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Italobdella ciosi, a new leech genus and species from Italy (*Hirudinea*: *Piscicolidae*)

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ABSTRACT. *Italobdella ciosi* gen. and sp. nov. is described from the river Adda nr. Milano (Rivolta), Italy, based on specimens collected from ventral fins of the trout *Salmo trutta* m. *fario*.

Italobdella gen. nov.

DIAGNOSIS

Piscicolinae; freshwater; basically 4 annulate; opening of seminal receptacle visible as a slit perpendicular to the long axis of the body, separated from the male gonopore by 2 rings and much larger than it. Female gonopore poorly visible, one ring posterad to the opening of seminal receptacle. On clitellum no copulatory area (CA). Vector tissue (VT) in shape of a narrow plate situated transversely to the long axis of the body, above the oviduct outlet.

REMARKS

The world fauna of the subfamily *Piscicolinae* JOHNSTON, 1865 comprises 15 genera (CABALLERO, 1956, SAWYER, 1986; EPSTEIN, 1987, 1989). With respect to reproductive organs, *Italobdella* n. gen. is comparable only with seven of them (fig. 1-7). The reproductive organs of the remaining eight genera have no characteristic features. *Limnotrachelobdella* EPSTEIN, 1968, *Bdellamaris* RICHARDSON, 1953, *Trachelobdella* DIESING, 1850 are devoid of vector tissue. *Johanssonia* SELENSKY, 1914 has no conducting strands of vector tissue. The reproductive system of the remaining genera: *Brachellion* SAVIGNY, 1822, *Orientobdella* EPSTEIN, 1962, *Trachelobdellina* MOORE, 1957 and *Zeylanicobdella* DE SILVA, 1963 has other, additional characters. The

leeches of the new genus *Italobdella* have reproductive organs similar to those of marine leeches of the monotypic genus *Galatheabdella* RICHARDSON and MEYER, 1973 (SAWYER, 1986; fig. 2). The vector tissue of those leeches is also situated anterior to oviduct outlets, but the conducting strands connect the vector tissue with the ovaries on one hand, and with the posterior part of atrium on the other. The latter connection is absent in *Italobdella* n. gen. (figs 18, 19).

Italobdella ciosi n. sp.

ETYMOLOGY

The species is dedicated to a Polish naturalist Mr. Stanisław CIOS, who collected the leeches and sent them alive to Poland.

MATERIAL

Holotype and 6 paratypes preserved in alcohol; December 3rd, 1989; river Adda near Milano (Rivolta), Italy; leg. S. CIOS. All were collected from pectoral fins of the

Table. *Italobdella ciosi* n. sp. - body measurements of 7 specimens (according to the body form model. figs 8-11; No 1 - holotype, L = L1+L2+R1+R2, TR - trachelosoma, UR - urosoma, M - medium)

No	L	Width							Length (L1+L2)					
		TR			UR				L1 TR		L2 UR			
		d1	d2	d3	d4	d5	d6	d7	S1	S2	S3	S4	S5	S6
1	14.8	0.8	1.3	1.2	2.5	2.3	1.6	1.2	1.8	1.8	6.5	0.9	0.9	0.9
2	14.8	0.8	1.4	1.2	2.6	2.2	2.0	1.2	1.5	1.5	6.7	1.0	1.0	0.9
3	15.1	0.8	1.3	1.1	3.5	3.0	2.2	1.2	1.3	1.3	6.5	1.3	1.3	1.2
4	16.6	1.1	1.9	1.7	4.7	3.5	2.6	1.4	1.6	1.6	7.0	1.4	1.4	1.3
5	17.2	1.0	1.8	1.6	3.6	3.2	2.4	1.3	1.8	1.8	7.1	1.4	1.4	1.5
6	19.2	1.0	1.9	1.7	4.4	3.5	2.6	1.3	2.0	2.0	9.4	1.3	1.3	1.4
7	21.1	1.1	2.0	1.7	4.5	3.7	2.7	1.4	2.5	2.5	8.8	1.7	1.7	1.7
M	17.0	0.9	1.6	1.4	3.7	3.0	2.3	1.3	1.8	1.8	7.4	1.3	1.3	1.3

trout *Salmo trutta* m. *fario*, 48 cm long. The holotype of *Italobdella ciosi* n. sp. is deposited at the Museum of Natural History, Wrocław University; paratypes are in the author's collection.

Table (continuation):

No	L	Suckers								Maximum width and height			
		Anterior				Posterior				TR	UR	TR	UR
		C1	C1/1	R1	M1	C2	C1/2	R2	M2	N1	N2	D1	D2
1	14.8	1.3	1.3	1.0	0.2	1.7	1.7	0.7	0.5	0.9	1.8	1.3	2.5
2	14.8	1.5	1.5	1.1	0.3	1.9	1.9	0.7	0.5	0.9	1.8	1.4	2.6
3	15.1	1.4	1.4	1.0	0.2	2.0	2.0	0.8	0.5	1.2	2.2	1.3	3.5
4	16.6	1.5	1.5	1.1	0.2	2.0	2.0	0.9	0.6	1.4	3.8	1.9	4.7
5	17.2	1.5	1.5	1.0	0.2	2.0	2.0	0.8	0.6	1.2	3.2	1.8	3.6
6	19.2	1.5	1.5	1.0	0.3	1.9	1.9	0.2	0.6	1.2	3.3	1.9	4.4
7	21.1	1.5	1.5	0.9	0.2	2.0	2.0	0.9	0.6	1.1	3.2	2.0	4.5
M	17.0	1.4	1.4	1.0	0.2	1.9	1.9	0.8	0.5	1.1	2.7	1.6	3.7

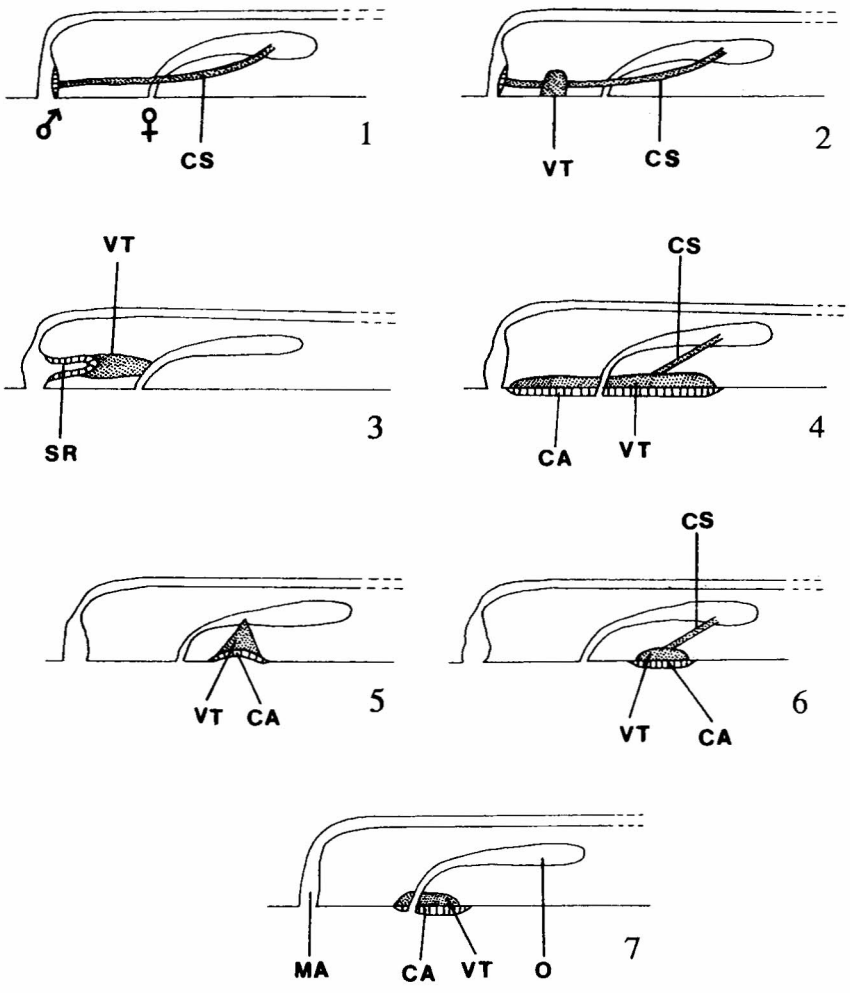
DESCRIPTION

Body shape and size (figs 10-13; table).

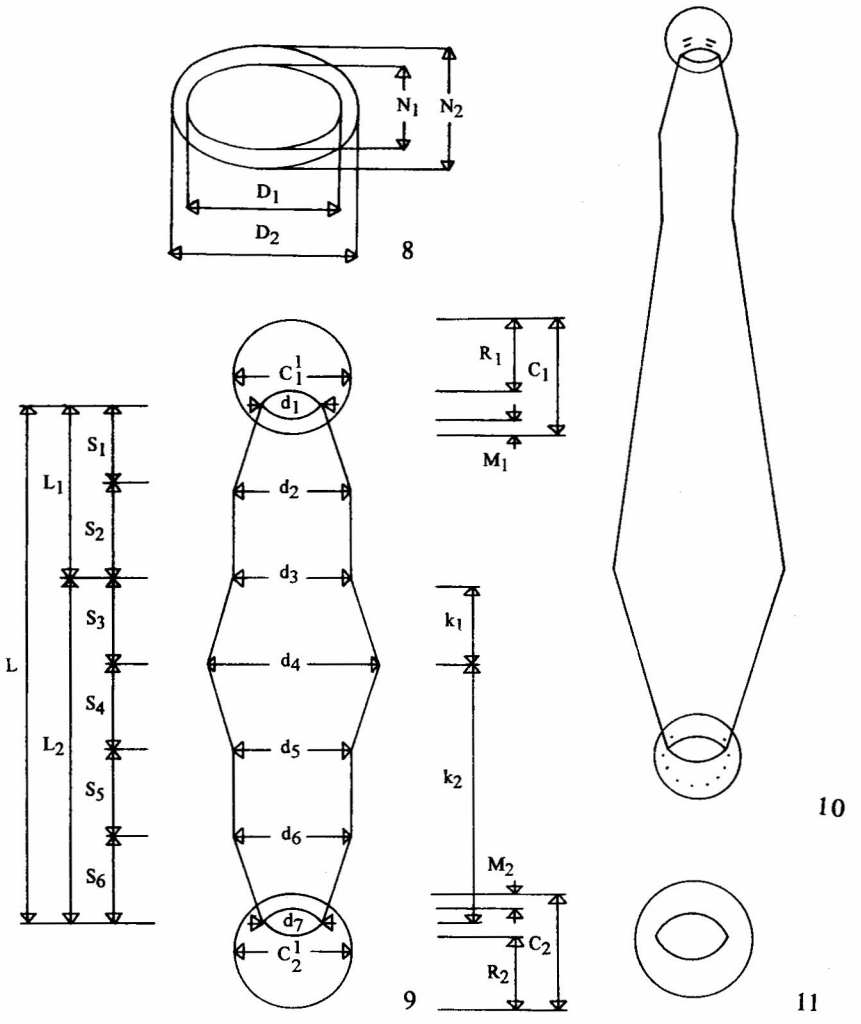
The size and shape are much dependent on many factors (a.o. degree of filling of alimentary tract), hence EPSTEIN's model (1989) was employed. Based on the model, and on empirical data a computer programme allowing a description of leech body form has been prepared, considering parameters proposed by EPSTEIN (1989):

1-4) Parameters describing the form of anterior sucker: horizontal diameter - C_1; vertical diameter - C1,1 ; length of anterior part of sucker - R_1 ; length of posterior part of sucker - M_1.

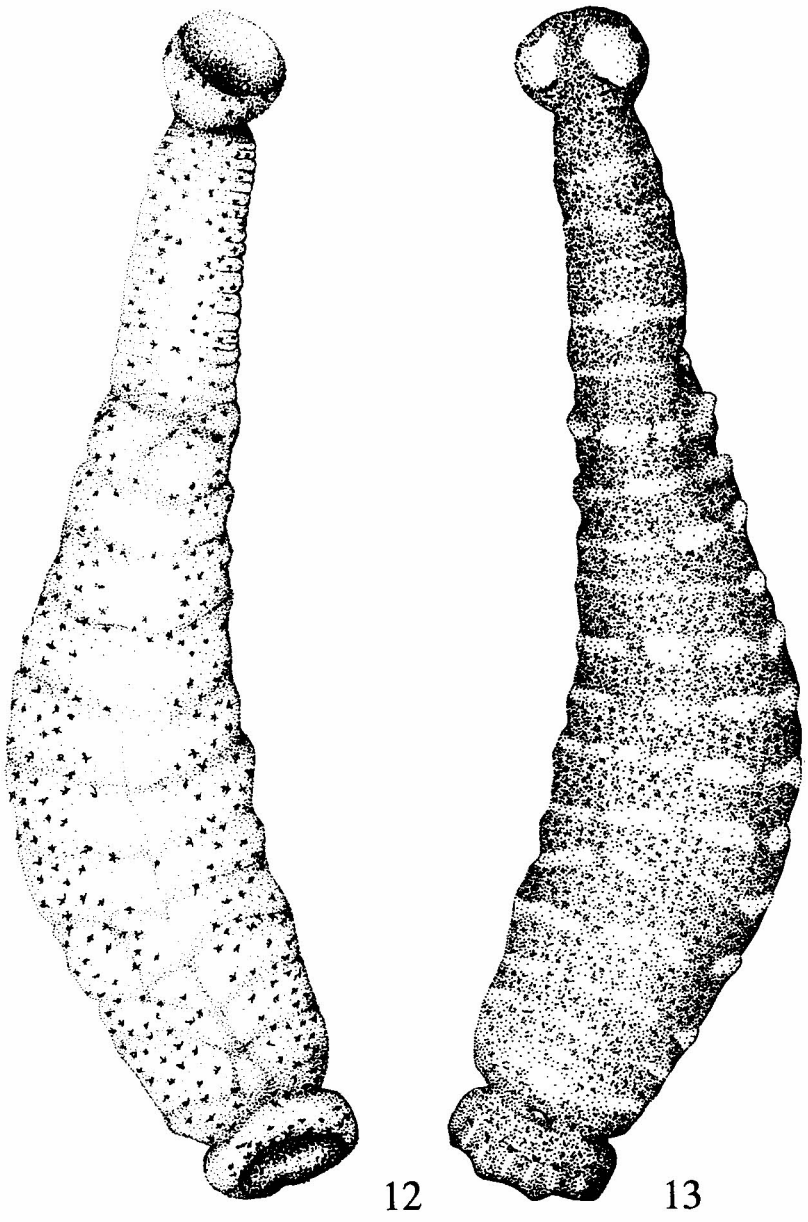
5-12) Parameters describing form of trachelosoma: width in place of sucker junction - d_1 ; in place of outline change (narrowing) - d_2 ; on the border with urosoma - d_3 ; the largest width of trachelosoma - D_1 ; the largest height of trachelosoma -



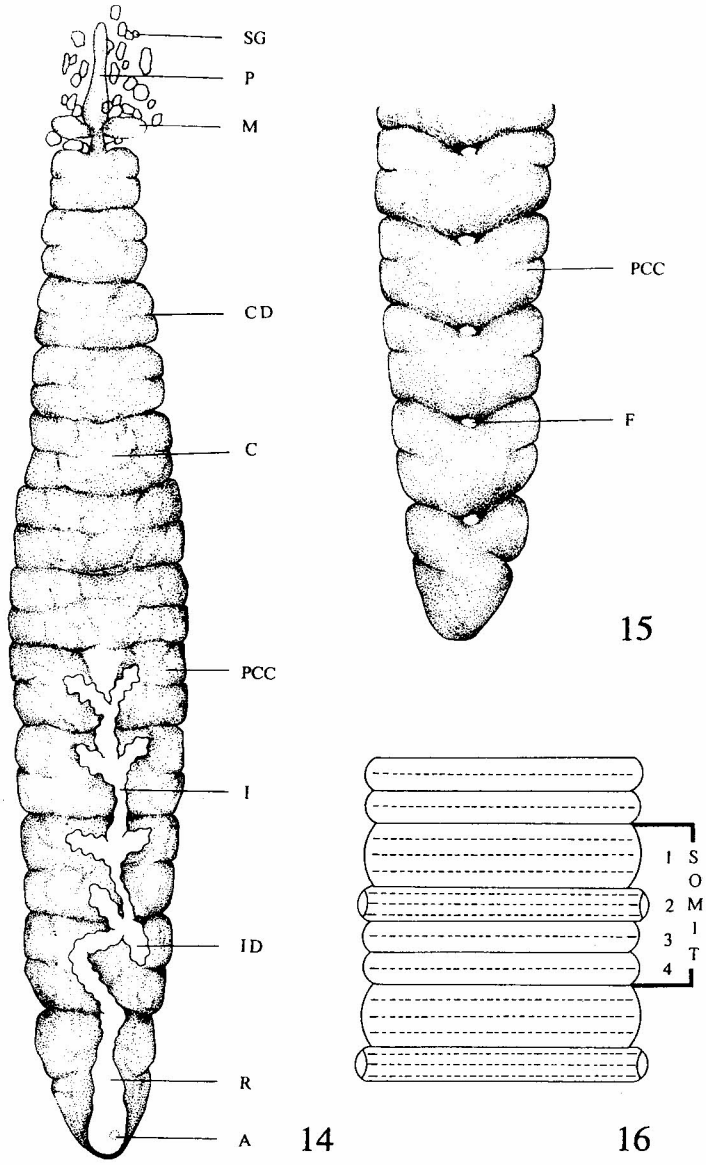
1-7. Diagrammatic representation of the arrangement of vector tissue (stippled) in *Piscicola geometra* and related species. 1. *Calliobdella* lophii, *C. nodulifera* and *Cystobranchus mammillatus*. 2. *Galatheabdella bruuni*, 3. *Calliobdella vivida*, 4. *Piscicola geometra* and *P. volgensis*, 5. *Cystobranchus respirans*, 6. *Cystobranchus fasciatus* and *Baicalobdella torquata*, 7. *Caspiobdella* ssp.; CA - copulatory area, CS - conducting strands of vector tissue, MA - male atrium, O - ovisac, SR - seminal receptacle, VT - vector tissue (after SAWYER, 1986)



8-11. Model of leech body form and *Italobdella ciosi* n. sp. - 8-9 - model, 10-11 - a generalized specimen, Power Point 2.0, based on mean measurements of 7 specimens



12-13. *Italobdella ciosi* n. sp.: 12 - ventral view, 13 - dorsal view



14-16. *Italobdella ciosi* n. sp.: 14 - alimentary tract; P - proboscis, M - mycetomes ("oesophegeal glands"), SG - salivary gland cell, C - crop, CD - caecal diverticulum, PCC - posterior crop caecum, I - intestine, ID - intestinal diverticulum, R - rectum, A - anus; 15 - posterior portion of digestive system, postcaecum (thin-walled caecum); F - fenestrae; 16 - typical somite (4-annulate)

N_1 ; height of the first trapezium - S_1 ; of the second trapezium - S_2 ; trachelosoma length - $L_1 = (S_1 + S_2)$.

13-25) Parameters describing the form of urosoma: width in places of outline distortion (bases of trapeziums) - d_4 ; d_5 ; d_6 ; width in place of sucker junction - d_7 ; the largest width of urosoma - D_2 ; the largest height of urosoma - N_2 ; height of trapeziums - S_3 ; S_4 ; S_5 ; S_6 ; urosoma length - $L_2 = (S_3 + S_4 + S_5 + S_6)$; distance from d_3 to D_2 = K_1 ; distance from D_2 to $d_7 = K_2$.

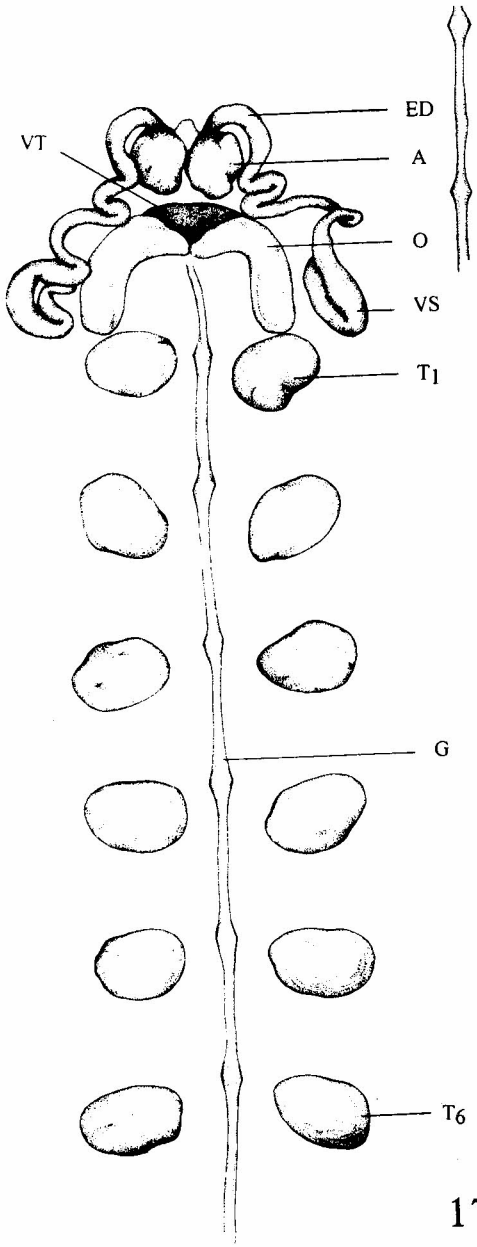
26-29) Parameters describing the form of posterior sucker: horizontal diameter - C1,2 ; vertical diameter C_2 ; length of anterior part of sucker - M_2 ; length of posterior part of sucker - R_2 .

The model is described by 19 indices. Using the model and IBM computer with Power Point 2.0 programme, images of particular specimens of leeches and a drawing of a leech of mean dimensions (resulting from measurements) were generated (fig. 10, 11).

The leeches are medium-sized. Of 7 specimens the largest measured 21.1 mm, at the largest width of 4.5 mm; the smallest 14.8 mm, its largest width being 2.6 mm. In further analysis of the measurements their mean values were used. The body length exceeds the largest width 4.6 times. The ratio of the largest width to the largest height (thickness) of urosoma is 1.4. The ratio of the largest width of urosoma to the largest width of trachelosoma is 2.3. The ratio of anterior sucker diameter to the largest width of trachelosoma is 0.9. The ratio of posterior sucker diameter to the largest width of urosoma is 0.5. The posterior sucker diameter exceeds that of the anterior sucker slightly, by 0.7 times.

The division into trachelosoma and urosoma is very well visible even in preserved and poorly fed specimens. The body is short, flattened, or only trachelosoma flattened and urosoma cylindrical in well fed specimens. It is easily seen in the table that three specimens had moderately filled alimentary tract, and in four it was packed with food. The anterior sucker is small or medium-sized, the posterior also small and united with urosoma somewhat eccentrically. Respiratory vesicles (11 pairs) are white, rather small but well visible. The body is smooth, with no papillae. Full somites consist of 4 rings each (fig. 16). On the rings further dividing grooves are visible. The first ring is the widest and divided in four parts, the second (vesicular) also in four, the third in two, and the fourth in two parts. The somite comprises a total of 12 parts.

Body colouration (figs 12, 13). It is a result of various arrangements of four kinds of melanophores: brown, black, white and yellow. Their arrangement makes the body brightly coloured and very characteristic. Even preserved specimens are difficult to mistake for other species of the family *Piscicolidae* known from Europe. The dorsal side is much darker than the ventral, since brown melanophores are arranged much denser, and though their processes are shorter, the bodies are bigger (thicker). The reverse is true of the ventral side: the processes are shorter and the bodies smaller. Trachelosoma is the darkest, the brown melanophores just named lose completely their processes, and only their bodies are left as irregular spots. Urosoma, because of the alimentary tract shining through, is lighter. Its dark colour is caused by densely arranged melanophores,



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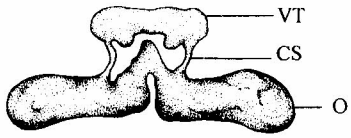

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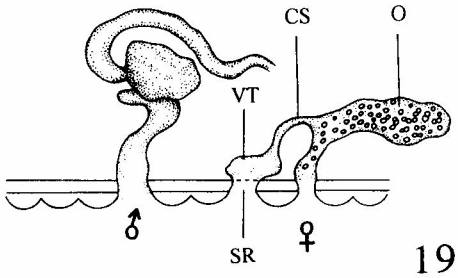

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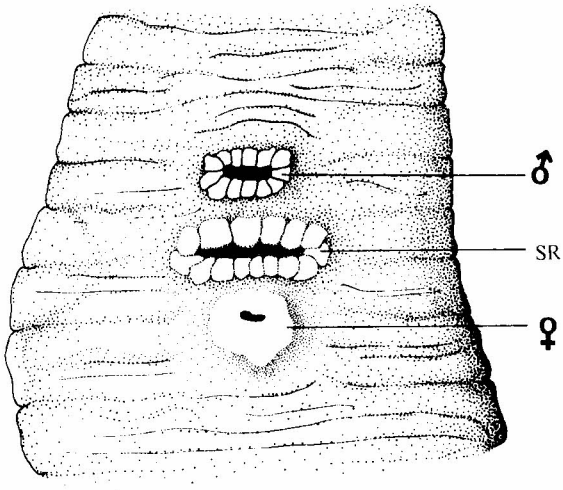

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17-20. *Italobdella ciosi* n. sp.: 17 - reproductive organs; ED - ejaculatory duct, A - atrium, VT - vector tissue, VS - vesicula seminalis, T_1, T_6, - testes of the 1st and 6th pair, O - ovisac, G - ganglion; 18-19 - position of vector tissue anterior to oviducts and its connection with the ovary through conducting strands; 18 - top view ovaries bent 180° backwards, 19 - side view, 20 - position of gonopores and seminal receptacle (spermatheca); SR - seminal receptacle

more often brown than black. White melanophores on trachelosoma form 4 or 5 spots in the median plane, the 4th or 5th spot being the largest and occupying 1.5 - 2 rings. It passes to the ventral side, forming a white band around trachelosoma. Left and right of the white median spots there are at the same level also white spots - paramedian (4 or 5), and on the sides of body also 4 or 5 white spots. On urosoma white spots have a similar arrangement. In the median plane there are 14 such spots, the last, 14th being situated on the dorsal side of the posterior sucker. Left and right of the median spots there are two rows of smaller white paramedian spots, thirteen on each side. On the sides of body, like on trachelosoma, there are 13 white spots on each side. In some specimens the white spots may fuse, and then on the dorsal side transverse bands are formed; the spots may also disappear completely.

On the anterior sucker big white spots form characteristic "spectacles", around which there are brown and black melanophores. The posterior sucker has very narrow white and wide brown-black radial streaks. There are 14 streaks of each kind. Yellow melanophores form small aggregations on the white spots. They are the most numerous on the white spots of the anterior sucker and on the 14th white spot of the posterior sucker.

Eyes. On the anterior sucker there are 2 pairs of eyes - the first larger, situated in the lower part of the white spots, obliquely relative to the axial plane; the second pair, situated perpendicular to that plane, is smaller. On the posterior sucker there are 10 eye-shaped spots, in its central part situated on the edge of dark radial streaks (fig. 13).

Alimentary tract (figs 14, 15). The mouth is situated eccentrically in the posterior part of the anterior sucker, and enters the proboscis sheath posterad. The position of the proboscis (P) is between the first and third nervous ganglia, beginning with the cephalic ganglionic mass (ganglia 1-6); it reaches to the ganglion of segment IX. Right and left of the proboscis there are salivary glands (SG). From IX to XII/XIII segment a thin-walled oesophagus stretches, which opens to the crop. There is an oesophageal gland (a pair of pockets) (M) opening to the oesophagus. Eight splanchnomeres situated primarily between segments are a characteristic feature of the crop (C). They are pair-wise divided along the left and right margin, each in two parts (CD). In XIX/XX somite, below the 7th crop splanchnomere, the intestine branches into a thin-walled caecum situated ventrally (PCC), and a thick-walled intestine proper (I) situated dorsally relative to the former. The thin-walled caecum (PCC) is built of 5 sacs which are not completely fused. In its dorsal and ventral part 5 openings (F) remain (at the level of neural ganglia). Each sac consists of 2 parts, like the crop splanchnomeres. The thick-walled intestine proper is characteristic compared with other species of European *Piscicolidae*. First of all it is very narrow, with folded margins. It has 5 paired branches (ID), of which the first 3 pairs are well developed, directed laterally and anterad. The fourth pair is not much smaller, and its branches are displaced to the axial plane; the fifth pair is very small and poorly visible. Posterad to it the intestine forms a twisted tube which further passes into rectum (R). The anus (A) is well visible, open, situated on the white field in the middle of the dorsum, two rings anterad to the posterior sucker.

Reproductive system (figs 17-20). The gonopores are separated by 3 rings. The male gonopore is very large, the female gonopore poorly discernible. In specimens with

moderately filled alimentary tract it is visible as an opening in the middle of a round, white field; in animals with alimentary tract packed with food it forms a slit between the rings (one ring posterad to the seminal receptacle opening). The seminal receptacle (SR) is present but there is no copulatory area (CA) on the clitellum. In the male reproductive system there are 6 pairs of testes (T_1-T_6) situated between segments from XIII/XIV to XVIII/XIX. From testes vasa efferentia depart, which join longitudinal vasa deferentia. The latter pass anterad into seminal vesicles (VS) at the level of the 1st pair of testes. Then they form ejaculatory ducts (ED) in form of thick loops, which do not reach the fifth neural ganglion and unite with the common part of atrium. The atrium (A) has a characteristic process in its middle upper part. Prostate glands on the atrium are present. In the female reproductive system the ovaries (O) are flattened, of a semilunate shape, with their posterior ends touching testes of the 1st pair. Anterior ends of the ovaries (just before passing into oviducts) cover the vector tissue (VT). The ovaries open to the female gonopore anterior to the mass of vector tissue. *Italobdella ciosi* n. sp. is characterized by a special structure and position of the vector tissue. It has a shape of a narrow plate situated transversely to the long body axis, above the oviduct outlet. Such a position makes the paired conducting strands of vector tissue (CS) have a shape of very short bands of fibres connecting each ovary with the vector tissue. Thus the space between the converging oviducts and the testes of the 1st pair is free. The vector tissue and the paired conducting strands are best visible after bending the ovaries backwards by 180° (figs 18,19).

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