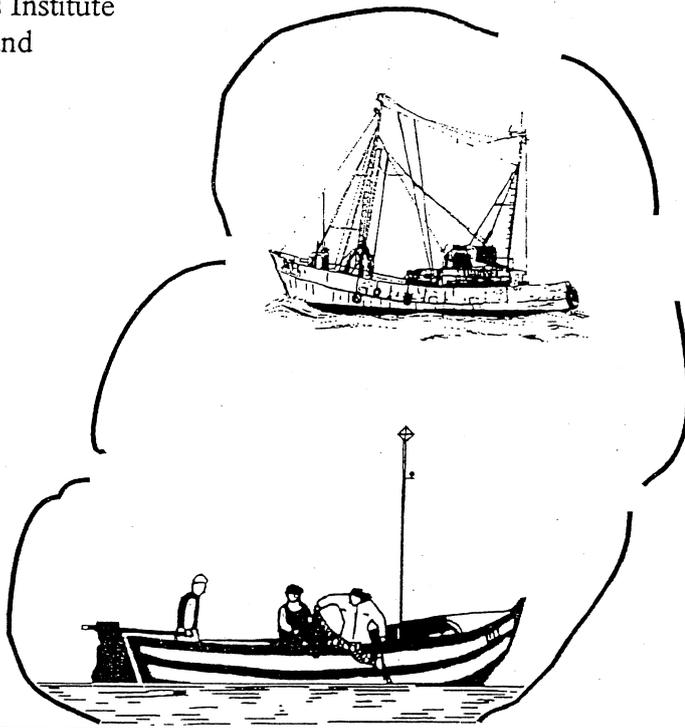


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OCCURRENCE OF *ANISAKIS SIMPLEX* LARVAE IN HERRING FROM THE SOUTHERN BALTIC SEA

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OBJECTIVE

The aim of our investigation was to analyse the present state of the extraintestinal occurrence of *Anisakis simplex* and other anisakid larvae in herring caught in the Polish Economic Zone, with special regard to the coastal fishing grounds, and adjacent areas (ICES-Subdivisions 26, 25 and 24).

RESULTS

The herring investigated in the years 1987-1994 (n=31,091) from the southern Baltic were found to be infected mainly with larvae of *A. simplex* Rud., 1809 (ranging from 0 to 86% in sample under examination), very rarely with *Hysterothylacium auctum* (Rud., 1802), *Contracaecum osculatum* C (Rud., 1802) and *Raphidascaris acus* (Bloch, 1779). The intensity of infection with *A. simplex* larvae ranged from 1 to 157 – average of 8 larvae per infected fish.

Herring examined belonged to the following spawning stocks:

- spring coastal herring - "W"
- spring open sea herring - "WM"
- autumn herring - "J"

A. simplex larvae occurred mainly in herring from spawning group "W" and sporadically in "WM" and "J" (Figure 1).

Prevalence (%)	W	WM	J	Unidentified
<i>A. simplex</i>	14,5	0,16	0,15	6,1
<i>H. auctum</i>	0,048	0,045	0,075	0
<i>C. osculatum</i>	0,17	0	0	0
<i>R. acus</i>	0,004	0	0	0

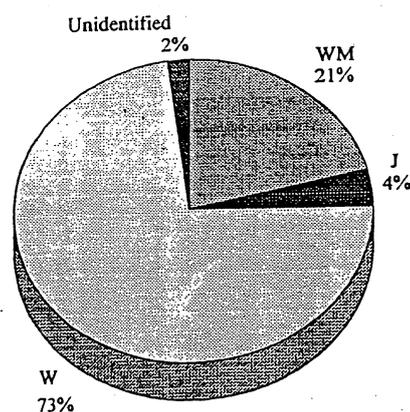


Fig. 1. Per cent of herring examined belonging to particular spawning stock (W, WM, J) and their prevalence of infection with anisakid larvae.

The prevalence of herring infection in different fishing sites and fishing grounds is presented in Figure 2 and Table 1.

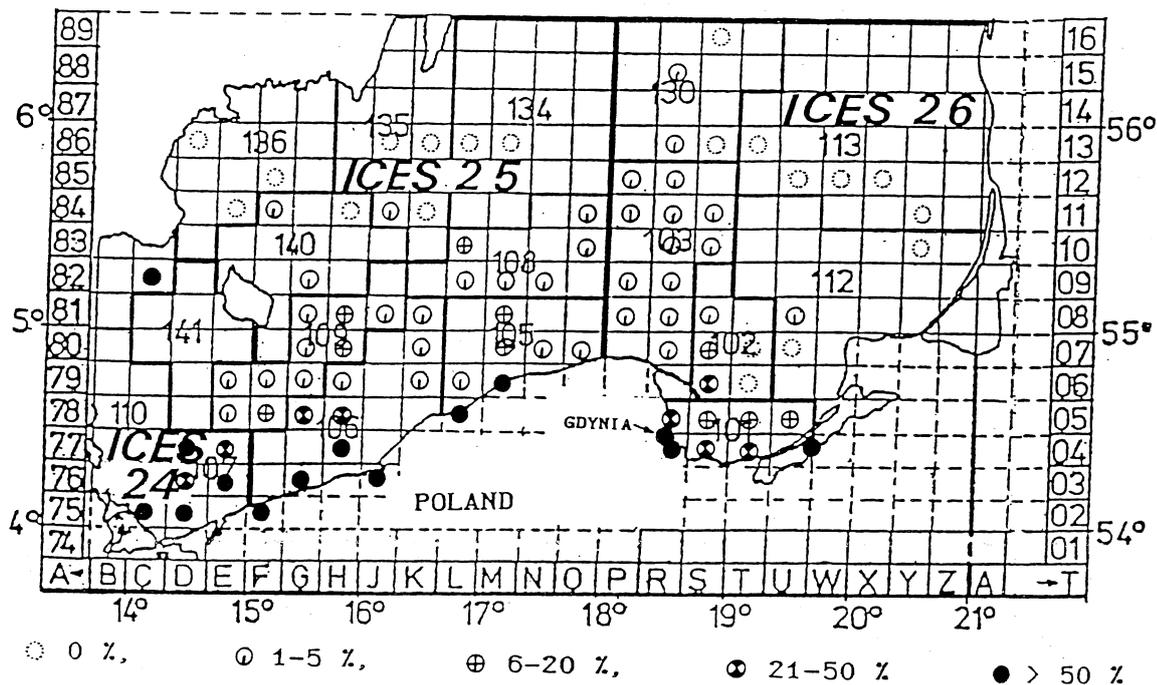


Fig. 2. Herring fishing sites and maximum prevalence of infection with *A. simplex* larvae, in fish samples examined.

Tab. 1. Infection of herrings with *A. simplex* larvae in particular fishing grounds of Southern Baltic (total data from the period of herrings with 1987-1994)

ICES subdi- vision	fishing ground No.	months of fishing	number of fish exami- ned	per cent of fish exami- ned	mean length of fish in cm	infection			
						preval- ence %	intensity mean	abunda- nce	density
26	101	1-12	12 973	87	22.9	10.2	8.1	0.83	10.6
	102	1-12	3 199	60	23.4	3.6	8.7	0.31	2.2
	103	1-12	3 512	54	23.3	1.6	6.5	0.11	1.7
	112	10	236	44	24.3	0.8	1.0	0.008	nd
	113	10	364	31	22.2	0	0	0	0
	130	10	475	35	22.6	0.2	1.0	0.002	nd
25	105	2-10	1 922	80	23.3	14.8	6.0	0.89	11.2
	106	2-12	2 491	83	23.9	28.3	7.0	2.0	20.3
	108	2-9	2 135	44	23.2	0.8	11.3	0.09	1.4
	109	2.5-11	1 658	56	23.4	2.0	7.2	0.14	2.3
	134	8	100	22	23.7	0	0	0	0
	135	6-11	399	33	24.1	0.25	10.0	0.02	0.4
	136	6, 10	104	46	20.3	0	0	0	0
24	107	2-5	1 584	99	24.6	49.4	9.1	4.49	39.9
	110	4	50	90	24.9	58.0	7.6	4.4	41.3

nd - not done

A pronounced seasonal character in the prevalence of herring infected was obtained (Figure 3).

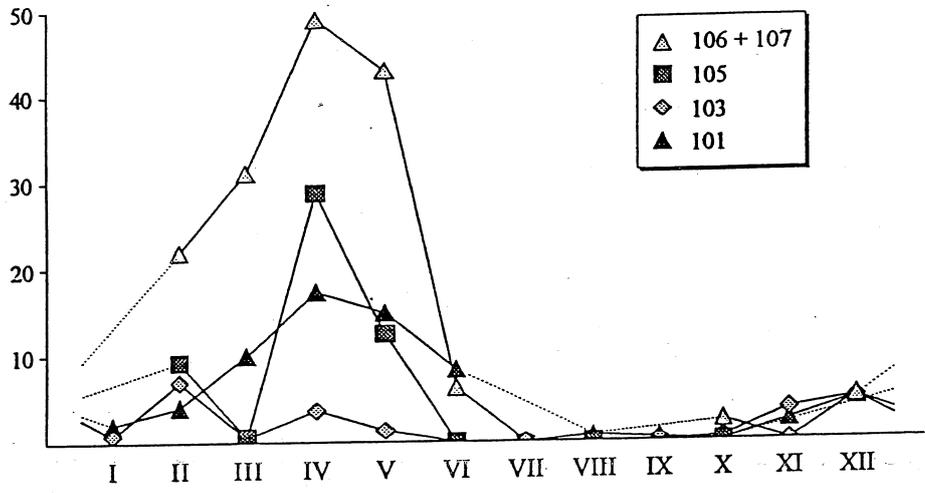


Fig. 3. Prevalence of infection with *A. simplex* larvae of herring caught in particular months (total data from the period 1987-1994).

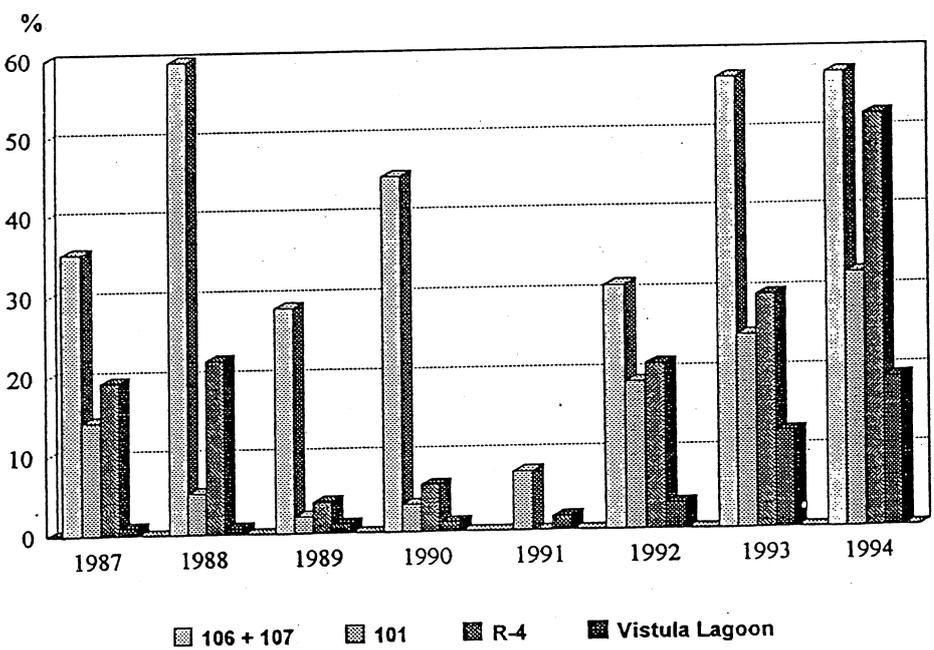


Fig. 4. Prevalence of infection with *A. simplex* larvae of herring caught on some fishing grounds from March to May.

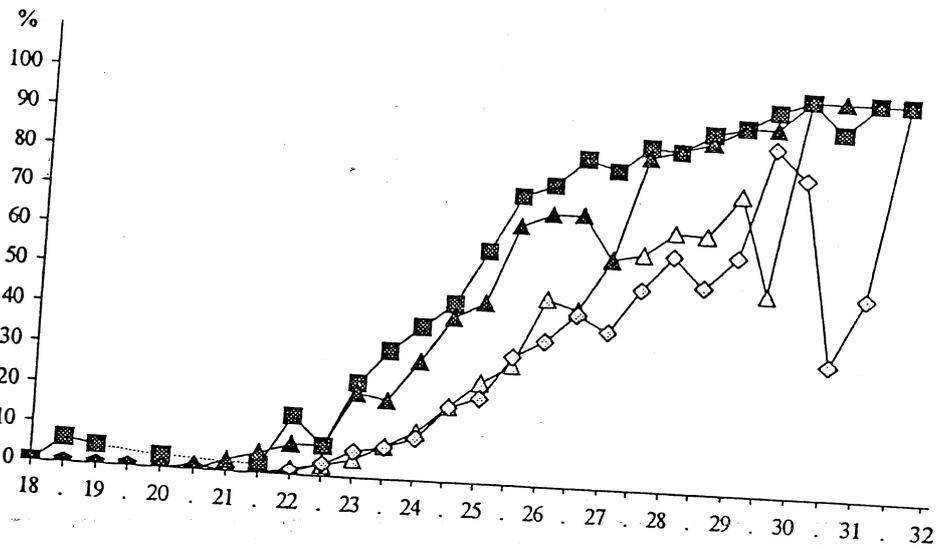


Fig. 5. Prevalence of infection with *A. simplex* larvae in male and female herring (belonging to spawning stock "W", caught from March to May) in relation to their body length.

Tab. 2. Prevalence and intensity of infection with *A. simplex* larvae in relation to gonad maturity conditions of herrings "W", caught in March to May

gonads maturity conditions, Meier scale	number of fish examined	length of fish in cm (mean)	age of fish in year	prevalence (%)	intensity (mean)
1	25 0	18.3	2.24	0	0
2	135 14	15.2 17.3	1.49 1.71	0	0
3	404 43	21.4 20.0	3.72 2.65	2.5 11.6	7.1 9.6
4	1108 201	22.6 22.8	4.11 3.70	10.4 31.3	8.0 6.5
5	1625 380	23.5 24.1	4.55 4.35	17.8 43.7	7.9 7.8
6	2853 1710	23.9 25.3	4.76 4.69	21.0 56.8	8.8 8.0
7	953 283	23.9 24.4	4.70 4.42	16.3 41.3	6.0 9.8
8	659 291	23.1 23.6	4.53 4.07	4.0 27.1	10.4 10.2

It was observed that the prevalence of infection in particular years was different (Figure 4). The lowest was found in 1989 and successively increased in the next years. This was most clearly seen on fishing ground No. 101 - Gulf of Gdańsk. This dependence was similar in each body length-class of the fish examined.

Results of analysis of herring belonging to spawning stock "W" and caught in the months from March to May (the highest prevalence of infection) showed that:

- the smallest herring infected was 18.5 cm long and the prevalence (a little higher in males than in females) and other parameters of infection (intensity, abundance, density) increased with fish body length (Figure 5). Similar relations were observed with an increase in fish age.
- the prevalence of infection reached its maximum at the time of spawning (stage VI on Maier's scale) and after that it gradually decreased (Table 2).

CONCLUSIONS

Herring infected with *A. simplex* larvae occur commonly, especially in spring time, on the fishing grounds of the southern Baltic most often on western, more rarely in eastern coastal and sporadically on open sea fishing grounds. Finding the *A. simplex* larvae in Vistula Lagoon herring widens the hitherto known eastern geographic range of this parasite in the Baltic Sea.

Herring infected with *A. simplex* larvae belong to the spring coastal spawning stock ("W"), swimming for spawning from the feeding grounds in Kattegat, Skagerrak or North Sea.

The prevalence and other parameters of infection increase with fish body length and age.

The larvae fixed in the muscles were observed in 12% of the infected fish examined and could be the main source of infection in man.