Orthoptera from the Kiskunság National Park

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István András Rácz
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ORTHOPTERA FROM THE KISKUNSÁG NATIONAL PARK

By

I. RÁCZ

A total of 63 species of Orthoptera has been ascertained to occur in the National Park. Of this number 36 are commonly found both in the sandy and in the saline turf. Besides some ecofaunistical notes conclusions are drawn concerning the composition of the Orthoptera fauna of this region.

There are only sporadic literature references concerning the fauna of the Kiskunság National Park. Consequently, very little is known about the composition of the Orthoptera fauna there. Of course, numerous publications appeared on locust control and the measures taken (Nagy 1958, 1959a, 1959b, 1974), the material of which is deposited in the collection of the Plant Protection Research Institute, Budapest.

A planned research programme was launched in 1977 by the Hungarian Natural History Museum, Budapest with a view to elaborate the fauna of the region. Thus the sporadic data known from this area have been amply complemented. During this intensive collecting period nearly 2500 specimens of Orthoptera belonging to 63 species were gathered.

List of species

Ensifera

Tettigoniidae

Phaneroptera falcata (Poda, 1761)—I. Lakitelek.—I. Dabas. VII-X.—Rather sporadic throughout the National Park.

Phaneroptera nana (Fieber, 1853)—II. Dömsöd: Apajpuszta; VI. Bugac.—1. Dabas; 3. Csévharaszt; 9. Kunfehértó. VIII-X.—Rather sporadic in the National Park.

Conocephalus (Xiphidium) discolor (Thunberg, 1815)—II. Dömsöd: Apajpuszta; IV. Fülöpháza: Szappan-szék; VI. Bócsa.—1. Ócsa: Öreg-turján; Dabas; 2. Ágasegyháza. VII-X.—It is found mostly in wet biotopes with tall grass, primarily in saline areas.

Conocephalus (Xiphidium) dorsalis (Latreille, 1804)—II. Dömsöd: Apajpuszta; III. Szabadszállás: Kelemen-szék, Kis-rét, Kiskunsági főcsatorna. VII-X.—Mostly found in wet biotopes, primarily in saline areas. Occasionally its macropterous form may be encountered.

Homorocoryphus nitidulus (Scopoli, 1786)—III. Szabadszállás: Kiskunsági főcsatorna; IV. Fülöp-háza: Szappan-szék. VIII-X.—Sporadic in wet, scrubby, bushy biotopes.

Tettigonia viridissima (Linné, 1758)—VI. Bócsa. VII-X.—In spite of this one collecting locality this species is common throughout the territory of the National Park in suitable biotopes.

Decticus verrucivorus (Linné, 1758)—II. Dömsöd: Apajpuszta; VI. Bugac: Szekercés-szék—1. Ócsa. VII-X.—Common in any place with tall grass.

Platycleis grisea (Fabricius, 1781)—IV. Fülöpháza: Strázsa-hegy; VI. Bugac: Nagybugac.—3. Csévharaszt. VII–IX.—May be found in dry meadows and in scrubs.

Platycleis affinis (Fieber, 1853)—II. Dömsöd: Apajpuszta; Kunszentmiklós; III. Szabadszállás: Kelemen-szék, Kis-rét; Fülöpszállás: Borda-tanya; IV. Fülöpháza: Strázsa-hegy; VI. Bugac: Alsópuszta, Nagybugac, Nagybugaci-erdő.—11. Izsák: Bika-torok. VII–IX.—May be found in dry meadows, in scrubs, mainly in saline areas.

Platycleis (Montana) montana (Kollar, 1833)—IV. Fülöpháza: Strázsa-hegy; VI. Bugac: Nagybugac, Kisbugac.—1. Ócsa; 2. Ágasegyháza. VI–IX.—May be found on compact soil, dry grassy stretches and on arreneous steppe areas.

Platycleis (Tesselana) vittata (Charpentier, 1825)—II. Dömsöd: Apajpuszta.—3. Csévharaszt. VII–IX.—May be found on saline areas of better quality, on loessy sand with steppe vegetation, usually locally.

Metrioptera (Bicolorana) bicolor (Philippi, 1830)—III. Szabadszállás: Kis-rét; Fülöpszállás: Borda-tanya; VI. Bugac: Nagybugac.—3. Csévharaszt. VII–IX.—It may be found both in dry and rather fresh grassy areas.

Metrioptera (Roeseliana) roeseli (Hagenbach, 1822)—III. Szabadszállás: Kis-rét; VI. Bugac: Szekercés-szék.—1. Ócsa; 2. Ágasegyháza; 3. Csévharaszt. VI–X.—Mostly found in rather damp biotopes.

Gampsocleis glabra (Herbst, 1786)—II. Dömsöd: Apajpuszta; VI. Bugac: Nagybugac, Szekercés-szék, Kisbugac. VII–X.—Common mostly on compact soil with tall vegetation.

Gryllidae

Gryllus campestris (Linné, 1758)—VI. Bugac.—2. Orgovány: Orgoványi-rét; 3. Csévharaszt. V–IX.—Distributed throughout the National Park.

Pteronemobius concolor (Walker, 1871)—Usually encountered in marshy meadows. V–VIII. (Móczár 1979—In: Tóth, K. (ed.) 1979.)

Tartarogryllus burdigalensis (Latreille, 1804)—It occurs on saline pastures and on saline stretches. V–IX. (Móczár 1979—In: Tóth, K. (ed.) 1979.)

Oecanthus pellucens (Scopoli, 1763)—3.Csévharaszt. VII–X.—Locally common. Obviously may well be encountered in warmer places on taller plants (*Achillea*, *Ononis*, etc.) standing well out of the surrounding vegetation.

Gryllotalpidae

Gryllotalpa gryllotalpa (Linné, 1758)—IV. Fülöpháza. IV–X. (—III).—In spite of its only one collecting locality, it must be more widely spread, especially in loose, moist soils.

Caelifera

Tetrigidae

Tetrix subulata (Linné, 1758)—IV. Fülöpháza. IV–VII, VIII–X.—It may be found in wet meadows, in flatland and the margins of aquatic—marshy biotopes.

Tetratetrix nutans (Hagenbach, 1822)—IV. Fülöpháza. V–IX.—Sporadically occurring along aquatic—marshy biotopes.

Tridactylidae

Tridactylus variegatus (Latreille, 1809)—It may be found along the sandy shores of small waters among the sand dunes of the National Park. III–IX. (Móczár 1979—In: Tóth, K. (ed.) 1979.)

Catantopidae

Calliptamus italicus (Linné, 1758)—VI. Bugac: Szekercés-szék. VIII–X.—Sporadically found in saline stretches with sparse vegetation, at places occurs in masses.

Calliptamus barbarus (Costa, 1836)—IV. Fülöpháza: Strázsa-hegy, Fehér-hegy, environs of Kondor-tó; VI. Bugac: Nagybugac, Kisbugac, Ősborókás.—3. Csévharaszt; 11. Izsák: Bikatorok. VII–X.—Common in the mosaic stands of sandy turf.

ACRIDIDAE

Acrida ungarica (Herbst, 1786)—I. Lakitelek; II. Dömsöd: Apajpuszta; Kunszentmiklós; IV. Fülöpháza: Strázsa-hegy; VI. Bócsa; Bugac.—1. Ócsa: Öreg-turján; 2. Ágasegyháza; 3. Csévharaszt. VII–IX.—It is rather sporadic throughout the territory of the National Park, mostly in steppe biotopes.

Oedaleus decorus (Germar, 1826)—II. Dömsöd: Apajpuszta; Kunszentmiklós; IV. Fülöpháza: Strázsa-hegy, Kondor-tó; VI. Bugac: Nagybugac, Kisbugac, Ősborókás.—2. Ágasegyháza; 3. Csévharaszt; 11. Izsák: Bikatorok. VII–IX.—Sporadic in dry steppe biotopes, frequent at places on sand.

Celes variabilis (Pallas, 1771)—II. Dömsöd. VI–VIII.—Sporadic in turf of saline puszta.

Oedipoda coerulescens (Linné, 1758)—I. Lakitelek; II. Dömsöd: Apajpuszta; Kunszentmiklós; III. Szabadszállás: Kiskunsági főcsatorna; IV. Fülöpháza: Fehér-hegy; VI. Bugac: Nagybugac, Ősborókás, Szekercés-szék.—1.Ócsa: Öreg-turján; Dabas; 2. Ágasegyháza; 3. Csévharaszt; 11. Izsák: Bikatorok. VII–IX.—A common species throughout the whole of the National Park.

Sphingonotus cearulans (Linné, 1767)—IV. Fülöpháza: Strázsa-hegy; VI. Bócsa.—1. Ócsa; 2. Ágasegyháza; 3. Csévharaszt. VII–X.—A rare species. It occurs on open sandy stretches in the National Park.

Acrotylus insubricus (Scopoli, 1786)—II. Dömsöd; IV. Fülöpháza; VI. Bócsa; Bugac: Nagybugaci-erdő.—1. Ócsa; Dabas; 3. Csévharaszt. V, VIII–IX.—A rare species. It occurs on open sandy stretches in the National Park.

Acrotylus longipes (Charpentier, 1845)—IV. Fülöpháza; VI. Bócsa.—2. Ágasegyháza. VII–X.—A rare species, attached to loose or moving sand dune slopes. Also captured by light-trap.

Aiolopus thalassinus (Fieber, 1781)—II. Dömsöd: Apajpuszta; III. Szabadszállás: Kelemen-szék; Kiskunsági főcsatorna; Kis-rét; VI. Bócsa; Bugac.—1. Ócsa: Öreg-turján. VII–X.—Generally common in various associations of mainly saline areas.

Epacromius coerulipes (Ivanov, 1887)—II. Dömsöd: Apajpuszta. VII–X.—Sporadic species on saline turf of better quality.

Parapleurus alliaceus (Germar, 1817)—VI. Bugac: Szekercés-szék.—1. Ócsa. VII–X.—Normally a limited number is found in aquatic—marshy biotopes.

Mecosthetus grossus (Linné, 1758)—IV. Fülöpháza: Szappan-szék; environs of Kondor-tó.—1. Ócsa: Öreg-turján. VIII–IX.—A limited number is found in aquatic—marshy biotopes.

Chrysochraon dispar (Germar, 1831–1835)—VI. Bugac: Szekercés-szék.—3. Csévharaszt. VII–VIII.—Rare, occurring in moist, shaded biotopes.

Euthystira brachyptera (Ocskay, 1826)—VI. Bugac: Szekercés-szék. VII–X.—A rare species occurring in moist and shaded biotopes; a species of the hills and mountains.

Dociostaurus maroccanus (Thunberg, 1815)—II. Dömsöd: Apajpuszta. VI–VII.—It is rare in dry, saline puszta; so far encountered only at Apajpuszta.

Dociostaurus brevicollis (Eversmann, 1848)—III. Szabadszállás: Kelemen-szék, Kis-rét, Kiskunsági főcsatorna; IV. Fülöpháza: Strázsa-hegy, Szappan-szék and environs, Kondor-tó; VI. Bugac: Nagybugac, Szekercés-szék, Kisbugac, Ősborókás.—3. Csévharaszt; 11. Izsák: Bikatorok. VI–IX.—A quite common species in dry saline and sandy turf with sparse vegetation.

Dirshius haemorrhoidalis (Charpentier, 1825)—II. Dömsöd: Apajpuszta; III. Szabadszállás: Kiskunsági főcsatorna; VI. Bócsa; Bugac: Kisbugac.—1. Ócsa: Öreg-turján; 3. Csévharaszt. VII–X.—Usually occurring in puszta biotopes, rather more common in saline steppe.

Dirshius petraeus (Brisout, 1855)—II. Dömsöd: Apajpuszta; III. Szabadszállás: Kiskunsági főcsatorna.—1. Ócsa; 2. Ágasegyháza; 3. Csévharaszt. VI–IX.—A very common species in dry steppe biotopes.

Omocestus ventralis (Zetterstedt, 1821)—II. Dömsöd; Szabadszállás: Kelemen-szék, Kis-rét; VI. Bócsa; Bugac: Nagybugac.—1. Ócsa: Öreg-turján; Dabas; 3. Csévharaszt. VI–IX.—Rather evenly spread in steppe biotopes.

Stenobothrus crassipes (Charpentier, 1825)—II. Dömsöd: Apajpuszta; III. Fülöpszállás: Borda-tanya; VI. Bugac: Nagybugac, Kisbugac, Ősborókás.—1. Ócsa; 3. Csévharaszt. VII–IX.—It mainly occurs in saline turf, but may also be encountered in more compact sandy soil types.

Stenobothrus lineatus (Panzer, 1790)—1. Dabas; Ócsa; 3. Csévharaszt. VII–X.—Sporadic in dry biotopes.

Stenobothrus fischeri (Eversmann, 1848)—IV. Fülöpháza; VI. Bugac: Kisbugac.—2. Ágasegyháza. VII–IX. Sporadic in closed sandy turf.

Stenobothrus nigromaculatus (Herrich—Schäffer, 1840)—II. Dömsöd: Apajpuszta; Kunszentmiklós; VI. Bugac: Kisbugac, Ősborókás.—1. Ócsa. VI–IX.—It is found in saline meadows of better quality, where comparatively more frequent.

Stenobothrus stigmaticus (Rambur, 1838)—II. Dömsöd; III. Szabadszállás: Kis-rét; VI. Bugac: Ősborókás.—3. Csévharaszt. VII–IX.—It occurs in various types of biotopes, but more common in drier places.

Crotalacris rubicundulus (Kruseman et Jekkel, 1967)—1. Ócsa.—It is a montane species; the occurrence of this species in the National Park is yet needing further verification.

Gomphocerus rufus (Linné, 1758)—1. Ócsa. VII–IX.—Sporadically occurring in forest margins.

Myrmeleotettix maculatus (Thunberg, 1815)—II. Dömsöd; IV. Fülöpháza: Strázsa-hegy; VI. Bócsa; Bugac: Kisbugac, Ősborókás.—1. Ócsa; 3. Csévharaszt; 11. Izsák: Bikatorok. VI–VIII.—It is found both in drier saline and sandy steppe turfs.

Myrmeleotettix antennatus (Fieber, 1853)—IV. Fülöpháza: Strázsa-hegy; VI. Bócsa; Bugac: Kisbugac, Ősborókás.—1. Ócsa; 2. Ágasegyháza; 3. Csévharaszt; 11. Izsák: Bikatorok. VII–X.—Sporadic exclusively in sandy steppe turf.

Glyptobothrus apicarius (Linné, 1758)—IV. Fülöpháza: Fehér-hegy, Strázsa-hegy. VII–IX.—It is a characteristic species of steppe meadows at 500 m; rather local in the National Park.

Glyptobothrus mollis (Charpentier, 1825)—II. Dömsöd; VI. Bugac: Kisbugac.—1. Ócsa; Dabas. VII–IX.—Rather sporadic in dry biotopes.

Glyptobothrus brunneus (Thunberg, 1815)—II. Dömsöd: Apajpuszta; III. Szabadszállás: Kelemen-szék; Fülöpszállás: Borda-tanya; IV. Fülöpháza: Fehér-hegy; VI. Bócsa; Bugac: Nagybugac.—1. Ócsa: Öreg-turján; Dabas; 3. Csévharaszt. VI–X.—A ubiquic species, at places frequent.

Glyptobothrus biguttulus (Linné, 1758)—1. Lakitelek; II. Dömsöd: Apajpuszta; IV. Fülöpháza: Strázsa-hegy, Fehér-hegy, environs of Kondor-tó; VI. Bócsa; Bugac: Ősborókás.—1.Ócsa: Öreg-turján; Dabas; 2. Ágasegyháza; 3. Csévharaszt. VI–X.—A ubiquic species, at places frequent.

Chorthippus albomarginatus (DeGeer, 1773)—II. Dömsöd: Apajpuszta; III. Fülöpszállás: Borda-tanya; Szabadszállás: Kelemen-szék, Kis-rét; IV. Fülöpháza: Strázsa-hegy; VI. Bócsa; Bugac: Szekercés-szék, Kisbugac.—1. Ócsa: Öreg-turján; 3. Csévharaszt. VII–X.—It frequents somewhat moist meadows, rather common in wet bitopes of steppe areas.

Chorthippus dorsatus (Zetterstedt, 1821)—II. Dömsöd: Apajpuszta; III. Fülöpszállás: Borda-tanya; Szabadszállás: Kelemen-szék, Kis-rét; IV. Fülöpháza: Strázsa-hegy; VI. Bócsa; Bugac: Nagybugac, Szekercés-szék, Kisbugac, Ősborókás.—1. Ócsa: Öreg-turján, Nagy-erdő; Dabas; 3. Csévharaszt. VII–IX.—At places frequent in steppe biotopes.

Chorthippus dichrous (Eversmann, 1859)—II. Dömsöd: Apajpuszta; III. Szabadszállás: Kelemen-szék, Kis-rét; VI. Bugac: Kisbugac.—1. Ócsa: Öreg-turján; 3. Csévharaszt. VII–X.—Rather sporadic in steppe biotopes.

Chorthippus loratus (Fischer—Waldheim, 1846)—II. Dömsöd: Apajpuszta; IV. Fülöpháza: Strázsa-hegy; VI. Bugac.—1. Ócsa: Öreg-turján; 2. Ágasegyháza; 3. Csévharaszt. VII–IX.—A sporadic species, rather local in steppe biotopes.

Chorthippus parallelus (Zetterstedt, 1821)—III. Szabadszállás: Kelemen-szék, Kis-rét; Fülöpszállás: Borda-tanya; IV. Fülöpháza: Strázsa-hegy; VI. Bugac: Nagybugac, Szekercés-szék, Kisbugac, Ősborókás.—2. Ágasegyháza; 3. Csévharaszt. VI–X.—Rather common in moist biotopes, usually along waters or marshes.

Chorthippus montanus (Charpentier, 1825)—III. Fülöpszállás: Borda-tanya; Szabadszállás: Kis-rét; VI. Bugac: Szekercés-szék, Ősborókás.—1. Dabas: Ócsa: Öreg-turján; 2. Ágasegyháza; 3. Csévharaszt. VII–X.—Rather local in adequately moist biotopes.

Euchorthippus pulvinatus (Fischer—Waldheim, 1846)—IV. Fülöpháza: Strázsa-hegy; VI. Bugac: Nagybugac, Kisbugac, Ősborókás.—2. Ágasegyháza; 3. Csévharaszt; 11. Izsák: Bikatorok. VII–X.—Sporadic and local in sandy steppe biotopes.

Euchorthippus declivus (Brisout—Barnville, 1848)—II. Dömsöd: Apajpuszta; III. Szabadszállás: Kelemen-szék, Kis-rét; Fülöpszállás: Borda-tanya; IV. Fülöpháza: Strázsa-hegy; VI. Bugac: Nagybugac, Kisbugac, Ősborókás; Bócsa.—1. Ócsa: Nagy-erdő; 2. Ágasegyháza; 3. Csévharaszt. VII–X.—A common species and rather well spread in steppe biotopes.

Ecofaunistical notes

In the subsequent section some particularly characteristic species are discussed.

Tridactylus variegatus: Hygrophilous, geocolous. A Ponto-Mediterranean species whose northernmost distribution is in Hungary. It burrows its galleries on the sandy banks standing or slowly meadering waters, penetrating down to 10 cm or thereabouts. Owing to its hiding habit, rather little is known about its biology.

Calliptamus barbarus: xerophilous, geopsammophilous, arenicolous. The species has a Ponto-Mediterranean distribution, occurring exclusively on sand.

Acrotylus insubricus: xero-thermophilous, geophilous, arenicolous, saxicolous. The species has a Mediterranean—sub-Mediterranean distribution. Its distribution in Hungary suggests an expansive area as it had been pointed out by Kaltenbach (1970) and also by Nagy (1974). Besides on drift-sand, it also occurs on fine clastic limestone and dolomite. The imagos dig themselves in the sand, wherein they overwinter (Nagy 1959b).

Acrotylus longipes: xero-thermophilous, geopsammophilous, arenicolous, saxicolous. The occurrence of this species in Hungary whose centre of dispersion is decidedly east Mediterranean, is rather interesting and not only faunistically but from biogeographical point of view too. The northernmost points of distribution in Hungary are the Kiskunság, Nyírség and Fenyőfő (Bakony Mts.). Whether it is autochthonous in Hungary or only an immigrant species has not yet been verified (Nagy 1974). It is a good flier, agile, digging itself into the sand for the night (Nagy 1958).

Sphingonotus caerulans: xerophilous, geophilous, arenicolous, saxicolous. Its occurrence in the National Park is a significant event. It particularly frequents warm biotopes of sandy soil, grassy steppe, open driftsand, pebbly stretches of river banks. It is a good flier.

Stenobothrus fischeri: xerophilous, thermophilous, geo-phytocolous. It is a characteristic species of the Orthoptera communities of sandy steppe turf with short grasses.

Myrmeleotettix antennatus: xerophilous, thermophilous, psammophilous. It is found on sandy steppe turf, where it is a characteristic species of the Orthoptera communities.

Euchorthippus pulvinatus: xerophilous, deserticolous, graminicolous. It is a trans-Palaearctic steppe species with polycentric area. Its occurrence is rather sporadic in dry meadows and steppe regions. In Hungary it mostly occurs on sandy steppe turf.

Conocephalus (X.) dorsalis: hygrophilous, phytocolous. Strongly stenotypic, thus, its occurrence is rather isolated, found only at suitable biotopes, at times rather frequent. Its brachypterous form appearing sometimes in masses occasionally include also macropterous specimens.

Bicolorana bicolor: mesophilous, stenotopic, deserticolous, praticolous, graminicolous. Wide spread in fresh meadows, grass-land, dry turf with dense vegetation and steppe lands. According to Dreux (1962) it is stenothermic. Its mesophilous nature thus may be explained by the high temperature, or its xerophily with a low quantity of heat as discussed by Bei-Bienko (1939) in his "habitat"-change theory.

Pteronemobius concolor: hygrophilous, ripi-graminicolous, terricolous. A characteristic species of marshy meadows, soggy patches of water-courses. Difficult to observe owing to its small size, though its stridulation is characteristic.

General conclusions

The material of 63 species, two-thirds of Hungarian Orthoptera, comprising the collections and literature data, derives from three main sources.

The first and foremost one is the collection of the Hungarian Natural History Museum, Budapest, which includes a good representative material from Hungary in spite of its total destruction in two occasions in the past.

The second source is the data from the literature and many verbal communications regarding the distribution of species, biotope conditions and ethological references.

The third source of the material derives from the one collected by the author himself (44 species), which is though not a large one, compared to the above ones, nevertheless serves good basis for quantitative conclusions. And this is due to the special method of sampling: unit of time (30 min) allowed for the sampling of a given area (100 m^2) by using the sweeping net or applying the singling mode of collecting. Previous examinations prove the efficacy of this combined method in providing exact qualitative and quantitative data for a given fauna (Rácz 1975).

The following sampling sites were selected for the application of this combined method: VI. Bugac: Nagybugac (1. *Astragalo-Festucetum rupicolae danubiale);* Bugac: Szekercés-szék (2. *Agrosti-Caricetum distantis hungaricum*); Bugac: Kisbugac (3. *Potentillo-Festucetum pseudovinae danubiale*); Bugac: Ősborókás (4. *Junipero-Populetum albae*) clearings; III. Fülöpszállás: Kelemen-szék (5. *Artemisio-Festucetum pseudovinae danubiale — Lepidio-Camphorosmetum annuae — Lepidio-Puccinellietum limosae* complex, *Bolboschoenetum maritimi phragmitetosum*); Fülöpszállás, pasture (6. *Artemisio-Festucetum pseudovinae* danubiale); III. Szabadszállás: Kis-rét (7. as under Kelemen-szék); IV. Fülöpháza, sand-dunes (8. *Festucetum vaginatae danubiale*); 11. Izsák: Bikatorok (9. *Brometum tectorum secaletosum*).

Both the individual and the specific numbers indicate that this national park along with the adjoining nature conservancy areas is one of the most important and characteristic biotopes of Hungary as far as Orthoptera are concerned. From among the species 52 occur on sandy steppe turf, while 43 on the plant associations of saline regions. Strictly adhering to sandy associations only ten species have been ascertained: *Montana montana, Oecanthus pellucens, Tridactylus variegatus, Calliptamus barbarus, Sphingonotus caerulans, Acrotylus insubricus, Acrotylus longipes, Stenobothrus fischeri, Myrmeleotettix antennatus, Euchorthippus pulvinatus,* while only six have been shown from saline stretches: *Homorocoryphus nitidulus, Tartarogryllus burdigalensis, Calliptamus italicus, Celes variabilis, Epacromius coerulipes, Dociostaurus maroccanus.* Common in both biotopes: 36 species. Among these especially important are the steppe species like *Tesselana vittata, Gampsocleis glabra, Dociostaurus brevicollis, Myrmeleotettix maculatus, Euchorthippus declivus,* and of course, the eurytopic *Chorthippus* and the hypereurytopic *Glyptobothrus* species. 34 species occur with high frequency in other associations, too.

Table 1. Species collected in June 1981: number of specimens, distribution according to sites, estimated adundance

Species	1	2	3	4	5	6	7	8	9
Phaneroptera nana			1						
Conocephalus discolor						2	3	1**	
C. dorsalis					9				
Homorocoryphus nitidulus						2		1	
Tettigonia viridissima	+			+		+		+	+
Decticus verrucivorus	+	2							
Platycleis grisea	1							2	
Pl. affinis	4		17		3	10	1		2
Montana montana			50					2	
Bicolorana bicolor	5		7			2	1		
Roeseliana roeselii		1	3				5		
Gampsocleis glabra	3	2	11						
Calliptamus italicus		10*							
C. barbarus	2		8	1				28	30
Acrida hungarica	+		+					2	
Oedaleus decorus			18	1				27	4
Oedipoda coerulescens	1	3		2				18	1
Sphingonotus caerulans								11	
Aiolopus thalassinus					23	4	1		
Parapleurus alliaceus		6							
Mecosthetus grossus								1**	
Chrysochraon dispar		1							
Euthystira brachyptera		1							
Dociostaurus brevicollis	3	9	23	9	3	12		80	34
Dirshius haemorrhoidalis			18			2			
D. petraeus			9			1			
Omocestus ventralis	6				3	14	8		
Stenobothrus crassipes	12		6			8			
St. fischeri			1						
St. nigromaculatus			26						
St. stigmaticus			1				9		
Myrmeleotettix maculatus			1	1				2	1
M. antennatus			5	4				38	3
Glyptobothrus apricarius								1	
Gl. mollis			3						
Gl. brunneus	1				1	3		1	
Gl. biguttulus				2				1	
Chorthippus albomarginatus		5	2		75	29	36	10	
Ch. dorsatus	13	2	28		7	3	7	12	
Ch. dichrous			2		2		2		
Ch. parallelus	51	21	43		2	22	21	1	
Ch. montanus		4	4			3	4		
Euchorthippus pulvinatus	1		36	7				3	3
Euch. declivus	76		21		4	73	78	3	
Total	200	68	374	27	134	220	177	250	78
Specimens m⁻²	9	7	13	3	13	11	17	14	8

* In the dry association of *Agrosti-Caricetum distantis hungaricum*.

** "Stray" species perhaps from *Molinietum* from among dunes.

Thus the data given in Table 1 readily support earlier observations (Nagy 1958, Rácz 1975), according to which the characteristic species combination of sandy turfs in Hungary is *Acrotylus insubricus, Myrmeleotettix maculatus, Acrida hungarica*, while local characteristic species are *Calliptamus barbarus, Acrotylus longipes, Sphingonotus caerulans, Myrmeleotettix antennatus*. Other, subcharacteristic species are *Montana montana* and *Euchorthippus pulvinatus*, which occur in the *Achilleo-Festucetum* of calcareous sand near Igrici (Rácz 1978).

The characteristic species of saline steppe turf are *Chorthippus albomarginatus* and *Dirshius haemorhoidalis* (Nagy 1944). The various types however, may not be sharply separated. Like the saline plant association which form transitory communities at the borders, and owing to mosaicism, form spatial succession series. Thus a spatial succession series may be observed from the saline marsh, the weakly moist, saline meadow *(Alopecuretum, Beckmannietum)* through *Achilleo-Festucetum* to *Camphorosmetum*. At the same time seasonal faunal migration may also be recorded, which takes place as a result of drying from hygro-, meso- and xerophilous habitats.

Among the species, some like *Acrotylus insubricus, Acrotylus longipes, Calliptamus barbarus, Stenoborthrus fischeri, Myrmeleotettix antennatus* are recovered from sandy steppe turf, others like *Dociostaurus maroccanus, Epacromius coerulipes* from saline steppe turf, in the Carpathian Basin reach their northernmost and possibly also their westernmost points of distribution. Thus we may subscribe to the opinion of B. Nagy (Szelényi, Nagy, Sáringer 1974) that these species are not only characteristic for the sandy biotopes but also for the Carpathian Basin, and furthermore, this assumption may be extended to the species living in saline biotopes too.

In summarizing we may establish that the Orthoptera fauna of sandy turfs is rather homogeneous, the number of geophilous species is high, at the same time, the proportion of Mediterranean and Ponto-Mediterranean elements is much higher than in the saline steppe turfs.

The saline steppe turfs are rather heterogeneous belonging to several types, dynamically changing. The role of geophilous species is inferior, while the dominance of Acridoidea being ubiquistic is much higher. These also diverge from the Hungarian sandy turfs in some continental Tettigonoidea, like those of *Tesselana vittata* and *Bicolorana bicolor*.

The study of Orthoptera is also important both from economic and nature conservancy points of view. Partly, because they are phytophagous and consume 5–10% of the total phytomass of steppe vegetation, consequently playing important role in the matter and energy turnover of the given association. Partly because the Orthoptera communities consume approximately 5–12% of the entire phytomass production in one year. Thereby these insects control the production of the phytomass, since the natural consumption in the majority of the cases stimulates plant growth and reproduction, which means more stability for the given association (Harris 1972, Jermy 1976, Stolyarov 1979).

In all probability there is a tendency of more equilibrium in the association as a result of Orthoptera consumption especially in areas that are grazed by cattle and would otherwise become weedy.

It may further be supposed, on the basis of the above, that as a result of artificial fertilization of grazed turfs the more pronounced weediness is not only the outcome of

a unilateral increase of nutritive elements in the soil. But artificial fertilization may exert a selective effect on the Orthoptera fauna too. This is why only the ubiquistic hypereurytopic species remain, thus the above-mentioned equilibrial effect may not function, consequently support the spread of weeds. Thus as a conclusion: in nature conservation areas the artificial fertilization of grazed turfs is rather undesirable.

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