

DATA ON THE BIOLOGY OF *LARINIA JESKOVI* MARUSIK, 1986 (ARANEAE: ARANEIDAE) FROM THE REED BELTS OF LAKE BALATON

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Abstract

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Observations were made of *Larinia jeskovi* Marusik, 1986 in Hungary (Balatonyörök, UTM XM87). The study describes the habitat, activity and phenological characteristics of this rare orb web spider observed in the reed belts of Lake Balaton.

Introduction

As part of a complex research project into the fauna of Hungarian reeds, the spiders of the reed belt of Lake Balaton have been studied by the author since 1992. Some interesting observations were previously reported on the fauna in 1995 (SZINETÁR, 1995). Several zoologists dealt with the research of the surroundings of Lake Balaton in the nineties. The observations of this research, together with an account of the collections made by Imre Loksa and István Loksa in 1990-91, were summarised by SZATHMÁRY (1995). In the summer of 1996 two female and two male *Larinia jeskovi* were collected during nocturnal observations and 9 further female specimens were observed. This rare species was described from the Amur River basin (Russia) by MARUSIK (1986). In Europe *L. jeskovi* has been discovered and investigated by KUPRYJANOWICZ (1995, 1997). The European population of *L. jeskovi* could belong to a different species (MARUSIK, pers. com.). One female specimen has been kept under experimental conditions to obtain a better understanding of the process of web building. In the summer of 1997 data on the species were collected at the same habitat for a longer time. During this period several hundred specimens were observed along the section of lakeshore under investigation. In this study I summarise the data collected during these two years.

Study area

The study area is situated in the north-western region of Lake Balaton, in the vicinity of Balatonyörök (Lat. 47°10' N, Long. 17°20' E., UTM XM 78).

The habitat where observations were made is a typical reedy part of the northern shore. The homogeneous reed belt has virtually disappeared from this shore section. Only some metre-wide spots can be sporadically found. This discontinuous reedy zone is completely washed by the waves and it creates a debris barrier beach parallel to the shore. Outwards, a sedge-reed strip of land of variable width can be found, which turns into a marsh meadow and fen meadow. The strip between the barrier beach and the fen meadow is a permanently flooded area, even in the summer. In some places this zone is one hundred metres wide. Its water is cooler than elsewhere and has a brownish colour caused by humic acids. In the sedge-reed strip *Typha angustifolia* is frequent and *Cladium mariscus* can be found sporadically as well. In some places *T. angustifolia* forms almost homogenous, reed-free stands. *Typha latifolia* can also be found in limited numbers in the reedy area. On the clumps of *Carex elata*, *Hydrocotyle vulgaris* and *Pedicularis palustris* are frequent. In the fragments of the swampy meadow several orchid species (*Dactylorhiza incarnata*, *Orchis laxiflora*, *Epipactis palustris*) and *Eriophorum latifolium* can be found. The major part of the area marked out for data collection was covered by *Caricetum elatae typhaetosum angustifoliae*.

Material and methods

Since the species is exclusively nocturnal, it was only investigated at night. Probably, this is the reason why the species has only recently been found. The research was carried out with the help of a torch, generally between 10 and 12 p.m. The field observations were made on 21-23 August, 1996. In the summer of 1996 a total of 13 specimens were found and observed (11 female, 2 male) in the examined reed belt. Data for the webs of eight females were collected in the surveyed habitat. From 24 August, 1996 a female specimen was kept in an artificial habitat for 5 days to observe web-building and feeding at night. A stem of *T. angustifolia* was planted in a pot filled with water. The pot had a diameter of 40 cm and height of 15 cm. The spider was acclimatised here. In the summer of 1997, between 14 July and 28 August, the research was carried out in the same location as in the previous year and in the surroundings along about 2-3 kilometres of a shore section. In the area several hundreds of specimens of *L. jeskovi* were observed. In order to get exact data, an area was marked out that was undisturbed by anglers and bathers. Data were collected six times here between 19 July and 29 August. The sampling area was a 2 metre-wide and 90 metre-long strip, perpendicular to the lake. The area was marked out with a rope at a height of 1 metre. The designated area was thoroughly examined at night, using torches for illumination. During observation periods in the summer of 1997, data on the web sites of 163 specimens were recorded. On the basis of this, we have factual information on the webs of 176 specimens (1996-97). In addition, at least the same number of specimens were observed along the section of shore examined. I recorded the exact location of the *Larinia* specimens, the distance between the hub of the web and the water level, the plant species the web was fastened to, and the behaviour of the animals. In the designated area no animals were collected. Two persons carried out the research each time, examining the sample area with torches. Only rainless and windless nights were adequate for data collection because the animals do not build their webs when the wind blows or it rains, and they quickly demolish their webs when the weather changes and they withdraw to the vegetation zone. During the research period (July and August) we did not manage to catch *L. jeskovi* specimens during the daytime. During nocturnal collection with sweep-netting

some specimens (non-quantitative sample) were caught. In the autumn of 1996 and 1997 daytime research has been carried out for finding the egg sacs.

Results and discussion

Phenology

My observation data relate to the period between 26 June and 10 October only. Between 26 June and 24 July only juvenile specimens were found. During July these were generally in the subadult stage (on the male spiders the swollen palpal organs were conspicuous). On 29 July fully developed males were also found. The majority of female spiders were still subadults. The adult male spiders were typical vagrants, but a fully developed male was found in a small web as well, and it was in a typical position on the hub. During August males were found in the webs of females on several occasions (for instance from the spiders observed on 29 August, 9 were males. 5 were vagrants, 2 were in their own web, and 2 at the edge of the web of females). The cocoon of the species could not be found. It is presumed that the females lay their egg sacs in September. During October 1997 daytime research was carried out in the area using sweep-netting. With sweep-netting at a height of 50 cm I managed to catch 3 young *L. jeskovi*. On the basis of their colour, shape and markings it was obvious that they were juvenile specimens from the 1. or 2. stage of *L. jeskovi*.

Daily activity

According to my observations, in the testing period (subadult and adult phase) *L. jeskovi* builds its web only at night. In the test area I did not manage to observe the animals during the daytime. The female specimen reared under experimental conditions spent the day near the water level, motionless, in a resting position. It became active during the half-hour after sunset. Firstly only slow stretching (smaller changes of position) was observed. Web building began 40-50 minutes after sunset and lasted for about 15-25 minutes. The building of the main and temporary spirals took place very quickly. After building the main spiral, the spider takes an upside-down position on the hub of the web. Like the other cross spiders, it wraps its prey and takes it to the hub. The web is relatively weak, and is easily damaged by the wind and by prey animals. The observed spider dismantled the web before dawn. 1.5-2 hours before sunrise the web could no longer be found. Between 17-24 July 1997 (sunset was 8.42 p.m. on 19 July) the web was actively built between 9.15 and 9.30 p.m. Between 27-29 August (sunset was 7.38 p.m.) the webs were ready after 8.45 p.m. When it was windy or rainy, they did not build webs. When the wind strength was increasing during the night, they quickly dismantled their webs. This prevented us from collecting data on several occasions.

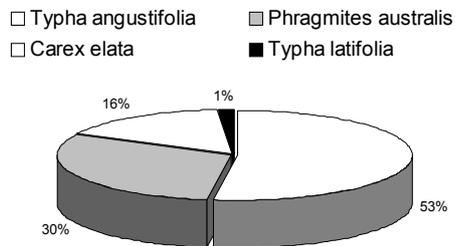


Fig. 1. Web-site selection of *Larinia jeskovi* (14.07.-29.08.1997, Balatonyörök).

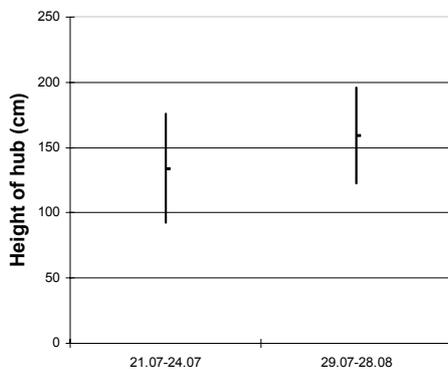


Fig. 2. Mean height (\pm SD) of web hubs (of *Larinia jeskovi* (21.07-24.07: only juveniles, 29.07-28.08: adult males and subadult and adult females).

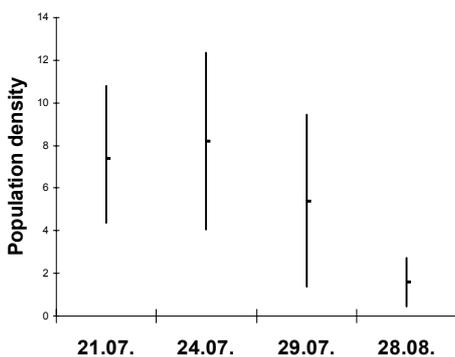


Fig. 3. Mean population density (\pm SD) of *Larinia jeskovi* at Lake Balaton (number of specimens/20m²).

Website selection

The webs of female specimens found in the summer of 1996 were all on *T. angustifolia*. Some of the webs were fastened to bulrush and reed at the same time. In the area designated in the summer of 1997 we managed to observe the choice of plants by 159 specimens. Between 14 July and 29 August, 52% of the observed adult and subadult specimens fastened their webs to *T. angustifolia*, 30% to reeds, 17% to *C. elata*, 1% to *T. latifolia*. From this it is clear that this species prefers *T. angustifolia* (Fig. 1). This choice can be explained by the fact that the closing of the upper level of the vegetation is disadvantageous for the species. The closing of the vegetation was more significant in the case of the reed in the examined habitat than at places where the bulrush was dominant at the upper level. The distance between the hub and the water level depends, of course, on the plant. Adults were usually found on bulrush and reed. In 28% of cases the height of the webs observed up to 24 July was less than 100cm, after 29 July it was only 3.4%. In the case of the webs examined in 1996 the average distance between the hub and water level was 113.7 (± 17.4) cm. In 1997 the height of 158 webs was recorded in the test area between 19 July and 29 August. The distance between the hub of the web and the water level was 139cm (138.89 ± 44.54). The height of the web found in the highest place was 225cm, the height of the web found in the lowest place was 40cm. The average height of the webs observed between 29 July and 28 August (they were already adults) was greater (159.15 ± 36.65). On the basis of this observation it can be concluded that webs of adults were higher than those of subadults (133.96 ± 41.72) ($P < 0.01$, t-test) (Fig. 2).

Web-structure and building behaviour

L. jeskovi builds its web exclusively at night. Every night it builds its typical web, and in the morning it recycles the web by ingesting it together with the frame threads. If it is disturbed by wind or rain during the night, it demolishes the web. With artificial illumination the dismantling of the web was also witnessed. This is a typical, vertical orb web. Its shape is generally oval and extended vertically, the shape depends on the plant to which the spider has fastened the web. Webs fastened to bulrush and reed are more stretched vertically than those fastened to sedge. The web has relatively few radii. Webs with 18 radii (17.77 ± 1.78) are the most frequent. The maximum was 21, and the minimum was 15 radii. Usually there were some thin threads across the centre of the web hubs. But sometimes the hub had a hole of irregular shape in the centre. There is a relatively wide free zone between the hub and the main spirals. The diameter of the whole capture area of the webs built by females on *T. angustifolia* was 38 cm vertically (38.2 ± 6.7), and 27 cm horizontally (26.7 ± 4.5). The capture area was wider under the hub. Its development also depends on the plant to which it is attached.

Population density

The density of *L. jeskovi* in the sample area designated in 1997 is given in Fig. 3. The density of *L. jeskovi* (specimens/20 m²) decreased between 29 July and 28 August. The number of observed *Larinia* specimens in five zones of reed belt (from the swampy meadow to the water) is shown in Fig. 4.

Further orb web species of the examined reed belt

Since 1992 the following orb web species have been found in the examined reed belt (from the water to the swampy meadow): *Tetragnatha striata* L. KOCH, *T. shoshone* (LEVI),

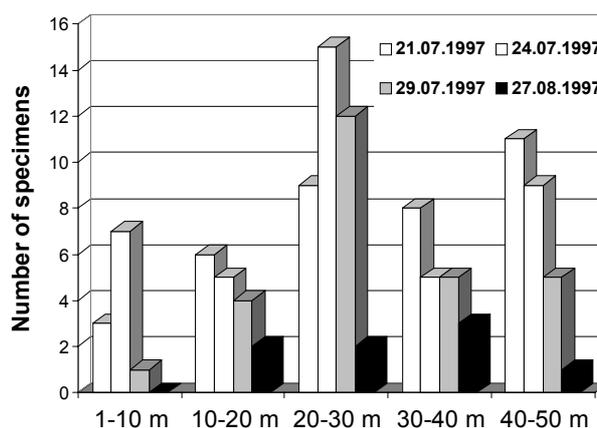


Fig. 4. The number of observed *Larinia* specimens in five zones of reed belts at four different dates.

T. reimoseri (ROSCA), *T. extensa* (LINNAEUS), *T. nigrita* LENDL, *Larinioides ixobolus* (THORELL), *Larinioides folium* (SCHRANK) (= *L. suspicax* (O.P.-CAMBRIDGE)), *Larinia jeskovi* MARUSIK, *Larinia bonneti* SPASSKY, *Singa nitidula* (C. L. KOCH), *Argiope bruennichi* (SCOPOLI), *Cyclosa oculata* (WALCKENAER), *Araneus quadratus* CLERCK, *Cercidia prominens* (WESTRING). The species were differentiated from each other in terms of horizontal and vertical web site locations, and in relation to daily activity. The distribution and activity of *L. jeskovi* overlapped with that of only *T. reimoseri*, *L. folium*, *S. nitidula* and *L. bonneti*.

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