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Corrigendum: Compensatory feeding in Eastern Baltic cod (*Gadus morhua*): recent shifts in otolith growth and nitrogen content suggest unprecedented metabolic changes

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Baltic cod, ecosystem change, food quality, growth, otolith microchemistry, protein uptake

A Corrigendum on

Compensatory feeding in Eastern Baltic cod (*Gadus morhua*): recent shifts in otolith growth and nitrogen content suggest unprecedented metabolic changes

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In the published article, the ratios between otolith width (*OW*) and fish length (*FL*) for the latter part of the study, i.e., from 2005–2015, had been erroneously measured, which led to a systematic bias.

This error might have arisen from overlooking changes in ocular magnifications. Since the otolith radii were measured from digital images, the error could also have been introduced in scaling the size relationships from the images. Since the publication, additional otoliths have been analyzed, coming from a period before 1995. These otoliths showed the opposite relationship for the *OW/FL* ratio, i.e., relatively smaller otoliths during periods of enhanced growth, which is to be expected according to previous studies (e.g., Mosegaard et al., 1988). We hence remeasured the otoliths in this study in order to see whether a scaling error had been introduced or not.

A correction has been made to the **Abstract** section, page 1. The corrected sentence appears below:

“Here we show that the otoliths were similar or larger at a given fish size, and the ratio of N/Ca has increased over the studied period.”

A correction has been made to the **Morphometrics** section, page 8, first and second paragraphs. The corrected paragraphs appear below:

“The otoliths tended to become bigger over time, i.e., the ratios between otolith width (*OW*) and fish length (*FL*) increased marginally between the start and the end of the study period

(Table 5, Figure 8). This pattern was more marked in younger age groups. All otoliths exhibited a similar relationship between *OW* and *FL* (Figure 9). ANOVA results and pairwise comparisons (Tukey multiple comparisons of means) indicated that *OW/FL* increased over time, as the ratios were significantly larger in 2010 compared to 1995 (Table 6).

The two proxies used to study metabolic changes, *OW/FL* and mean post-larval N-content, were found not to be related (linear regression, $p=0.34$, adjusted $r^2 = 0.02$, Figure S3).

A correction has been made to the **Discussion** section, pages 8–9, third paragraph. The corrected sentences appear below:

“Records on in this study suggests that *OW/FL* in *EBC* have been rather constant or increased marginally. However, otoliths could also become smaller due to decreased metabolic rates even though they are expressing identical somatic growth rates (Mosegaard et al., 1988). Experimental studies on Atlantic cod and Atlantic salmon (*Salmo salar*) suggest that proportionality between otolith size and somatic size may not always be affected by experienced differential energy allocation patterns (Aubin-Horth and Dodson, 2002; Høie et al., 2003)”.

A correction has been made to the **Discussion** section, page 9, fourth paragraph.

The corrected sentence appears below:

“Therefore, the present observations indicate reduced individual growth rates rather than higher metabolic rates”.

A correction has been made to the **Discussion** section, page 10, fifth paragraph.

The corrected sentence appears below:

“It is hence possible that the observed early maturation in *EBC* has been induced by growth retardation in size groups around 20 cm, i.e., in size groups whose condition has remained stable (Casini et al., 2016)”.

A correction has been made to the **Discussion** section, page 11, ninth paragraph.

The corrected sentence appears below:

“The progressively higher water temperature in the Baltic Sea since the mid-1990s due to climate change (Kniebusch et al., 2019) may have led to a thermal habitat with potential to affect *OW/FL*.”

However, metabolic changes may not always result in changed proportionality between otolith and somatic growth (Aubin-Horth and Dodson, 2002”.

A correction has been made to the **Discussion** section, page 11, tenth paragraph.

The corrected sentence appears below:

“Further studies are needed to understand better the driver of the higher feeding rate and how it is connected to the decreased productivity of the *EBC*”.

A correction has been made to the **Legend of Figure 8**, page 10. The corrected legend appears below:

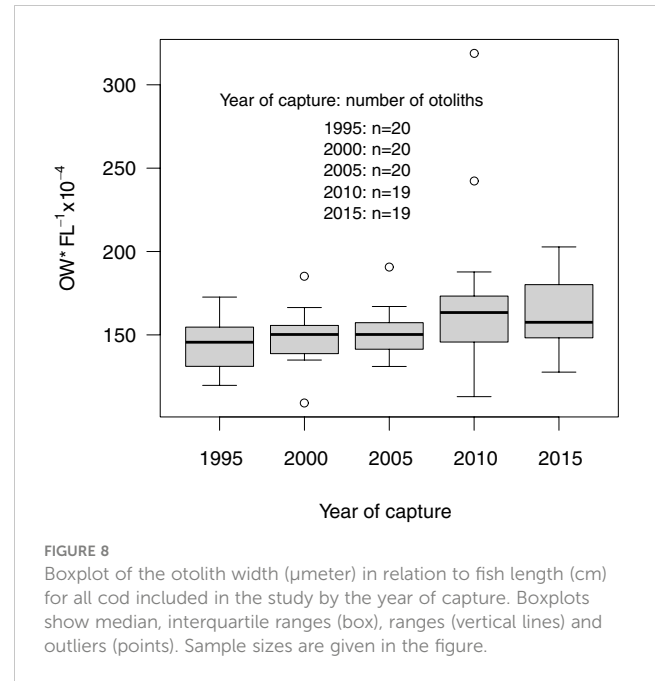


FIGURE 8

Boxplot of the otolith width (μmeter) in relation to fish length (cm) for all cod included in the study by the year of capture. Boxplots show median, interquartile ranges (box), ranges (vertical lines) and outliers (points). Sample sizes are given in the figure.

A correction has been made to the **Legend of Figure 9**, page 10. The corrected legend appears below:

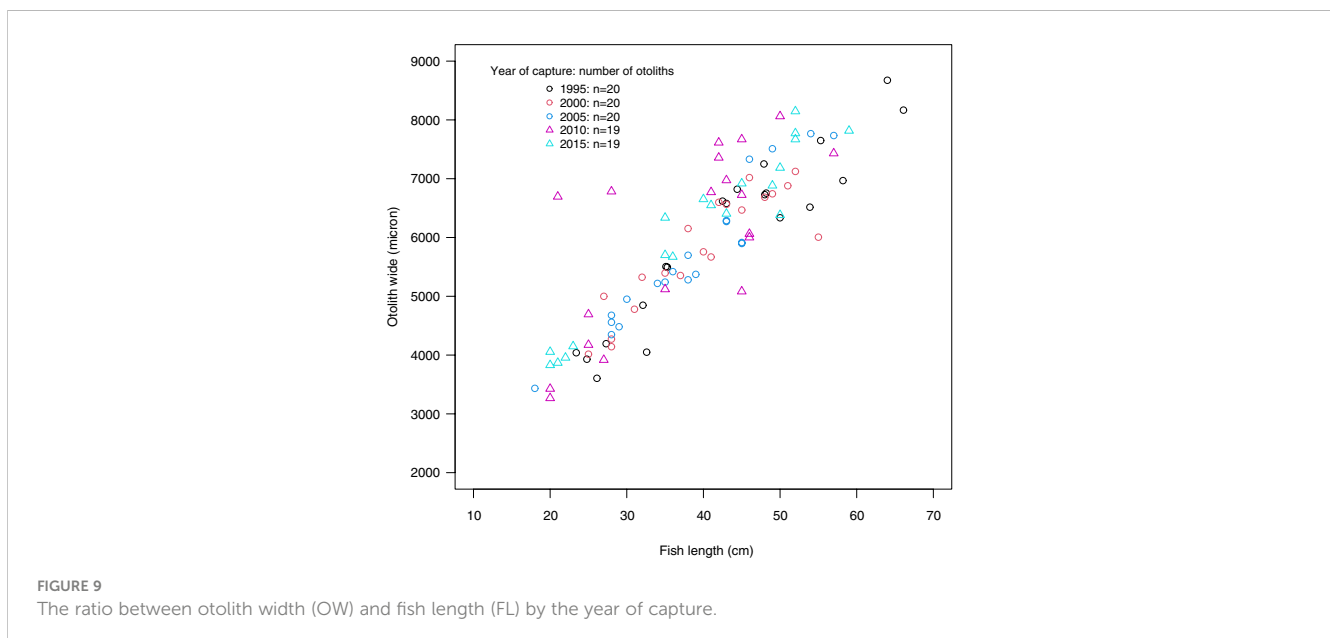


FIGURE 9

The ratio between otolith width (*OW*) and fish length (*FL*) by the year of capture.

A correction has been made to Table 5, page 10. The corrected table appears below:

TABLE 5 The mean (\pm s.d.), minimum, and maximum values of the ratio between otolith width and fish length (*OW/FL*) are shown by year of capture.

Age	Year of capture				
	1995	2000	2005	2010	2015
Age 2: mean \pm s.d.	149.4 \pm 18.7	163.1 \pm 15.1	166.1 \pm 14.7	201.7 \pm 66.1	187.7 \pm 9.6
Min-max 124-172	153-185	154-191	163-319	180-203	
Age 3: mean \pm s.d.	143.6 \pm 14.7	154.0 \pm 10.3	149.0 \pm 11.2	155.7 \pm 50.2	157.3 \pm 6.0
Min-max	121-157	144-166	138-165	113-242	149-163
Age 4: mean \pm s.d.	147.7 \pm 7.9	149.1 \pm 7.5	141.8 \pm 9.8	162.9 \pm 19.7	157.0 \pm 16.4
Min-max	138-156	138-157	131-151	130-181	140-181
Age 5: mean \pm s.d.	126.3 \pm 8.2	131.6 \pm 12.6	147.6 \pm 9.1	152.9 \pm 17.3	142.9 \pm 12.7
Min-max	120-136	109-139	136-159	130-170	128-157

A correction has been made to Table 6, page 11. The corrected table appears below:

TABLE 6 Summary of ANOVA results for logarithmically transformed *OW/FL*-values with year of sampling (*Year*) as fixed factor.

	Df	Sum Sq	Mean Sq	F value	Pr(>F)
<i>Year</i>	4	0.2640	0.0660	3.37	0.0123
Residuals	93	3.404	0.0366		
Fixed Effects (<i>Year</i>)					
Factor	1995	2000	2005	2010	2015
	-0.068	-0.032	-0.015	0.074	0.048
repetition	20	20	20	19	19

Table of Tukey multiple comparisons of means (Tukey HSD, test = adjusted (type = "Bonferroni") for ANOVA model: $\log(OW/FL) \sim Year$. 95% confidence level of is shown.

Year	Difference	Lower C.I.	Upper C.I.	p-level adjusted
2000-1995	0.03581827	-0.087341857	0.1589784	0.9272270
2005-1995	0.05337794	-0.069782182	0.1765381	0.7480666
2010-1995	0.14180742	0.017037289	0.2665775	0.0176232
2015-1995	0.11560078	-0.009169351	0.2403709	0.0829408
2005-2000	0.01755968	-0.105600450	0.1407198	0.9946908
2010-2000	0.10598915	-0.018780979	0.2307593	0.1347923
2015-2000	0.07978251	-0.044987618	0.2045526	0.3919744
2010-2005	0.08842948	-0.036340654	0.2131996	0.2879126
2015-2005	0.06222284	-0.062547294	0.1869930	0.6372285
2015-2010	-0.02620664	-0.152566262	0.1001530	0.9781359*

Pairwise comparisons between means of *Year* are tested with Tukey HSD (adjusted with Bonferroni correction for the ANOVA model). Significance codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1. 2 observations deleted due to missingness. 95% confidence level of is shown.

A correction was made to Figure 3 within the Supplementary Materials.

Supplementary Figure S3 has been changed according to a revision of the relative otolith size (otolith width/ fish length). The scatter plot shows the mean post larval N-content by year versus the relative otolith size for all cod included in the study. A linear regression line is fitted to the data ($p=0.34$, adjusted $r^2=0.02$). Year of capture: Black points – 1995, red points – 2000, blue points – 2005, pink triangles – 2010, light blue triangles – 2015.

The authors apologize for this error and state that this does not change the scientific conclusions of the article in any way. The original article has been updated.

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