

Five new species of *Cichlidogyrus* (Monogenea: Ancyrocephalidae) from *Tilapia brevipennis*, *T. buttikoferi* and *T. cessi* from Guinea, Ivory Coast and Sierra Leone (West Africa)

Antoine Pariselle^{1,3} and Louis Euzet²

¹ Laboratoire de Parasitologie, ORSTOM / C.R.O., 01 BP V 18, Abidjan 01, Côte d'Ivoire;

² Laboratoire de Parasitologie Comparée, Station Méditerranéenne de l'Environnement Littoral, 1 Quai de la Daurade, 34200 Sète, France;

³ Present address: GAMET, B.P. 5095, 34033 Montpellier Cedex 1, France

Key words: Monogenea, gill parasites, Cichlidae, *Tilapia*, West Africa

Abstract. Three species of cichlid fish, *Tilapia brevipennis* Boulenger, 1911, *T. buttikoferi* (Hubrecht, 1881), and *T. cessi* Thys van den Audenaerde, 1968, from Guinea, Ivory Coast and Sierra Leone (West Africa) were examined for gill parasites for the first time. Six species of Monogenea were found of which one, *Cichlidogyrus digitatus* Dossou, 1982, had been previously described. Five new species, all belonging to the genus *Cichlidogyrus* Paperna, 1960, are described herein: *C. albareti* sp. n., *C. hemi* sp. n., *C. nuniezi* sp. n., *C. bonhommei* sp. n., and *C. slembroucki* sp. n.

During the study of gill parasites of West African cichlids, three species of *Tilapia* that had not previously been examined for gill parasites were sampled: *Tilapia brevipennis* Boulenger, 1911, *T. buttikoferi* (Hubrecht, 1881) and *T. cessi* Thys van den Audenaerde, 1968.

Six species of Ancyrocephalidae (Monogenea) were recorded. *Cichlidogyrus digitatus* Dossou, 1982, previously described from *Tilapia zilli* (type host), was recovered on *T. brevipennis*. The other were considered new species. They all belong to the genus *Cichlidogyrus* Paperna, 1960. The type species *Cichlidogyrus arthracanthus* Paperna, 1960, is characterised in having: three pairs of cephalic glands, two posterior ocellus with crystalline lenses, two small inconstant anterior ocellus, simple intestinal branches posteriorly joined, two pairs of gripi (one dorsal and one ventral), two transversal bars (the dorsal with two auricles and the ventral V-shaped), fourteen uncinuli, median posterior testicle, a vas deferens on the right side not encircling the intestinal branch, a seminal vesicle present, one prostatic reservoir, a male copulatory complex with penis and accessory piece, an auxiliary plate sometimes present, a median pre-testicular ovary, a submedian vagina opening, a sclerified vagina and a seminal receptacle present. *Cichlidogyrus* is a parasite of African Cichlidae (rarely on Cyprinodontidae and Nandidae).

In the present paper, new species of *Cichlidogyrus* found on the gills of *Tilapia* species from West Africa are described.

MATERIALS AND METHODS

Fish were captured in various rivers of Guinea, Ivory Coast and Sierra Leone, using gill nets, cast nets, or after poisoning

with Rotenone. They were dissected on site immediately after capture by separating the gill arches via dorsal and ventral section. The left arches were frozen at -20°C or in liquid nitrogen, until examination. To verify the specific identity of host fishes, the carcasses were numbered, fixed and preserved in formalin. After thawing, the parasites were detached from the gill using a strong water current and transferred individually with a mounted needle directly into a drop of ammonium picrate-glycerine mixture (Malmberg 1957). The preparation was then covered with a cover slip and sealed with Glyceel (GURR-BDH Chemicals Ltd.). From these preparations drawings were made of the sclerotized pieces of the haptor and of the copulatory complex using a camera lucida. All measurements, in µm, are given as: mean ± standard deviation (minimum - maximum), as proposed by Gussev (1962) (Fig. 1).

The method of numbering the marginal hooks is that adopted at ICOPA IV (Euzet and Prost 1981). The method of naming is that proposed by Pariselle and Euzet (1995a) i.e. "uncinulus" for the little marginal hooks, "gripus" for the large median hooks (anchors or hamuli) on Dactylogyridea.

RESULTS

Cichlidogyrus albareti sp. n.

Fig. 2.

Description: Adults 515 ± 54.5 (412-619 long, 118 ± 32.3 (57-167) wide at level of ovary. Dorsal gripus with very long guard (four times longer than shaft), blade arched at distal end: a = 55 ± 3.2 (50-62), b = 35 ± 2.6 (30-40), c = 6 ± 1.1 (3-8), d = 25 ± 2.3 (20-30), e = 14 ± 1.1 (12-17). Dorsal transverse bar very thick: x = 57 ± 5.8 (57-68), y = 26 ± 3.4 (20-32), w = 14 ± 1.6 (11-17), h = 18 ± 2.3 (13-25). Ventral gripus stronger than dorsal, with shaft slightly shorter than guard and acute blade regularly arched: a = 44 ± 3 (40-53), b = 41 ± 2.8

(35-47), $c = 8 \pm 1.8$ (4-11), $d = 15 \pm 1.9$ (10-19), $e = 15 \pm 1.3$ (11-18). Ventral transverse bar long, thick and V-shaped: $z = 56 \pm 7.2$ (30-67), $w = 8 \pm 1.3$ (6-10). Uncinulus I large, 33 ± 2.5 (27-39) long, uncinulus II = 14 ± 0.8 (11-15), III = 22 ± 2 (18-28), IV = 27 ± 1.9 (22-33), V = 29 ± 1.5 (26-34), VI = 28 ± 1.3 (24-30), VII = 24 ± 1.5 (20-29). Long, thin and slightly arched tubular penis: Pe = 109 ± 5.2 (98-121), with heel variable in length: He = 8 ± 3.6 (2-16). Accessory piece simple, slightly arched, folded up at distal extremity, linked to penis bulb by thin stalk: St = 22 ± 3.9 (14-28) long, Ap = 72 ± 9.1 (53-93). Thin vagina with funnel-shaped beginning: Vg = 56 ± 7.7 (43-69) long, 1 ± 0.2 (1-2) in diameter at the middle.

Type host: *Tilapia brevimanus* Boulenger, 1911.

Type locality: River Bourouma, 10 km southwest of La Ramié (Guinea) (19/04/1992). This species was also found on the same host in the River Kogon at Ndyarendi and at Kogon (Guinea) (04/1992).

Site of infection: gills.

Material studied: 18 individuals fixed and stained according to Malmberg (1957).

Deposition of types: Holotype at the Muséum National d'Histoire Naturelle (Paris) (Coll. No. 543HF, Tk73); paratypes at the Muséum National d'Histoire Naturelle (Paris) (Coll. No. 543HF, Tk74); the Natural History Museum (London) (Reg. No. 1997.1.30.1); the Musée Royal d'Afrique Centrale (Tervuren) (MRAC No. 37.408).

Etymology: The name is given in honour of Dr. Jean-Jaques Albaret, an ichthyologist from ORSTOM.

Comments: This *Cichlidogyrus* is characterised by large uncinulus I, short uncinuli III to VII, and a long penis (more than 100 μ m). This cluster includes: *C. arthracanthus* Paperna, 1960; *C. bychowskii* (Markevich, 1934); *C. euzeti* Dossou and Birgi 1984, and *C. longicirrus* Paperna, 1965. All these species have spirally coiled penis: *C. bychowskii* and *C. arthracanthus* only one turn, *C. euzeti* four to five turns, *C. longicirrus* eight to nine turns. Because the species described herein is the only one which has a straight penis (slightly arched) we consider it is a new species.

Cichlidogyrus hemi sp. n.

Fig. 3.

Description: Adults 431 ± 34.9 (359-480) long, 94 ± 16.6 (63-122) wide at level of vagina. Dorsal gripus with guard less than twice longer than shaft, blade arched at distal end: $a = 33 \pm 1.6$ (28-35), $b = 26 \pm 1.3$ (23-28), $c = 7 \pm 1$ (4-9), $d = 13 \pm 1.3$ (11-16), $e = 10 \pm 0.7$ (9-12). Dorsal transverse bar with long auricles: $x = 40 \pm 4$ (34-47), $y = 13 \pm 1.9$ (9-16), $w = 7 \pm 1.1$ (6-9), $h = 23 \pm 2.3$ (18-28). Ventral gripus same as dorsal but slightly bigger: $a = 36 \pm 1.3$ (34-38), $b = 31 \pm 1$ (29-32), $c = 7 \pm 1$ (5-8), $d = 14 \pm 1.4$ (11-17), $e = 11 \pm 1.1$ (9-14). Ventral transverse bar V-shaped: $z = 41 \pm 2.3$ (37-46), $w = 6 \pm 0.9$ (5-8). Uncinulus I = 18 ± 1.2 (16-22), II = 13 ± 0.5 (12-14), III = 35 ± 2.3 (30-40), IV = 39 ± 2.8 (34-44), V = 42 ± 3.2 (33-48), VI = 40 ± 2.6 (36-47),

VII = 36 ± 2.5 (32-42). Penis, beginning in elongated bulb, C-shaped: Pe = 58 ± 6.1 (54-82), He = 7 ± 1 (5-9); accessory piece ending in three points: Ap = 39 ± 2.6 (34-44). Vagina short, straight and ringed: Vg = 10 ± 1.5 (6-12) long and 2 ± 0.4 (1-3) in diameter.

Type host: *Tilapia brevimanus* Boulenger, 1911.

Type locality: River Bourouma, 10 km southwest of La Ramié (Guinea) (19/04/1992). This species was also found on the same host in the River Kogon at Ndyarendi and at Kogon (Guinea) (04/1992).

Site of infection: gills.

Material studied: 21 individuals fixed and stained according to Malmberg (1957).

Deposition of types: Holotype at the Muséum National d'Histoire Naturelle (Paris) (Coll. No. 544HF, Tk75); paratypes at the Muséum National d'Histoire Naturelle (Paris) (Coll. No. 544HF, Tk76); the Musée Royal d'Afrique Centrale (Tervuren) (MRAC No. 37.411).

Etymology: The name is given in honour of Saurin Hem, a hydrobiologist from ORSTOM.

Comments: This species is characterised by little uncinulus I and long uncinuli III to VII, and no auxiliary plate associated to the male apparatus. This cluster includes: *C. anthemocolpos* Dossou, 1982; *C. dossoui* Douëllou, 1993; *C. ergensi* Dossou, 1982; *C. flexicolpos* Pariselle et Euzet, 1995; *C. halli* (Price et Kirk, 1967); *C. testificatus* Dossou, 1982; *C. tiberianus* Paperna, 1960; *C. vexus* Pariselle et Euzet, 1995. The new species is easily distinguishable from all these known species in having a short vagina versus long in *C. flexicolpos* and *C. testificatus*; a short and thin penis versus large and long in *C. halli*; three points at distal end of accessory piece versus one in *C. ergensi* and *C. vexus* and two in *C. anthemocolpos* and *C. dossoui*; a straight vagina versus looped vagina in *C. tiberianus*; longer shaft and guard of dorsal gripus 7 and 13 versus 4-5 and 10-11 in *C. tiberianus*. Consequently, we consider it is a new species.

Cichlidogyrus nuniezi sp. n.

Fig. 4.

Description: Adults 687 ± 74.9 (551-857) long, 125 ± 15.4 (87-150) wide at level of penis. Dorsal gripus with very long guard, five times longer than shaft: $a = 44 \pm 2.9$ (36-49), $b = 32 \pm 2.1$ (27-37), $c = 3 \pm 1.2$ (1-6), $d = 16 \pm 1.8$ (11-21), $e = 15 \pm 1.4$ (12-19). Dorsal transverse bar: $x = 36 \pm 2.5$ (32-42), $y = 12 \pm 1.7$ (7-15), $w = 8 \pm 1.2$ (5-10), $h = 17 \pm 1.9$ (10-21). Ventral gripus, with very short shaft, slightly stronger than dorsal: $a = 38 \pm 2.5$ (33-43), $b = 36 \pm 2$ (31-41), $c = 3 \pm 1.1$ (1-6), $d = 11 \pm 1.4$ (8-15), $e = 17 \pm 1.4$ (12-20). Ventral transverse bar V-shaped: $z = 41 \pm 2.2$ (36-47), $w = 7 \pm 1.1$ (6-9). Uncinulus I large, 27 ± 1.5 (23-30) long, uncinulus II = 12 ± 0.8 (8-14), III = 21 ± 1.8 (13-25), IV = 22 ± 1.7 (15-25), V = 24 ± 1.2 (19-27), VI = 22 ± 1.1 (20-24), VII = 21 ± 1.2 (18-24). Penis, beginning in small, sub-spherical bulb, short and slightly S-shaped: Pe = 40 ± 1.9 (34-43), He = 4 ± 0.5 (4-5). Accessory piece a lamina with bifurcated beginning, one portion linked

C. thurstonae was described by Ergens (1981) without an auxiliary plate associated with the male apparatus, but the examination of numerous individuals sampled on *Oreochromis niloticus* (type host) and *O. aureus* from several location in West Africa always shows the presence of an auxiliary plate.

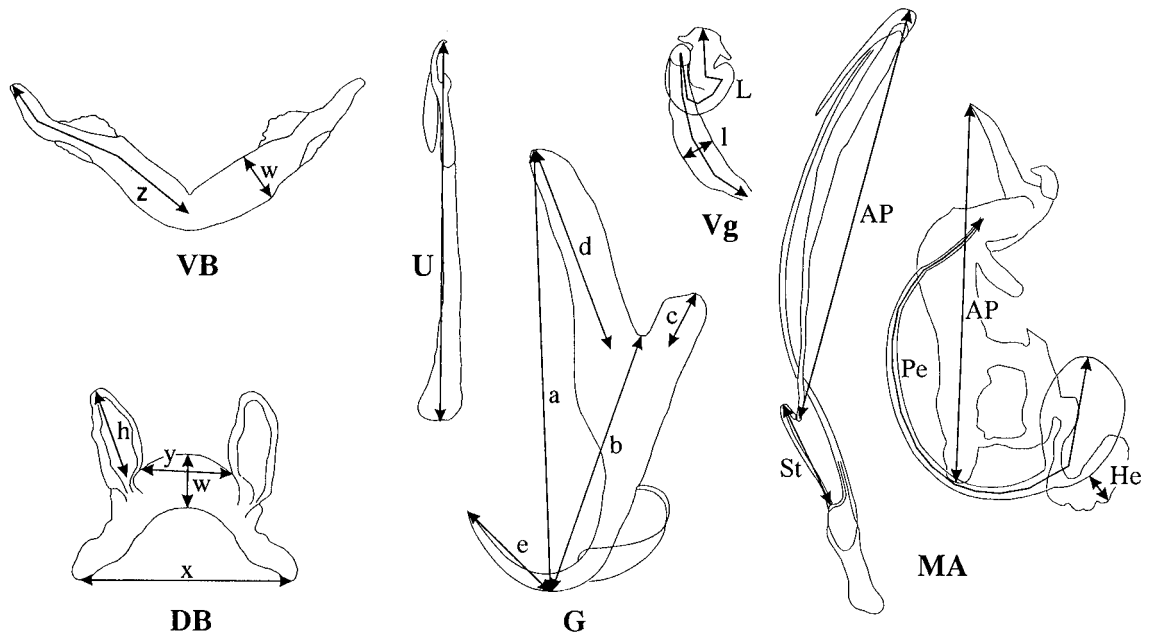


Fig. 1. Measurements used in this study. a - gripus total length; AP - accessory piece; b - gripus blade length; c - gripus shaft length; d - gripus guard length; DB - dorsal transverse bar; e - gripus point length; G - gripus; h - dorsal bar auricles length; He - heel; L - vagina length; l - vagina width; MA - male apparatus; Pe - penis; St - stalk; U - uncinulus; VB - ventral transverse bar; Vg - vagina, w - transverse bar width; x - dorsal transverse bar total length; y - dorsal transverse bar length between auricles; z - 1/2 ventral transverse bar length.

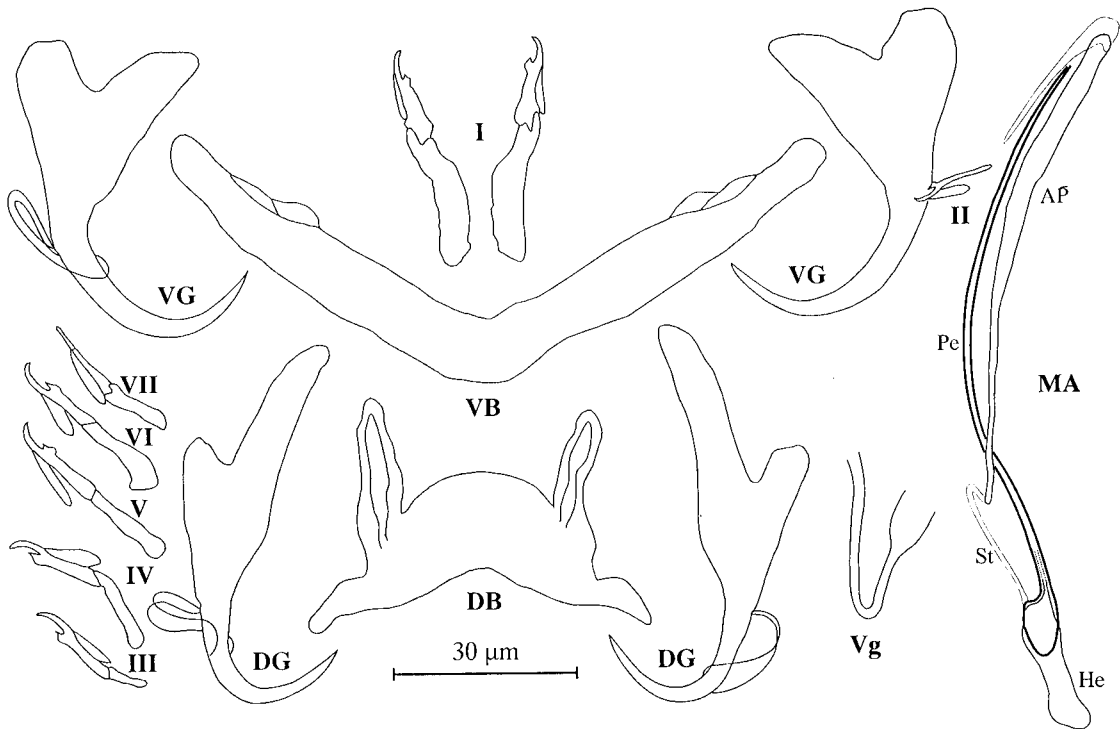


Fig. 2. *Cichlidogyrus albareti* sp. n. AP - accessory piece; DB - dorsal transverse bar; DG - dorsal gripus; MA - male apparatus; He - heel; Pe - penis; St - stalk; Vg - vagina; VB - ventral transverse bar; VG - ventral gripus; I to VII - uncinuli.

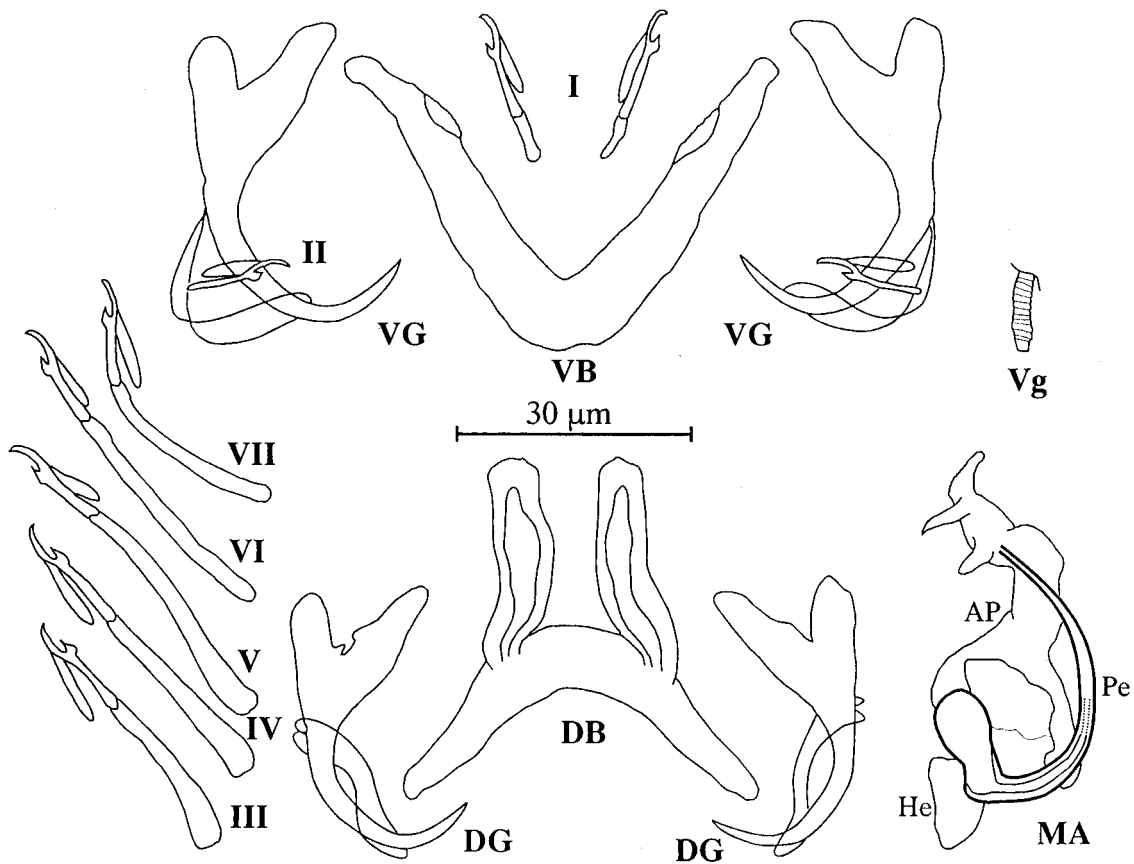


Fig. 3. *Cichlidogyrus hemi* sp. n. AP - accessory piece; DB - dorsal transverse bar; DG - dorsal gripus; MA - male apparatus; He - heel; Pe - penis; Vg - vagina; VB - ventral transverse bar; VG - ventral gripus; I to VII - uncinuli.

to basal bulb of penis, the other one gutter-like, distal extremity marked with spherule supporting small denticulated curved point: Ap = 74 (69-87). No vagina observed.

Type host: *Tilapia cessiana* Thys van den Audenaerde, 1968.

Type locality: Nipoué River at Toyebli (Ivory Coast) (23/03/1991). This species was also found on *Tilapia buttikoferi* (Hubrecht, 1881) in the Kogon River at Kandiafara (Guinea) (04/1992) and in the Little Scarcies River at Katonga (Sierra Leone) (30/11/1994).

Site of infection: gills.

Material studied: 30 individuals fixed and stained according to Malmberg (1957).

Deposition of types: Holotype at the Muséum National d'Histoire Naturelle (Paris) (Coll. No. 542HF, Tk69); paratypes at the Muséum National d'Histoire Naturelle (Paris) (Coll. Nos. 542HF, Tk69 and 542HF, Tk70); the Natural History Museum (London) (Reg. No. 1997.1.30.3); the Musée Royal d'Afrique Centrale (Tervuren) (MRAC No. 37.404).

Etymology: The name is given in honour of Dr. Jésus Nuñez-Rodrigues, a fish physiologist from ORSTOM.

Comments: This *Cichlidogyrus* is characterised by large uncinulus I, short uncinuli III to VII, and a short

penis (less than 90). This cluster includes *C. arfii* Pariselle et Euzet, 1995; *C. dageti* Dossou et Birgi, 1984; *C. digitatus* Dossou, 1982; *C. falcifer* Dossou et Birgi, 1984; *C. halinus* Paperna, 1969 (syn. *C. erectus* Dossou, 1982; see Pariselle and Euzet 1996); *C. kothiasi* Pariselle et Euzet, 1994; *C. papernastrema* Price, Peebles et Samfors, 1969 and *C. yanni* Pariselle et Euzet, 1996. The new species is easily distinguishable from all these known species as follows.

It differs from *C. arfii* in having shorter penis (40 in *C. nuniezi* versus 62 in *C. arfii*), bigger gripus (i.e. dorsal a = 44 in *C. nuniezi* versus 24 in *C. arfii*) and by the shape of accessory piece (bifurcated lamina in *C. nuniezi* versus simple, shank-like and straight in the latter species); from *C. dageti* in having no vagina observed versus thick and 20-25 long vagina in *C. dageti*; from *C. digitatus*, *C. falcifer*, *C. halinus* and *C. yanni* by the shape of accessory piece of the penis (bifurcated lamina in *C. nuniezi* versus shank-like in listed species); from *C. kothiasi* in having well developed auricles on the dorsal transverse bar, slightly S-shaped penis versus three turns of spiral penis in *C. kothiasi*, and bifurcated lamina accessory piece in

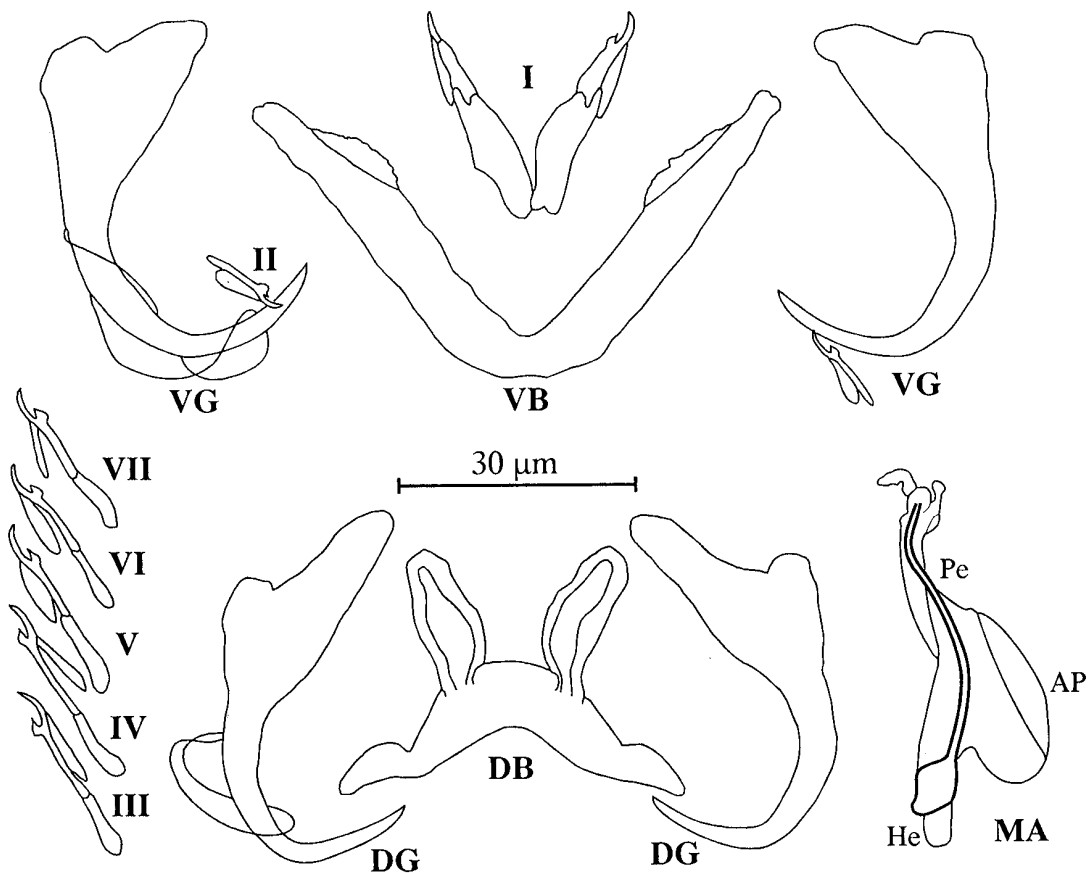


Fig. 4. *Cichlidogyrus nuniezi* sp. n. AP - accessory piece; DB - dorsal transverse bar; DG - dorsal gripus; MA - male apparatus; He - heel; Pe - penis; VB - ventral transverse bar; VG - ventral gripus; I to VII - uncinuli.

C. nuniezi versus simple lamina in *C. kothiasi*, and from *C. papernastrema* in having tubular penis versus swelled in *C. papernastrema*, and longer penis (length 40 versus 30 in *C. papernastrema*).

Cichlidogyrus bonhommei sp. n.

Fig. 5.

Description: Adults 778 ± 177.2 (460-1008) long, 135 ± 25.4 (97-187) wide at level of penis. Dorsal gripus with guard twice longer than shaft: a = 44 ± 2.1 (37-47), b = 37 ± 1.5 (32-40), c = 2 ± 0.7 (1-4), d = 13 ± 1.5 (10-16), e = 12 ± 0.7 (11-14). Dorsal transverse bar: x = 33 ± 2.9 (28-40), y = 12 ± 1.2 (9-14), w = 8 ± 0.8 (7-9), h = 17 ± 1.8 (13-21). Ventral gripus slightly stronger than dorsal: a = 46 ± 1.5 (43-49), b = 41 ± 1.5 (37-44), c = 2 ± 0.8 (1-3), d = 11 ± 1.4 (7-14), e = 15 ± 1.1 (13-17). Ventral transverse bar z = 33 ± 1.7 (19-36), w = 7 ± 0.8 (6-8). Uncinulus I short, its length 13 ± 0.6 (12-14), uncinulus II = 11 ± 0.7 (9-13), uncinuli III to VII long, III = 16 ± 1.3 (14-19), IV = 19 ± 1.3 (16-22), V = 21 ± 1.3 (19-23), VI = 19 ± 1.3 (16-21), VII = 16 ± 0.9 (14-18). Penis, beginning in large ovoid bulb, C-shaped, heel poorly developed: Pe = 32 ± 1.8 (28-34), He = 1 ± 0.4 (1-2). Accessory piece right angle shaped with three digitations, one at level of angle vertex, two

others at distal extremity of accessory piece (one three times longer than the other): Ap = 28 ± 2.6 (23-33). Looped vagina: Vg = 19 ± 2.8 (15-23) long and 3 ± 0.5 (2-4) in diameter.

Type host: *Tilapia buttikoferi* (Hubrecht, 1881).

Type locality: Little Scarcies River at Katonga (Sierra Leone) (30/11/1994).

Site of infection: gills.

Material studied: 19 specimens fixed and stained according to Malmberg (1957).

Deposition of types: Holotype at the Muséum National d'Histoire Naturelle (Paris) (Coll. No. 545HF, Tk77); paratypes at the Muséum National d'Histoire Naturelle (Paris) (Coll. Nos. 545HF, Tk77 and 545HF, Tk78); the Natural History Museum (London) (Reg. No. 1997.1.30.2); the Musée Royal d'Afrique Centrale (Tervuren) (MRAC No. 37.403).

Etymology: The name is given in honour of Dr. François Bonhomme, a geneticist from CNRS.

Comments: This species is characterised by small uncinulus I, long uncinuli III-VII and no auxiliary plate associated to the male apparatus. This cluster includes: *C. anthemocolpos* Dossou, 1982; *C. dossoui* Douëllou, 1993; *C. ergensi* Dossou, 1982; *C. flexicolpos* Pariselle et Euzet, 1995; *C. halli* (Price et Kirk, 1967); *C. hemi*

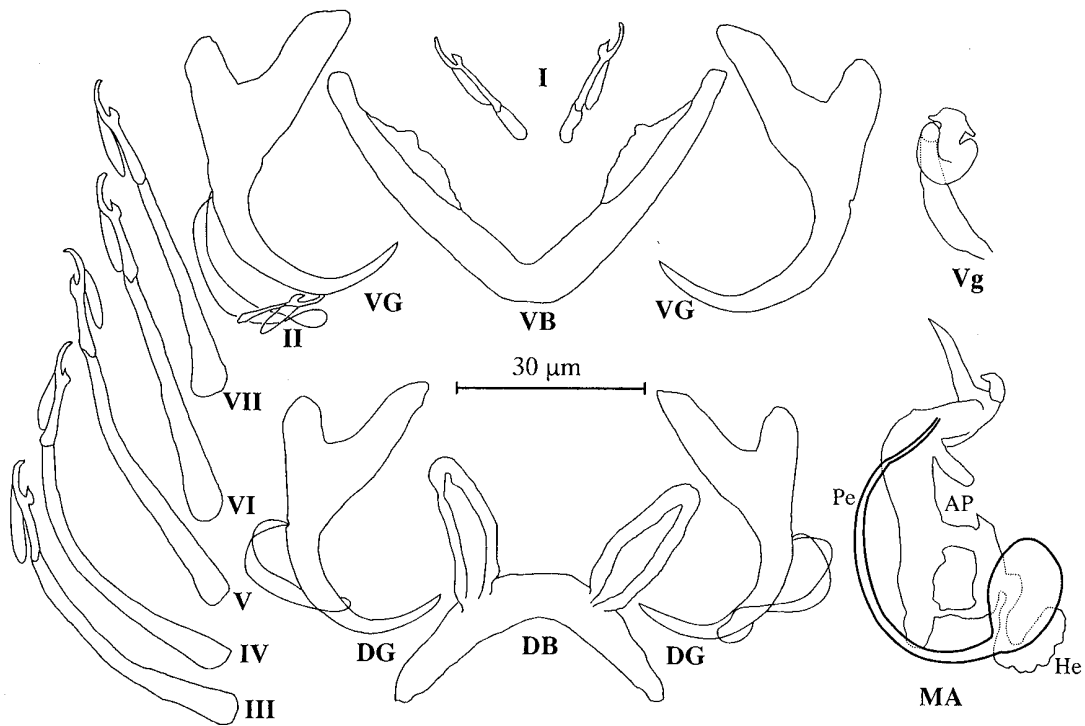


Fig. 5. *Cichlidogyrus bonhommei* sp. n. AP - accessory piece; DB - dorsal transverse bar; DG - dorsal gripus; MA - male apparatus; He - heel; Pe - penis; Vg - vagina; VB - ventral transverse bar; VG - ventral gripus; I to VII - uncinuli.

sp. n.; *C. testificatus* Dossou, 1982; *C. tiberianus* Paperna, 1960 and *C. vexus* Pariselle et Euzet, 1995. The new species is easily distinguishable from all these known species in possessing the following features: from *C. flexicolpos* and *C. testificatus* in having a shorter vagina (versus longer in these species); from *C. halli* by the length and diameter of the penis (short and thin versus large and long in *C. halli*); from *C. ergensi* and *C. vexus* or *C. anthemocolpos* and *C. dossoui* in having three points at the distal end of the accessory piece (versus one in members of the former group or two latter species); from *C. hemi* sp. n. in having looped vagina (versus straight in *C. hemi*).

C. bonhommei is closely related to *C. tiberianus* by the shape of the accessory piece of the penis and the presence of a looped vagina. These two species are easily distinguishable by the dimensions of the vagina (larger in *C. bonhommei*), the presence of two unequal digitations at the extremity of the accessory piece in *C. bonhommei* (versus equal in *C. tiberianus*), the shape of the dorsal and ventral gripus identical in *C. bonhommei* versus very different in *C. tiberianus*, and the dimension of those sclerotized pieces (always larger in *C. bonhommei*).

***Cichlidogyrus slembroucki* sp. n.** Fig. 6.

Description: Adults 778 ± 177.2 (460-1008) long, 135 ± 25.4 (97-187) wide at level of penis. Dorsal gripus with very long guard and short shaft: a = 44 ± 2.1 (37-

47), b = 37 ± 1.5 (32-40), c = 2 ± 0.7 (1-4), d = 13 ± 1.5 (10-16), e = 12 ± 0.7 (11-14). Thick dorsal transverse bar with large auricles: x = 33 ± 2.9 (28-40), y = 12 ± 1.2 (9-14), w = 8 ± 0.8 (7-9), h = 17 ± 1.8 (13-21). Ventral gripus with very short shaft, slightly stronger than dorsal: a = 46 ± 1.5 (43-49), b = 41 ± 1.5 (37-44), c = 2 ± 0.8 (1-3), d = 11 ± 1.4 (7-14), e = 15 ± 1.1 (13-17). Thick and short ventral transverse bar z = 33 ± 1.7 (19-36), w = 7 ± 0.8 (6-8). Uncinulus I short, its length 13 ± 0.6 (12-14), uncinulus II = 11 ± 0.7 (9-13), III = 16 ± 1.3 (14-19), IV = 19 ± 1.3 (16-22), V = 21 ± 1.3 (19-23), VI = 19 ± 1.3 (16-21), VII = 16 ± 0.9 (14-18). Penis, beginning in small ovoid bulb, short, large and straight, heel being very thin: Pe = 32 ± 1.8 (28-34), He = 1 ± 0.4 (1-2). Accessory piece consisting of two parts: first with large and thin beginning connected to C-shaped portion with round ending recovered by expansion ending in hook; second part represented by sub-circular lamina related to ending of first part. Accessory piece fastened to basal bulb by short stalk: Ap = 28 ± 2.6 (23-33). Thin vagina: Vg = 19 ± 2.8 (15-23) long and 3 ± 0.5 (2-4) in diameter.

Type host: *Tilapia buttkoferi* (Hubrecht, 1881).

Type locality: Kogon River at Kandiafara (Guinea) (20/04/1991).

Site of infection: gills.

Material studied: 14 individuals fixed and stained according to Malmberg (1957).

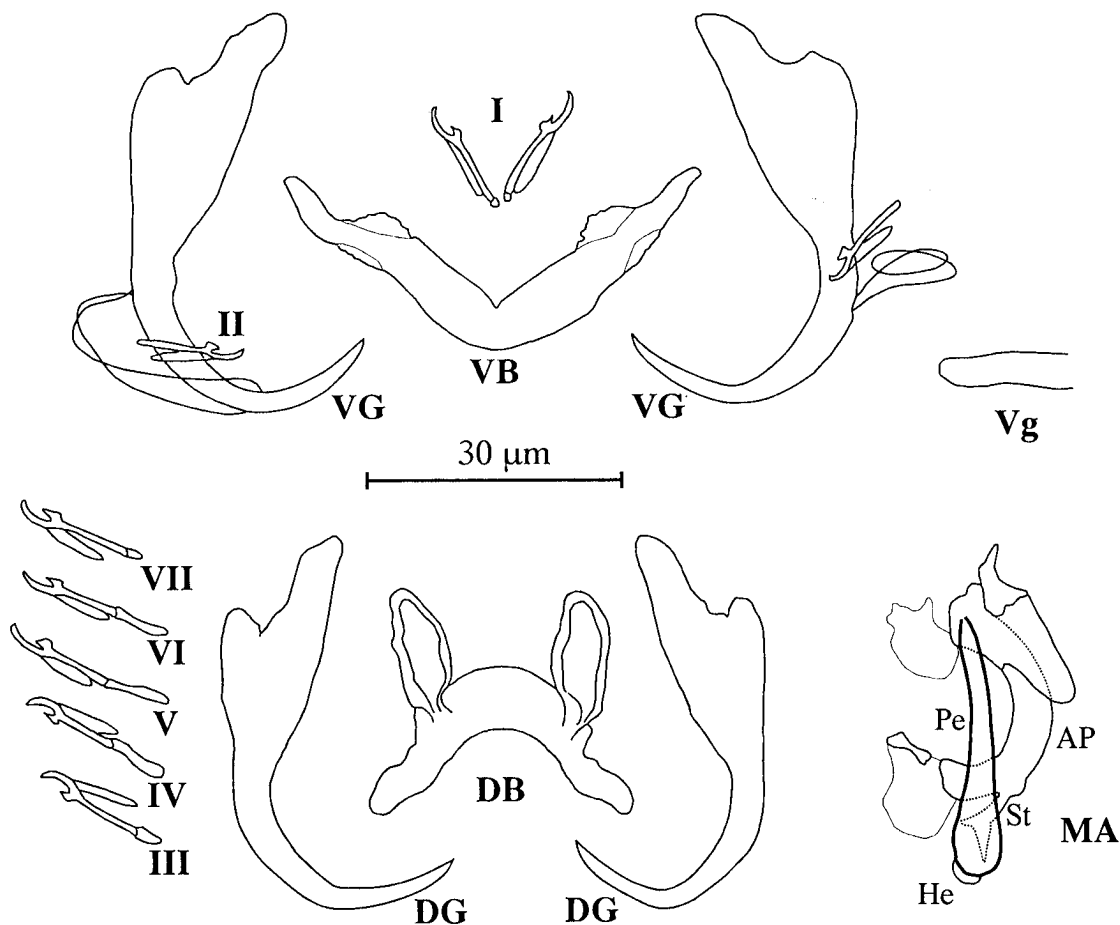


Fig. 6. *Cichlidogyrus slembroucki* sp. n. Ap - accessory piece; DB - dorsal transverse bar; DG - dorsal gripus; MA - male apparatus; He - heel; Pe - penis; Vg - vagina; St - stalk; VB - ventral transverse bar; VG - ventral gripus; I to VII - uncinuli.

Deposition of types: Holotype at the Muséum National d'Histoire Naturelle (Paris) (Coll. No. 546HF, Tk79); paratypes at the Muséum National d'Histoire Naturelle (Paris) (Coll. No. 546HF, Tk79); the Natural History Museum (London) (Reg. No. 1997.1.30.4); the Musée Royal d'Afrique Centrale (Tervuren) (MRAC No. 37.405).

E t y m o l o g y: The name is given in honour of Mr. Jacques Slembrouck, a hydrobiologist technician from ORSTOM.

Comments: This *Cichlidogyrus* is characterised by short uncinulus I, short uncinuli III - VII, and a short penis (less than 40 long). This cluster includes: *C. acerbus* Dossou, 1982; *C. amphoratus* Pariselle et Euzet, 1996; *C. berrebii* Pariselle et Euzet, 1994; *C. gibbus* Dossou, 1982; *C. haplochromii* Paperna et Thurston, 1969; *C. lagoonaris* Paperna, 1969; *C. pouyaudi* Pariselle et Euzet, 1994; *C. quaestio* Douëllou, 1993, and *C. tilapiae* Paperna, 1960. The new species is easily distinguishable from all these species by the following features: from *C. amphoratus* and *C. gibbus* in having no swelled portion of the penis (versus its presence in these species) and a very thin heel (versus large in *C. amphoratus* and *C. gibbus*); from *C.*

berrebii and *C. pouyaudi* in having very large auricles on the dorsal transverse bar (versus short and thin in the two latter species) and a sclerified vagina (versus only opening sclerified in *C. berrebii* and *C. pouyaudi*); from *C. haplochromii*, *C. quaestio* and *C. tilapiae* by the shape of accessory piece of the penis: in two parts and C-shaped in *C. slembroucki* versus simple and straight in those three species; from *C. lagoonaris* in having a straight penis (versus C-shaped in *C. lagoonaris*), an accessory piece more complex and a visible vagina in *C. slembroucki*.

The species most closely related to *C. slembroucki* is *C. acerbus*. Nevertheless, these two species with the accessory piece of the penis can be differentiated as follows: *C. slembroucki* has a large and thin beginning of the C-shaped portion, which is not present in *C. acerbus*, this species having a short diverticulum at the level of the attachment of the stalk, which is not present in *C. slembroucki*; the extremity of the accessory piece has a hook and a sub-circular lamina in *C. slembroucki* which are not present in *C. acerbus*.

DISCUSSION

Members of the genus *Cichlidogyrus* generally have an oioxenic specificity towards their fish host. However, when the hosts are genetically closely related, the parasites incline to present a stenoxenic specificity. For example, four species of *Cichlidogyrus* are found each on five species of cichlids of the subgenus *Coptodon* within six species studied by Pariselle et Euzet (1996). Evidence to support this hypothesis includes the fact that *C. nuniezi* is found on *Tilapia cessiana* and *T.*

buttikoferi. These two host species are morphologically and genetically very closely related (Thys van den Audenaerde 1968, Pouyaud and Agnèse 1995). The presence of two species (*C. slembroucki* and *C. bonhommei*) on *T. buttikoferi*, which are not present on *T. cessiana*, could be explained by the allopatric distribution of these two fishes, their geographical distribution (wider for *T. buttikoferi*), and their different size (bigger in *T. buttikoferi*).

REFERENCES

- ERGENS R. 1981: Nine species of the genus *Cichlidogyrus* Paperna, 1960 (Monogenea: Ancyrocephalinae) from Egyptian fishes. *Folia Parasitol.* 28: 205-214.
- EUZET L., PROST M. 1981: Report of the meeting on Monogenea: problems of systematics, biology and ecology. In: W. Slusarski (Ed.), *Rewiew of Advances in Parasitology*. P.W.N. Polish Scientific Publishers, Warsaw, pp. 1003-1004.
- GUSSEV A. V. 1962: In: E. Bykhovskaya-Pavlovskaya et al. (Eds.), *Key to Parasites of Freshwater Fish of the USSR*. Publ. House of Academy of Sciences of the USSR, Moscow – Leningrad, 919 pp. (Translated from Russian by IPST, Ser. No. 1136, Jerusalem, 1964).
- MALMBERG G. 1957: On the occurrence of *Gyrodactylus* on Swedish fishes. (In Swedish, with description of species and a summary in English). *Skrifter utgivna av Södra Sveriges Fiskeriförening*, (1956), pp. 19-76.
- PARISELLE A., EUZET L. 1995a: Gill parasites of the genus *Cichlidogyrus* Paperna, 1960 (Monogenea, Ancyrocephalidae) from *Tilapia guineensis* (Bleeker, 1862), with descriptions of six new species. *Syst. Parasitol.* 30: 187-195.
- PARISELLE A., EUZET L. 1995b: Monogenea ectoparasites branchiaux de *Pelmatochromis buttikoferi* (Steindachner, 1895) (Cichlidae) en Guinée. *Parasite* 2: 203-209.
- PARISELLE A., EUZET L. 1996: Gill parasites of the genus *Cichlidogyrus* Paperna, 1960 (Monogenea, Ancyrocephalidae) from the subgenus *Coptodon* Regan, 1920 (Pisces, Cichlidae) in West Africa, with descriptions of four new species. *Syst. Parasitol.* 34: 109-124.
- POUYAUD L., AGNÈSE J.-F. 1995: Phylogenetic relationships between 21 species of three tilapiine genera *Tilapia*, *Sarotherodon* and *Oreochromis* using allozyme data. *J. Fish Biol.* 47: 26-28.
- THYS VAN DEN AUDENAERDE D.E.F. 1968: Description of *Tilapia cessiana* sp. nov. with some remarks on *Tilapia buttikoferi* (Hubrecht, 1881) (Pisces, Cichlidae). *Rev. Zool. Bot. Afr.* 78: 183-196.

Received 14 July 1997

Accepted 31 January 1998