Bull. Eur. Ass. Fish Pathol. 16(5),154, 1996.

ALTERATIONS IN SKELETAL MUSCLE OF WITCH *GLYPTOCEPHALUS CYNOGLOSSUS* FROM NORTH ATLANTIC WATERS CAUSED BY A MICROSPORIDIAN OF THE GENUS *GLUGEA* (ORDER: MICROSPORIDIA SUBORDER: PANSPOROBLASTINA)

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Abstract

A first description of the occurrence of xenomas in the body muscle of a witch *Glyptocephalus cynoglossus* caught in the North Sea caused by *Glugea* sp. (Phylum *Microspora.* Order *Microsporidia.* Suborder *Pansporoblastina)* is given.

Introduction

Protozoa of the Order *Microsporidia* are cell parasites widespread in marine and fresh water fish species with a definite histotropism for transversely striated muscle tissues (Sprague, 1977).During the 115th research cruise of the FRV "Walter Herwig" in the North Sea a witch specimen was caught by bottom trawling on June 9th, 1991. on Station 556 (55° 45'N, 3° 21.1'E).

The witch weighed 460g and measured 42 cm in total length. During dissecting the fish alterations in muscle tissue of the eye-side of the fish were observed. Immediately after the dissection the fish was deep frozen and kept at –30°C until it arrived at Bremerhaven.

Description of findings

At three different positions (dorsal and ventral of the linea lateralis) of the eye-sided muscle yellow whitish cylindrical, partly bent grouped deposits with a blunt end of 2-6 mm length with a diameter up to 2 mm (see Fig. 1) were found. Preferential the longitudinal direction of these corpuscles was identical with that of the muscle segments of the surrounding myomeres . The inclusions could be simply be prepared from the muscle tissue by use of a blunt instrument. Upon opening of the corpuscles their crumbly, pulpy and fine-granular content could be squeezed out. The outer membrane was thin but firm and at either of its ends it proceeded to the neighbouring intact striated muscle cells. The microscopy of the native sample revealed that the membrane of the corpuscle consisted of the hypertrophic sarcolemma of the striated muscle cell. Such pseudocysts are commonly referred to as xenomas. which are different from encapsulated parasitic herds originating from proliferation of connective tissue. The microscopic investigation in bright field showed that the content of these vaulted muscle cells was formed of distinct ball-shaped elements (Fig. 2) which were embedded in a large number of smaller egg-shaped single cells. The bigger balls in its core contained approximately 100 of the smaller single cells which were enveloped by a very thin almost invisible membrane. Many balls were burst so that the single cells were extruded in bulk amounts (Fig. 3). Without doubt those ball-shaped corpuscles are to be identified as SPV (sporophorous vesicle) previously termed pansporoblasts. With regard to form and size of the single cells, this can be described as a sporoblast of the zoological Suborder Pansporoblastina in the protozoa-Order Microsporidia (Phylum Microspora, Class Mic-

References

Austin, B. and Austin, D.A. (1989). *Bacterial Fish Pathogens. Disease in Farmed and Wild Fish.* Ellis Horwood Ltd. 364 p.

Baudin-Laurencin, F., Pepin, J.F. and Raymond, J.C., (1991). First observation of an epizootic of pasteurellosis in farmed and wild fish on the French Mediterranean coasts. In: Abstracts, 5th International Conference, European Association of Fish Pathologists (EAFP) Budapest, Hungary, p.17.

Ceschia, G., Quaglio, F., Giorgetti, G., Bertoja, G. and Bovo, G., (1991). Serious outbreak of pasteurellosis (*Pasteurella piscicida*) in euryhaline species along the Italian coasts. In: *Abstracts, 5th International Conference, European Association of Fish Pathologists (EAFP). Budapest, Hungary*, p. 26.

Hawke, J.P., Plakas, S.M., Minton, R.V., Mc Phearson, R.M., Snider, T.G. and Guarino, M., (1987). Fish Pasteurellosis of cultured striped bass (*Morone saxatilis*) in coastal Alabama. *Aquaculture*, **65**: 193-204.

Kent, M.L., (1982). Characteristics and identification of *Pasteurella piscicida* and *Vibrio* species pathogenic for fishes using API 20 E (Analtab products) multitube test strips. *Can. J. Fish. Aquat. Sci.*, **39**, 1023-1026.

Kimura, M. and Kitao, T., (1971). On the etiological agent of 'bacterial tuberculoidosis' of *Seriola. Fish Pathol.*, **6**, 8-14.

Kitao, T., (1993). Pasteurellosis. In: *Bacterial Diseases of Fish* (Ed. by V. Inglis, R.J. Roberts, N.R. Bromage). pp159-165.

Kubota, S.S., Kimura, M. and Egusa, S., (1970). Studies of a bacterial tuberculoidosis of the yellowtail. I. Symptomatology and histopathology. *Fish Pathol.*, **4**, 111-118.

Kusuda, R.and Yamaoka, M., (1972). Etiological studies of bacterial pseudotuberculosis in cultured yellowtail with *Pasteurella piscicida* as the causative agent. I. On the morphological and biochemical properties. *Bull. Jpn. Soc. Sci. Fish.*, **38,** 1325-1332.

Santos, Y., Romalde, J.L., Bandin, I., Magarinos, B., Nunez, S., Barja, J.L. and Toranzo, A.E., (1993). Usefulness of the API - 20 E system for the identification of bacterial fish pathogens. *Aquacult.*, **116,** 111-120.

Simidu, U. and Egusa, S., (1972). A re-examination of the fish-pathogenic bacterium that had been reported as a *Pasteurella* species. *Bull. Jpn. Sci. Fish.*, **38**, 803-813.

Snieszko, S.F., Bullock, G.L., Hollis, E. and Boone, J.G., (1964). *Pasteurella* sp. from a epizootic of white perch (*Roccus americanus*) in Chesapeake Bay tidewater areas. *J. Bacteriol.*, **88**: 1814- 1815.

Toranzo, A.E., Barreiro, S., J.F., Figueras, A., Magarinos, B. and Barja, J.L., (1991). Pasteurellosis in cultured gilt head sea bream (*Sparus aurata*): first report in Spain. *Aquaculture*, **99,** 1-15.

Tung, M.C., Ssai, S.S., Ho, L.F., Huang, S.T. and Chen, S.C., (1985). An acute septicaemic infection of *Pasteurella* organism in pond-cultured Formosa snakehead fish (*Channa maculata* Lacepede) in Taiwan. *Fish Pathol.*, **20**,143-148.

Ueki, N., Kayo, Y. and Moorage, K., (1990) Pasteurella piscicida in juvenile red grouper. *Fish Pathol.*, **25**, 43-44.

Yasunaga, N., Hatai, K. and Tsukahara, J., (1984). On a massive mortality of oval file fish (*Navodan modestus*) caused by *Pasteurella piscicida. Fish Pathol.*, **19,** 51-55.

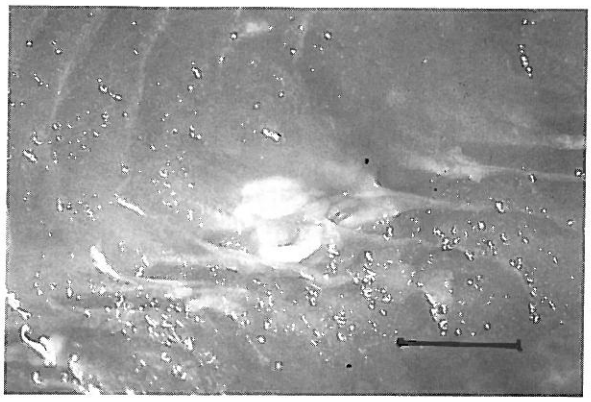

Figure 1. Whitish yellow xenomas in muscle of witch *Glyptocephalus cynoglossus,* bar = 1cm

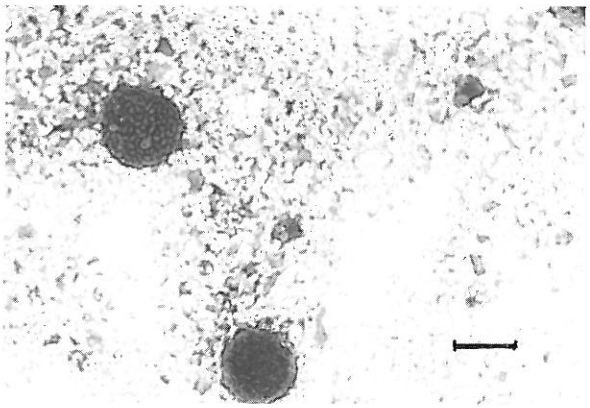

Figure 2. SPV's and sporoblasts of *Glugea* sp. from the muscle tissue of witch (*G. cynoglossus),* Giemsa stained. Bar=10µm.

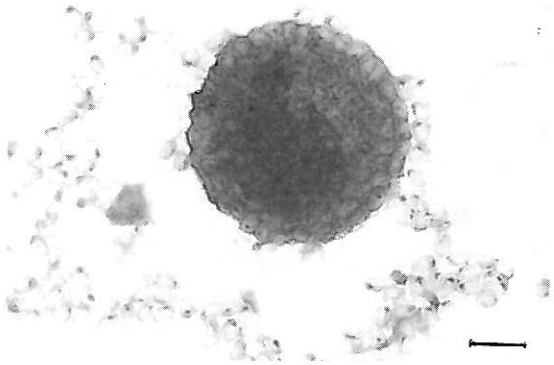

Figure 4. SPV with surrounding sporoblasts of *Glugea* sp. isolated from muscle xenoma of witch (*Glyptocephalus cynoglossus*). Giemsa stained. Bar=20µm.

rosporea). The SPV's in the xenomas are enveloped only by a very thin fragile membrane which is nestled to the peripheral located sporoblasts. The SPV's had a diameter of 28.7-35.7µm. The non homogeneous sized ellipsoid-shaped blunt edged sporoblasts were 3-3.9µm in length and 1.8-2.9µm in width.

While in thawed, native state under dimmed light field and phase contrast conditions a thickening of the single spores content at one polar end could be seen, in the sample stained according to Giemsa (Fig. 3) in vicinity to the centre a concave shaped nucleus was visible. which was situated, however. eccentric at the more blunt polar end of the spore. In the posterior vacuole (polar capsule) which was not clearly differentiated no polar tube was detected. Sometimes a partly extruded polar tube outside of the sporoblast was visible.

Discussion

The witch, *Glyptocephalus cynoglossus,* is mainly caught in the North Sea and around Iceland but is also found in Norwegian and Greenland-East waters. Xenomas in skeletal muscle of witch caused by *Microsporidia* are hitherto not described in literature. According to the microscopic findings the species described here belongs to the Suborder *Pansporoblastina* because Spy are formed. In this species the SPV's are not located directly in the transversely striated muscle tissue but are localised within the xenomas which build a pseudocyst. Only some SPV's are intact most are disrupted. A close look at the SPV membrane (Fig. 3) shows that there

is no specific membrane contour formed out. The surface of the SPV's is not even rounded and smooth which is typical for a robust membrane, but nestles to the contours of the sporoblasts located at the periphery. The localisation of SPV's in xenomas and also the thin and tender form of the membrane allow the taxonomic arrangement of this *Pansporoblastina* species according to the key of Lom & Dykova (1992) to the genus *Glugea.*

Glugea species which showed a distinct histotropism for the transversely striated muscle tissue are reported after Sprague (1977) as *G. destruens* in *Callionymus lyra* from French Atlantic coast and as *G. punctifera* in *Gadus pollachius.* According to Lom & Dykova (1992) these two species, however, have not been characterised sufficiently what means that they cannot be classified as Genus *Glugea* taxonomically any more. Other *Glugea* species which occur in other marine fish species present in the spreading area of witch are different from the newly described species especially by the tropism for other tissues (e.g. *Glugea stephani* in plaice, flounder, dab and turbot). This newly described species in witch is different from other *Pansporoblastina* species which are present preferably in transversely striated muscle of marine fish of the same spreading area (*Pleistophora* spp.) because of the different characteristics according to Lom & Dykova (1992).

Reference

Lom,J. and Dykova, I.(1992). Protozoan parasites of fishes. In : *Developments in Aquaculture and Fisheries Science*, **26**, Elsevier, Amsterdam, London, New York, Tokyo.

Sprague, V. (1977). Systematics of the *Microsporidia.* In : Bulka, L.A. and Cheng, T.C. (eds.) *Comparative Pathobiology.*Vol. II, Plenum Press, New York.