

## Specific Composition and Morphological Peculiarities of Endemic Monogenean Parasites of Freshwater Fishes of Iran

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**Abstract:** Result obtained during ten years research work (1990-2000) on distribution of monogenean fauna Iranian fishes indicates that its composition of monogenean fauna of Iranian fishes depends on their habit and since Iran includes three different zoogeographical zones with highly endemic fish hosts, its monogenean parasites have specific composition. The Caspian fauna is characterized by relatively great diversity of monogenean species (eleven genera and at least forty-eight species). Presence of some species with sphyrnoid type of anchors is one of its speciation. The Iranian part of Mezopotomian (Tigris) fauna (six genera and at least twenty-six species) is characterized by distinct monogenean parasites, for instance, presence of Dogielius type of anchors and prevalence of *Dactylogyrus spp.* with morphological peculiarities not similar to Sarmatian fauna. The most of it's specific character is the shape of dorsal and ventral bar in *Dactylogyrus* species found in the Tigris Zone. Endemism in the aforesaid zone is high therefore species of *Dactylogyrus* will be increased more. The oriental monogenean fauna of Iran (three genera and at least eleven species) shows special characteristics, amongthem, the presence of one connective dorsal bar only, presenc of varicorhinoid type of bar and haptor would suggest that aforesaid zone of Iran has been influenced by the Indian fauna.

**KEY WORDS:** Monogenean, Fresh water fishes, specific composition, Iran

## Introduction

Composition analysis of freshwater fish species of Iran shows that three major faunal regions with more than 165 species exist in Iran. Among them, however, over one third of species are endemic to Iranian waters (Armentrout, 1981). Results obtained from the research work on distribution of monogenean fauna of Iran shows that the occurrence of specific monogenean in different regions of Iran, has special characteristics and clearly reflect the boundaries of zoogeographical regions, drawn by Berg, 1940. (Fig 1). (Bychowsky, 1949 ; Jalali & Molnar, 1990a,b ; Molnar & Jalali, 1992 ; Gussev *et al.*, 1992; Shamsi & Jalali, 1997 ; Jalali & Rohani, 1997 and Jalali *et al.*, 2000).

In the present paper, the specific composition of endemic monogenean parasites of freshwater fishes of Iran is presented.

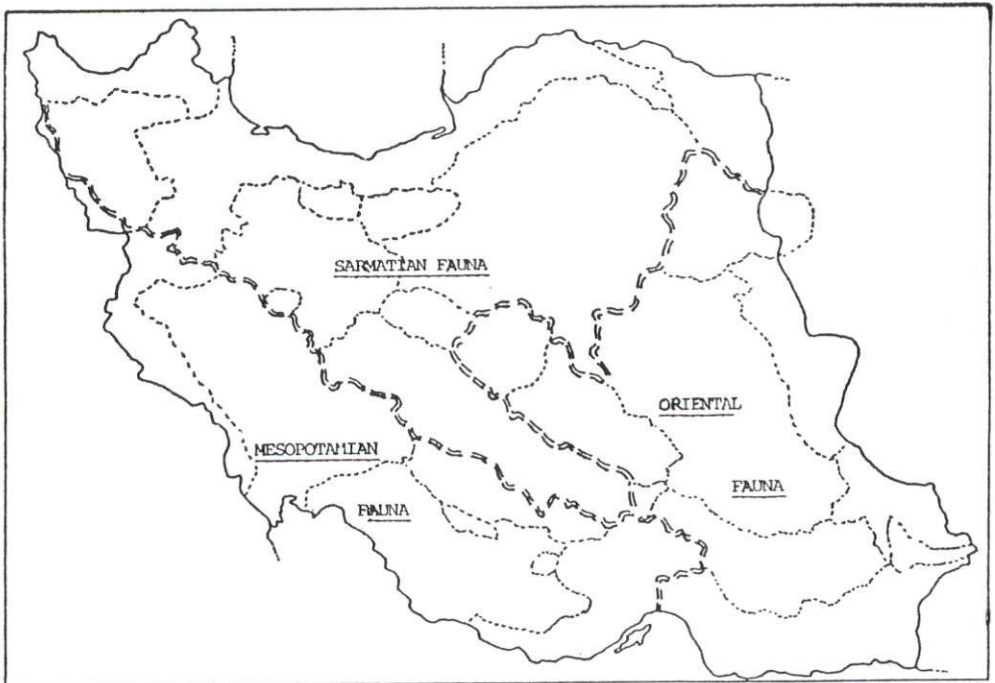


Figure 1: Three major faunas of Iran. (After Armentrout, 1981)

## Material and Methods

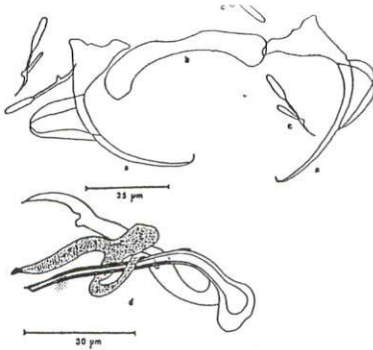
Collection of monogenean from freshwater fishes of Iran was carried out in the different regions of the country from the year 1990-2000. Samples of fish were

collected from three faunal regions mostly from natural waters and carried alive to the laboratory for more examinations. Approximately 1000 fish specimens belonging to 100 species were caught and examined. Parasites were separated under stereomicroscope at a magnification of 40-100 and pick off the gill scraping alive, by a pipette then fixed in Ammonium picrate solution or gelicerin jelly (Gussev, 1983 ; Fernand *et al.*, 1972). Line drawings and measurments of the sclerotized organs were made from the screen of a computer, projected there by a video camera. The validity of this method was checked by measuning the same organs with microscope micrometer.

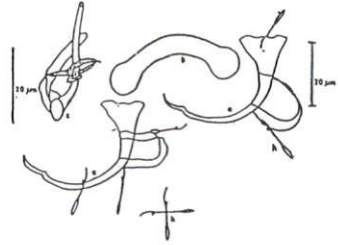
## Results

Composition of fauna at the level of genera and species of monogenea shows significant differences of sclerotized elements of species among three different faunal region of Iran. The main features of specific composition and morphological peculiarities of Iranian fauna are summerized here:

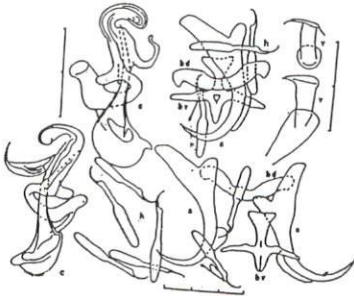
- A) The Iranian part of Mezopotamian (Tigris) fauna (7 genera and at least 28 species) is characterized by :
- 1) Presence of 3 Dactylogyrins species with Dogielius type of haptor embracing the gill filaments by the anchors (*D. mokhayeri* , *D. molnari* and *D. persicus*).
  - 2) Prevalence of species of Dactylogyrins with five ray additional ventral bars ( *D. deziensis* and *D. pawlowski*).
  - 3) Small number of Dactylogyrins with one bar in the haptor (*D. rectotorabus* and *D. acinacus*).
  - 4) Presence of species of genus *Paradiplozoon*.
  - 5) Presence of species of Dactylogyrins with T shaped additional ventral bar (*D. orbus*).
  - 6) Absence of Dactylogyrins with copulatory organ of (goktschaicus) type.
  - 7) Absence of species of Dactylogyrins with (sphyrnoid) type of anchors (Fig. 2).



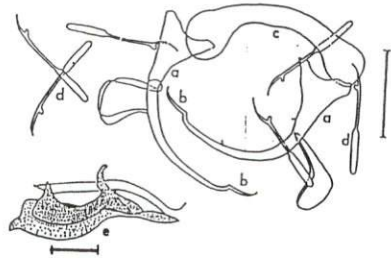
*D. persicus* Monlar and Jalali, 1992



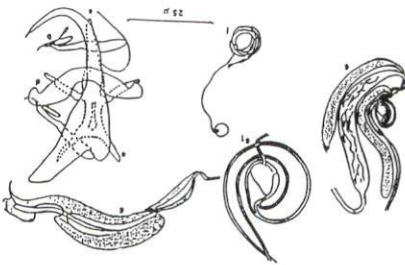
*D. molnari* Jalali, 1992



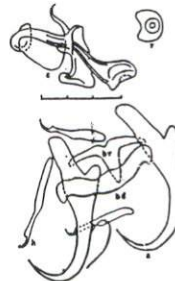
*D. deziensis* Gussev *et al.*, 1993



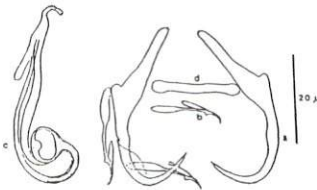
*D. mokhayeri*. Jalali and Molnar, 1990



*D. pawlowski* Bychowsky, 1949



*D. orbis* Gussev *et al.*, 1993a



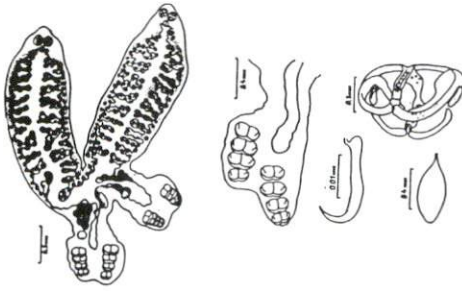
*D. rectorabrus* Gussev *et al.*, 1993b



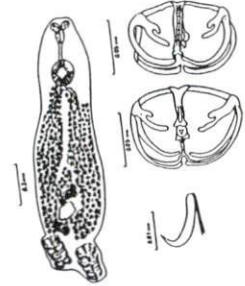
*D. acinacus* Gussev *et al.*, 1993b

**Figure 2:** Sclerotized elements of haptor of specific monogenean parasites Mezopotamian part of IRAN

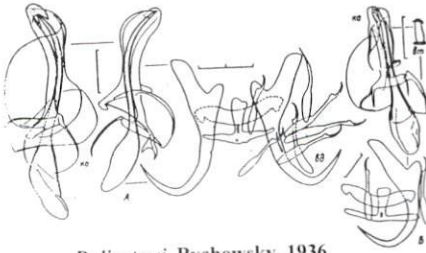
- B) The Sarmatia fauna (11 genera and at least 48 species) is characterized by:
- 1) Considerable abundance and morphologically diverse Dactylogyrins (24 species).
  - 2) Small diversity of Ancylo-discoidins (2 species).
  - 3) Relatively diverse species of genera *Paradiplozoon* and *Octomacrum*.
  - 4) Prevalence of species Dactylogyrins with two bars and with upside down T shaped additional (ventral bar of haptor and its derivatives: five ray ventral bar (*D. affinis* and *D. linstowi*)).
  - 5) Presences of a group species with copulatory organ goktschaicus type (*D. goktschaicus* and *D. linstowi*) and ergensi type (*D. cornoides*).
  - 6) Presence of few species with sphyrnoid type of anchors and haptor (*D. sphyrna* and *D. vistulae*).
  - 7) Presence of two species of genus *Ligophorus* (Fig. 3).
- C) The Oriental fauna (3 genera and at least 11 species) according to the latest data (Jalali *et al.*, 2000) represents special characters. They are as follows:
- 1) Presence of species of Dactylogyrins with single dorsal bar of haptor (*D. rectorabus* ; *D. acinacus* and *D. schizocyris*).
  - 2) Presence of few species of Dactylogyrins with varicorhini type of anchors and Dorsal bar, (*D. pallicirus* and *D. rohdianus*).
  - 3) Prevalence of species of Dactylogyrins with 2 bar and with the V shaped ventral bar, (*D. faridpaki* and *D. yousefpouri*)
  - 4) Presence of few species of Paradiplozoon (*P. schizothoraci*)
  - 5) Absence of species of Dactylogyrins with (gussev) type of copulatory organ (goktschaicus type) and Tetraonchids (Fig. 4).



*Paradiplozoon* sp.



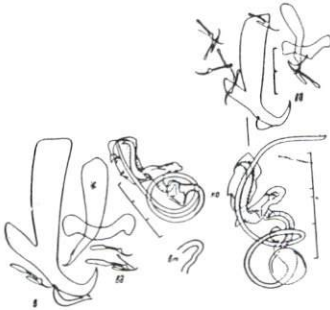
*Octomacrum* sp.



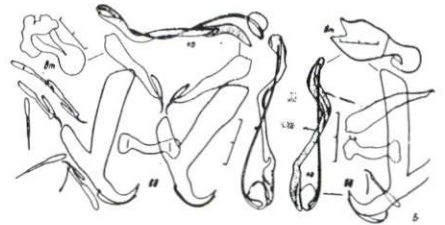
*D. linstowi* Bychowsky, 1936



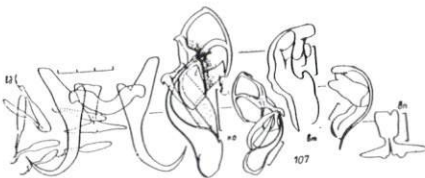
*D. goktschaicus* Gussev, 1966



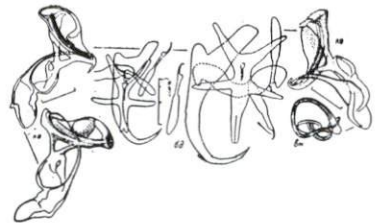
*D. sphyrna* Linstow, 1878



*D. vistulae* Prost, 1957



*D. nanus* Dogiel and Bychowsky, 1934

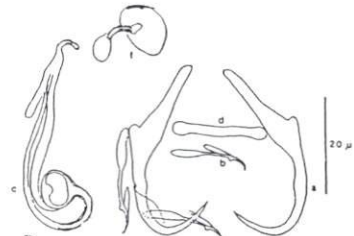


*D. affinis* Linstow, 1878

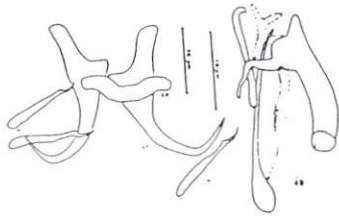
**Figure 3:** Sclerotized elements of haptor of specific monogenean parasites of Sarmatian subregion of IRAN



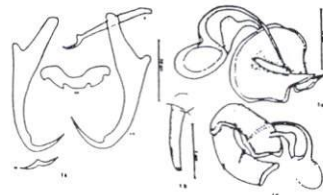
*D. acinacus* Gussev et al., 1993b



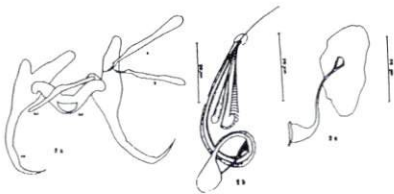
*D. rectotorabus* Gussev et al., 1993b



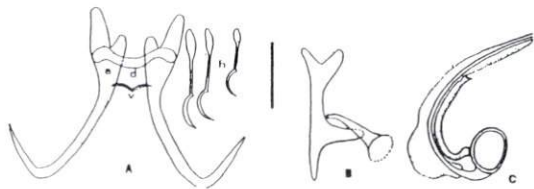
*D. schizocypris* Jalali et al., 1995



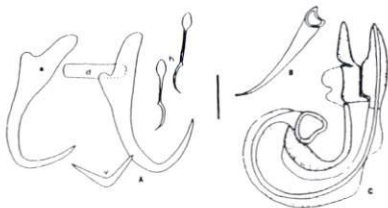
*D. pallicirus* Jalali et al., 1995



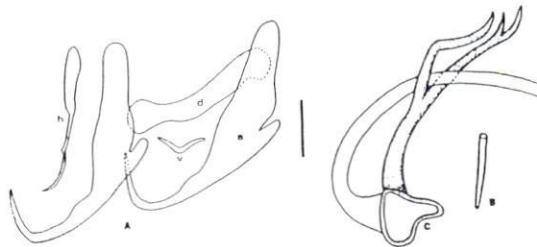
*D. rohdianus* Jalali et al., 1995



*D. yousefpouri* Jalali et al., 2000



*D. faridpaki* Jalali et al., 2000



*D. eslami* Jalali et al., 2000

**Figure 4:** Sclerotized elements of haptor of specific monogenean parasites of Oriental region of IRAN

## Discussion

The results obtained on morphological peculiarities of monogenean parasites found in endemic fishes of 3 different region of Iran and their analysis show that the composition of monogenean fauna of Iranian endemic freshwater fishes clearly reflect the boundaries of zoogeographical regions drawn by Berg, 1940 and Armentrout, 1981 and are confirmed by the analysis of palaeartic and Indian faunas summerized by Gussev, 1976. This means that in northern Iran belonging to the Palaeartic all of the monogenean species were identified with the ones common in Europe and central Asian region and mostly with the same morphological peculiarities (Gussev, 1976 ; Gussev *et al.*, 1993b,c).

Parasites found on endemic fishes of Iranian part of Mezopotamian transitional region (Jalali, 1992 ; Jalali & Molnar, 1990b, Molnar & Jalali, 1992 ; Gussev *et al.*, 1993b) proved to be new and mostly host specific parasites indicating that the monogenean fauna of Mezopotamian subregion possess the elements of Palaeartic fauna and African fauna at the same time and has undergone an independent evolution.

The recent data on morphological characteristics of *Dactylogyrus* species obtained from Jalali *et al.*, (2000) ; Jalali & Rohani, (1997) proved that Oriental fauna of Iran has influenced by Indian fauna and almost confirm the opinions expressed by Gussev *et al.*, 1993a,b,c, Jalali *et al.*, 1995 ; Jalali *et al.*, 2000.

According to our findings it can be concluded that Iran occupies a significant part of the middle east, regarding 60 monogenean fauna and contains elements of both palaerctic and Indian fauna.

For final confirmation and evaluation of the rate of influence of Indian fauna on oriental fauna of Iran, many freshwater fishes and their monogenean in Pakistan, (our eastern neighbor) should be precisely studied.

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