INTRODUCTION

In 1965 and 1969 Paperna described *Cichlidogyrus longicirrus* on *Hemichromis fasciatus* Peters, 1858 (type host) and *Pelmatochromis guentheri* (Sauvage, 1882) (syn. *Chromidotilapia guentheri*) from the Volta River and Coastal systems in Ghana. Paperna (1968) observed among *Hemichromis fasciatus* (type host) and *H. bimaculatus* Gill, 1863 two new species belonging to the new genus *Onchobdella*: *O. aframae* Paperna, 1968; *O. bopeleti* Bilong Bilong & Euzet, 1995; *O. voltersis* Paperna, 1968; *C. dageti* Dossou & Birgi, 1984; *C. euzeti* Dossou & Birgi, 1984; *C. falcifer* Dossou & Birgi, 1984 and *C. longicirrus* Paperna, 1965); two, belonging to the latter genus, are considered as new species: *C. sanseoi* n. sp. and *C. teugelsi* n. sp. As parasitic species are not present in all the host distribution area, we think that *H. fasciatus* is made up of two distinct populations (or even sister species).

KEY WORDS: Monogenea, Ancyrocephalidae, *Cichlidogyrus sanseoi* n. sp., *Cichlidogyrus teugelsi* n. sp., Freshwater fish, *Cichlidae*, Hemichromis fasciatus, Africa.

**MATERIALS AND METHODS**

Fish were caught in Gambia (Gambia River at Banjul), Ivory Coast (Kounougou River; Adiopodoumé, Km 17 Dabou Road; and Grand Lahou Lagoon), Mali (Niger River at Selingué) and Senegal (Niokolokoba National Park), using gill nets or cast nets. The fish were dissected as soon as possible, and the left branchial arches were frozen in liquid nitrogen until examination. To verify the specific identity of host, the fish specimens were numbered, fixed and preserved in formalin. In the laboratory, the gills were thawed and the monogeneans were detached from the gill using a strong water current. The worms were then

**SUMMARY:**

The examination of gill parasites from *Hemichromis fasciatus* Peters, 1858 (*Pisces*, *Cichlidae*) in Africa revealed the presence of nine species of *Monogenea*, three belong to *Onchobdella* Paperna, 1965; two, belonging to the latter genus, are considered as new species: *C. sanseoi* n. sp. and *C. teugelsi* n. sp. As parasitic species are not present in all the host distribution area, we think that *H. fasciatus* is made up of two distinct populations (or even sister species).

KEY WORDS: *Monogenea*, *Ancyrocephalidae*, *Cichlidogyrus sanseoi* n. sp., *Cichlidogyrus teugelsi* n. sp., *Freshwater fish*, *Cichlidae*, *Hemichromis fasciatus*, Africa.

**RéSUMÉ:**

L'examen des parasites branchiaux d’*Hemichromis fasciatus* Peters, 1858 (*Pisces*, *Cichlidae*) en Afrique révèle la présence de neuf espèces de *Monogenes*, trois appartenant à *Onchobdella* Paperna, 1965; deux, appartenant à ce dernier genre, sont considérées comme nouvelles : *C. sanseoi* n. sp. et *C. teugelsi* n. sp. Les différentes espèces de parasites n'étant pas présentes sur l'ensemble de l'aire de répartition de l'hôte, nous pensons qu’*H. fasciatus* est composée de deux populations distinctes (voire de deux espèces jumelles).

**MOTS CLÉS:** *Monogenea*, *Ancyrocephalidae*, *Cichlidogyrus sanseoi* n. sp., *Cichlidogyrus teugelsi* n. sp., *Poissons d'eau douce*, *Cichlidae*, *Hemichromis fasciatus*, Afrique.
Table I. - Geographical distribution of *Hemichromis fasciatus* gill Monogenea (new locations in bold).

<table>
<thead>
<tr>
<th>Location</th>
<th>Senegal</th>
<th>Gambia</th>
<th>Mali</th>
<th>Ivory Coast</th>
<th>Ghana</th>
<th>Benin</th>
<th>Congo</th>
<th>Cameroon</th>
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</thead>
<tbody>
<tr>
<td><em>O. aframae</em></td>
<td>+</td>
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<td><em>O. bopeleti</em></td>
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<td><em>O. voltensis</em></td>
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<tr>
<td><em>C. dagetti</em></td>
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<td>+</td>
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<tr>
<td><em>C. enzeti</em></td>
<td>+</td>
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<td><em>C. falcifer</em></td>
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<tr>
<td><em>C. longicirrus</em></td>
<td>+</td>
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<tr>
<td><em>C. sanseoi</em> n. sp.</td>
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<td>+</td>
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<tr>
<td><em>C. teugelsi</em> n. sp.</td>
<td>+</td>
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<td>+</td>
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</tr>
</tbody>
</table>

Fig. 1. - Measurements used in this study.

**RESULTS**


**DESCRIPTIONS**

*Cichlidogyrus sanseoi* n. sp. (Figs 2 & 3)

**Type host:** *Hemichromis fasciatus* Peters, 1858.

**Site:** gills.

**Type locality:** Kounougou River (Ivory Coast).

Other records: also found on the same host in Grand Lahou Lagoon (Ivory Cost), in Gambia River at Nio...
TWO NEW SPECIES OF *Cichlidogyrus*

**Fig. 2.** *Cichlidogyrus sanseoi* n. sp. haptoral sclerites.

- DB = dorsal transverse bar; DG = dorsal gripus; VB = ventral transverse bar; VG = ventral gripus; I to VII = uncinuli.
- Bar = 30 µm.

**Fig. 3.** *Cichlidogyrus sanseoi* n. sp. Copulatory organs.

- Ap = accessory piece; MA = male apparatus; Pe = penis; Vg = vagina.
- Bar = 30 µm.

kolokoba National Park (Senegal), and in Niger River at Selingue (Mali).

Material studied: 30 individuals.


Adults: 564 ± 78.6 (415-775) long, 92 ± 10.6 (72-122) wide at level of vagina. Dorsal gripus with root three times shorter than shaft, blade arched at distal end: a = 40 ± 1.2 (37-42), b = 26 ± 0.9 (24-28), c = 6 ± 0.9 (4-7), d = 16 ± 11.1 (13-18), e = 12 ± 0.8 (10-14). Dorsal transverse bar: x = 36 ± 2.1 (32-41), y = 12 ± 1.3 (10-15), w = 7 ± 0.5 (6-8), h = 11 ± 1.1 (8-14). Ventral gripus, slightly heavier than dorsal, with root two times shorter than shaft, blade regularly arched: a = 36 ± 1.1 (33-38), b = 31 ± 1.2 (29-33), c = 5 ± 0.8 (3-7), d = 11 ± 1 (8-13), e = 15 ± 1.1 (12-17). Ventral transverse bar arched: x = 35 ± 1.6 (32-39), w = 5 ± 0.3 (4-5). Uncinuli I large = 32 ± 1.4 (28-36) long, II = 11 ± 0.4 (10-12) long, III = 19 ± 0.9 (17-22) long, IV = 21 ± 1.1 (18-24) long, V = 27 ± 0.8 (25-29) long, VI = 22 ± 1.1 (18-23) long, VII = 19 ± 0.7 (17-21) long. Penis, beginning in spherical bulb without heel, extremely long (more than twice the total body length): Pe = 1418 ± 98.3 (1288-1625), spirally coiled around accessory piece, likewise spiral shaped ending with a straight portion: Ap = 213 ± 16.4 (165-245). Vagina in four por-
Fig. 4. — *Cichlidogyrus teugelsi* n. sp.

Ap = accessory piece; DB = dorsal transverse bar; DG = dorsal gripus; MA = male apparatus; Pe = penis; VB = ventral transverse bar; VG = ventral gripus; Vg = vagina; I to VII = uncinuli. Bar = 30 µm.

**Cichlidogyrus teugelsi** n. sp. (Fig. 4)

Type host: *Hemicromis fasciatus* Peters, 1858.

Site: gills.

Type locality: Kounougou River (Ivory Coast).

Other records: also found, on the same host, in a little river at Adiopodoumé, Km 17 Dabou Road (Ivory Coast), in Gambia River at Niokolokoba National Park (Senegal), in Niger River at Selingue (Mali).

Material studied: 30 individuals.


Adults: 528 ± 55.9 (403-605) long, 86 ± 9.6 (68-100) wide at level of vagina. Dorsal gripus with root three times shorter than shaft, blade arched at distal end: a = 41 ± 1.6 (35-45), b = 27 ± 1.2 (25-31), c = 5 ± 0.9 (3-7), d = 17 ± 1.7 (12-20), e = 11 ± 0.7 (10-15). Dorsal transverse bar: x = 35 ± 1.7 (32-38), y = 12 ± 1 (10-13), w = 8 ± 0.9 (7-10), h = 11 ± 1.2 (8-14). Ventral gripus, slightly heavier than dorsal: a = 36 ± 1.1 (33-38), b = 31 ± 1.4 (29-34), c = 5 ± 1 (3-7), d = 11 ± 1.5 (8-14), e = 15 ± 1.2 (12-17). Ventral transverse bar arched: x = 34 ± 2.7 (31-39), w = 6 ± 0.5 (4-7). Large uncinulus I = 31 ± 1.6 (28-37) long, uncinulus II = 10 ±

**Comments**

This species is characterised by the spiral shape of the penis. Only few *Cichlidogyrus* present this particularity, even though the same shape for the penis can be found in other genera of Monogenea (e.g. *Annulotrema spiropenis* Paperna, 1969; *Thaparocleidus euzeti* Pariselle et al., 2002); these are *C. arthracanthus* Paperna, 1960 described on *Tristamella simonis* (Günther, 1864), *C. euzeti* and *C. longicirrus* both from *Hemicromis fasciatus*. It can be easily distinguished from all these species by the length of the penis and the number of turns: 130 µm and one to two turns for *C. arthracanthus*; 375-390 µm and four to five turns for *C. euzeti*; 400-500 µm and eight to nine turns for *C. longicirrus* vs. 1288-1625 µm; and 14 to 15 turns for *C. sanseoi* n. sp.

The name *Cichlidogyrus sanseoi* n. sp. is given for François Sanseo, technician from IRD (ex-ORSTOM) who helped us in collecting material.

0.5 (9-12) long, III = 18 ± 1.2 (17-23) long, IV = 20 ± 1.5 (18-25) long, V = 24 ± 1.2 (21-29) long, VI = 21 ± 1.1 (19-23) long, VII = 18 ± 0.8 (16-20) long. G-shaped penis, beginning in sub-spherical bulb with irregular heel: Pe = 99 ± 4.3 (90-111). The accessory piece, linked to the junction between heel and basal bulb, is made of two parts: a large sclerotised extremity with a large semi-circular expansion, and a thin base with a moderate trapezoidal expansion: Ap = 74 ± 3.9 (69-87). The vagina is a narrow and sinuous tube, with a slightly sclerotized plate close to the aperture: V = 72 ± 7.2 (61-88), v = 3 ± 0.3 (3-4).

Comments
This parasite belongs to the group of *Cichlidogyrus* with large uncinulus I, short uncinuli III to VII and a long (between 60 and 150 µm) non spirally coiled penis². This group includes *C. bychowskii* (Markевич, 1934) described on *Hemicromis bimaculatus*, *C. nandidae* Birgi & Lambert, 1986 described on *Polycentropus abbreviata* Boulenger, 1901; *C. arfii* Pariolle & Euzet, 1995 described on *Pelmatobromis buettikoferi* (Steindachner, 1894); and *C. albaret* Pariolle & Euzet, 1998 described on *Tilapia brevimanus* Boulenger, 1911. The parasite herein described is easily distinguishable from all these species by the shape of the penis:
- from *C. arfii* and *C. albaret* (thin and G-shaped vs large and slightly sinuous or thin and slightly C-shaped).
- from *C. bychowskii* and *C. nandidae* (G-shaped vs looped).

The name *Cichlidogyrus teugelsi* n. sp. is given in memory of Dr. Guy Teugels, ichthyologist from the Musée Royal d’Afrique Centrale (Tervuren, Belgium) recently deceased and who provided a great deal of material from numerous locations in Africa.

**DISCUSSION**

The examination of geographical distribution of *Hemicromis fasciatus* gill Monogenea shows that two groups of species (*C. dageti/C. euzeti/C. longicirrus* and *C. sanseoi/C. teugelsi*, highlighted in Table 1) are not present in all the host distribution area. The first one is only from Southern part, when the second one is only from Northern part, the limit seems to be the border between Ghana and Ivory Coast. Moreover, *C. longicirrus* (Southern distribution) is morphologically related to *C. sanseoi* (Northern distribution). This distribution pattern (i.e. disjunct areas) and morphological similarity of these two parasitic species as observed by Bilong Bilong & Euzet (1995) on two *Onchobdella* species (*O. spirocirra* and *O. bopeletti*) coming from two different but related host species (*Hemicromis fasciatus* and *H. bimaculatus*) suggest a vicariant speciation between two isolated populations of parasites, thus of hosts. These data lead us to think that two closely related host species are both designated as *Hemicromis fasciatus*. The late G. Teugels (pers. comm.), ichthyologist from the Musée Royal de l’Afrique Centrale (Tervuren), supported the same hypothesis after morphological studies.

**REFERENCES**


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