

NOTE

Imposex in Gastropods from Argentina (South-Western Atlantic)

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Imposex is a widespread phenomenon in marine molluscs, documented in more than 120 gastropod species. Its occurrence is explained as a result of an anti-fouling paint compound called TBT (tributyltin) (Bryan *et al.*, 1986), whose presence is related to high marine traffic. The amount of TBT in the water or sediment is directly related to the masculinization of female gastropod molluscs of some species. This masculinization appears as a penis and sometimes vas deferens in females. Concentrations lower than 0.5 ng l^{-1} can induce imposex in meso and neogastropods (Bryan *et al.*, 1986).

In order to study if imposex was occurring in the SW Atlantic, specimens of two common gastropods *Buccinanops monilifer* and *Adelomelon brasiliense* were collected during the five last months of 2000 from Mar del Plata harbor (Lat. $37^{\circ}50' \text{ S}$) in a high boating activity area. The snails were collected by bottom trawling. Sex was determined on the basis of the presence or absence of the egg capsule gland. Juveniles and parasited individuals were excluded from the analysis. We considered as adult snails with a shell length greater than 32 mm for *B. monilifer* and greater than 100 mm for *A. brasiliense*. The presence or absence of a penis was recorded and the penis length was measured with 0.1 mm precision callipers. Penis was measured from its base where it joins with the body behind the right tentacle to the tip. Measurements were conducted on unnarcotized snails relaxed by cold exposure in a 4°C refrigerator. The percentage of females with imposex, average female penis length and relative penis size index (RPSI) (Gibbs and Bryan, 1994) was calculated for each species. Histological sections of each individual were stained with Hematoxylin-eosin to confirm its gonadic sex.

Imposex was clearly identified in *B. monilifer*. The percentage of imposex varied among the monthly samples from 33.3% to 85.7%. RPSI ranged from 0.14 to 0.34. Histological examination confirmed that all *B. monilifer* specimens with a penis of more than 10 mm

were males and those with no penis or a penis of less than 10 mm were females. The specimens of *A. brasiliense* also showed imposex, with the percentage varying from 38.9 to 50%. RPSI ranged from 0.18 and 1.0. Histological sections analysis demonstrated that all *A. brasiliense* individuals with penises larger than 15 mm were males and all with no penis or a penis shorter than 10 mm were females.

Mar del Plata harbors the most important coastal fishery fleet in Argentina, with a coastal fleet of about 200 boats and an offshore fleet of about 100 vessels (Errazti and Bertolotti, 1998).

The sedimentary reservoir of TBT seems to contribute to its persistence here, in contrast with the rapid rates of degradation observed in the water column and in laboratory studies of suspended material. TBT has been observed to persist in sediments from 0.9–5.2 years (Gibbs and Bryan, 1994). Sediment collected near the harbor mouth at Mar del Plata has been added to its tourist beaches, during which 2 480 000 m^3 of sediments was moved during 1998 (Marcomini and López, 1999). The transfer of sediments may have increased exposure to pollutants. TBT concentrations as low as 0.5 ng l^{-1} can result in changes in morphology of some gastropods (Gibbs *et al.*, 1987).

A high degree of imposex in *B. monilifer* near Mar del Plata may be related to the observed decline of the population in the coastal waters in front of the city of Mar del Plata, the very low breeding activity observed for the very few females carrying egg capsules (which are attached to the callous region of the mother shell), the lack of juveniles and male predominance in the adults.

From these results we conclude that the Mar del Plata locality shows a high imposex occurrence, but the relatively low RPSI could reflect a contaminated area that is far from being in an extreme state. This less than extreme state could be related to the sampling zone being in open ocean and not in an enclosed system such as occurs with inlets or semi-closed gulfs or bays. Studies carried out in the harbor or near the beaches could provide more extreme figures for imposex.

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This is the first report of imposex from the large coastline of Argentina. Imposex has been previously recorded for South America, in Chile by Gooding *et al.* (1999) and in Brazil by Braga de Castro *et al.* (2000).

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