



Description of an hamartoma-type odontoma in Angelfish (*Pterophilum scalare*)

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Background

Fish present the same variety of tumors as described in mammals and birds (1). Odontogenic tumors are related to alterations in epithelial and/or mesenchymal tissues involved in the formation and development of teeth. Histologically, the odontoma is a tumor characterized by abortive tooth formations and dental tissues (i.e. enamel, dentin, and cementum) that are normally formed but present a more or less disorganized pattern (2). In small fish species, odontogenic tumors have almost exclusively been described in angelfish (*Pterophilum scalare*) and ocellaris clownfish (*Amphiprion ocellaris*) (3). These tumors are macroscopically characterized as a nodular mass located in the frontal regions of the mouth. In angelfish these tumors have been described only as individual cases either as lip fibroma (in captive specimens) (1, 4) or as ameloblastoma (in wild specimens) (5), but in this report we describe the occurrence of tumors in the frontal region of the mouth in a group of twenty aquarium angelfish.

Objetive

To describe the characteristics of a tumor observed in the frontal region of the mouth in a group of twenty aquarium angelfish, and determine its etiology.

Materials and methods.

Twenty angelfish (*P. scalare*) from an ornamental fish farm in central Mexico were analyzed to study the tumors that they presented in the frontal region of the mouth. The fishes did not showed any other sign or apparent lesion of disease. From the tumor area samples were collected for bacteriological analysis; and imprints were stained by Gram and for acid-fast bacteria.

Tumors and internal organs of the fishes were fixed in 10% buffered formalin for histological analysis.

To detect the potential presence of viral particles, tumorous-mass fragments were collected for electron microscopy analysis.

Fragments of the tumors were deposited in Leibovitz's L-15 medium (Gibco BRL) to attempt viral isolation in monolayers of Epithelioma Papulosum Cyprini (EPC) and bluegill fry (*Lepomis macrochirus*, BF-2) cells with 90% confluence in 24-well multiwall plates.

For radiograph (x-ray) analyses, images were obtained using digital x-ray equipment (CMR) at 41 KVp and 10 mAs.

Results

- The tumors located in the frontal region of the mouth both in the maxilla and the mandible were spherical or semi-spherical, between 0.2 to 0.4 cm in diameter, with edematous appearance and a whitish, pink or reddish coloration (Figure 1).
- Histologically the tumors showed a nodular protuberance covered by a stratified hyperplastic squamous epithelium. Inside the nodule, numerous well-differentiated dental structures (denticles) were observed, but in different stages of development. The denticles were oriented towards the epithelial surface, without projecting into or being exposed to the stratified squamous epithelium (Figure 2). The dental structures were composed of ameloblastic cells over a layer of enamel. Under this was a layer of dense eosinophilic ivory supported by a population of odontoblastic cells. The dental papilla was centrally positioned at a deeper level. All of these odontogenic structures were embedded between a lax mesenchymal stroma and were categorized as a compound odontoma or hamartoma (Figure 3A and 3B).
- In the cell culture and electron microscopy no viral particles were detected (No showed). There was also no growth of bacteria, and the imprints stained by Gram and for acid-fast bacteria were negative.
- Nearly all specimens presented a radiopaque protuberance with smooth edges on the front of the mouth, concordant with the tumor mass observed macroscopically (Figure 4A and 4B). Inside the tumor mass, irregular areas with greater radiopacity were found (Figure 4B). These corresponded to the multiple denticles recorded histologically (Figure 2 and 3A). Furthermore, some fish presented maxillary shortening (Figure 4).

Conclusion

- This is the first case of odontoma in angelfish that does not occur affecting fish as individual cases.
- This is the first case of a hamartoma type odontoma in angelfish.
- In angelfish, tumors of macroscopic appearance similar to those observed in this case have been described as lip fibroma or as ameloblastoma.
- Similar macroscopic and microscopic lesions in species other than *P. scalare*, have only been reported in two individual cases in *Amphiprion ocellaris*.
- No evidence of viral etiology was observed
- The analysis suggests that this odontoma-hamartoma has its origin at cellular level, on a hereditary basis.

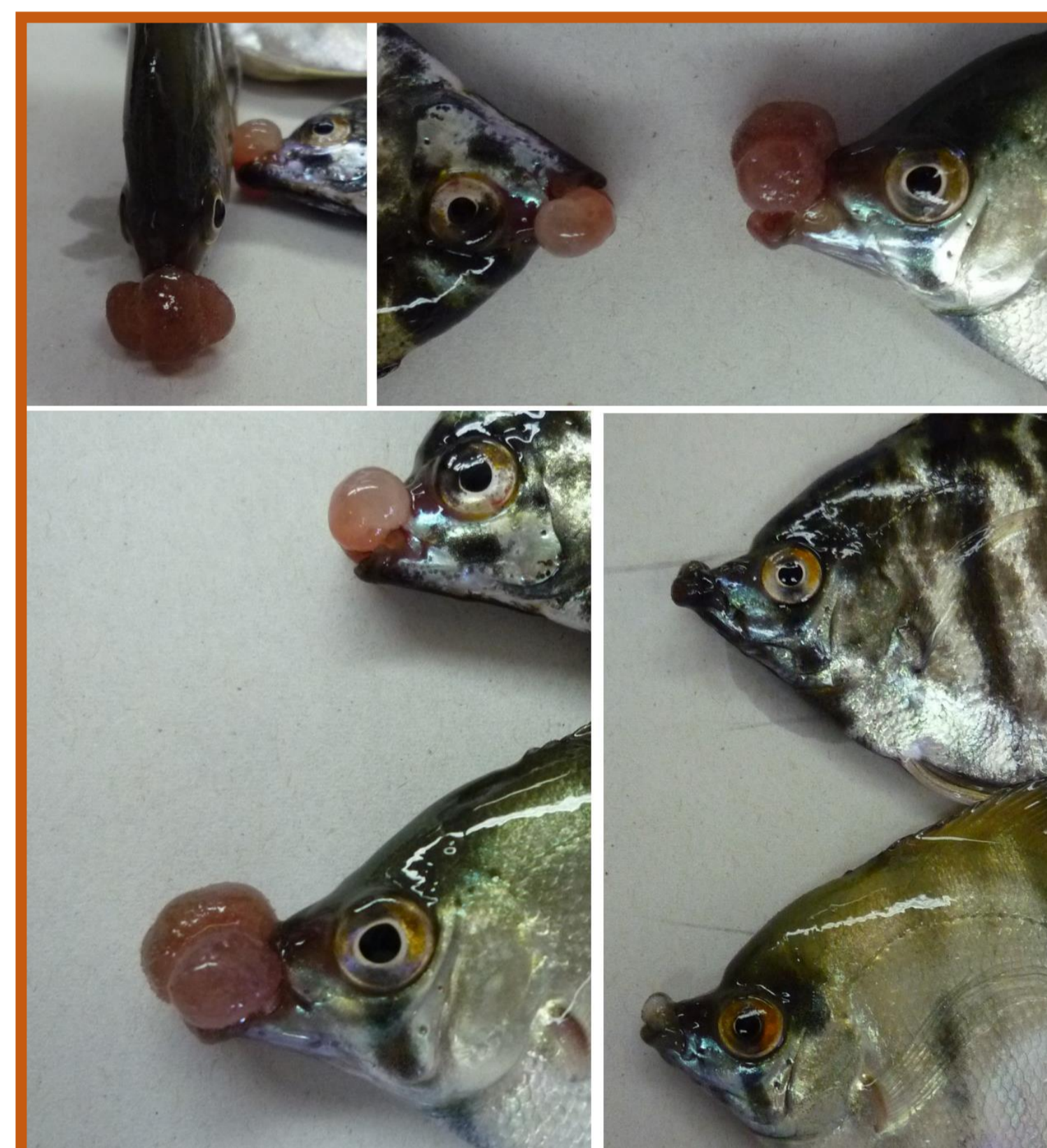


Figure 1. Angelfish with uni or multilulate tumors in the frontal region of the mouth.

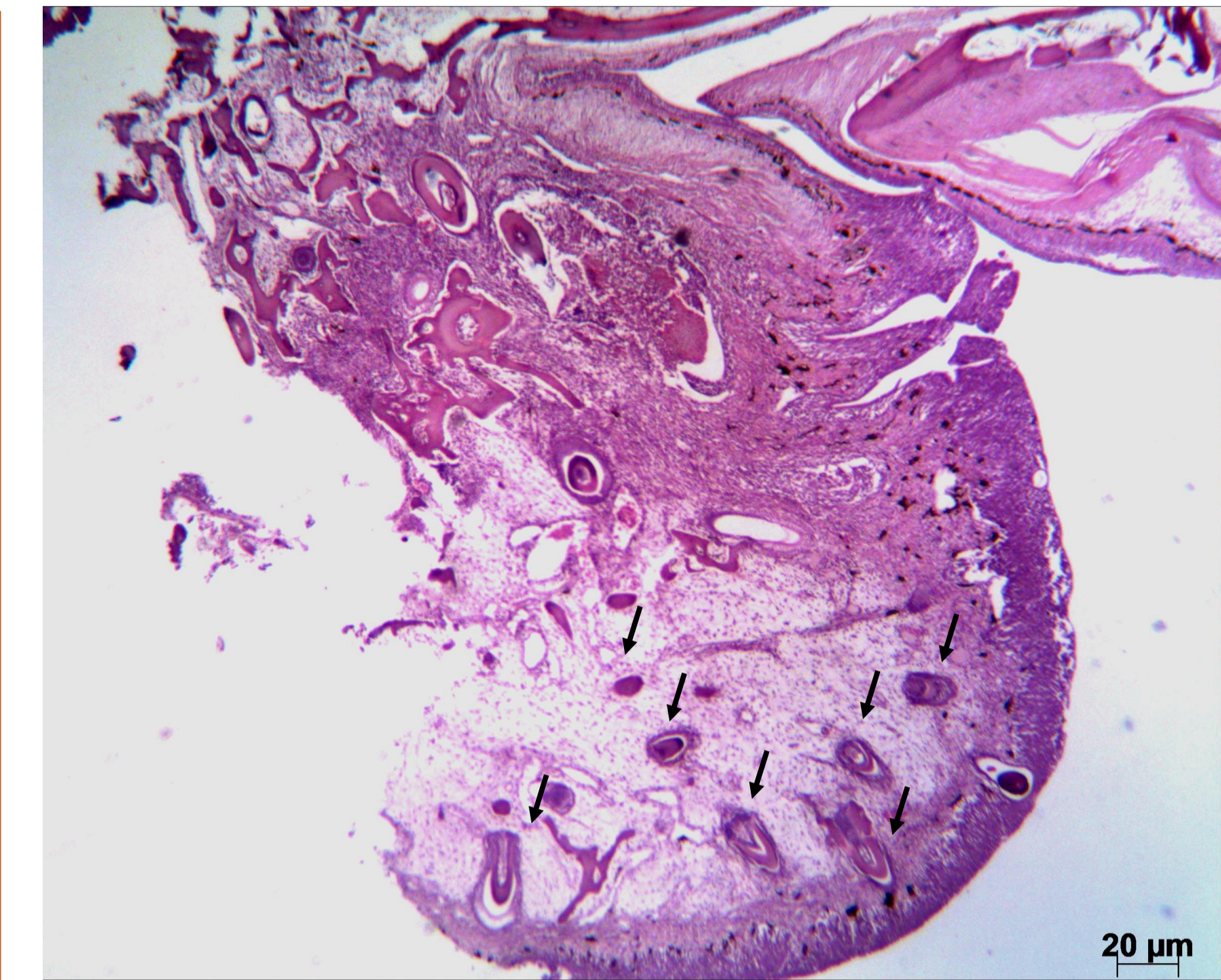


Figure 2. Histopathology of a tumor mass. A rounded nodular protuberance of hyperplastic stratified squamous epithelium arrow), with various denticles (arrow) dispersed in lax mesenchymal stroma.

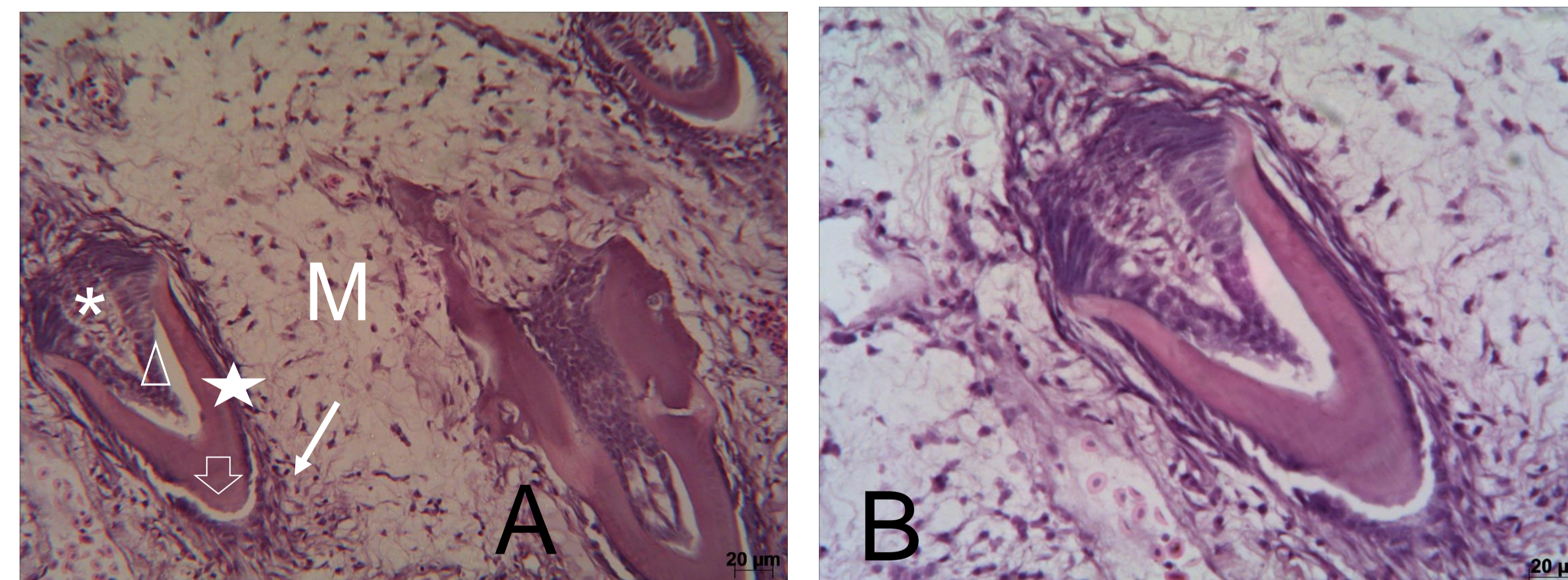


Figure 3. (A) Detail of figure 2, showing three denticles dispersed in the lax mesenchymal stroma (M). The denticle presented ameloblasts (arrow) over a layer of enamel (star), under which can be seen a layer of dense eosinophilic ivory (arrowhead) supported by a population of odontoblastic cells (triangulo). Centrally located at a deeper level is the dental papilla (asterisk). (B) Detail of A.

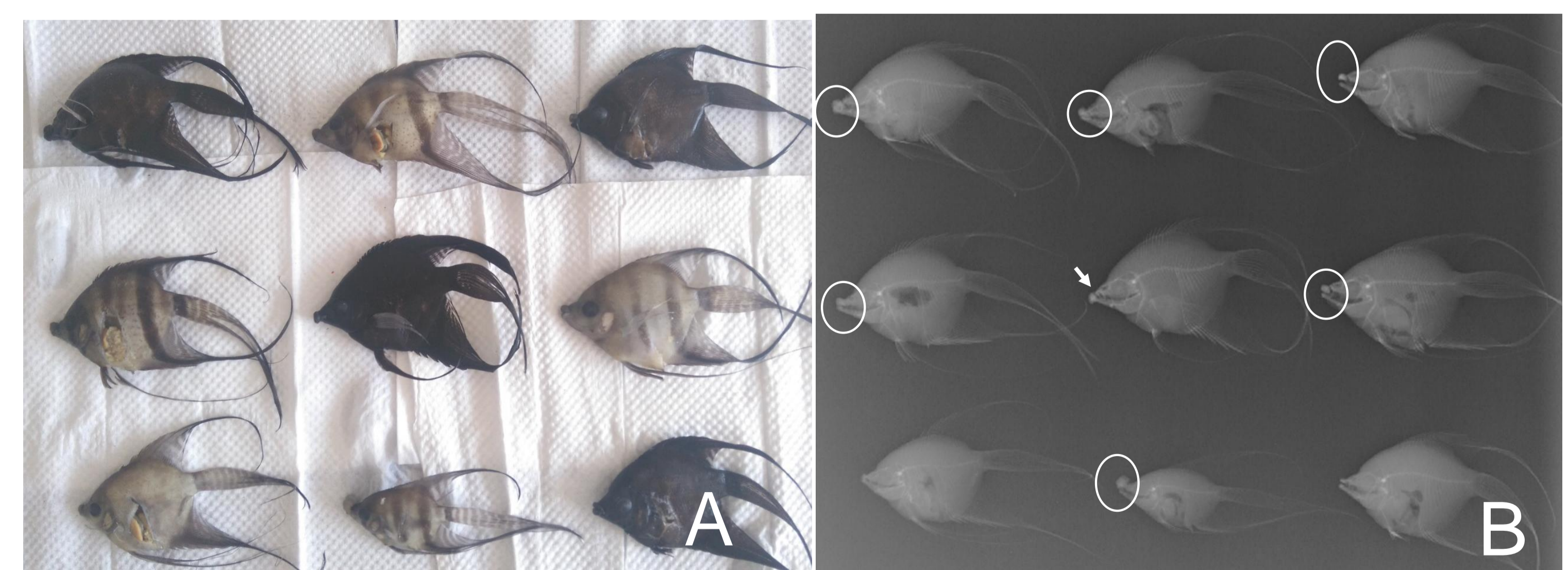


Figure 4. Images of angelfish with an odontoma. (A) Macroscopic aspect of tumors; (B) radiopaque protuberances (circles) of different magnitudes are observable on the rostral region of the fish, these correspond to the macroscopically observed masses (Figure 3A). In some fish shortening of the maxilla is observed (arrow).

References

- Vergneau-Grosset, et al. 2017. Fish Oncology: Diseases, Diagnostics, and Therapeutics. Veterinary Clinics of North America Exotic Animal Practice 20:21–56.
- Jiang, et al. 2016. Benign Odontogenic Tumors: Origins, Immunophenotypic Features, and Genetic Alterations. Current Oral Health Reports 3: 93–101.
- Vorbach, BS. Et al. 2018. Odontomas in two long-finned ocellaris clownfish (*Amphiprion ocellaris*). J Vet Diagn Invest, 30:136–139
- Francis-Floyd, R. et al. 1993. Lip fibromas associated with retrovirus-like particles in angel fish. JAVMA, 202:427–429.
- Videira, M. et al. 2015. Spontaneous multi-cystic peripheral ameloblastoma in the freshwater angelfish, from the Brazilian state of Pará. Arq Bras Med Vet Zoo, 67:1201–1204.
- Garg, K. et al. 2015. Molecular and genetic aspects of odontogenic tumors: a review. IJBMS, 18:529–536.

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