledgment
This study was supported by Mustafa Kemal University Scientific Research Projects Commission (Project No: 18.YL.014).

Conflict of Interest
Article authors declare that there are no conflicts of interest among them.

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