

In memory of RNDr. Vladimír Košel CSc. (22.05.1946-26.08.2022)

***Dina apathyi* Gedroyč, 1916 in Bulgaria and notes on other leeches (Annelida, Hirudinida) from this country**

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With 3 figures and 4 tables

Keywords: *Dina*, Hirudinea, Bulgaria, first record, cocoons occurrence, distribution, species spectrum, zoocoenoses

The article deals with the leech fauna from Bulgaria mainly from in the East part of the country. Ten species were recorded in the years 1975, 1977 and 1980. *Dina apathyi* is the new species to this country. The description of morphology of the body and also the first description of its cocoons is given. There are also notices on the distribution of other 9 leech species and their zoocoenoses found at various localities. There is a great difference in species composition and zoocoenoses between sites within the Black Sea basin and those flowing into the Danube.

1 Introduction

The leech fauna of Bulgaria is relatively good known. The first summary checklist of leeches was published by Russev & Janeva (1976) where 16 species were recorded. The last checklist published by Jueg (2010) contains 22 species. The first author visited Bulgaria in 1975, 1977 and 1980 what was exploited to the survey of leech fauna. Ten species were recorded including *Dina apathyi*, the species new to Bulgaria, so that the total number of species attains 23.

2.1 Material and method

The leeches were searched for in brooks, lakes and marshes along the Bulgarian Black Sea coast (1975, 1977) and in the Iskar River (1980). They were collected by hand picking with a tweezer during 30-60 minutes from stones, water vegetation, plastic and metal wastes. After narcotization in a diluted alcohol they were preserved in 4 % formaldehyde.

2.2 Overview of the sites with leeches (from North to South)

1. Shablensko ezero lake, collecting 1 hour at the east shore, sandy bottom with sporadic stones and sparse water vegetation. 26.06.1977.
2. The town of Kavarna. The brook originating from a karstic source in the valley bellow the town (12,8 °C). After approximately 1800 m it join the Black Sea. 24.06.1977.
1st station: about 200 m bellow the source, at the bridge, 16,8 °C.
2nd station: at the bridge, about 200 m from the sea, 19,3 °C.
3. Batova reka brook, about 30 km long, flowing into the Black Sea at the Albena resort. The site of collecting about 2 km from the Black sea, at the bridge with a road Kranevo – Albena.
The brook at the sampling site has a form of the regulated channel with a width about 2–3 m, with almost standing water, muddy bottom with water emergent vegetation (mainly *Sparganium*). Scattered stones were only at the bridge. The watercourse probably without water in summer. Collecting time 60 min. mainly on *Sparganium*, partially on stones, 24.06.1977.

4. Golyamata reka brook, a brook with more tributaries. The site of collecting: Kranevo in the eastern part of the city, about 600 m from the sea, sandy bottom with a lot of plastic wastes, bricks, etc. 23.06.1977. 21,6 °C. One hour collecting.
- 5.-6. Dyavolska reka, a brook about 30 km long with several tributaries, it flows into the Black Sea at Primorsko.
- 5. Primorsko, marshes and small pools with vegetation in the mouth of the Dyavolska reka brook about 200 m from the sea, one hour of collecting, 17.06.1975.
- 6. Dyavolska reka, at the bridge at Yasna Polyana – about 12 km from the sea, the riverbed with gravel and small stones, 1 hour collecting, 18.06.1975.
7. The Iskar River at Mezdra (the Danube Basin), 210 m a.s.l. Submontane river with stony bottom. 21.09.1980, 1 h collecting.
8. Katina, the village at the north margin of Sofia municipality, about 585 m a.s.l., a small brook above the village, a tributary of the Iskar River, 02.09.1980, 20 min. collecting.

3 Results and Discussion

Altogether 10 leech species from 4 families (besides of Piscicolidae) were found. The checklist in the Table 1 represents the numbers of the leeches calculated per 1 hour of collection.

The checklist is divided according to the leeches originating from brooks, marshes and lakes from the Black Sea cost area (the 1st column) and those from the Iskar river (the Danube basin).

The species of Glossiphoniidae prevailed in quantity and dominance in the water connected with the Black Sea area: *Helobdella stagnalis* (38,1%), *Glossiphonia complanata* (16,5 %) and *Placobdella costata* (14,4 %). A different type of river habitat represents the Iskar River where 3 species were found with the high abundance and dominance of *Erpobdella octoculata* (74,4 %) and also with a higher proportion of *Erpobdella verrucosa* (24,9 %). The brook at Katina yielded only *E. verrucosa*.

Tab. 1: The checklist of the leeches with the numbers and dominance according to the hydrobiological and geographical characteristics (brooks, lakes and marshes at the Black Sea coast versus the Iskar River - a submountain river of the Danube basin)

	Species/biotops	Brooks, lakes, marshes at the sea coast	Iskar River basin
	Glossiphoniidae	n/D (%)	n/D%
1	<i>Alboglossiphonia heteroclita</i> (Linnaeus, 1761)	21/4,9	
2	<i>Glossiphonia complanata</i> (Linnaeus, 1758)	70/16,5	
3	<i>Helobdella stagnalis</i> (Linnaeus, 1758)	162/38,1	2/0,6
4	<i>Hemiclepsis marginata</i> (O. F. Müller, 1774)	11/2,6	
5	<i>Placobdella costata</i> (Fr. Müller, 1846)	61/14,4	
	Haemopidae		
6	<i>Haemopsis sanguisuga</i> (Linnaeus, 1758)	71/16,6	
	Hirudinidae		
7	<i>Hirudo verbana</i> Carena, 1820	2/0,5	
	Erpobdellidae		
8	<i>Dina apathyi</i> (Gedroyć, 1916)	17/4,0	
9	<i>Erpobdella octoculata</i> (Linnaeus, 1758)	10/2,4	227/70,3
10	* <i>Erpobdella verrucosa</i> (Örley, 1886)		94/29,1
	Total	425/100	323/100

* *Erpobdella verrucosa* (Örley, 1886) is the new name for *Erpobdella vilnensis* Liskiewicz (1925) (Košel 2020)

Family Glossiphoniidae

Alboglossiphonia heteroclita (Linnaeus, 1761)

- 5: Dyavolska reka at Primorsko, 17.06.1975, one specimen per h.

- 6: Dyavolska reka, at the village of Yasna Polyana, 18.06.1975, 39 specimens per h collecting.

The only brook with this species on the territory visited. The specimens had eggs in the body and also young on the ventral side.

Summary overview from Bulgaria was published by Russev & Janeva (1976), Jueg (2010) published the finding of *Alboglossiphonia hyalina* (O. F. Müller 1774) from the Varna region. It seems that the genus *Alboglossiphonia* is a rare and little distributed species in the east Bulgaria.

Glossiphonia complanata (Linnaeus, 1758)

- 3: Batova reka brook, at the Albena resort, 24.06.1977, 12 specimens per h.

- 4: Golyamata reka brook at Kranevo. 23.06.1977. 58 specimens per h.

Presented only at two sites from 8 (presentation 25 %). The species can reach locally medium to higher abundance. It seems to be not very distributed and abundant in Bulgaria (Russev & Janeva 1976, Jueg 2010).

Helobdella stagnalis (Linnaeus, 1758)

- 6: Dyavolska reka at Yasna Polyana, 18.06.1975, 86 specimens per h. The specimens had eggs in the body and also young on the ventral side.

- 7: The Iskar River at Mezdra, 21.09.1980, 2 specimens per h.

Known only from 2 sites of 8 (presentation 25 %). It seems to be rare and little distributed species in the east Bulgaria (Russev & Janeva 1976) Summary review of the distribution from Bulgaria was done by Jueg (2010).

Hemiclepsis marginata (O. F. Müller, 1774)

- 6: Dyavolska reka at Yasna Polyana, 18.06.1975, 21 specimens/h. The only site with this species on the visited territory (presentation 12,5 %).

From Bulgaria, the review of its occurrence is known from Jueg (2010). It seems to be rare and little distributed species in the east Bulgaria.

Placobdella costata (F. Müller, 1846)

- 1: Shablensko ezero lake, 26.06.1977, 3 specimens per h (2 adults) from stones.

- 3: Batova reka brook at Albena, 24.06.1977, 3 specimens on the legs of *Emys orbicularis* in a small pool at the brook.

- 4: Golyamata reka brook, Kranevo, 23.06.1977, 1 specimen per h on hard substrat.

- 5: Primorsko, in pools in the lower part of the Dyavolska reka brook, 17.06.1975, 57 specimens per h.

The highest number of this species was observed and collected in the Dyavolska reka brook at Primorsko. Adult specimens were found only with young on ventral side (without cocoons).

The leech indicates the occurrence of *Emys orbicularis* (Bielecki et al. 2012) and the aborigine occurrence of this turtles can indicate the presence of the leech in question as it was proved in Slovakia (Košel et al. 2004).

The leeches were observed on various substrat and also on turtles (*Emys orbicularis*) and I found them (both adults and juveniles) also attached to my legs mainly on the places with scratched skin. Sucking of the blood was accompanied by a weak tan but without bleeding after sucking. Already small leeches (4-5 mm) were able to suck the blood. The suckink took about 15 minutes.

From Bulgaria, it was published by Russev & Janeva (1976), and Jueg (2010) found it also in the Batova reka brook.

Family Haemopidae

Haemopsis sanguisuga Linnaeus, 1758

- 2: Kavarna, a brook below the karstic spring, 20.06.1977, 76 specimens per hour from the both sites. Very abundant species in the whole brook. A large amount of *Allobophora dubiosa* Örley (Lumbricidae) in the lower part.

- 3: Batova reka brook at Albena, 24.06.1977, 7 specimens per h. Abundant species only locally, presented at two sites from 8 (frequency 25 %).

Family Hirudinidae

Hirudo verbana Carena, 1820

- 5: Dyavolska reka at Primorsko, in pools with vegetation, 17.06.1975, 2 specimens/h. Russev & Janeva (1976) report *H. medicinalis* from many sites. According to Jueg (2010), from Bulgaria there is known only *Hirudo verbana* Carena, 1820.

Though the leech species richness is relatively good known in Bulgaria, there are almost no data on their taxocoenoses. Most publications have faunistical character. As mentioned above, species assemblages and taxocoenoses in the short brooks or rivers within the Black Sea region are different from those belonging to the Danube basin. Species spectrum and the dominance of the Glossiphoniidae are typical for short brooks, while Erpobdellidae are typical for the larger river of the Danube basin. On the other side, there is a relative large heterogeneity in the species spectrum and their dominance between particular small brooks (Tab. 4). The reason of this fact is, that spreading of the species is more difficult between isoleted basins and each water body has different life conditions (length of watercourse, discharge of water, substrat composition, character of food sources).

Family Erpobdellidae

Dina apathyi Gedroyć 1916

The first record to Bulgaria. The site: Batova reka brook, the site of collecting about 2 km from the Black sea, bellow and above the bridge with a road Kranevo – Albena. 24.06.1977. The sample contained 16 specimens of *Dina apathyi* and 23 cocoons.

From 16 specimens four ones were with a clitellum – i.e. sexually mature. Their length was 57-62-62 and 65 mm (the average length 61,5 mm), other specimens were immature and can be devided into two groups: subadult and juvenile. The subadult – 8 specimens were long 34-56 mm (the average 42,6 mm), juvenile ones – 4 specimens with the length 20-30 mm (the average 25,0 mm).

Typical colorig for this species is dark, almost black body with light spots on the dorsal side. They are arranged in transvesal rows: in the middle part of the body they are in one row on annuli ba1,ba2, a2, b5, mostly 11-12 spots, and in two rows on the broader – the fifth annulus - b6, mostly 9+11 spots.

Genital pores were observed in 8 specimens: 6 specimens had 2 annuli between genital pores, two other had 2+1/3 and 2+1/2 annuli respectively.

Important for the species identity is the morphology of the reproductive system. The ovarian sacks extend to the seventh or eighth somite after the female genital pore. However, the ends of the broadened part of the vasa deferentia and the beginning of the testicle are one to two somites earlier (Fig 1 A, B, C). The cornua of the genital atrium are long almost parallel, slightly convex to the dorsal side seen from lateral (Fig. 2 A, B).

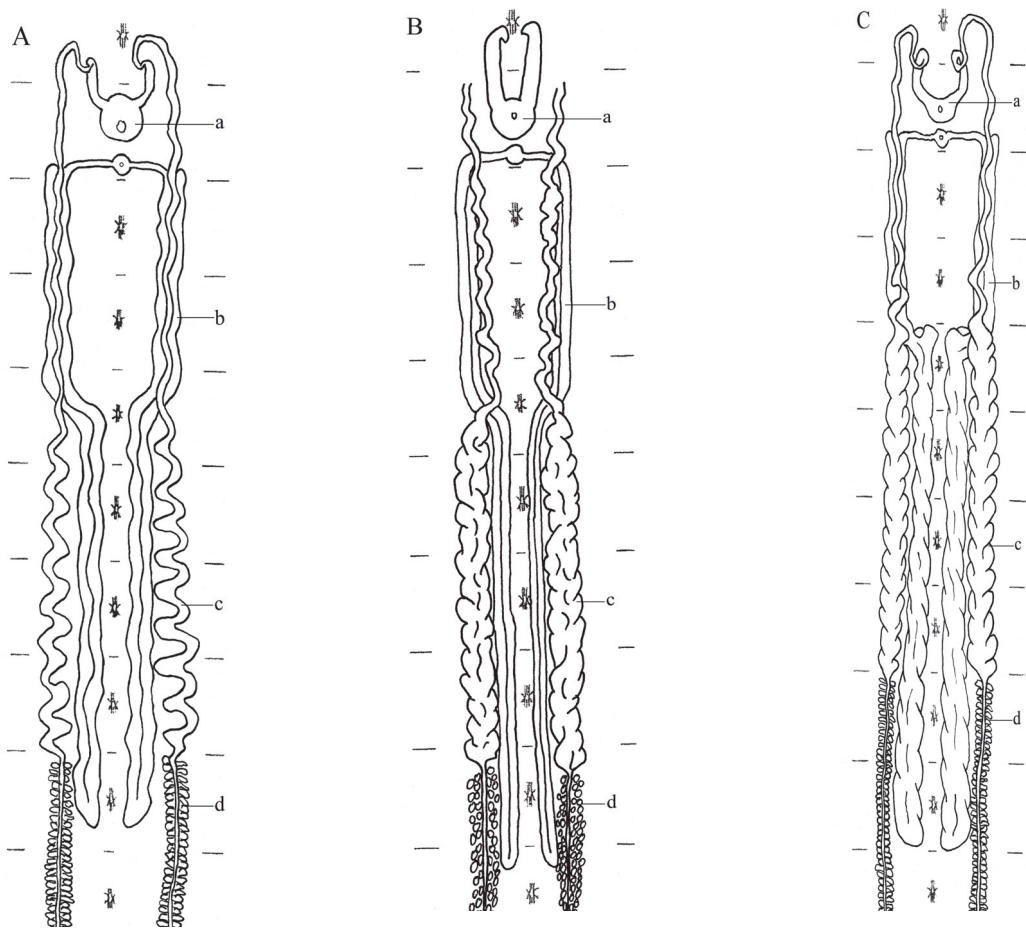


Fig. 1: *Dina apathyi*. Schematic depictions of reproductive system of three populations. A = Batova reka/Bulgaria. a = genital atrium, b = ovarian sacks, c = vas deferens, d = testisacs. B = lagoon of the Oder/Mecklenburg-West Pomerania/Germany. C = Havel/Berlin/Germany.

Besides of the leeches, 23 cocoons were found. Their shape is typical for the family Erpobdellidae: oval contour, flat ventrally, arched dorsally. Specific shape for this species is the direction of tubular orifices which are almost horizontal, not bent to the dorsal side. Their colour was light yellow-brown, rarely dark yellow, tubular orifices more dark than the cocoon proper (Fig. 3 A, B).

The dimensions of the cocoons: the smallest one measured 5x3 mm, largest one 13x5 mm. The most frequent size is 8 x 5 mm, average value 8,5 x 4,3 mm. The dimensions of the cocoons and their frequency are in the table 2.

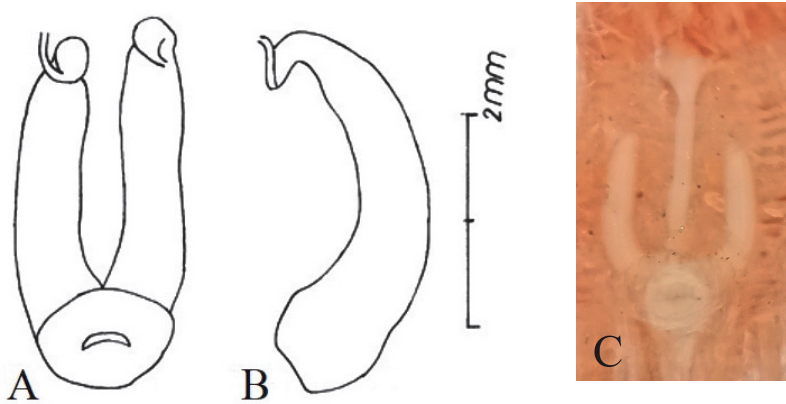


Fig. 2: *Dina apathyi*. Genital atrium. A, B – drawing of the atrium, A – from ventral, B – from lateral; C – photo of the atrium. Batova reka/Bulgaria

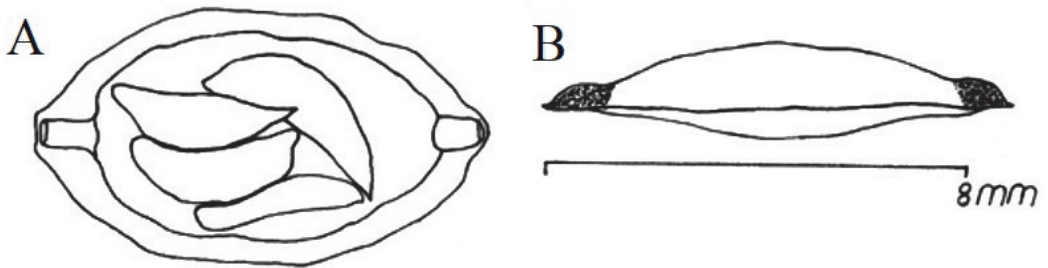


Fig. 3: *Dina apathyi*. Cocoon from dorsal (A) and lateral (B). Batova reka/Bulgaria

Of 23 cocoons, eggs, embryos and juveniles were found in 21 ones. Eggs were only in two cocoons, three ones contained both eggs and juveniles. The number of embryos with the highest frequency was five, the highest number was 9 juveniles (2 cases). The average number was five (4,6). The number of eggs and juveniles in the cocoons are in the table 3.

Tab. 2. Dimensions of the cocoons of *Dina apathyi*: length in mm/frequency, width in mm/frequency. Batova reka/Bulgaria

Length mm	Frequency	Width mm	Frequency
5	1	3	4
6		4	7
7	3	5	11
8	8	6	1
9	6		
10	4		
11			
12			
13	1		
average 8,5	23	average 4,3	23

Tab. 3. The numbers of eggs and embryos in the cocoons of *Dina apathyi* and their frequency. Batova reka/Bulgaria

Number of eggs/embryos	Frequency
1	2
2	1
3	1
4	5
5	8
6	0
7	2
8	0
9	2

Tab. 4: Taxocoenoses of leeches of some representative sites of the flowing waters

Species/Site	Site 2 Brook at Kavarna	Site 3 Batova ri- ver	Site 4 Kranevo	Site 5 Primorsko	Site 6 Dyavolska r	Site 7 Iskar River	Site 8 Katina brook
Glossiphoniidae	n/D%	n/D(%)	n/D(%)	n/D(%)	n/D(%)	n/D(%) <9	n/D(%) <9
1 albo hete				1/1,7	39/26,7		
2 glos comp		12/25,5	58/42,9				
3 helo stag			76/56,4		86/58,9	2/0,7	
4 hemi marg					21/14,4		
5 placo cost		1/2,1	1/0,7	57/95,0			
Haemopidae							
6 haem sang	64/100	7/14,9					
Hirudinidae							
7 hirud verb.				2/3,3			
Erpobdellidae							
8 dina apat		17/36,2					
9 erpo octo		10/21,3				227/74,9	
10 erpo verru						76/25,1	18/100
Total	64/100	47/100	135/100	60/100	146/100	303/100	18/100

Judging by the content of the cocoons and embryos, laying eggs starts at the end of May and continues during June.

The species was described as a new taxon from the west Ukrayina (province of Lviv/Lvov) (Pawlowski 1936, Lukin 1962, 1976). It is known also from the west Belarus, a large territory of Poland (a north half of the country) (Bielecki et al. 2011), Romania – the Donau Delta (Cristea & Manoleli, 1977), Austria – Burgenland (Nesemann & Neubert 1999) and Northern Germany (lagoons of the Oder River) (Grosser 2003). It is mentioned also from Hungary (Soós 1963, 1966 p. 387), but the data on it from the Hungarian Danube (Soós 1967, Dudich 1967) relate to *Dina punctata* Johansson, 1927. New records from more sites from Hungary were published by Nesemann (1994). Also the data on it from the Danube in Slovakia (Košel 1983) relate to *Dina punctata* (Johansson, 1927). From Slovenia (Istria - the Rižana river at Koper) (Sket 1968), the records remain doubtful: the figure 29 of a male atrium does not corresponds to the species in question, and also two records from

the Soča River at Tolmin are questionable (Sket l. c. p. 151, 171). From Soča River at Deskle, I have a species which resembles *Dina* cf. *punctata*.

Erpobdella octoculata (Linnaeus, 1758)

- 3: Batova reka brook, at the Albena resort. 24.06.1977, 10 specimens per h.

- 7: The Iskar River at Mezdra, 21.09.1980, 227 specimens per 1 h collecting.

It was found only at two sites from 8 (presentation 25 %). It seems to be rare and little widespread in the waters of the Black Sea basin. In the waters of the Danube basin, it is a quite common species. The bibliography on the occurrence of this species in Bulgaria was published by Jueg (2010).

Most specimens from Iskar had the form „*pallida*“. Only 14,8 % specimens had typical coloring as the form „*vulgaris*“.

Erpobdella verrucosa (Örley, 1886)

[(syn. *E. monostriata* (Gedroyć, 1916) in Russev & Janeva (1976), and *E. vilnensis* Liskiewicz, 1925 in Jueg (2010)].

- 7: Iskar River at Mezdra, 21.09.1980, 76 specimens per h (14 specimens with clitellum, 27-37 mm long).

- 8: Katina, a brook above the village, 25.09.1980, 18 subadult specimens per h collecting. The specimens from the both sites were less intensely colored (f. „*pallida*“) compared to Central European populations. The black lines on dorsum were little distinctive. Only 16 % of the specimens had typical dark colouring.

There is also its different distribution in rivers belonging to the Danube basin and those belonging to the Aegean Sea. In waters connected with the Danube, its distribution reaches almost the Danube proper. In the rivers connected with the Aegean Sea (south slopes of the Rila, Pirin, Rodopi mountains), its occurrence occupies only the highest section of the brooks or rivers (Russev & Janeva 1976). Such distribution in flowing waters corresponds well to its psychrophily.

4 The sites without leeches

- a short, about 1,5 km long nameless brook between Ecopark Varna and Sv. Sv. Konstantin i Elena (resort Druzhiba). The bottom with sinter sediments, water 15 °C at 18 h. 19.06.1977

- a short, about 4 km long nameless brook between Vinitza and Trakata. 20,1 °C. Travertine sediments. 19.06.1977

- a brook in Varna, about 4,5 km long, at Dolphinarium Varna flowing into the sea, sinter sediments, 17,5 °C. 19.06.1977

- a brook in Varna flowing into Varnensko ezero lake, length about 3 km. 25.06.1977.

- Balchik, a brook in the old town. 26.06.1977, 30 min. The watercourse with lot of wastes.

- Varnensko ezero lake, north shore at Varna, 25.06.1977, 30 min. collecting. Brakish water?

- a small brook at the road to Vinitza, 22. 06.1977, the bottom with travertine sediments.

- Ropotamo reka brook at the road Yasna Polyana – Veselye, the riverbed up to 3 m broad, the bottom with tiny gravel, 30 min collecting. 18.06.1975

- Ropotamo reka brook at the road Primorsko – Arkutino, probably brakish water. 18.06.1975.

- Karaagach river brook at Kitten, about 150 m from the Black Sea, brackish water, 30 min collecting, 15.6.1975.

- Tzarskoye (previously Michurin), a nameless brook in the south part of the town, gravel bottom, collecting 30 min. 20.06.1975.

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Annotation

Vladimír Košel was a Slovakian speleologist and hirudinologist with numerous publications on ecology and taxonomy of leeches. He had already almost completely prepared this article. Only a short time before his sudden death, he sent me the material from *Dina apathyi* for redetermination. Unfortunately, he was not longer able to find out the result of my determination. For me it is a matter close to my heart and an obligation to complete his work. Clemens Grosser

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