

1. IDENTITY

1.1 Nomenclature

1.11 Valid name

Osmerus eperlanus (Linnaeus, 1758).

Original combination: Salmo Eperlanus
Linnaeus, 1758, Syst. Nat. (ed. 10), p. 310

1.12 Objective synonymy

Salmo eperlano-marinus Bloch, 1782,
Naturgesch. d. Fische Deutschlands 1, p. 128,
Pl. 28, Fig. 1.

Osmerus eperlanus: Lacépède, 1804, Hist.
nat. des Poissons, 5, p. 229.

Salmo (Osmerus) eperlanus: Pallas, 1814,
Zoogr. Ross. As., 3, p. 386.

1.2 Taxonomy*

1.21 Affinities

Suprageneric

Superphylum-Chordata
Phylum-Vertebrata
Subphylum-Craniata
Superclass-Gnathostomata
Series-Pisces
Class-Teleostomi
Subclass-Actinopterygii
Order-Clupeiformes
Suborder-Salmonoides
Family-Osmeridae
Subfamily-Osmerinae

Generic

Osmerus Linnaeus, 1758, Syst. Nat. (ed. 10)
p. 310. Type species: Salmo eperlanus
Linnaeus, 1758. [Linnaeus (1758) adopted four
sub-divisions of his genus Salmo, one of which
he named 'Osmeri'. The generic name Osmerus
Linnaeus, 1758, with type-species Salmo
eperlanus Linnaeus, was validated in Direction
69 of the International Commission on Zoologi-
cal Nomenclature.]

*One large canine on either side of vomer,
sometimes accompanied by smaller ones. Pala-
tine teeth enlarged anteriorly. Maxillary ex-
tends to about posterior border of orbit. No
striae on opercle or subopercle. Distance
from snout to dorsal origin shorter than from
dorsal origin to caudal base. A midlateral
ridge, but no anal shelf or elongated midlate-
ral scales in male. Gill-rakers 25 to 37.
Pyloric caeca 3 to 8. Stomach with blind sac.

Lower jaw spatulate. Anal rays 11 to 14.
Midlateral scales 58 to 72. Lateral line in-
complete. Adipose base about two-thirds of
orbit diameter (rarely in large specimens equal
to orbit). Orbit diameter two-thirds or less
of caudal peduncle depth. Proethmoid double.
Mesethmoid simple, without other ossifications.
Parietals completely separated by supraoccipi-
tal. Pterosphenoidea not reaching parasphenoid
anteriorly. Slit present between hyomandibu-
lar. Four simple actinosts. (McAllister,
1963).

Anadromous or landlocked forms in the
Polar, Pacific and Atlantic Oceans and their
drainages.

Subjective generic synonyms

Eperlanus Gaimard, 1850-52, Voy. en Islande
et Groenland, Paris. Atlas, pl. XVIII, fig. 2
(type-species: Eperlanus vulgaris Gaimard).

Allosmerus Hubbs, 1925, Proc. Biol. Soc. Wash.,
38, p. 53. (type-species: Osmerus attenuatus
Hubbs).

Specific

Three forms of the boreal smelt have gen-
erally been recognized; O. eperlanus of the
North and Baltic seas, O. dentex of the Pacific
north into the Arctic and west to the White Sea,
O. mordax of the Western Atlantic. Following
detailed studies of their populations Berg
(1948), Andriashev (1954) and other Russian
workers have reduced dentex to a subspecies of
eperlanus. Some American authors (Kendall,
1927; McKenzie, 1958, and others) consider the
American smelt as a separate species, but
Bigelow et al. (1963) and McAllister (1963),
who made a revision of the Osmeridae, considered
that the genus Osmerus includes only one species,
O. eperlanus (L).

1.22 Taxonomic status

It is a morpho-species, a polytypic species
with many geographical and ecological forms.

1.23 Subspecies

Key to subspecies of Osmerus eperlanus
(from McAllister, 1963).

1(2) Pored scales in the lateral line usually
14-28 (rarely 13-30). Western Atlantic, Pacific
and Arctic west to the White Sea and their
drainages
Osmerus eperlanus mordax (Mitchill)

*After Berg (1948) and McAllister (1963)

2(1) Pored scales in the lateral line usually 6-13 (rarely 0-16). Baltic and North seas and their drainages and Upper Volga River
Osmerus eperlanus eperlanus (Linnaeus)

Osmerus eperlanus mordax (Mitchill) 1814*

Atherina mordax Mitchill, 1814, p. 15, New York (Speirs 1951, indicated that this was the type description).

Osmerus viridescens Le Sueur, 1818, p. 230, coast of Maine.

Osmerus sergeanti Norris, 1868, p. 93, Sohuykill River, New Jersey (described but not named by Norris, 1868, p. 58).

(Osmerus sergenti auctorum).

Osmerus spectrum Cope 1870, p. 490, Wilton Pond, Kennebec County, Maine.

Osmerus dentex Steindaehner, 1870, p. 429, Dekastria Bay, USSR.

Osmerus dvinensis Smitt, 1882, p. 32, Northern Dvina River, Russia.

[The following natioes named by Petrov, 1925 p. 82, 108, have no status under the rules of the Int. Comm. Zool. Nomencl. Osmerus e. dentex natio kaninensis, Cheshekaya Gulf; O. e. dentex natio jenisseensis, Enisey River at Tyurin and some other localities].

Diagnosis

Distinguished from other osmerid species by the two large canines, one on either side of the vomer opercular striae; the maxillary extending past the pupil. 4 to 8 pyloric caeca. This subspecies is distinguished from O. e. eperlanus by the greater number of pored lateral line scales, usually 14 to 28.

Description

D 8-10(11); C 19; A (12)13-15(16); V 8; P 11-13(14); LL (13,14)15-28(29,30); midlateral scales (62)63-69(72); vertebrae (58,59) 60-66(67,68,70); gill-rakers 8-11 + 18-24 = (26) 27-36(37); branchiostegals (6)7-8; pyloric caeca 4-8. Standard length 3.8 to 4.4 times head length, 4.7 to 7.4 times depth. Pectorals reaching from one-half to two-thirds the distance to pelvic insertion; pelvic a little more than half way to anal origin. Adipose base short, about two-thirds of eye diameter.

Medium sized canines on dentary, enlarging posteriorly. Small pointed teeth on premaxillary and maxillary. Canines on anterior end of tongue enlarged. Pelvic origin anterior to dorsal origin. Ductus pneumaticus attached to anterior end of gas bladder. Lateral line incomplete, ceasing about a head's length along the body.

Peritoneum light with dark speckles, more intense dorsally. Ventral portion of body pale; dorsum speckled with black, more intensely around exposed borders of scales. Chin and top of head evenly speckled. A dark medio-lateral bar without sharply delimited border. In life sides an iridescent silver, the back an olive green. Total length to 324 mm according to Berg (1948). A larger subspecies than O. e. eperlanus.

Osmerus eperlanus eperlanus (Linnaeus) (Fig. 1).

Salmo eperlanus Linnaeus, 1758, p. 310. European seas and rivers.

Eperlanus Schonfoldii Rutton, 1772, p. 358, Ireland.

Salmo eperlano-marinus Bloch, 1782, p. 229, Table 28, Fig. 1, northern and Baltic seas and into rivers.

Salmo eperlanus var. marinus Walbaum, 1792, p. 57.

Salmo spirinchus Pallas, 1814, p. 387, lakes and rivers. Germany, European Russia, (Beloozero, Chudsk, and other localities).

[Eperlanus Rondeletii Willughby, 1789, p. 202, Table 6, Fig. 4, Anadromous in Thames (unavailable since it is a reprint of a pre-Linnaean edition originally published in 1686)].

Salmo eperlanus marinus: Walbaum, 1792, p. 57 (ex. Bloch).

[Eperlanus fluviatilis Gesner, in the synonymy for Salmo eperlanus of Donovan, 1804, p. 189 (not available, a pre-Linnaean name cited in a synonymy)].

Eperlanus vulgaris Gaimard, 1851, p. 207, p. 18, Fig. 2, Iceland (this species not known in Iceland before or since this time according to Saemundsson, 1949).

Osmerus e. eperlanus natio ladogensis Berg, 1932, p. 281, Lake Ladoga (infraspecific names have no status under the Int. Rules Zool. Nomencl.)

* Diagnosis, description of subspecies and synonymy by McAllister (1963:15-21).

Diagnosis

This subspecies is distinguished from O.e. mordax by the lower number of pored lateral line scales, 4 to 13.

Descriptions:

D 7-9; C 19; A (11)12-13 (14); V 8; P 11-12(13); LL (0)4-13(16); midlateral scales (58)61-69; vertebrae (55,56)57-61(62,63); gill-rakers 25-37; branchiostegals 7(8), pyloric caeca 3-7. Standard length about 4 to 5 times head length, 5.6 to 6.1 times depth; pectorals extend one-half to two-thirds the distance to the pelvic insertion; pelvis about half-way to anal origin. Adipose base short, about two-thirds the orbit diameter.

Medium sized canines on dentary, enlarging posteriorly. Small pointed teeth on premaxillary and maxillary. Ductus pneumaticus attached to anterior end of the air bladder. Lateral line incomplete, ceasing less than a head's length along the body.

Peritoneum light with dark speckles. Back greenish, sides silver in life. Total length to 307 mm according to Berg (1948). A smaller form than O.e. mordax.

1.24 Standard common names and vernacular names - See Table I.

TABLE I

Standard common names and vernacular names of Osmerus eperlanus (L.)

Country	Standard common name	Vernacular name
England	smelt	
France	éperlan	
Netherlands	smelt	
Finland	kuore	
Sweden	nors	
Norway	nors	
Canada	smelt, éperlan	
USA	smelt	
USSR	koriushka	rainbow smelt zubatka, ogu- rechnik, koreha, snetok, tint, nors, salaka.
Japan	kyuri-uwo	

1.3 Morphology

1.31 External morphology

McAllister (1963), who studied the geographical variability of smelt, came to the

conclusion that the only difference between dentex and mordax is the vertebral number (Table II), however this may be because of lower water temperature during the development of dentex eggs. McAllister therefore considered dentex a synonym of mordax. Mordax and eperlanus differ considerably (especially number of pored lateral line scales - Table VI). Using this character alone over 90 percent of all the specimens of both forms can be separated. Since the two forms are allopatric and since vertebral and anal ray differences all overlap considerably it is necessary to consider the two forms as subspecifically different. The difference is nonlocal (McAllister, 1963).

Data on plastic characters of different smelt populations of Europe and Asia are given in Tables III-V, on meristic characters in Table VI.

Plastic characters of the smelt vary considerably with age (especially height of fins and their situations, width of forehead, eye diameter). Kirpichnikov (1935) found that height of fins decreases with growth: correlation coefficients between height of A and standard length (L) in the White Sea smelt were -0.40 and -0.45 (for various samples), between height of D and L were -0.38, -0.42, -0.73; between P and L were -0.45 and -0.47; between V and L -0.54. Eye diameter also shows a negative correlation: -0.79 and -0.75. Snout length and forehead width increase with age: the correlation coefficients were +0.66 and +0.75. Values of A-V, P-V, D-d also increase, although the correlation coefficient is rather low (usually less than +0.50).

The smelt scale is very specific (Figs. 2, 3). "The smaller year-old smelt has scales with relatively large focus and no complete circuli in the first growth field whereas scales of the larger fish have a smaller focus and one to several completed circuli. Both types however exhibit clearly the diagnostic features of a gradual shortening of the horseshoe-shaped incomplete circuli as growth slows in late season and a distinct cutting over the first circulus of the second growing season. Later annuli are easily recognizable. A growth field contains a series of complete circuli that gradually shorten as growth slows. The first circulus that appears in the following growing season cuts across these shortened circuli" (Bayley, 1964). The year annuli form as scars outside the series of incomplete circuli of the last growing season (Figs. 2, 3). Annulus formation starts near June. Circulus number in the successive years of growth in different smelt populations is shown in Table VII.