
A case of partial albinism in the yellow-belly flounder, *Rhombosolea leporina* GÜNTHER, 1862 (Pleuronectiformes: Pleuronectidae) collected from Manukau Harbour, Auckland, New Zealand

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ABSTRACT. A partial albino specimen of *Rhombosolea leporina* with a total length of 295 mm was collected from Manukau Harbour, south of Auckland City, New Zealand. This is the first record of abnormal pigmentation in the wild yellow-belly flounder from New Zealand waters. The specimen is patterned with a white blotch on the caudal peduncle area of the ocular side. Causes for such colour aberration are discussed.

KEY WORDS: Abnormality, flatfish, vertebral deformity, albino specimen

INTRODUCTION

The yellow-belly flounder, *Rhombosolea leporina* is a right-sided eye flounder endemic to New Zealand. The adults occur at depths of 30-40 metres, where the water is brackish and very turbid (FRANCIS, 2012). It is a commercially valuable species, with one kilogram worth over NZ\$20 (17.3 US\$).

The peculiar colouration of this species has attracted the attention of biologists for a long time. The colouration pattern is considered as a tool to avoid predators, catch prey, and for conspecific communication (MILLS & PATTERSON, 2009). There are three basic types of colour abnormalities in fishes: ambicolouration, albinism, and xanthochroism. Ambicolouration is an excess of pigmentation on the blind side of flatfish. Xanthochroism is a rare condition in which the melanophores are missing, though other pigments are present, typically producing a golden-orange colour (COLMAN, 1972).

Malpigmentation is the typical anomaly of flatfishes. It is characterized by either a deficiency of pigment cells on portions of the ocular side (albinism, pseudoalbinism, or hypomelanism), or the presence of dark pigmentation on the normally light-coloured bellyside of the fish, also called ambicoloration (BOLKER & HILL, 2000).

Colour abnormalities are well documented for flatfish (e.g., DÍAZ DE ASTARLOA, 1995; BOLKER & HILL, 2000; CHAVES et al., 2002; Purchase et al., 2002; MACIEIRA et al., 2006), while abnormal pigmentation in other fish groups is rare (HERNÁNDEZ & SINOVCIC, 1987; JAWAD et al., 2007, 2013; JAWAD & AL-KHARUSI, 2013).

Flounders are famous for their ability to match their background by changing their ocular-side pigmentation. Such alterations are based on rapid changes in the morphology of melanophores, specifically in the distribution of pigment-containing melanosomes within the cytoplasm (BURTON, SUGIMOTO & OSHIMA 2002). In addition to this cause of changes, flounder pigmentation also changes during ontogeny, beginning during larval development and then, noticeably, at metamorphosis (SUGIMOTO & OSHIMA, 2002).

In New Zealand, JAWAD et al. (2007) is the only published work on alteration of colouration of fishes other than flatfish, while ARCHEY (1924) and COLMAN (1972) represent the only work on flatfishes. ARCHEY (1924) reported on a xanthochroic specimen of the yellow-belly flounder *R. leporina* and COLMAN (1972) examined partial and complete albinism cases in *R. plebeia* obtained from Wellington and Firth of Thames waters, respectively. In the present

study, a report on partial albinism in the yellow-belly flounder *R. leporina* is presented.

MATERIAL AND METHODS

On 10th October 2013, an abnormally-pigmented specimen of *Rhombosolea leporina* with a total length of 295 mm was obtained from a commercial catch in Auckland City. This specimen originated from Manukau Harbour, south of Auckland City, and was caught with a

set net. In addition, normal specimens of 280 mm total length were obtained from the same catch and used for comparisons. Total length was measured to the nearest 1 mm and the specimens photographed. Counts and measurements were made on both the miscoloured and normal specimens. All specimens were kept frozen and later radiographed, fixed in 10% formaldehyde solution and stored in 70% ethanol and deposited in the fish collection of Auckland War Memorial Museum (AIM MA33573).

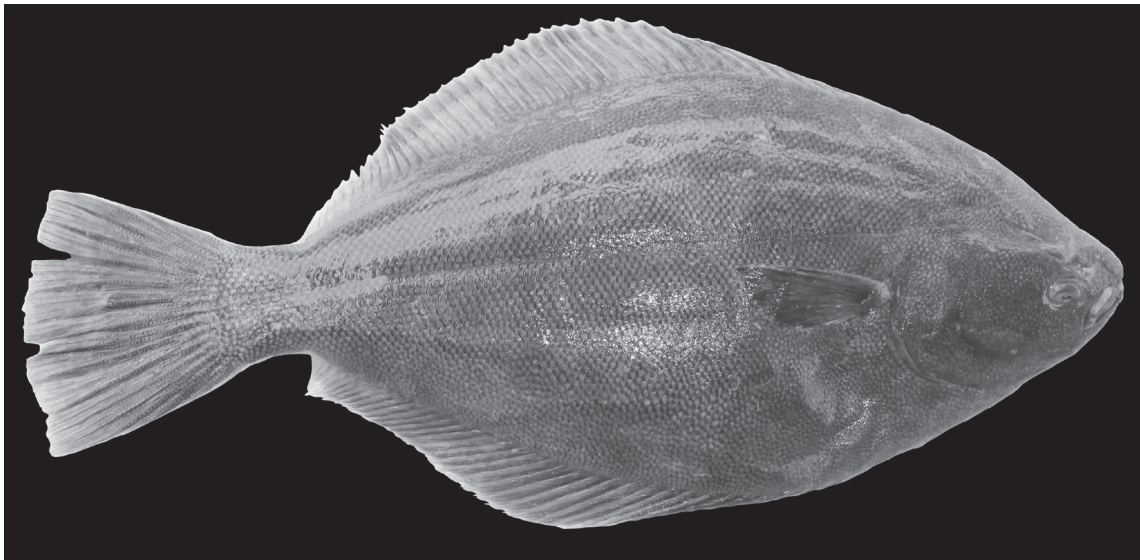


Fig. 1. – Normal specimen of *Rhombosolea leporine*, 280 mm total length.



Fig. 2. – Abnormal specimen of *Rhombosolea leporine*, 295 mm total length.

RESULTS

The normal colouration of this species (Fig. 1) is green to olive above and cream-yellow below with numerous small black spots (< 1 mm in diameter) (FRANCIS, 2012). The edge of the dorsal fin rays is creamy –yellow. The pectoral fin is slightly darker than the body. The blind side of the miscoloured specimen (Fig. 2) exhibits the normal colouration. The caudal peduncle and the caudal fin are the areas that display partial albinism. The white patch starts from the end of the anal fin and goes up and forward reaching the last few dorsal fin rays, and extends to the caudal fin, covering the whole area of the caudal

peduncle and the base of the caudal fin. A faint brown triangular blotch with an area of 33 mm² is found at the posterior dorsal end of the caudal peduncle area. The caudal fin rays appeared to be less dark than the anterior part of body with the dark colour being paler towards the posterior end of the caudal fin. The area from the posterior edge of the operculum to the line passing through the deepest point of the body, and from the base of the dorsal fin to the ventral edge of the anal fin had a faint brown colouration. The edge of the pectoral fin appeared darker than the fin itself. The dorsal edges of the dorsal fin rays are black. No other external deformations are seen in the colour or in the fish body structure.

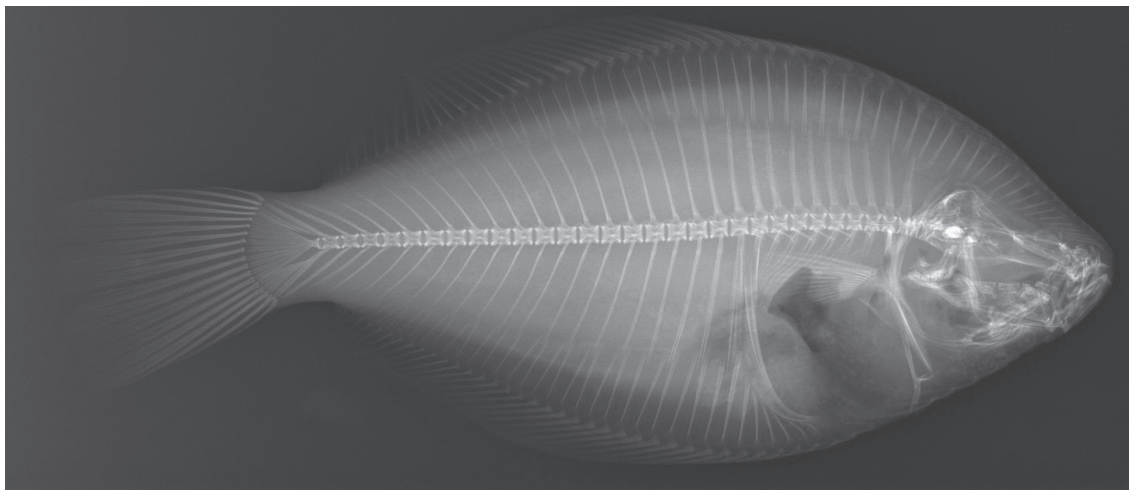


Fig. 3. – Radiograph of a normal specimen of *Rhombosolea leporina*, 295 mm total length.

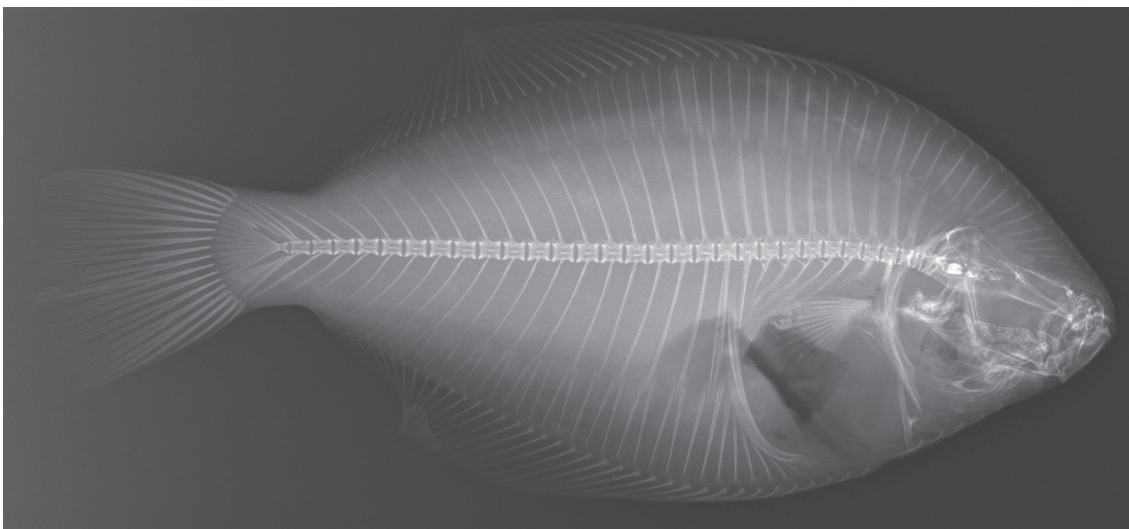


Fig. 4. – Radiograph of the abnormal specimen of *Rhombosolea leporina*, 295 mm total length.

From examination of the radiographs of the normal specimen (Fig. 3) and that of the abnormal specimen (Fig. 4), it is clear that in the abnormal specimen the ultimate and penultimate vertebrae are fused together and the anterior part of the centre of the ultimate vertebra is missing. Other osteological features of the skeleton appear to be normal.

DISCUSSION

DAWSON (1967) suggested that partial albinism occurs as a result of a wound or the effects of adverse environmental factors. It was not clear whether the occurrence of abnormal pigmentation in the present specimen was caused by bites received from other fish. There were no visible signs of injuries that might cause such anomaly.

Abnormal pigmentation is frequently accompanied by morphological variation and vertebral deformities (DÍAZ DE ASTARLOA, 1998). No noticeable variation in morphological or meristic characteristics was found in the abnormal specimen of *R. leporine*, but a slight vertebral fusion of the ultimate and penultimate vertebrae was noticed.

The incomplete pigmentation of flatfishes is almost always associated with head or vertebral anomalies or some other variation in the morphology of the specimens, such as migration of the eye, scales and associated structures (DÍAZ DE ASTARLOA, 1995, 1998).

Pigmentation anomalies can occur on both sides of the body. Hypomelanoses results in white patches or areas devoid of normal pigmentation on the ocular side of the body (VENIZELOS & BENETTI, 1999). Such aberrations in flatfishes may occur during metamorphosis and when the eye migrates to the other side of the head (GARTNER, 1986), depending upon the asymmetry of organizational environments that potentially regulate latent chromatophore precursor survival, proliferation and differentiation (HAMRE et al. 2007; BOLKER & HILL, 2000). Such regulatory

asymmetry may be due to differences in the expression and distribution of secretory proteins involved in the precursor differentiation into mature chromatophores (YAMADA et al., 2010). Accordingly, the partially un-pigmented ocular side could be due to abnormalities in the asymmetry of the regulatory system (BARTON, 2010). This has not yet been studied for wild fish in general and in the flatfish species of New Zealand in particular. Thus, further experimental research is needed to test this hypothesis.

CONCLUSIONS

The partial albino case in a specimen of *Rhombosolea leporina* obtained from Manikau Harbour, south of Auckland City, New Zealand is considered to be the first reported case of its kind in New Zealand. The pattern of body coloration is similar to the partial albinism occurring in other fish species sporting parts of the body completely devoid of chromatophores. Possible causes for such colour aberration are discussed and include abnormalities in the asymmetry of the regulatory system of the chromatophores.

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