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Observations on the acarofauna of fish aquariums I. Mites associated with Discus fish

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Summary

Investigations on the acarofauna in 5 aquariums containing Discus fishes (*Symphysodon* spp.) have revealed the presence of 3 species of mites *Hydronothrus aquariorum* sp.n. (Oribatei), *Histiostoma (Ichtanoetus) ocellatum* sp.n (Anoetidae) and *Tyrophagus putrescentiae* (Schrank, 1781) (Acaridae). The oribatids were found harmful for the very young fishes.

Résumé

Des recherches sur l'acarofaune de 5 aquariums contenant des poissons Discus (*Symphysodon* spp.) ont montré la présence de 3 espèces d'acariens: *Hydronothrus aquariorum* sp.n. (Oribates), *Histiostoma (Ichtanoetus) ocellatum* p.n. (Anoetidae) and *Tyrophagus putrescentiae* (Schrank, 1781) (Acaridae). *H.aquariorum* fut trouvé pathogène pour les très jeunes poissons.

Introduction

Only few investigations have been done on the acarofauna living in fish tanks or aquariums.

HUGHES and JACKSON (1958) recorded two species of the genus *Histiostoma* (Anoetidae) from gold fish tanks, at the Aquarium of the New York Zoological Society. One was *Histiostoma cyrtandrae* (VITZTHUM, 1931), a species described originally from the axil fluid of a water flower *Cyrtandra glabra* (Aracae) from Java. The other was a new species, *H. nigrellii* HUGHES and JACKSON, 1958.

Recently, two new species of the same genus *Histiostoma* have been found associated with or parasitic on fish living in aquariums in Antwerp. One species, *H. piscium* FAIN and LAMBRECHTS, 1985 had produced lesions of the swim bladder of a *Pangasius sutchi*, the other, *H. anguillarum* FAIN and BELPAIRE, 1985, was found attached to the gills of young eels, *Anguilla anguilla*. Numerous specimens of the last species were also found on the bottom of the aquarium containing the fish.

These four species of *Histiostoma* found in aquarium form a small group biologically

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and morphologically distinct from the other species in the genus and a new subgenus, *Ichtanoetus* FAIN and BELPAIRE, 1985, was created to include it.

Mites of other groups have also been recorded from aquariums, in Germany by GESH (1982) and UNTERGASSER (1985). These authors listed the following mites from aquariums: *Trimalaconothrus* sp. (Oribatei), acarids (Astigmata) and Bdellidae (Prostigmata). UNTERGASSER observed that the oribatids are able to attach to the fish, however he believed that these mites are not really parasitic but that they merely feed on the algae or on the decaying material accumulated on the bottom of the aquariums.

In order to find out the importance of the acarofauna in aquariums and the eventual pathogenic role of some of these mites, we have examined several aquariums containing Discus fish (*Symphysodon* sp.) in Antwerp. The results of these investigations are related herein.

All our measurements are given in microns (μm).

Material examined

We have examined five aquariums, all containing a couple of Discus fish (*Symphysodon* spp.) All these aquariums belong to the same owner. Their characteristics are the following:

Aquarium n° 1 (LB1):
Size: 1 m x 0,4 m x 0,5 m (height).
Characteristics of the water: 90 mS (electrolytes) ; pH 6,2 ; KH 0,5(carbonate hardness); Nitrites 0,012 mg/liter; Nitrates 55 mg/liter; Temperature 30° C. Filtration method: First filtration on cotton-wool and synthetic moss, final filtration on porcelain cylinders. This aquarium contains a couple of Discus fish. Both measured 5 cm (length) when they were introduced. The male, of the Turquoise variety, is now 5 years old. The female, of the Brillant Turquoise variety, is 4 years old.

Aquarium n° 2 (LB2)
Size: 1 m x 0,4 m x 0,5 m (height).
Characteristics of the water: 140 mS; pH 6,4; KH 0,5; Nitrites 0,027 mg; Nitrate 38 mg/liter; Temper. 28-30° C. Filtration method as for n° 1 but final filtration on lava stone. The male fish was 5 cm long when introduced. It is now 5 years old. Colour variety Turquoise. The female was adult when introduced, it has been in the aquarium for 7 years and is probably 9 years old. Colour: *Symphysodon discus*

Aquarium n° 3 (RB1)
Size: 0,7 m x 0,6 m x 0,5 m (height)
Characteristics of the water: 550 mS; pH 7,2; KH 6; Nitrites 0,086 mg/liter; Nitrate 80 mg/liter; Temper. 28° to 30° C. Filtration as for n° 2. The male fish measured 5 cm when introduced; it is now 5 years old: Colour: Turquoise. The female is an offspring of the couple of aquarium n° 1 and is now 2 years old. Colour: Turquoise.

Aquarium n° 4 (RB2)
Size: 0,7 m x 0,6 m x0,5 m (height)
Characteristics of the water: 160 mS; pH 6,4; KH 1; Nitrites 0,034/liter; Nitrates 65 mg/liter; Temper. 28 to 30° C. Filtration as for aquarium n° 1. Male and female were introduced aged 1,5 years. Both are offspring of a crossing of a Royal Blue male with a Discus Heckel

Aquarium n° 5 (RB3)
Size: 0,7 m x 0,6 m x 0,5 m (height)
Characteristics of the water: 120 mS; pH 5,8; KH 1; Nitrites 0,011 mg/liter; Nitrates 35 mg/liter; Temper. 28 to 30° C. Filtration: motorfilter eheim 2000/u Substrate: Perlon wool and Nitrex.
The water of this aquarium had been permanently radiated with UV light before the fish was put in. It contained the offspring (a male and a female) of a Brown Discus (3rd generation). They were introduced as adults and are now 1,5 years old.

All these Discus fish were fed with a mixture, freshly prepared, of fresh ox heart, deep-freezed spinach, raw fish and a complex of vitamines (Dagravit). They also received deep-freezed shrimps originating from brackish water in Lillo.

The length of the adult male Discus is 16 to 20 cm, that of the female is 2 to 5 cm smaller.

Results

The following species of mites were found in these aquariums:
1. *Hydronothrus aquariorum* sp. n. (Cryptostigmata, Trhypochtoniidae)): Found in great numbers (more than 100 specimens, adults and immatures) in the aquarium n° 2. They were less numerous in aquarium n° 1 (50-60 specimens), n° 3 and n° 4 (5 to 15 specimens in each) and very rare in aquarium n° 5 (1 specimen).
2. *Histiostoma (Ichtanoetus) ocellatum* sp.n. (Astigmata, Anoetidae): This species was abundant in aquarium n° 3 (more than 100 specimens, including females, nymphs, larvae and also a few hypopi). They were less numerous in aquariums n° 4 (40 specimens), rare in n° 1 and 5. They were not found in n° 2.
3. *Tyrophagus putrescentiae* (SCHRANK) (Astigmata, Acaridae): Was present in small numbers (1 to 5 specimens, mostly adults) in aquariums n° 1, 3, 4 and 5. It is to be noted that the aquariums n° 1 and 2 contained numerous worms and crustaceans (*Cyclops* sp.) whereas these invertebrates were rare or very rare in the aquariums n° 3 and 4.

The water of aquarium n° 3 was directly provided by the Water Company of Antwerp.

It appears from this table that the Oribatids (*H. aquariorum*) are the most numerous in aquariums n° 1 and 2 which have a low pH, and a low content of mS, KH, nitrites and nitrates. On the contrary, the Anoetids are rare or absent in these aquariums, but they increase in number when the pH and the minerals reach a higher level, as it is the case in the aquariums n° 3 and 4. The rarity of both species of mites in aquarium n° 5 could be explained by the very low pH or by the fact that this aquarium had been radiated with UV before the fish was put in.

N° of aquarium	pH and mineral content					Mite fauna (number of mites in each sample)		Number of	
	pH	mS	KH	Nitrites	Nitrates	Oribatid	Anoetid	Worms (Tubifex)	Crustaceans (Cyclops)
5	5,8	120	1	0,011	35	1	2	?	?
1	6,2	90	0,5	0,012	55	50-60	5	++	++
2	6,4	140	0,5	0,027	38	120-150	0	++	++
4	6,4	160	1	0,034	65	5-10	40	rare	rare
3	7,2	550	6	0,086	80	15	more than 100	rare	rare

TABLE I: Variations of the mite populations in the 5 aquariums

Study of the species

ORDER CRYPTOSTIGMATA (ORIBATEI)

Genus Hydronothrus AOKI, 1964

Hydronothrus crispus AOKI, 1964, the type of the genus, was described from the Island of Kauai, Hawaii. The mites were attached to the leaves of *Hibiscus tiliaceus* lying under water at 10 cm depth.

A second species, *H. puniceus* HABEEB, 1981, was described from falls in the north branch of the Ventura River, Ventura Co, California, U.S.A.

The normal habitat of most of the Oribatei is the soil. Some species of the families Nothridae, Malaconothridae, Limnozetidae and Cymbaerenaeidae live in very moist biotopes (moss, sphagnum etc..). A true aquatic habitat is observed in the family Hydrozetidae whose almost all the members live permanently in water (GRANDJEAN, 1948; NEWEL, 1948; AOKI, 1964). Two other families contain genera or species completely adapted to aquatic life, e.g. Trhypochthoniidae (with genera *Trhrypochthoniellus* and *Hydronothrus*) and the Ceratozetidae (with *Heterozetes palustris* WILLMANN, 1917).

PIFFL, (1978) published a list of 15 species belonging to 9 genera of Oribatids occuring in various water collections in Europe.

Key to the genus *Hydronothrus*

1. Hysterosoma finely punctate without a network of lines. Presence of a pair of pigmented eyes. Dorsal setae not curled. From a river in California .....
..... *H. puniceus* HABEEB, 1981.

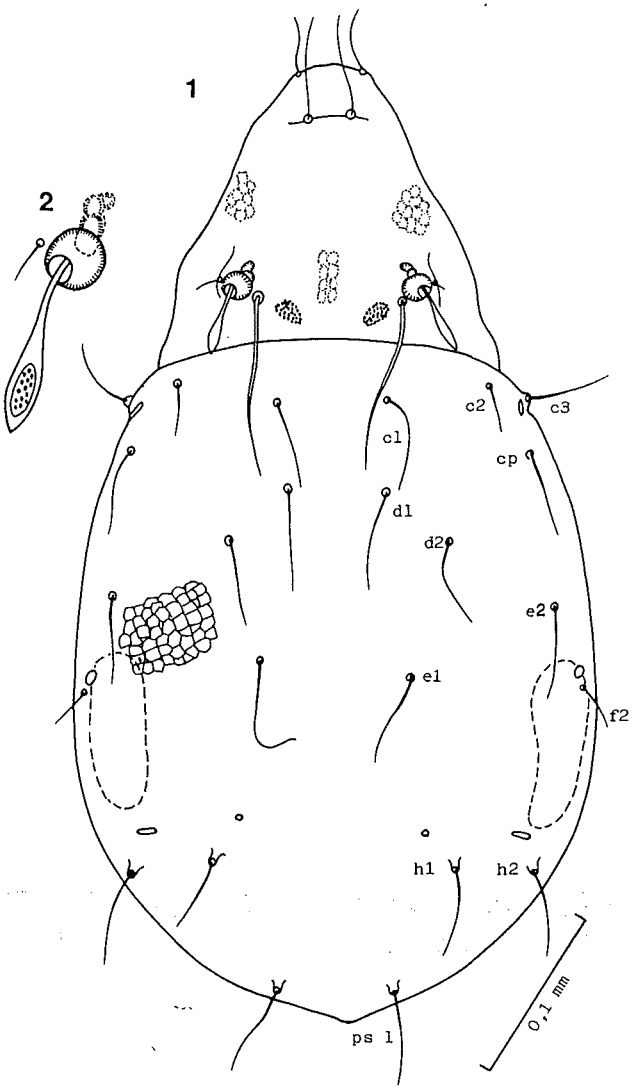
Hysterosoma with a distinct network of lines. Other characters variable ..... 2.
2. Dorsal setae curled. Pigmented eyes and exobothridial setae lacking. Epimeral setae 3-0-3-2. Only the setae *c3* inserted on small tubercules. From a taro patch on Kauai Island, Hawaiian Is. ..... *H. crispus* AOKI, 1964.
Dorsal setae not curled. Presence of a pair of pigmented eyes and a pair of exobothridial setae. Epimeral setae: 3-1-3-2. Setae *c3*, *h1*, *h2* and *ps 1* inserted on small tubercules. From aquariums containing Discus fish, in Antwerp. .....
..... *H. aquariorum* sp. n.

Hydronothrus aquariorum spec. nov.

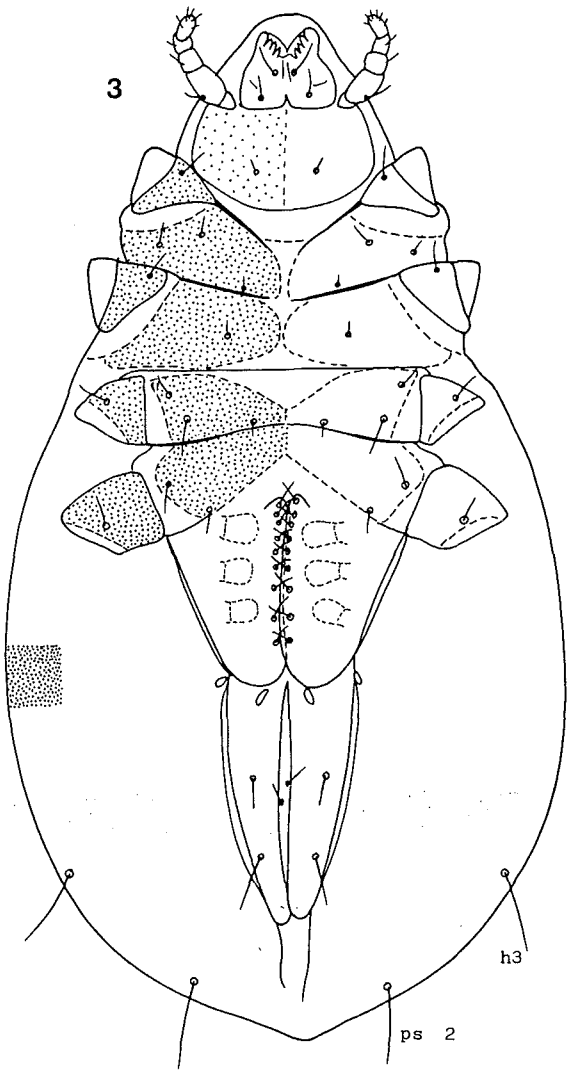
This species has been found in several aquariums in Antwerp. All the developmental stages (adults, nymphs I, II and III, larvae) were present which proves that the mites are reproducing in the aquariums.
Adults (fig 1-3): Holotype 516 long and 300 wide. Lenght and width in 6 paratypes: 570 x 315, 544 x 310, 534 x290,525 x 300, 510 x 255 and 475 x 270. Colour yellowish to reddish-brown. *Prodorsum* irregularly rounded at tip, with three patches of very small rounded and clear spots (one posteromedian and two lateral) There is a pair of deeply situated pigmented spots (? eyes) formed of rounded dark brown granules. These "eyes" are generally situated at the level of the bothridiums but in some specimens they are more anterior. Rostral setae very thin, 30-35 long. Lamellar setae very thin, 45 long and 25 apart. Interlamellar setae strong, 90 long. Orifice of bothridium posterolateral. Sensillus club-shaped with a granular content in its dilated part, total lenght 30. There is a pair of thin and short exobothridial setae. *Notogaster*: Maximum width slightly behind the middle. Dorsal surface with a distict reticulate pattern; the cuticle is flat in its anterior part and slightly verrucose in its posterior part. There are 14 pairs of setae 45 to 60 long except the *c2* and *f2* shorter (25 to 30). Setae *c3*, *h1*, *h2* and *ps1* are situated on small tubercules. There are two pairs of lyrifissures, the anterior is located just behind the base of *c3*, the posterior is in front of *h2*. Orifice of oil gland just in front of *f2*. All these setae are smooth. *Epimeral region*: Integument finely punctate. Setal formula 3-1-3-2. *Anogenital region*: Adanal plate with 2 pairs of setae, the anal plate bears 1 pair of setae difficult to see. Genital plate with 9 pairs of setae 13 to 19 long. *Legs*: all legs tridactyl, the median claw shorter than the laterals. Length of tarsi I-IV: 52-50-54-70. Chaetotaxy: seta *ft'* thickened and curved and finely attenuated at apex. Tibia I as in *H. crispus* except that seta *d* is distinctly thickened in its basal half.
Nymphs I, II and III and larvae: they are smaller and less sclerotized than the adults. The bothridium is poorly developed or absent. All the legs are monodactyl.

Habitat

Holotype and 30 paratypes adults, numerous immatures from the debris on the bottom of aquarium n° 2 containing a couple of Discus fish (*Symphysodon*) as well as eggs of them and very young fish. Antwerp, December 1985.



Figs 1-2 *Hydronothrus aquariorum* sp.n. : Dorsal view of an adult (1); bothridium and sensilla



Figs 3 *Hydronothrus aquariorum* sp.n. : Ventral view of an adult

Other paratypes (adults): 20 from aquarium n° 1 and 10 from aquarium n° 3. Holotype in the Institut royal des Sciences naturelles de Belgique.

Pathology

Immediately after hatching the larvae of the fish are motionless. They begin to swin 100 to 200 hours after the hatching. One of us (L.L.) observed that in the aquariums where the mites are abundant they are regulary found walking on the eggs of the fish. After the young fishes hatched the mites attached to them. The second day after hatching approximately 30 to 40 % of the young fishes, about 4 mm long, are found carrying one or more mites on their backs. The parasitized fishes seem to be impaired by the presence of these mites on their backs and a number of them turn in circles, staying in the same place. Apparently they are unable to follow their congeners which swim towards the parent fishes for uptake he mucoid substance that they secrete throught their skin and which represents the main food supply for these young Discus fishes.

A careful examination of the parasitized fishes revealed an abnormal amount of mucus on their backs at the sites where the mites were attached. After removal of the mites lesions were observed consisting of erosion or even local necrosis of the skin. No pathological action has been observed in the adult fishes.

Photograph n° 1: two mites (*Hydronothrus aquariorum*) fixed to the back of a young Discus fish.

From a total of about 200 eggs obtained in these infected aquariums about 100 have hatched into fishes and from these 100 fishes only 20 survived. We think that this high mortality is largely caused by the mites.

Parasitism of Discus fishes by oribatid mites had, until now, never been observed, however UNTERGASSER (1985) reported the presence of an oribatid mite, *Trimalaconothrus* sp., in a aquarium containing Discus fishes, but these mites were not found attached to the fish and apparently were harmless. This author observed that when another fish (Wagtail-Schwertträger or ? *Xiphophorus helleri*) was introduced in this aquarium the mites attached to the mucosa of these hosts causing important lesions.

Another aquatic oribatid, *Hydrozetes lemnae* (COGGI, 1899) has been found causing mechanical obstruction in tadpoles (GRANDJEAN, 1949). This mite is common in waters in Europe and it had been found pullulating in great number in a tank containing a breeding of tadpoles in Geneva, Switzerland. These mites had invaded the mouth of the tadpoles causing mechanical obstruction of the pharynx, thus preventing a normal intake of food.

Control of the mites

We have tried to control the mites with Neguvon. Two different doses were experimented: 0,3 mg per liter of water was used in aquariums containing Discus fish and 1 mg per liter in aquariums whose fish had been removed. In both cases the product was left for 48 hours before to renew the water. No mites were found in these aquariums during the first days following the treatment, however after 7 to 10 days the mites reappeared. The source of the reinvasion was not established.

ORDER ASTIGMATA

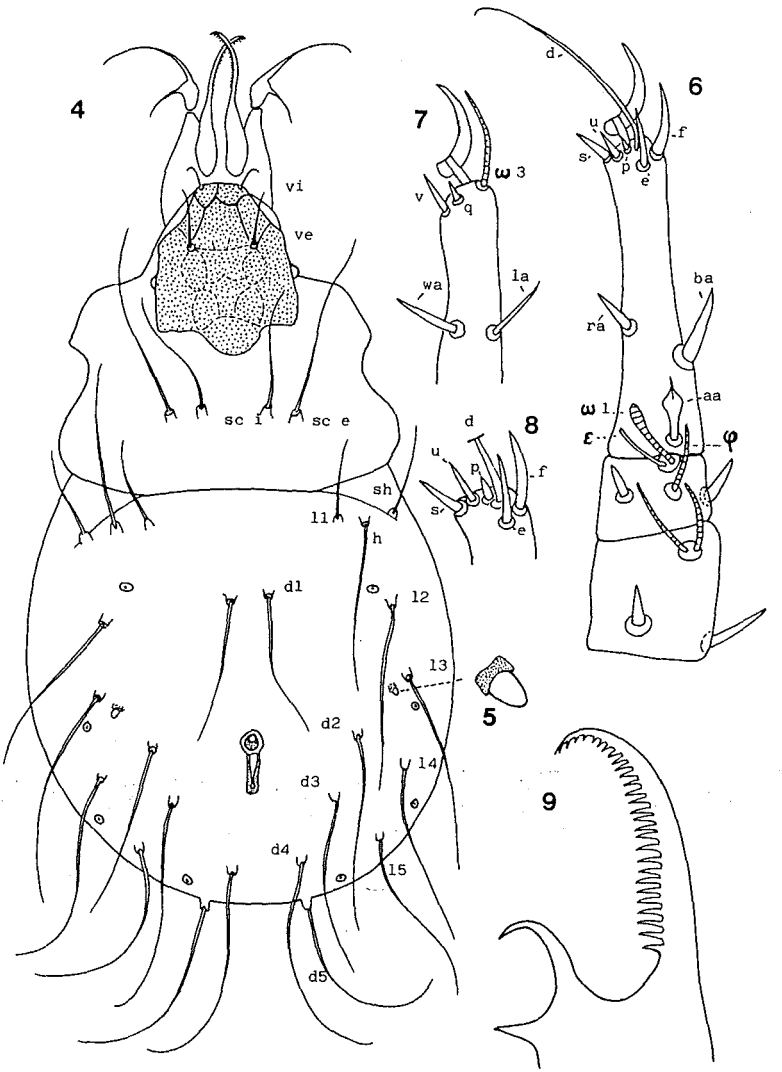
FAMILY ANOETIDAE

Histiostoma (Ichtanoetus) ocellatum spec. nov.

Histiostoma cyrtandrae HUGHES & JACKSON, 1958: 59, nec VITZTHUM, 1931: 110.

Female (figs 4-12):

Holotype 295 long and 160 wide (idiosoma). Total length including gnathosoma, 338. Length and width of 5 paratypes: 270 x 150; 285 x 153; 287 x 163; 315 x 180; 330 x190. *Dorsum*: Propodosoma with a shield bearing a pattern of thin lines poorly sclerotized. A pair of small non pigmented hemispherical eye lenses are present along the lateral border of the shield slightly behind the middle. Cuticle of the hysterosoma soft without elevations. The genital orifice opens in front of a small punctate tongue-like platelet. The canal



Figs 4-9 *Histiostoma (Ichtanoetus) ocellatum* sp.n. Female in dorsal view (4); oil-gland papilla (5); leg I in dorsal view (6); apical half of tarsus I in ventral view (7); apex of tarsus I in dorsal view (8); chelicerae (9).

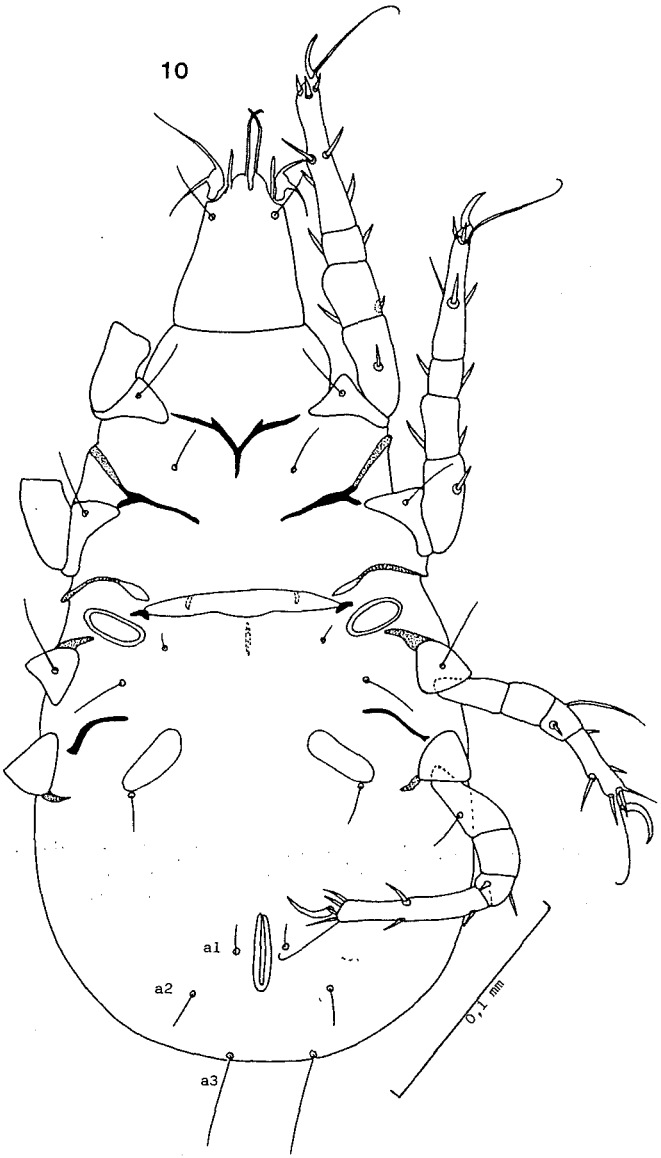


Fig 10 *Histiostoma (Ichtanoetus) ocellatum* sp.n. Female in ventral view

of the bursa continues more deeply and backwards by an elongate sclerite. The entire structure has a key-hole aspect and is 22 long and 8-9 wide (maximum). Behind this sclerite the bursa is membranous and poorly distinct and it ends into a large spermatheca surrounding the bursal area. At the posterior part of this pouch there are two small more or less ovoid sclerites which probably represent openings of glands (fig. 11). Orifice of oil gland very close to the base of seta *l3* and with an ovoid transparent papilla (fig. 5).

Chaetotaxy of idiosoma (length of setae): *vi* 10-12, rod-like and bent at right angle in its apical third; *ve* 28; *sc i* 55; *sc e* 70; *dl* 55; *d2* 65; *d3* 75; *d4* 85; *d5* 75; *l1* 55; *l2* 80; *l3* 75; *l4* 75; *l5* 90; *h* 65, *sh* 55. Distances *ve-ve* 22; *sc i-sc i* 24. *Venter*: Epimera I fused in a sternum 12 long. Other epimera short and free. Sclerotized rings elongate, the anterior, thick-walled, is about 25 x 10, the posterior, thin-walled, is 29 x 10. Anal area with 3 pairs of thin setae. Gnathosoma: Chelicerae with 25 to 30 teeth. Palps ending into two unequal thin appendages. Legs long and narrow, ending in a strong slightly curved claw. Lengths of tarsi 53-45-42-58. *Chaetotaxy of legs* (number of setae): Tarsus I with 13 setae, of which 11 are spines (7 in apical area and 4 in the median third), one is a long simple seta curved at apex and one is a basal modified seta (foliate,flattened dorsoventrally and finely attenuated at apex). Tarsus II with 12 setae, of which 11 spines (7 apical, 3 median and one basal), one thin and long apical with curved apex. Tarsus III and IV with 9 spines (6 apical, 2 median and 1 basal) and one apical simple seta. We have restudied the chaetotaxy of the tarsi in the females of *Histiostoma piscium* and *H. anguillarum* and we have found the same number of setae as in this new species. Tibiae with 2-2-1-1 spines. Genua I and II with 2 spines, genua III and IV bare. Femora I-II with a spine, femur IV with a thin hair, Femur III bare. Trochanters I-III with a very thin hair. Solenidiotaxy: leg I: tarsus with a thin apical $\omega 3$; Tibia with $\omega 1$ slightly inflated at apex, a thin famulus sligtly shorter than $\omega 1$ and a thin *phi* shorter than $\omega 1$. Genu with two thin slightly unequal setae *sigma*. Leg II: Tarsus with a basal $\omega 1$; tibia and genu with a solenidion. Legs III and IV with a solenidion only on the tibiae.

Tritonymph:

Measurements of 2 paratypes: 210 x 120 and 255 x 145 (idiosoma). Propodonotal shield as in the female but the pattern of lines is very poorly developed and unconspicuous. Cuticle bare. Some dorsal setae are situated on large cuticular bosses. Anterior pair of sclerotized rings irregulary rounded (about 11 x 10), the posterior rings are much larger and oval (21 x 12)

Protonymph:

Measurements of 2 paratypes: 170 x 90 and 180 x 108. Cuticle bare . Dorsal shield with indistinct markings. Dorsum without rounded bosses but with 3 semi-circular scale like formations on the propodonotum behind the scapular setae. Venter with one pair of rings (17 x11)

Hypopus:

Measurements of 2 paratypes: 164 x 113 and 160 x 114. Resemble closely the specimens described by HUGHES and JACKSON under the name *H. cyrtandrae* (VITZTHUM, 1931).

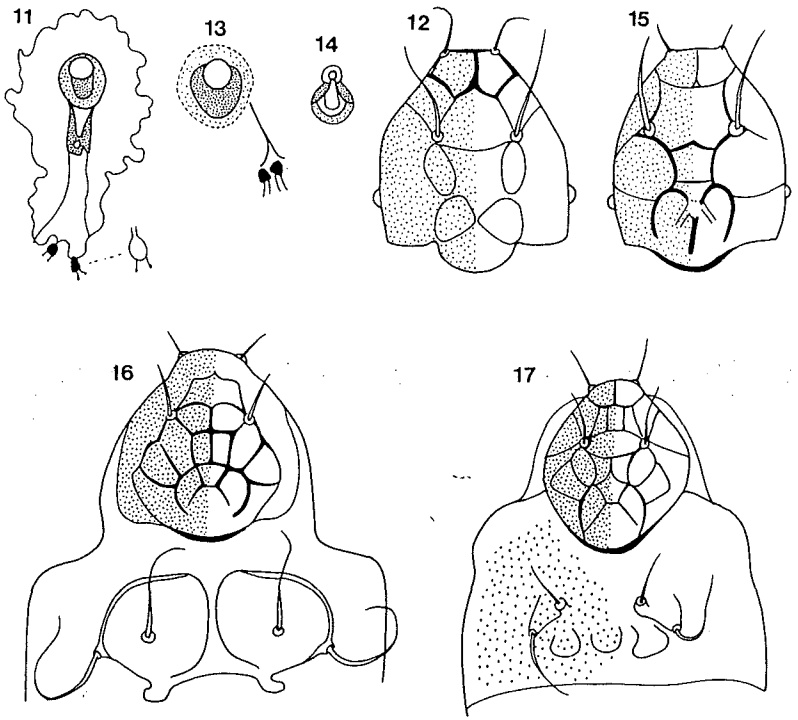
Males: Not observed

Habitat:

Holotype female from an aquarium containing Discus fish, in Antwerp, December 1985.

Paratypes: 29 females, 4 tritonymphs, 4 protonymphs and 3 hypopi from aquariums containing Discus fishes from the same locality and date.

Holotype in the Institut royal des Sciences naturelles de Belgique.



Figs 11-17 Figs 11-12: *Histiostoma (Ichtanoetus) ocellatum* sp.n. Female: copulatory organ (11); propodonotal shield (12). Figs 13-17: *Histiostoma (Ichtanoetus) cyrtandrae* (Vitzthum, 1931) (tax. nov.): Female lectotype: copulatory orifice (13) and internal bursal sclerite (14); propodonotal shield (15). Tritonymph (16) and protonymph (17) (paralectotypes): propodonotum.

Pathological role of Histiostoma (Ichtanoetus) ocellatum sp.n.

We have not found these mites attached to the Discus fishes even in the aquariums wich contained numerous mites.

We believe, however, that these mites constitute a potential danger for the fish and we would suggest that every effort should be made to try to control or at least to reduce the number of these mites in the aquariums where they are too abundant.

From our preliminary observations, based only on five aquariums (see above), it appears that a low pH associated with a low concentration of minerals is less favorable for the development of these mites than the reverse conditions.

If new observations in another series of aquariums confirm these first results, a good method to reduce the anoetid population in aquariums could simply be to lower the pH and the mineral content of the water.

Remarks:

1. *H.ocellatum* sp.n. is close to *H.cyrtandrae* (VITZTHUM, 1931) described from two females and nymphs found in the axill fluid of an Aracae, *Colocasia indica* in middle Java, and in the water filled bases of the flower *Cyrtandra glabra*, in souhern Sumatra. This species was found again in a goldfish tank in New York, and redescribed by HUGHES and JACKSON, 1958.

Through the kindness of Dr E.KARL of the Zoologische Staatssammlung, Munchen, we were able to examine the type of the species of VITZTHUM. The study of this specimen has shown that *H. ocellatum* is very close to *H. cyrtandrae*, but however distinct by several characters that we summarize hereunder:

Female:

a) The different shape of the copulatory organs. In *H.ocellatum* the copulatory orifice is situated in front of a small punctate area. This orifice leads to a bursa which is surrounded by a long sclerotized structure. The total length of this sclerotized organ is 22, its shape resembles a key hole. In the type of *H.cyrtandrae* the punctate area behind the copulatory orifice is larger and the more deeply situated bursal sclerite is round, very short and completely covered by the superficial puntate area (fig 13-14) The membranous part of the bursa is distinctly longer in *H.ocellatum* than in *H. cyrtandrae*.

b) The propodotonal shield is slightly larger (70 long) and bears a very faint pattern of lines becoming unconspicuous in its posterior half. In *H. cyrtandrae* (fig 15) the shield is shorter (57 long) and it bears a very well marked pattern of lines. These lines have not the same shape than in *H. ocellatum*. The posterior margin of this shield is reinforced in this species wich is not the case in our new species.

c) Setae *ve* are closer to each other (20-22, for 27 in *H. cyrtandrae*) whilst the *sc i* are more remote from each other (24, for 20 in *H. cyrtandrae*).

d) On tibia I the solenidion *phi* is shorter (12) than $\omega 1$ (15-16), whilst in *H. cyrtandrae* *phi* is longer (19-20) than $\omega 1$ (17-18)

It is to be noted that the cuticle of the type of *H. cyrtandrae* is completely devoid of ornamentation. We have not observed the pointed elevations described and depicted by VITZTHUM. The eye-lenses described in our new species are also present in *H. cyrtandrae*.

Tritonymphs and Protonymphs: The pattern of the dorsal shields is unconspicuous in *H.ocellatum* and strongly developed in *H.cyrtandrae* (figs 16-17). In the protonymphs of this last species the cuticle is covered by numerous very small rounded elevations wich are missing in *H.ocellatum*. In the tritonymph of *H.ocellatum* the anterior sclerotized ventral rings are subcircular and much smaller (11 x 10) than the posterior rings(21 x 12) while in *H.cyrtandrae* the anterior rings are oval and only slightly smaller (16x13) than the posterior rings (18x12)

We give herein drawings of some organs of the type specimens of *H. cyrtandrae*. As VITZTHUM did not mention a holotype we designate the female labelled as TYPE as the LECTOTYPE of this species. This specimen was collected on *Cyrtandra glabra*. The LECTOTYPE is now 310 long and 150 wide (idiosoma). The tarsi are 63-51-45-66 long. The dorsal shield is 57 long. Membranous part of bursa narrower and shorter than in *H.ocellatum*

2. The species described and depicted by HUGUES and JACKSON (1958) under the name *Histiostoma cyrtandrae* (VITZTHUM, 1931) is identical with *H.ocellatum*. It had been found in a gold fish tank in New York. We have examined the plesiotypes (female and hypopi) described by HUGUES and JACKSON and did not find any significant difference between them and our *H.ocellatum*.

FAMILY ACARIDAE

Tyrophagus putrescentiae (SCHRANK, 1781)

This mite is very common in stored food products especially those containing a large amount of fat and proteins (cheese, flour, ham, nuts etc..). Their presence in aquariums was probably purely accidental or introduced with some food. We do not believe that they are able to live and to reproduce in aquatic conditions.

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