

CORRELATION OF SADDLEBACK SYNDROME WITH DEFORMITIES OF THE PELVIC FINS AND LATERAL LINE IN EUROPEAN SEA BASS, *DICENTRARCHUS LABRAX*

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Introduction

Despite the intensive research of the last decade, morpho-anatomical abnormalities continue nowadays to be a significant problem for finfish aquaculture. This is especially because of the high variation of the frequency of deformities during the production process, as well as due to the appearance of new deformity types (Koumoundouros, 2010; Boglione et al., 2013).

Saddleback syndrome is a rare deformity (<1%), however, with significant effects on the anatomy of dorsal fin and on the external morphology of fish. Anatomically, saddleback syndrome is characterized by the partial to complete lack of rays, accompanied by severe abnormalities of the respective pterygiophores (Koumoundouros, 2010). In the present study we describe a new type of saddleback syndrome which is highly correlated with abnormalities of the pelvic fins and of the lateral line.

Materials and methods

Samples were taken from a population of sea bass juveniles (70-90mm standard length, SL; 145-150 days post hatch) during routine quality control in a commercial hatchery. Juveniles were anaesthetised and examined for the presence of saddleback syndrome. Subsequently, a random sample of 50 normal and 50 deformed individuals was taken. Both sides of the body were photographed to examine the lateral line in each sampled individual. Finally, the juveniles were x-rayed and examined for the presence of skeletal deformities (Koumoundouros et al., 2000). To study the ontogeny of the new type of saddleback syndrome, larval samples from the records of the laboratory were examined. Larvae were double stained with Alcian-blue and Alizarin-red (Park & Kim, 1984).

G-test was applied to test the significance of the differences between groups (Sokal and Rohlf, 1981).

Results and discussion

In the examined population, the 12% of the fish presented a new type of saddle-back syndrome (SBS). This deformity is mainly characterised by the loss of fin rays on the pterygiophores Prx3-Prx7 (92% of the cases), which rarely expands at the first two pterygiophores (8% of the cases; Fig. 1). Unlikely to the saddle-back types which have been recorded so far (Koumoundouros, 2010), this new type neither correlates with deformities of the pterygiophores, nor with deformities of the caudal fin. However, it is highly correlated with a partial or total lack of pelvic-fin rays (in the 66% of the fish with SBS vs. 0% of the fish without SBS, Figs. 1,2).

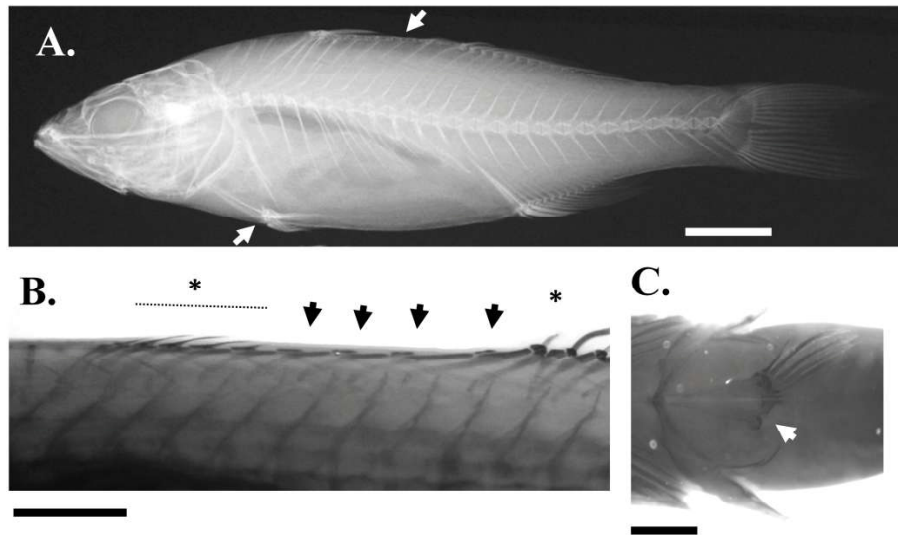


Fig. 1. Anatomy of SBS in a sea bass juvenile (A) and larva (B). Missing rays are indicated with arrows. Asterisks in B indicate atrophied rays. C. Lack of rays and spine of the right pelvic fin (arrow). Scale bars equal to 10mm (A) or 1mm (B, C).

The examination of external morphology of the two groups showed that both SBS and non-SBS juveniles presented a high frequency of abnormalities of the lateral line, mainly in the form of bilaterally or unilaterally lacking sectors (Fig. 3). Statistics revealed that the abnormality of the lateral line was significantly more frequent in the SBS than in the non-SBS fish (62% vs. 42%, $p < 0.05$, Fig. 2). Other types of lateral line abnormalities consisted of bilaterally double-overlapping lateral line (Fig. 3C-3C', 10%-16%), and to a less extent of discontinuous or dorso-ventrally curved lateral line. Similar abnormalities of the lateral line have been previously documented to develop at very high frequencies in

reared *Sparus aurata*, with however still unknown causative factors (Carillo et al., 2001).

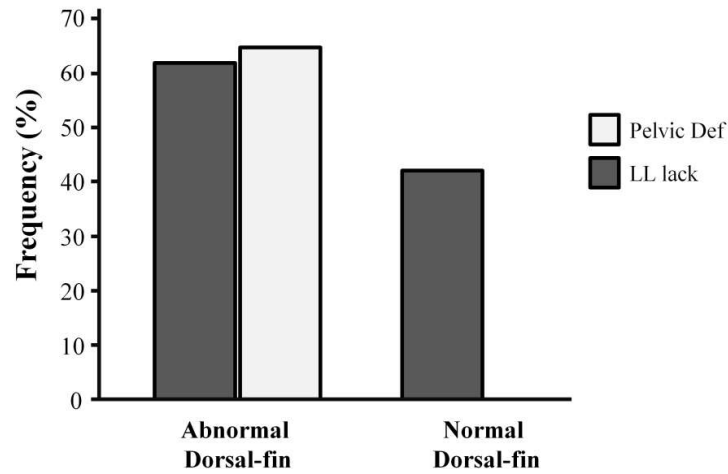


Fig. 2. Frequency of the pelvic-fin deformities and of the abnormalities of the lateral line (LL) in the juveniles with normal and abnormal dorsal fin.

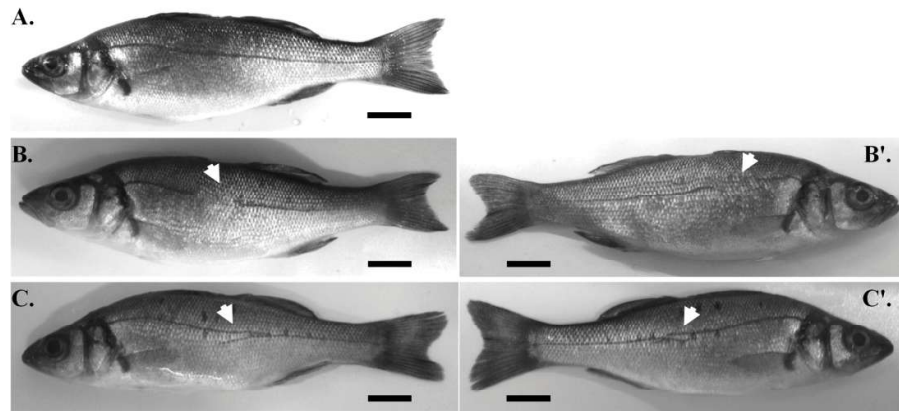


Fig. 3. Abnormalities of the lateral line in the studied juveniles. A. Normal fish. B-B', bilateral lack of a part of the lateral line. C-C', bilaterally double-overlapping lateral line. Scale bars equal to 10mm.

In the present study, we document a highly correlated development of three different morpho-anatomical abnormalities. Although bibliographically rare, such high correlations between deformities of different structures, anatomically and/or ontogenetically, have been attributed to common causative factors acting during specific ontogenetic stages (Koumoundouros et al., 2001; 2002). Such a hypothesis could explain the strong correlation of SBS with pelvic-fin deformities in *D. labrax* (present study), since dorsal and pelvic fins develop during

overlapping periods (unpublished data). The high frequency of the abnormalities of the lateral line in the non-SBS juveniles could be explained by the fact that scales develop later than the dorsal and pelvic fins (unpublished data).

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