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研究简报
A Letter

从阿曼的阿拉伯海湾海岸收集来的野生银鲳鱼和银鲳鱼的畸形尾鳍

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摘 要 一种野生银鲳鱼与银鲳鱼的描述并且和正常鱼类进行比较。在观察中发现畸形的严重程度是完全没有骨架。 轻微的异常比如尾部鱼鳍射线的波动，鳍条，和在标本尾部区域脊柱血管的畸形。在这篇文章里，对这些异常的潜在致病因素进行了讨论。
关键词 尾鳍畸形；骨骼畸形；银鲳；阿拉伯海湾

Caudal Fin Deformity in the Wild Silver Pomfret *Pampus argenteus* Collected from the Arabian Gulf Coasts of Oman

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Abstract A wild silver pomfret, *Pampus argenteus* with deformity in the caudal fin is described and compared with normal fish specimen. Among the severe abnormalities observed is the complete absence of the caudal skeleton. Minor abnormalities such as undulation of caudal fin rays and pterygiophores and deformity of the haemal spines were encountered in the caudal region of the specimen. The potential causative factors of this anomaly were discussed.
Keywords Caudal fin deformity; Skeletal abnormalities; Silver pomfret; Arabian Gulf

1 介绍

描述了一些一般畸形形态的鱼和骨骼异常的，特别是在文献中有高出现率的。(Tutman et al., 2000; Jawad and Hosie, 2007; Jawad and Öktoner, 2007;Jawadet al. 2007; Jawad et al., 2010; Al-Mamry et al., 2010)。由于他的发病率高，所以在污染地区，它们被当做一个环境污染的指标。(Bengtsson, 1979)。在水产养殖区域和户外，畸形的例子包括了没有尾巴，部分尾巴(单瓣)，双重或三重的尾巴或叶，还有压缩。(Honma, 1990; Dunham et al., 1991; Lemly, 1993; Honma, 1994; Divananch et al., 1996; Jawad et al., 2010)。仅有一例从阿曼海域收集来的尾部畸形是鲻鱼 *Moolgarda pedaraki*(Jawad and Al-Mamry, 2012)。银鲳鱼(属：鲳科)是一种生活在特别生活在阿曼海域的阿拉伯湾，并且从阿拉伯海湾到西太平洋到印度尼西亚，北到北海道和日本的淡水，海产的，洄游的物种。(Froese and Pauly, 2010)。在这些地区，它们拥有很高的地方经济重要性，大部分的生活方式以及在它整个生命周期里的海里繁殖(Cruz et al., 2000)。它揭露了在这些最受威胁的生态系统中从温度到污染的物理和化学的变化。(Araghi, 2010)。这项研究描述了一个硬骨鱼 P.鲳鱼断尾的例子，并且显示了环境污染对鱼类可能产生的影响，这反过来可以吸引社会的关注，来关心它们的环境健康。

2 材料与方法

十例银鲳鱼尾鳍(TL 250-258mm, SL165-168mm，320g)畸形的范本是被渔网从阿拉伯西南方向的海赛卜的阿曼海域捕来的(图 1)。十例正常物种大小从 183-260mm，TL，173－180mm，SL 不等，是从同一个地方抓获用来观察的。总共有 250 种鱼类标本在抓获和变形的标本中，占总捕获量的 4%。标本采用数字卡尺精确到毫米，重量利用电子天平精确到克。其中一个变形的标本显示承担所有现在的不正常种类的变形标本，并且在与剩下的变形标本进行普通 x 射线对骨骼的异常检查对比内被认为是最畸形的标本。这个标本作为一个鱼类收藏存放在阿曼领地，马斯喀特的马林科学与渔业中心的渔业财产部门，

OMMSTC 目录编号为 1095。水的样本是用来衡量生态变量，如水温、盐度、溶解氧和 PH 值使用仪器”Hydrolab”(SVR 2-SV 模型)，这是一个可测量范围内水文参数的仪器，水文参数具体有以下几点：温度-5 到 45℃；DO 从 0 到 20mg/l；PH 从 0 到 14 和深度 0 到 200 米。为了测量变形鱼类标本中的重金属含量，Alyahya(2011)等人的方法被使用。在这种方法中，水样将在浓硝酸氧化前先经过 0.45-μ m 的过滤膜。溶解的微量金属通过使用 Chelex-100 来追踪 Riely 和 Taylor 的程度来集中浓缩。然后对水样进行分析，一式三份，采用原子吸收分光光度计(模型 SP 9)来分析镉、汞、铅、锌。去离子的水被应用在分析中。水文参数值见表 1，重金属的值见表 2。

图 1 地图显示了站点采样的地方。地图显示了鱼类标本被采集的方位。

Figure 1 Map showing location of the sites sampling. Map showing locality where fish specimens were obtained

表 1 从阿拉伯海岸南部的海塞卜收集来的海洋学变量的平均值和范围

Table 1 Mean and range of oceanographic variables of water samples from Khasab, south of the Arabian Gulf

Oceanographic variables	Range	
Temperature (℃)	Min	23.05
	Max	36.43
	Ave	28.59
Hydrogen ion concentration (pH)	Min	6.42
	Max	9.08
	Ave	8.71
Dissolved Oxygen (mg/lit)	Min	6.65
	Max	10.04
	Ave	8.15
Salinity (ppt)	Min	36.90
	Max	39.40
	Ave	37.50

表 2 从阿拉伯海岸南部海塞卜采集来的海水样本中的重金属含量

Table 2 Concentration of heavy metal (μ g/g dry weight) in water sample from Khasab, south of the Arabian Gulf

Heavy metal	Value(μg/ml)	Nature concentration of marine water (EPA 2002)
As	10.7	3
Cd	0.42	0.11
Hg	0.04	0.03
Pb	6	0.3
Zn	34.9	10

3 结果

在与正常标本相比，捕获后的鱼体上可见尾翅畸形(图 2 A, B)。变形后的尾翼的外部检查表明，这鳍已经失去了它的背和腹叶。此外，尾部的鳍条似乎是短的，波浪状的，粘在一起的。与正常版本的 X 线比较(图 3 A,B)，异常的标本显示了一些严重的异常，这些异常是：缺少整个尾鳍骨骼，包括骨骼的尾下骨、尾杆骨，尾上和杆尾下骨；缺两尾椎骨的椎体变形；35 号中枢，这个标本上脊椎的脊柱，和缺少的神经和血液脊柱；在正常的标本中 33 和 34 号的脊柱神经不直不弯；脊柱 32，33 和 34 是直而短，并且脊柱 33 有两个脉棘。其他小的异常也被检测到，他们是：强烈起伏的尾鳍鳍条；波浪后部的 14 条鳍条(从背鳍后端计数)，波浪上五臀鳍鳍条和支持它们的鳍条。

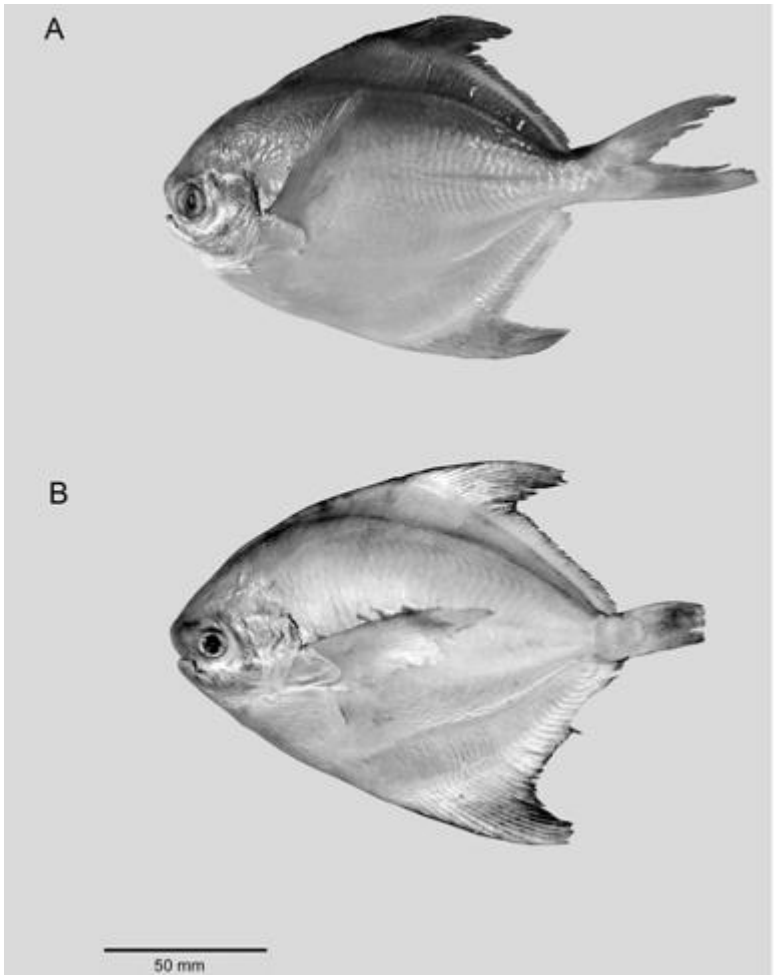

图 2 A：正常银鲳鱼的样本(TL 183 毫米，SL 173 毫米)。B：变形的银鲳鱼样本(TL 250 毫米，SL 168 毫米)

Figure 2 A: Normal fish specimen of *Pampus argenteus* (TL 183 mm, SL 173 mm). B: Abnormal fish specimen (TL 250 mm, SL 168 mm)

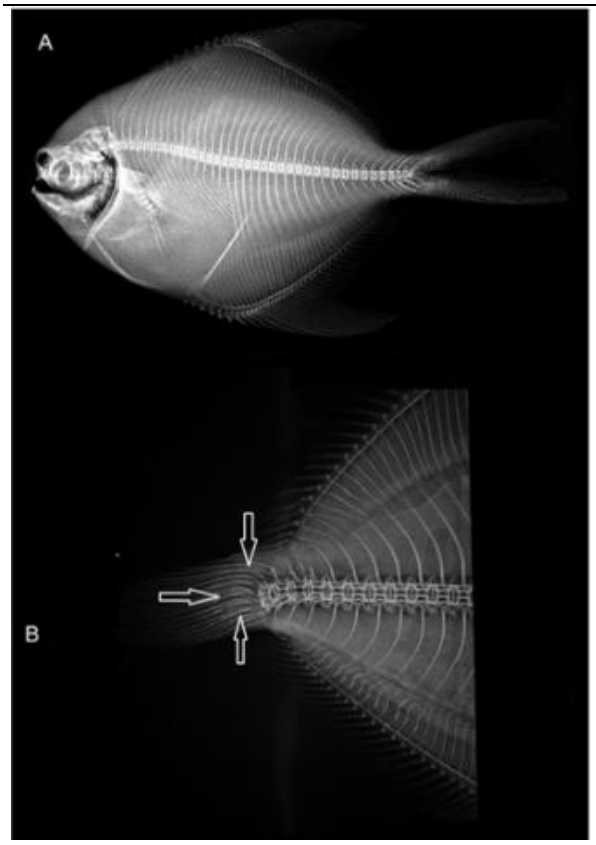

图 3 X 光照片 A:正常银鲳鱼的样本(TL 183 毫米，SL 173 毫米)。B：变形银鲳鱼样本(TL 250 毫米，SL 168 毫米)。变形标本的尾翅

Figure 3 Radiograph of A. normal specimen of *Pampus argenteus* (TL 183 mm, SL 173 mm). B. abnormal specimen (TL 250 mm, SL 168). Caudal fin of abnormal specimen

4 讨论

鱼类生活的有干扰的环境是可以通过脊柱畸形来追踪和监控的，这是生态系统中存在着这类干扰的一种信号。因此，让人们意识到他们生活的环境有多么的健康是很重要的。在鱼类中，总的来说，尾鳍有机动和转向功能的重要作用；因此，必须构建以应对动力应力能量尽可能少的支出(Boglione et al., 1993)。在尾翅的任何异动都会损害尾巴的灵活性，从而阻碍鱼的性能(包括获得食物的能力和躲避肉食动物)。据作者所知，没有其他鱼类被记载有这样类似的情况。

有几个潜在的环境因素也会导致尾鳍畸形，它们是：重金属，比如砷、镉、汞、铅和锌 (Sloof, 1982)；和在繁殖中影响曝光的光和热(Koo & Johnston, 1978)。温度数据显示，在同一地区，海水的温度高于 Thangaraja 等人的报道(2011)，并且重金属分析的结果表明，砷、镉、汞、铅和锌的含量超出海水中的标准值。这些因素也被其他人报告存在于阿拉伯海湾的阿曼海域，水中的动植物已经被暴露在不同的环境因素中，容易受到不同程度重金属的影响(Reid et al., 2004; De Mora et al., 2004, 2005; Tolosa et al., 2005; Araghi, 2010)。这些环境和污染因素可能会影响到银鲳鱼标本，就像在阿拉伯海湾地区采集的骨骼异常的其他鱼类一样(Laith Jawad, unpublished data)。

在当前报告中，4%的变形的鱼是温和的，剩下的部分是让人害怕的。 如果这样的百分比在未来逐渐增加，那么接下去，这个可能会影响渔业，特别是 P. argenteusis 认为的高商业价值的物种(Tutman et al., 2000)。

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