

Four new *Dactylogyrus* species (Monogenea: Dactylogyridae) from Iranian fishes

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Abstract. Four new *Dactylogyrus* species (*Dactylogyrus pallicirrus* sp. n. from *Cyprinion macrostomum* and *Cyprinion watsoni*, *D. rohdeianus* sp. n. and *D. capoetae* sp. n. from *Capoeta damascina*, and *D. schizocypris* sp. n. from *Schizocypris brucei*) are described from endemic Iranian freshwater fishes. Comments on the monogenean fauna of Iranian freshwater fishes are presented.

Since the report of Jalali and Molnár (1990a) on the occurrence and host range of some *Dactylogyrus* species infesting Iranian fishes, several new *Dactylogyrus* and *Dogielius* species have been described from Iran (Jalali and Molnár 1990b, Jalali 1992, Molnár and Jalali 1992, Gussev et al. 1993a,b,c). All of the new monogenean species described from Iranian freshwaters were found in fishes caught in tributaries of the Tigris River (Mesopotamian Faunal Region) and in rivers running into undrained lakes in Central Iran. Fishes living in the water system of the Caspian Sea proved to be infected by monogeneans known from European and Central Asian waters (Gussev 1985).

This paper describes four new *Dactylogyrus* species from the gills of fishes caught in the Rivers Dez and Chaghalnandi of the Mesopotamian Faunal Region, in the River Shur of Murian Province, and in the Chahnimeh water reservoir located in the Central Asian subregion of Eastern Iran.

MATERIALS AND METHODS

During a survey of the monogenean fauna of Iranian fishes in May and June 1993, one of us (B. Jalali) examined several fish species from the Rivers Dez and Chaghalnandi (tributaries of River Karun and River Karkheh, respectively, Tigris River basin), from the River Shur (a tributary of the River Halil, Murian basin), and from Chahnimeh water reservoir (Sistan Province, Eastern Iran). This survey revealed the presence of several undescribed *Dactylogyrus* species. As the first step, we selected for description four species which showed the most distinct differences from known species.

Fishes were carried fresh to the laboratory where their gills were cut out and examined under a stereomicroscope at

4- to 16-fold magnification. Vigorously moving worms were separated from the gills with a pipette and fixed under a coverslip according to Fernando et al. (1972) and Gussev (1983) in ammonium picrate and glycerol-gelatine, respectively. Line drawings of the sclerotized organs were made from the screen of a computer, projected there by a video camera. Measurements of the hooks, anchors and copulatory organ were related to the scale of an objective micrometer projected to the screen in the same way. The validity of this method was checked by measuring the same organs with a microscope micrometer. In the descriptions, which use the terminology of Gussev (1983), all data are given in micrometres (μm).

DESCRIPTION OF SPECIES

Dactylogyrus pallicirrus sp. n. Fig. 1

Type locality: River Dez, close to city Ahwaz, Tigris basin, Iran

Type host: *Cyprinion macrostomum* Heckel, 1843

Specimens studied: 6

Type material: Holotype deposited in the monogenean collection of the Zoological Department, Hungarian Natural History Museum, Budapest. Coll. No. 67116; paratype deposited in the helminthology collection of the Institute of Parasitology AS CR, České Budějovice, Coll. No. M-342

Other host: *Cyprinion watsoni* (Day, 1872)

Locality: River Shur, a tributary of River Halil, Murian Province, southern part of Iran

Description (based on specimens collected from *C. macrostomum*): Small worms with 4 eye-spots. Body length 396 (363-429), width 48 (46-53). Marginal hooks slender with handle poorly separated from its pivot, with rounded, slightly projected heel of blade; total length 21 (18-24). Anchors of "varicorhini" type

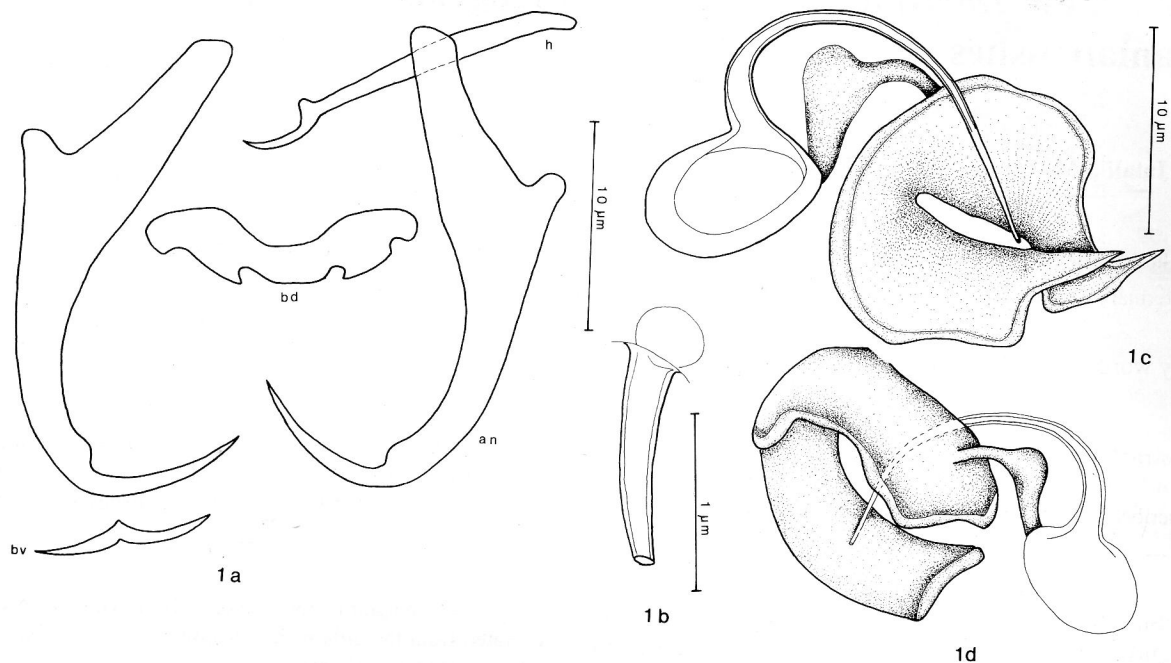


Fig. 1. *Dactylogyrus pallicirrus* sp. n. from *Cyprinion macrostomum* Haptoral apparatus (a); sclerotized vagina (b); copulatory organ of the holotype (c); copulatory organ of the paratype (d). an = anchors; bd = dorsal bar; bv = ventral bar; h = hooks.

(Gussev 1983) with constriction at base of point, with well-developed inner roots and short outer roots. Dorsoapical length of anchors 22.5 (21.5–24.5), ventroapical 19 (18–19.5); shaft 19 (17.5–19.5); point 8.5 (8–9); inner root 10 (9–10.5); outer root 1.5 (1.3–2). Dorsal bar “*varicorhini*” type with central cavity. Its width 15.5 (13–17), length without central cavity 2.5 (2–2.6). Ventral bar v-shaped with pointed ends, measuring 12.5 (11.5–13) × 2.5 (2–4). Copulatory organ composed of

bent, tapering copulatory tube starting from funnel; short accessory piece enlarging into pall. Total length of copulatory organ 25 (19.5–30). Sclerotized vagina 9 (8–11) long, stubby tube with round enlargement at one end.

E t y m o l o g y : The species is named after the shape of the accessory piece of the copulatory organ.

Comments: This species differs from the known ones

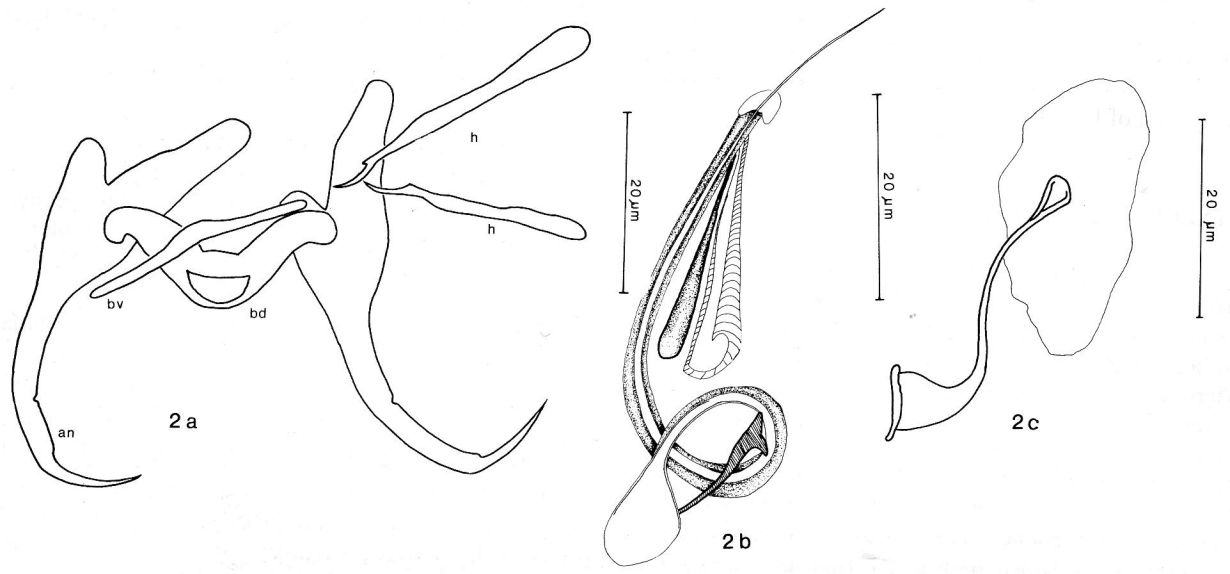


Fig. 2. *Dactylogyrus rohdeianus* sp. n. Haptoral apparatus (a); copulatory organ (b); sclerotised vagina (c).

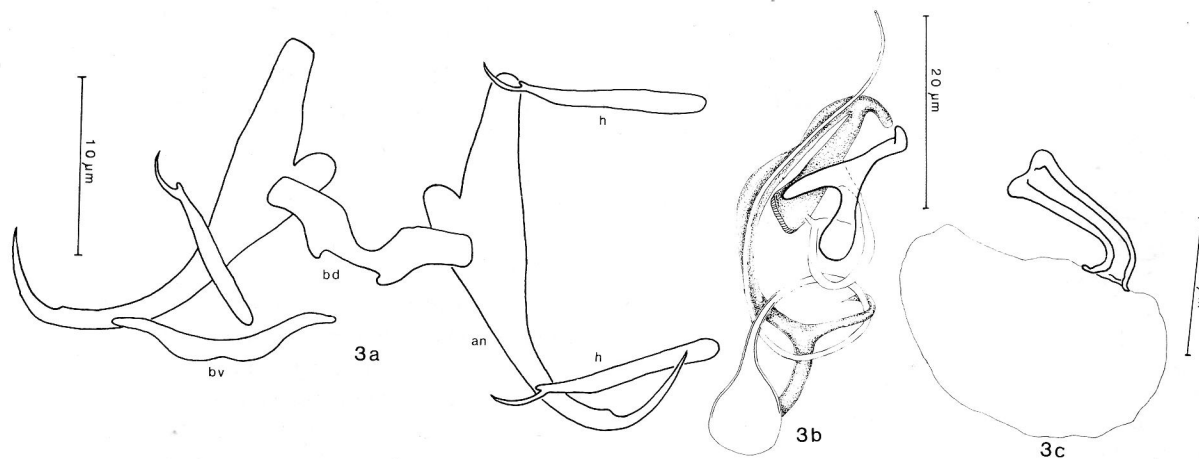


Fig. 3. *Dactylogyrus capoetae* sp. n. Haptoral apparatus (a); copulatory organ (b); sclerotized vagina (c).

by the characteristic palliform shape of the accessory piece of the copulatory organ. Specimens collected from *C. watsoni* in another zoogeographical zone conformed to specimens from *C. macrostomum*.

***Dactylogyrus rohdeianus* sp. n.**

Fig. 2

Type locality: River Chaghalnandi, a tributary of the River Karkheh, north to city Ahwaz, Tigris basin, Iran

Type host: *Capoeta damascina* (Valenciennes, 1842)

Specimens studied: 3

Type material: Holotype deposited in the monogenean collection of the Zoological Department, Hungarian Natural History Museum, Budapest. Coll. No. 67112; paratype deposited in the helminthology collection of the Institute of Parasitology AS CR, České Budějovice, Coll. No. M-343

Description: Medium-sized worms with 4 eye-spots. Body length 660 (627–693), width 100 (86–113). Marginal hooks long with indistinct border between the handle and the stout pivot and with slightly projected heel of blade. Hooks differ in size, small ones 26, larger ones 43 in average. Anchors of “varicorhini” type (Gussev 1983) with constriction at the base of point, with well-developed inner roots and less developed outer roots. Dorsoapical length of anchors 44.5 (40.5–47), ventroapical 43 (41.5–45.5); shaft 38 (36.5–39); point 11.5 (10.5–13); inner root 19.5 (18–21); outer root 6.5 (5.2–8). Dorsal bar “varicorhini” type with central cavity. Its width 28.5 (27.5–29), length without central cavity 4 (3.8–4.2). Ventral bar elongated rod measuring 26.5 (26–27.5) × 6 (5.2–6.5). Copulatory organ composed of a long tube with one turn supported by a rod-like and trough-like accessory piece. Total length of copulatory organ 60

(55–64). Sclerotized vagina 28 (26–30) long, narrow bending tube starting from a funnel and ending in an amorphous sclerotized structure.

Etymology: This species was named in honour of Klaus Rohde, the well-known specialist of Monogenea.

Comments: In the shape of anchors and hooks this species resembles most species described from varicorhinid fishes but distinctly differs from the latter in the shape of the copulatory organ.

***Dactylogyrus capoetae* sp. n.**

Fig. 3

Type locality: River Chaghalnandi, a tributary of the River Karkheh, north to city Ahwaz, Tigris basin, Iran

Type host: *Capoeta damascina* (Valenciennes, 1842)

Specimens studied: 4

Type material: Holotype deposited in the monogenean collection of the Zoological Department, Hungarian Natural History Museum, Budapest. Coll. No. 67113; paratype deposited in the helminthology collection of the Institute of Parasitology AS CR, České Budějovice, Coll. No. M-344

Description: Medium-sized worms with 4 eye-spots. Body length 660 (561–693), width 102 (95–107). Marginal hooks long with indistinct border between the handle and the stout pivot and with slightly projected heel of blade. Hooks differ in size, small ones 26, larger ones 42 in average. Anchors of “varicorhini” type (Gussev 1983) with constriction at the base of point, with well-developed inner roots and less developed outer roots. Dorsoapical length of anchors 43 (41.5–45.5), ventroapical 41.5 (40.5–44); shaft 38 (35–40.5); point 13 (11.5–13); inner root 18 (17–19.5); outer root 5.2 (4.5–8). Dorsal bar “varicorhini” type

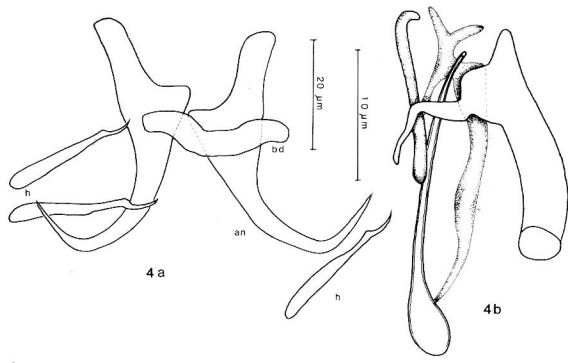


Fig. 4. *Dactylogyrus schizocypris* sp. n. Haptoral apparatus (a); copulatory organ (b).

with central cavity. Its width 31 (28.5–32.5), length without central cavity 5.2 (2.6–5.2). Ventral bar elongated rod measuring 28.5 (24.5–31) × 6 (46.5). Copulatory organ composed of a long tube with one turn supported by a complicated accessory piece. Total length of copulatory organ 48 (45–52). Sclerotised vagina 18 (17–19) long, relatively wide tube starting from a funnel and ending in an amorphous sclerotized structure.

Comments: This species strongly resembles *D. rohdeianus* but differs from it in the structure of the copulatory organ and the sclerotized vagina.

***Dactylogyrus schizocypris* sp. n.**

Fig. 4

Type locality: Chahnimeh water reservoir, close to Lake Hamoon, eastern part of Iran

Type host: *Schizocypris brucei* Regan, 1914

Specimens studied: 6

Type material: Holotype deposited in the monogenean collection of the Zoological Department, Hungarian Natural History Museum, Budapest. Coll. No. 67115; paratype deposited in the helminthology collection of the Institute of Parasitology AS CR, České Budějovice, Coll. No. M-345

Description: Small worms with 4 eye-spots. Body length 475 (395–530), width 115 (85–110). Marginal hooks long with slightly distinct handle a bit longer than pivot and with indistinct heel of blade; total length 26 (22–32.5). Anchors of “*wunderi*” type (Gussev 1983) with long inner roots and scantily projected outer roots. Dorsoapical length of anchors 41.5 (39–44), ventroapical 39 (36.5–41.5); shaft 36.5 (35–38); point 11 (9–13); inner root 18 (15–19.5); outer root 2 (1.3–3.9). Dorsal bar “*wunderi*” type, measuring 5.5 (56.5) × 27.5 (26–28.5). No ventral bar present. Copulatory organ

composed of a long, relatively straight tube supported by a complicated accessory piece. Total length of copulatory organ 27 (26–27.5). No sclerotized vagina found.

Comments: This species differs from all known *Dactylogyrus* spp. by the shape of the copulatory organ.

DISCUSSION

Iranian freshwaters belong to three different faunal regions (Palaeartics; Mesopotamian Region; Indian Faunal Region). The northern part of Iran belongs to the Ponto-Aralo-Caspian zoogeographical region of the Palaeartics where the composition of the fish fauna is about the same as in Europe and in the neighbouring Central Asian region. The monogeneans found in this region by Jalali and Molnár (1990a,b) also roughly corresponded to those recorded by Gussev (1985) from the Soviet territories of the given area. The fish fauna of the Mesopotamian region, however, is composed mostly of endemic species which, according to data reported by Gussev et al. (1993a,b,c), Jalali (1992) and Molnár and Jalali (1992), were infected by undescribed monogenean species. Due to the strict host specificity of dactylogyrids, further new species could be expected to occur besides those described in the works cited above. The species described in this paper represent some of these expected ones. Three of the *Dactylogyrus* spp. described here was found on fishes of the Mesopotamian region, while *D. pallicirrus* sp. n. was recorded both on *Cyprinion macrostomum* of the Mesopotamian region and on a closely related fish species, *Cyprinion watsoni*, inhabiting rivers of Murian Province in the southern part of Iran. The data obtained in this study also allow us to draw some conclusions on the zoogeographical relations of the surveyed area. According to Berg (1940), the southeastern region of Iran has been influenced by the neighbouring Indian faunal region. The fact that *D. pallicirrus* was recorded, on the one hand, from a fish of a typical Mesopotamian river and, on the other hand, from a closely related fish species inhabiting River Shur which carries its water into an undrained lake, Jaz Murian, shows that the fauna of that South Iranian lake is related to that of the Mesopotamian area. *Dactylogyrus schizocypris* infected a fish endemic in Eastern Iranian waters. Fishes of this region belong to the better studied Central Asian faunal region; however, before this work no data had been published on the parasites of *Schizocypris brucei*.

The sclerotized organs of each species show unique characteristics greatly differing from those of *Dactylogyrus* species of fishes of the neighbouring Palaeartic and Indian faunal regions (Gussev 1973, 1974, 1985).

REFERENCES

- BERG L. S. 1940: Zoogeography of the freshwater fishes of Asia anterior. Uchen. Zap. Leningr. Univ. 56: 331. (In Russian.)
- FERNANDO C. H., FURTADO J. I., GUSSEV A. V., HANEK G., KAKONGE S. A. 1972: Methods for the Study of Fish Parasites. Biol. Series, Univ. of Waterloo, Waterloo, pp. 76.
- GUSSEV A. V. 1973-74: Freshwater Indian Monogenea. Principles of systematics, analysis of the world faunas and their evolution. Ind. J. Helmit. 25-26: 1-241.
- GUSSEV A. V. 1983: Methods for Collecting and Processing Fish Parasitic Monogenean Material Akad. Nauk. USSR, Leningrad, pp. 47. (In Russian.)
- GUSSEV A. V. 1983: Methods for Collecting and Processing Fish Parasitic Monogenean Material Akad. Nauk. USSR Leningrad, pp. 47. (In Russian.)
- GUSSEV A. V. 1985: Monogenea. In: O. N. Bauer (Ed.), Key to Parasites of Freshwater Fish of the USSR. Vol. II. Nauka, Leningrad, pp. 10-424. (In Russian.)
- GUSSEV A. V., JALALI B., MOLNÁR K. 1993a: New and known species of *Dactylogyrus* Diesing, 1850 (Monogenea: Dactylogyridae) from Iranian freshwater cyprinid fishes. Syst. Parasitol. 25: 221-228.
- GUSSEV A. V., ALI N. M., ABDUL-AMEER K. M., AMIN S. M., MOLNÁR K. 1993b: New and known species of *Dactylogyrus* Diesing, 1850 (Monogenea: Dactylogyridae) from cyprinid fishes of the River Tigris, Iraq. Syst. Parasitol. 25: 229-237.
- GUSSEV A. V., JALALI B., MOLNÁR K. 1993c: Six new species of the genus *Dactylogyrus* (Monogenea: Dactylogyridae) from Iranian freshwater fishes. Zoosyst. Rossica 2: 2935.
- JALALI B. 1992: Description of *Dogielius molnari* sp. n. (Monogenea: Dactylogyridae) from the gills of an Iranian freshwater fish, *Cyprinion macrostomum* (Heckel). Acta Vet. Hung. 40: 239-242.
- JALALI B., MOLNÁR K. 1990a: Occurrence of monogeneans on freshwater fishes in Iran: *Dactylogyrus* spp. on cultured Iranian fishes. Acta Vet. Hung. 38: 239-242.
- JALALI B., MOLNÁR K. 1990b: Occurrence of monogeneans on freshwater fishes of Iran: Dactylogyridae from fish of natural waters and description of *Dogielius mokhayeri* sp. n. Parasitol. Hung. 23: 23-31.
- MOLNÁR K., JALALI B. 1992: Further monogeneans from Iranian freshwater fishes. Acta Vet. Hung. 40: 55-61.

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