

The prevalence, ichthyopathological significance and control measures of *Gyrodactylus* specimens in fishes from the waters of Banat region

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ABSTRACT. In Banat's waters was recorded two species of *Gyrodactylus*: *G. elegans* from the gills of bream (*Abramis brama danubii*), and also in carp (*Cyprinus carpio*), on gills and skin, and *G. medius*, found on body surface and gills of the young goldfish (*Carassius auratus auratus*). A varieties of this two species are discussed. *G. medius* is a highly pathogenic species for young goldfish and *G. elegans* can produced important outbreaks and damages in carp culture. Formalin can be useful for the treatment of gyrodactylosis in goldfish, but it is forbidden in carp culture. The surveillance of carp and goldfish gyrodactylosis is necessary, and they must be included by the O.I.E. list of fish diseases like salmonid gyrodactylosis.

Key words: *G. medius*, goldfish gyrodactylosis, *G. elegans*, carp gyrodactylosis.

Introduction

The very most of monogeneans (over 1500 species) are fish ectoparasites, which are found on the skin and gills. A few species are met in amphibians, reptiles, cephalopods and mammalians (in the eye of *Hippopotamus*). Most species are found in marine fish.

A high prevalence of these parasites is present in wild fish, but they do not generate too serious diseases. Some species are strongly pathogenic, and when they enter fish farms, they cause important mortalities, decreases of growing rhythm and economic losses. The symptoms and lesions are not very specific: increasing of gill and skin mucus secretion, equimoses, ulcerations, hyperplasia and sometimes necrosis. Among the monogenesis with ichthyopathological significance, we mention: carp dactylogyrosis, ancyrocephalosis of tropical aquarium fish, sheat fish silurodiscooidosis, sturgeon nitschiosis, salmonid and pike tetraonchosis, salmonid gyrodactylosis, salmonid discocotilosis and diplozoonosis (monogenesis with insufficient elucidated ichthyopathological significance).

Gyrodactylosis is an important ectoparasitosis of the fish, especially in aquaculture. Among the parasitological diseases of fishes, only salmonid gyrodactylosis with *Gyrodactylus salaris* is comprised in the O.I.E. list of fish diseases, because this little monogenean can produce significant losses and damages in the field of salmonids rearing, a very profitable activity.

According to Boeger and col. (1992), the taxonomical position of *Gyrodactylus* is: supraregnum *Eucarya*, regnum *Animalia*, branch *Metazoa*, *Eumetazoa*, *Coelomata*, subregnum *Bilateria*, branch *Protostomia*, infraregnum *Platyzoa*, phylum *Plathelminthes*, subphylum *Neodermata*, infraphylum *Cercomeromorpha*, class *Monogenea*, subclass *Monopisthocotylea*, order *Gyrodactylidea*, suborder *Gyrodactylinae*, family *Gyrodactylidae*, subfamily *Gyrodactylinae*, genera *Gyrodactylus*. *Gyrodactylus* specimens are very small worms (0,5-1,2/0,1-0,3 mm), translucent, viviparous and hermaphrodite; In the body of adults we can see one young worm and this containing another worm. Very often, this „grandchild” contains another embryon (Kinkelin and col., 1985, Ghittino, 1986, van Duijn, 1973, Schäperclaus,

1979, Roberts, 1989). They have an elliptical shaped body, without eye spots, but with two conical projection at the anterior end which bear cephalic glands, secreting a thick, sticky liquid (Elena Roman-Chiriac, 1960, van Duijn, 1973.). Intestinal ceca terminating blind near posterior end of body proper. At the posterior end of body, a strong attachment organ is situated. This organ is disc-shaped, has two large central hooks (anchors) supported by a dorsal and ventral bar and surrounded by a ring of 16 marginal hooklets. The attachment organ (opisthaptor) are very mobile and the morphometry and morphology of the opisthaptoral pieces has taxonomically significance (Yamaguti, 1967, Euzeby, 1986, Margolis and Beverley-Burton, 1984). From Malmberg (cited from Euzeby, 1986), the excretory system differ from each other specimens, and this taxonomical feature is useful for taxonomy. So that, after the morphology of excretory system, exist a few subgenera of *Gyrodactylus*: *Mesonefrotus*, *Metanefrotus*, *Paranefrotus*, *Neonefrotus* and *Limnonefrotus*, which are divided in groups according with the morphology of cyrus and opisthaptoral sclerites.

Over 300 species of *Gyrodactylus* are recorded from freshwater fishes. (Bauer, 1985, Beverley-Burton, 1984, Ergens and Lom, 1970).

The dead worms are very quickly disintegrate. For this reason, in order to confirm gyrodactylosis, it is essential to send to the laboratory only alive fish in water where they live, exceptionally in formaldehyde 4% or ethanol 70%. The study upon opisthaptor's morphology and morphometry after the clarification with ammonium-picrate-glycerine (APG) – the Malmberg's method, usable for all monogeneans, or the genetic analyses – PCR, applicable especially for *Gyrodactylus* species in *Salmonidae*, are the methods used at this moment.

Material and methods

During the years 2000-2005, we have examined 2331 fish samples and investigated 47 fish species, taken from the following waters: the Danube stream, the rivers: Timiș, Pogăniș, Bistra, Bega, Nera, Cerna, Caraș, Bârzava, the lakes: Văliug and Surduc, the trout farms Văliug and Românești, the cyprinicol units: S.C. Pescotim S.A. (farms in Timișoara, Sacoșu

Turcesc and Banloc), S.C. Coscerco S.R.L. Topolovățu Mare, S.C. Santim S.A. Sânanđrei, the Pișchia dam, the pools from Săcăláz, Calacea and Nițchidorf, the irrigation channel Giroc - Chișoda - Moșnița Nouă, the puddle from Ghiroda. A few specimens of young goldfish provided from an aquarium and a basin built in a yard. The parents of young goldfish have been imported from Thailand. Fishes have been carried out in the Aquatic Pathology Laboratory, within the State Sanitary Veterinary Laboratory of Timiș county, using also own material resources. So, we have designated some absolutely necessary endowments, like the macrophotographic stall and the ichthyoparasitological case.

Work methods aimed especially the following objectives:

- the accomplishment of a monograph concerning the *Gyrodactylus* species from the fishes of Banat region, there being not any such systemic studies at the moment;
- the accomplishment of some studies regarding the epidemiology of the *Gyrodactylus* from the Banat;
- the field investigation of some disease episodes in fish, in order to get a general view upon the ichthyopathological importance of the *Gyrodactylus* species from the fishes of Banat region, being aware of the fact ichthyoparasitoses` epidemiological, pathological and control aspects cannot be considered separately from the other ichthyopathological components (ecological, virusologic and bacteriological), taking also into account the human, legislative and decisional aspects;
- the basic component of our researches is represented by the problems related to a correctly and earlier diagnosis of gyrodactylosis, this representing the key for the adoption of control measures;
- the adoption of a viable strategy regarding the ichthyoparasitological control of gyrodactylosis.

From theoretical and also practical reasons, we considered essential to know the prevalence of *Gyrodactylus* specimens in natural waters whose ichthyopathological importance is not very significant. We can't exclude automatically the

ichtyopathological implications of a species just because we have not studied it enough.

The diagnostic method of *Gyrodactylus* species was stereomicroscopic and microscopic examination, using ammonium-picrate-glycerine solution (APG) - the Malmberg's fixation-, relying upon the opisthaptor's morphology and morphometry. For parasitological examination the fishes were carried on in water where they living. After the microscopical examination of scraping from gills and skin we make a stereomicroscopical examination of the the surface of the fish body. The sediment of water using at fish transport and for rinsed the gills and fish body surface was examined too. If the worms are observed by their movements, they must be transferred to a slide in a drop of water. A cover slip is gently placed on a top and a small drop of APG is added to the edge of cover-slip. Four drop of nail-polish should be added to each corner of the cover-slip and the slide can be transported without problems. For the measurement it was been using a micrometric eye pieces 8x.

Some sick fish was treated using formalin 37% for laboratory use, applied in doses of 0.25 ml/l water, during 15 minutes, for three successive days.

Results and discussions

In Banat's waters, we have identified two species of *Gyrodactylus*: *G. elegans* and *G. medius*.

G. elegans on gills of bream (*Abramis brama danubii*) in the river Bega, near Ghiroda, and also in carp (*Cyprinus carpio*), on gills and skin during April, within a very agglomerated pool from Buziaş. Identification of the specia: total length of body: 1-1,2mm x 0,5 mm. Total length of central hooks: 50 µm, length of anchor shaft and point: each 20 µm. Dorsal bar: 14x2 µm, ventral bar 16x4 µm. Total length of marginal hooks: 20 µm. Comments: because the specimens recorded by us are more smaller then *G. elegans*, they can be a subspecia including in „*elegans* group”; a electronmicroscopical examination and PCR will be very usefully.

G. medius, found on body surface and gills of the young goldfish (*Carassius auratus auratus*) provided from aquarium; The old fish (parents of the younger), imported from Thailand was healthy. We suppose that the parasites provide

from the old fish, but they can't produce outbreaks at this age. Identification of the specia: a little monogenean (0,2-0,3 mm x 0,06 mm). Thin and relatively straight central hooks with 30-40 µm total length. The point of central hooks 20 µm. Total length of marginal hooks; 20 µm. Dorsal bar slowly curved, thin, without membrane, about 17 µm. Ventral bar, 20 µm x 4 µm. Comments: about the opisthaptoral features this species resembling whith *G. carassi*, but this species are more larger (until 1mm), and the ventral bar is more bigger. The anchor shaft of the specimens founded by us is straighter then the *G. medius* type specimens; for this reason the specimens recorded from goldfish can be a subspecia of *G. medius*. Specimens resembling with the specimens of „*elegans* group”, but these species are more larger, except some species from aquarium fish, but not *Carassius auratus auratus*. Very similar is *G. elegans kobayashii* (sin. *e. yamaguti*), recorded in Japan from the skin of crucian carp (*Carassius carassius*), but this species are specific for his host- crucian carp. In conclusion, the specimens recorded from the goldfish are *G. medius* or a variety of this species.

Gyrodactylosis disease was met only in young goldfish and carp, the prevalence being 100%, and the intensivity from 20 individuals per a fish to numerous individuals. Mortality was up to 60% in goldfish, fact that proves this species' ichtyopathological importance for the goldfish, when it is still young (20-30 days old). In carp, the mortality was lower then goldfish (50%). In both fishes (goldfish and carp) can be observed fins necrosis, but in goldfish the diseases it was be mostly damages: the covering gills are extend, gills being like a pieces of fleece and the fish get weakened very quickly. At the body surface we can observed smear agglomerations and a lot of worms, conferring a „hairy” aspect of the fish.

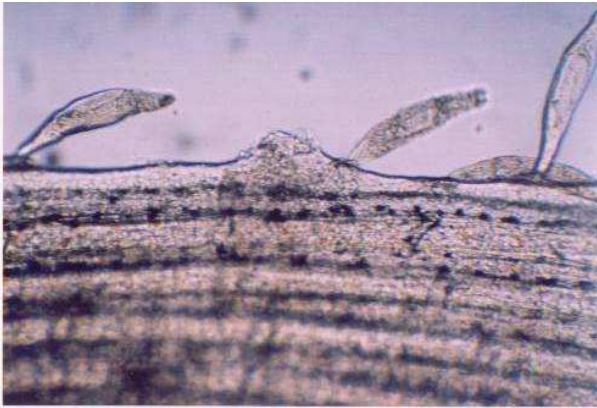
The treatment with formalin 37% for laboratory use, applied in doses of 0.25 ml/l water, during 15 minutes, for three successive days, allows the cure of *Carassius auratus auratus* fish. Before applying mass treatment, the test is carried out upon a control lot. With the occasion of transporting fish, parasitological control of the material must be accomplished properly, respecting the international regulations regarding this field (C.E. directives, O.I.E. and F.A.O. recommendations- using formaldehyde it is not permitted in fish for human consumption).



a



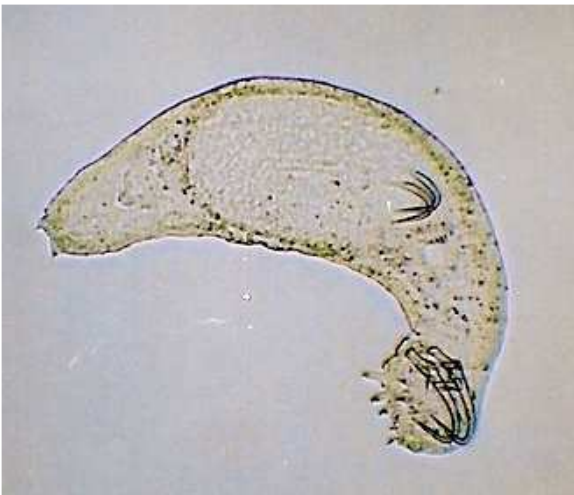
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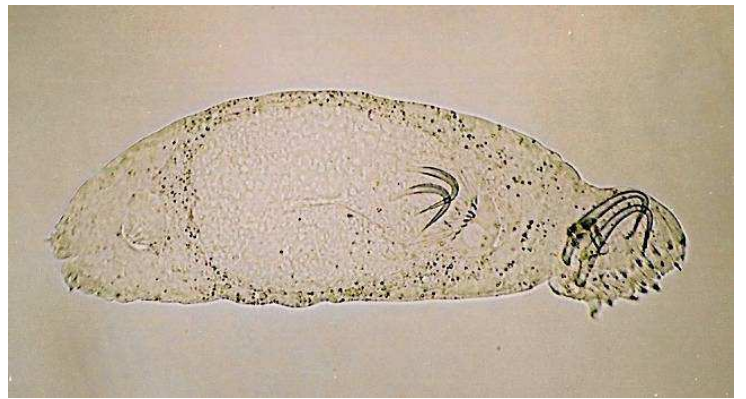
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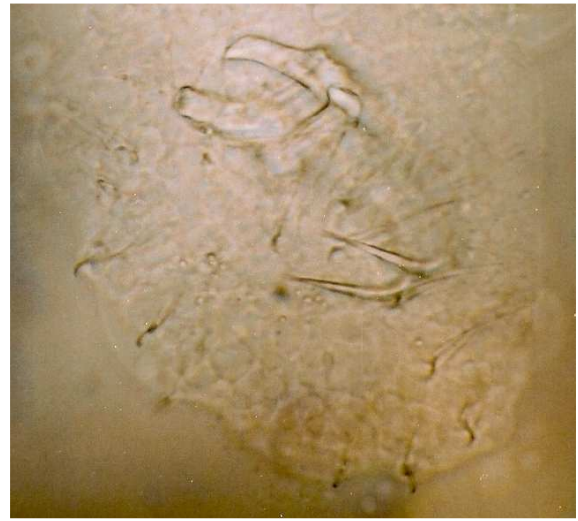
g



h



i



j

Figura 1

Gyrodactylus medius de la carasul chinezesc (*Carassius auratus auratus*): a: puiet de caras chinezesc bolnav de girodactiloză; b: *G. medius* pe tegument la puietul de caras chinezesc; c, d: *G. medius* pe înotătoare la puietul de caras chinezesc; e, f: *G. medius* în stare vie; g: extremitatea anterioară a corpului (A.P.G.); h: extremitatea posterioară a corpului (A.P.G.); i, j: opisthaptorul, original

(*Gyrodactylus medius* from goldfish (*Carassius auratus auratus*): a: girodactilosis in fry of goldfish; b: *G. medius* on the skin of goldfish; c, d: *G. medius* on the fins of goldfish; e, f: alive *G. medius*; g: anterior end of body (A.P.G.); h: posterior end of body (A.P.G.); i, j: the opisthaptor, original)



a



b



c



d

Figura 2

Gyrodactylus elegans de la plătică (*Abramis brama danubii*) și crap (*Cyprinus carpio*): a, b, c: opisthaptorul; d: extremitatea posterioară a corpului, original
(*Gyrodactylus elegans* from bream (*Abramis brama danubii*) and carp (*Cyprinus carpio*): a, b, c: the opisthaptor; d: the posterior end of body, original)

Conclusions

1. In Banat`s waters, we recorded two species of *Gyrodactylus*: *G. elegans* from the gills of bream (*Abramis brama danubii*) and also in carp (*Cyprinus carpio*), on gills and skin and *G. medius*, found on body surface and gills of the young goldfish (*Carassius auratus auratus*). A varieties of this two species are discussed.

2. The only fish parasitical disease focused by O.I.E. at the moment is salmonid gyrodactylosis, but the ichthyopathological significance of others gyrodactylosis (gyrodactylosis of carp and goldfish, both important species) are high, must be reconsidered and will be discussed in the future.

3. Formalin is efficient for the treatment of gyrodactylosis in goldfish, but it can`t kill all the monogeneans and it is not permitted in fish for human consumption. So that, the surveillance of gyrodactylosis of other fish then salmonids (goldfish and carp gyrodactylosis) is necessary, being single measure for the control.

REZUMAT

Incidența, importanța ihtiopatologică și măsurile de control al speciilor de *Gyrodactylus* la peștii din apele regiunii Banat

În apele Banatului au fost semnalate două specii de *Gyrodactylus*: *G. elegans* pe branhii la plătică (*Abramis brama danubii*) și la (*Cyprinus carpio*) pe branhii și piele și *G. medius*, găsit pe suprafața corpului și pe branhii la exemplarele tinere de caras chinezesc (*Carassius auratus auratus*). Existența varietăților acestor două specii este discutată. *G. medius* este o specie foarte patogenă pentru carasul chinezesc tânăr, iar *G.elegans* poate produce îmbolnăviri și pierderi în carpicultură. Formalina poate fi utilizată în tratamentul girodactilozei la carasul chinezesc, dar ea este interzisă în carpicultură. Supravegherea girodactilozei crapului și carasului chinezesc este necesară și ele trebuie incluse în lista O.I.E de boli ale peștilor, ca și girodactiloza salmonidelor.

Cuvinte cheie: *G. medius*, girodactiloza carasului chinezesc, *G. elegans*, girodactiloza crapului.

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