First record and morphometry of the non-indigenous fathead minnow *Pimephales promelas* (Rafinesque, 1820) (Teleostei, Cyprinidae) in Flanders (Belgium)

Dieter Anseeuw[1], **Thierry Gaethofs**[2] **and Gerald Louette**[3]

[1] **Institute for Forestry and Game Management, Duboislaan 14, B-1560 Hoeilaart**
Current address : Interdisciplinary Research Center, KULAK, E. Sabbelaan 53, B-8500 Kortrijk
[2] **Royal Museum for Central Africa, Laboratory of Ichthyology, Leuvensesteenweg 13, B-3080 Tervuren**
[3] **Laboratory of Aquatic Ecology, KULeuven, Ch. De Béroitstraat 32, B-3000 Leuven**
Corresponding author : T. Gaethofs, e-mail : thgaethofs@belgacom.net

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Pimephales promelas is widely distributed across North America. Its home area ranges from southern Chihuahua, Mexico, north to the Maritime Provinces and Great Slave Lake District of Mackenzie (Canada) and from the Rocky Mountains eastwards to the Appalachians. It has been introduced to both Atlantic and Pacific coastal drainage basins in the United States (1, 2). In Europe, reproducing populations of this non-native species have only been documented from the River Chiers in the Meuse basin in France (3).

The fathead minnow (*P. promelas*) is a robust, somewhat laterally compressed, cylindrical cyprinid with a maximal length of 100 mm. Its overall coloration is dark olive-green or brown above with a straw-coloured to whitish belly. At the base of the caudal fin, often a narrow dark vertical bar is present. A diagnostic feature is the shortened first ray in the dorsal fin. Males generally grow larger than females and have a typical swollen black head (4, 5, 6).

In 1995, the Institute for Forestry and Game Management (IBW) has made the first wild record of *Pimephales promelas* for Flanders (Belgium). Fish were collected using a pulsed-DC DEKA 7000 electrofishing unit with a ring anode. Three individuals were recorded in two small tributaries of the River Demer (Scheldt basin). Two specimens were captured in the Munsterbeek and a single specimen in the Zutendaalbeek. In 2001, ichthyological exploration of the Demer subbasin revealed 36 specimens of *P. promelas* from 7 localities in 3 different waters : Grote Gete, Melsterbeek and Cicindria (Fig. 1). The presence of *P. promelas* has never been recorded in other basins of Flanders, despite the numerous fish stock inventories by various research groups within the last 10 years.

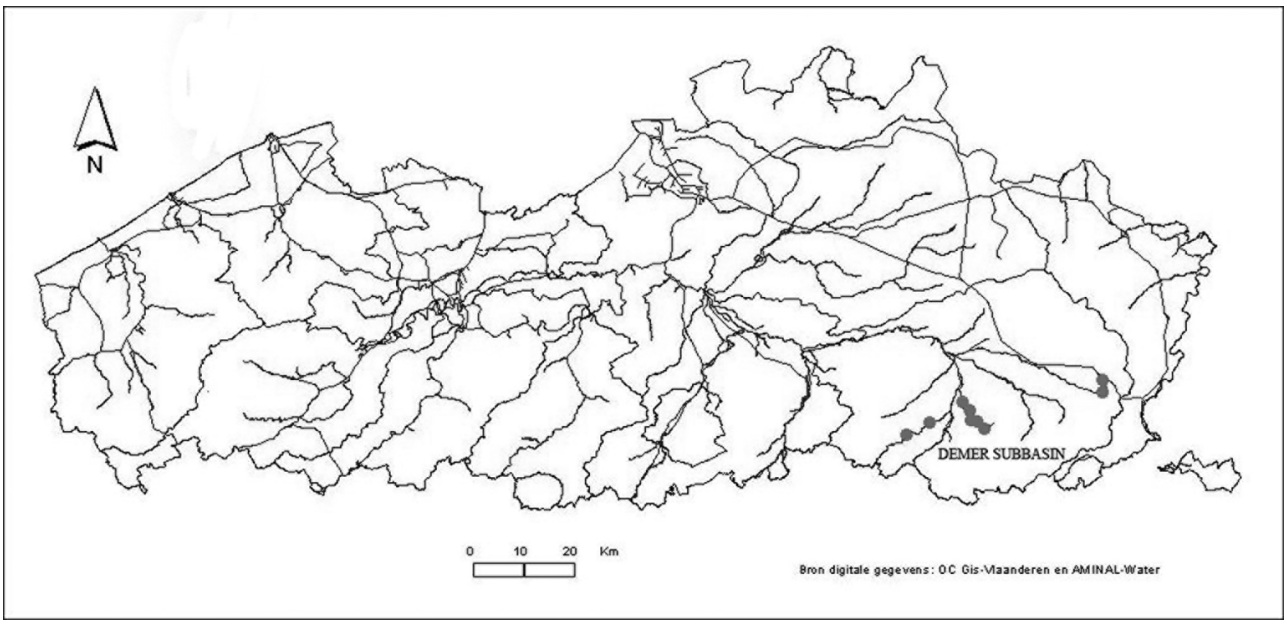

Fig. 1. – Map of the hydrogeographical network of Flanders (Belgium). The records of *Pimephales promelas* in the tributaries of the Demer subbasin are marked with spots.

A morphometric study was performed on different populations of this minnow species in North America (1). However, merely five morphological characters and three meristic variables were investigated. No data on the morphometry of introduced specimens of this alien fish in European countries are available by which a comparison can be made. We present here the results of a morphometric analysis exerted on 30 specimens from two different watercourses (Melsterbeek and Cicindria) of the Demer subbasin, which can serve as a base reference for future research. Thirty-seven morphometric variables were measured on the head and body of each fish specimen (Fig. 2). Measurements were taken point to point to 0.1 millimeter. The investigated specimens of *P. promelas* are housed in the fish collection of the Royal Museum for Central Africa in Tervuren (A1053-P-693-702 ; A1053-P-703-723).

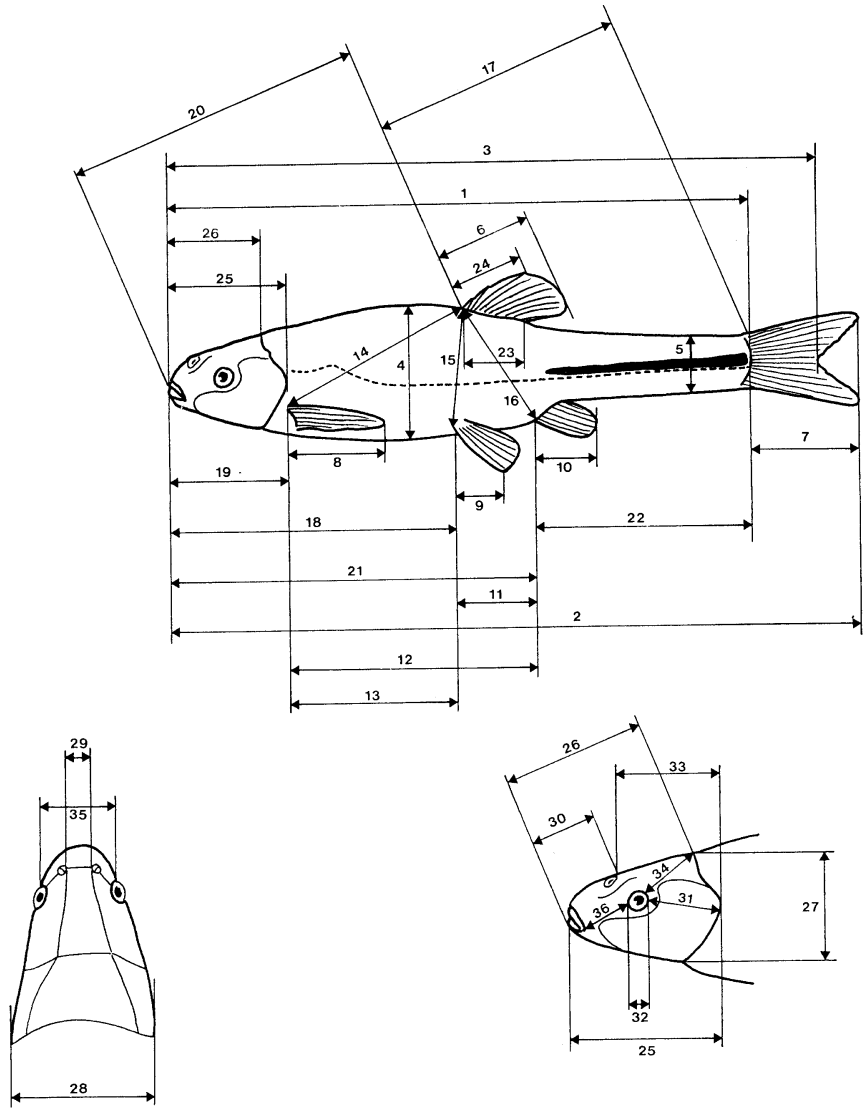

Fig. 2. - Location of the mensural measurements taken on the left side of the body and head and on the dorsal surface of the head of a *Pimephales promelas* specimen.

1 = standard length (ST), 2 = total length (TL), 3 = fork length (FL), 4 = maximum body depth (Mbd), 5 = minimum body depth (mbd), 6 = depth dorsal fin (DD), 7 = length caudal fin (LC), 8 = length pectoral fin (LPc), 9 = length ventral fin (LV), 10 = depth anal fin (DA), 11 = distance between anal fin and ventral fin (AV), 12 = distance between anal fin and pectoral fin (Apc), 13 = distance between ventral fin and pectoral fin (VPc), 14 = distance pectoral fin and dorsal fin (PcD), 15 = distance between ventral fin and dorsal fin (VD), 16 = distance between anal fin and dorsal fin (AD), 17 = distance between dorsal and caudal fin (DC), 18 = preventral length (PrV), 19 = prepectoral length (PrPc), 20 = predorsal length (PrD), 21 = pre-anal length (PrA), 22 = length caudal peduncle (LPC), 23 = length dorsal fin (LD), 24 = length of dorsal spine (Ldsp), 25 = maximum head length (MHL), 26 = frontal head length (frHL), 27 = head depth (HD), 28 = head width (HW), 29 = internasal length (ina), 30 = length snouth (LSn), 31 = postorbital length (Po), 32 = eye diameter (ed), 33 = distance between nose and operculum (nop), 34 = distance between eye and head-body transition (ehb), 35 = interorbital distance (io), 36 = distance between eye and mouth angle (ema).

TABEL 1-3

Morphological characters of male and female specimens of *Pimephales promelas* collected in two brooklets of the River Demer (Melsterbeek and Cicindria).

Melsterbeek n = 10 Character	Mean	Stdev	Min	Max	Var
ST	53,95	5,17	44,2	61,7	26,81
TL	66,13	5,52	56,08	75,12	30,48
FL	61,53	5,55	51,04	69,95	30,9
in % SL					
Mbd	23,93	2,03	20,18	27,01	4,13
mbd	11,71	0,93	9,49	13,03	0,87
Ldsp	14,94	0,88	13,21	16,17	0,77
LC	23,36	2,32	18,96	26,85	5,42
LPc	18,64	0,94	17,37	20,70	0,88
LV	15,02	1,06	13,58	16,92	1,14
DA	14,24	2,30	10,67	17,13	5,31
AV	16,24	1,15	14,98	18,63	1,32
VPc	27,88	1,59	24,50	29,79	2,54
APc	43,76	2,35	39,52	47,27	5,52
PcD	33,64	1,54	31,13	35,50	2,39
VD	22,19	1,85	18,28	24,98	3,44
AD	25,63	1,37	22,91	27,78	1,88
DC	49,55	1,42	47,84	52,05	2,03
PrV	52,30	1,33	50,08	54,05	1,79
PrPc	25,46	0,50	24,71	26,15	0,25
PrD	52,54	1,40	50,01	54,09	1,98
PrA	67,42	1,86	65,22	70,89	3,46
LCP	33,89	1,27	31,78	36,24	1,61
LD	12,92	0,84	11,65	14,17	0,70
LA	7,72	0,95	6,38	9,260	0,90
DD	22,25	1,38	20,11	23,96	1,90
MHL	24,45	1,02	22,34	25,92	1,04
in % MHL					
HW	60,81	3,29	57,62	67,50	10,84
HD	75,38	3,28	71,79	81,92	10,81
io	41,47	2,17	38,09	45,48	4,71
LSn	32,48	2,11	28,70	35,63	4,45
Po	49,52	2,70	43,31	52,04	7,30
ed	21,85	1,39	20,15	24,39	1,95
frHL	82,15	3,15	77,21	87,15	9,93
ema	22,55	2,28	20,35	26,54	5,22
ina	16,40	1,55	14,83	19,61	2,40
nop	75,75	2,18	72,19	79,34	4,76
lvl	23,41	1,09	21,65	25,22	1,19
ehb	41,84	1,59	38,38	43,46	2,55

Cicindria n = 10 male fish Character	Mean	Stdev	Min	Max	Var
ST	57,09	7,98	45,03	66,15	63,77
TL	68,18	8,64	55,60	77,85	74,67
FL	64,33	8,60	51,89	73,66	73,99
in % SL					
Mbd	26,57	2,00	23,45	29,55	4,00
mbd	12,63	0,57	11,75	13,61	0,32
Ldsp	13,65	0,93	12,57	15,01	0,87
LC	23,02	1,60	20,92	26,98	2,56
LPc	19,43	0,81	18,23	20,83	0,67
LV	16,08	1,00	14,67	17,48	1,00
DA	15,79	0,96	14,11	17,10	0,93
AV	15,56	1,18	13,39	17,32	1,39
VPc	44,44	3,15	38,55	48,21	9,92
APc	29,10	2,38	24,86	32,09	5,70
PcD	34,63	1,61	32,20	37,10	2,61
VD	24,48	1,68	22,40	26,98	2,85
AD	26,95	1,34	25,52	29,18	1,82
DC	49,56	1,17	47,62	51,43	1,38
PrV	53,63	1,83	50,82	55,43	3,37
PrPc	25,75	0,94	23,75	27,42	0,90
PrD	52,37	0,83	51,31	53,55	0,70
PrA	67,91	1,87	64,60	70,14	3,51
LCP	34,31	0,93	32,84	35,58	0,88
LD	13,64	0,39	12,80	14,08	0,15
LA	8,24	0,52	7,27	9,08	0,27
DD	23,17	0,78	21,96	24,07	0,60
MHL	25,28	0,81	23,96	26,63	0,67
in % MHL					
HW	65,24	4,14	60,44	73,58	17,14
HD	83,05	6,27	73,35	93,82	39,32
io	46,34	5,04	41,03	53,80	25,46
LSn	34,68	3,51	28,70	40,30	12,33
Po	50,12	1,76	47,14	52,89	3,10
ed	20,30	1,61	17,82	22,71	2,59
frHL	83,81	2,58	80,09	87,95	6,68
ema	24,11	3,79	19,12	29,85	14,41
ina	17,77	1,22	14,64	18,77	1,51
nop	75,97	2,77	71,73	80,84	7,72
lvl	25,83	2,27	21,31	28,81	5,18
ehb	44,59	3,18	39,47	49,71	10,16

Cicindria n = 10 female fish Character	Mean	Stdev	Min	Max	Var
ST	48,57	3,95	44,26	55,2	15,64
TL	59,63	4,55	55,35	68,22	20,72
FL	55,29	4,46	50,64	63,14	19,93
in % SL					
Mbd	27,45	1,18	25,19	29,01	1,41
mbd	11,69	0,62	10,46	12,67	0,38
Ldsp	14,10	1,28	10,84	15,31	1,64
LC	24,23	1,06	22,38	25,59	1,14
LPc	18,01	0,93	16,55	19,50	0,87
LV	14,33	0,86	13,20	15,47	0,74
DA	10,59	0,51	9,94	11,64	0,26
AV	17,32	0,97	15,58	18,58	0,94
VPc	47,83	2,34	44,68	51,87	5,47
APc	31,13	2,14	28,35	35,59	4,60
PcD	36,11	1,53	32,78	38,67	2,36
VD	26,08	1,49	22,84	27,59	2,23
AD	26,04	0,96	24,71	27,42	0,93
DC	50,35	1,01	48,61	52,08	1,03
PrV	53,49	1,37	51,78	56,45	1,88
PrPc	24,08	0,77	23,08	25,41	0,60
PrD	52,45	1,08	50,12	53,75	1,18
PrA	70,98	6,66	67,60	89,69	44,43
LCP	32,19	0,81	31,10	33,41	0,66
LD	13,06	0,72	11,94	14,14	0,53
LA	6,14	0,57	5,25	7,21	0,32
DD	20,22	1,85	16,03	22,61	3,45
MHL	24,08	0,60	23,17	24,89	0,36
in % MHL					
HW	64,79	2,93	59,90	68,53	8,64
HD	78,50	2,72	74,61	82,90	7,41
io	42,27	2,40	39,89	47,16	5,76
LSn	31,64	1,69	29,31	34,04	2,85
Po	47,65	1,21	45,64	49,16	1,46
ed	24,07	1,81	21,29	26,95	3,28
frHL	86,67	2,80	82,40	91,86	7,87
ema	20,18	2,00	16,85	23,97	4,02
ina	16,28	1,66	12,82	18,71	2,77
nop	75,81	2,37	71,87	78,22	5,61
lvl	24,75	1,44	23,26	27,91	2,09
ehb	44,29	2,11	41,79	47,46	4,47

Sexual dimorphism is particularly manifested by means of larger anal fin length and larger body size in male fish. All biometric data are summarised in Table 1-3. Yet, no wild-caught *P. promelas* juveniles have been reported from Flanders. As both genders were in breeding condition, and regarding its expanding distribution, the species seems to be established.

The fathead minnow has attracted much attention to man as forage fish, suitable for pond culture, and as bait-fish for trout angling (7, 8). In Belgium and adjacent countries, a xanthoric form of this species is being sold for ornamental purposes. Non-indigenous species have often been found to out-compete, prey upon, or bring diseases to economically or ecologically valuable native species (9, 10). With respect to the potential harm involved with the introduction of non-indigenous species and the possible invasivity of the fathead minnow, one should be aware of, and follow up the development of this non-native fish species.

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