IX European Multicolloqium of Parasitology, Valencia 19 - 23 July 2004

INFECTIONS OF *CRYPTOCARYON IRRITANS* (CILIOPHORA) ON *SERIOLA DUMERILI* IN THE EXPERIMENTAL FACILITIES OF IEO MAZARRÓN (SE SPAIN)

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ABSTRACT

This report describes the effects of parasite *Cryptocaryon irritans* (Ciliophora) on the Mediterranean yellowtail (*Seriola dumerili*) during the years 2000 – 2003, in the IEO aquaculture facilities in Mazarrón (SE Spain), where *C. irritans* seems to be resident in this and other fish. All fish was susceptible to the parasite independently to their size (0.7 – 17 kg), and most of them finally died. This parasite emerged for the first time in September 2000, and re-emerged in September of 2001, coinciding with the natural fall of the water temperature (from 26 to 20 ºC in one month). No signs of parasitosis (nor mortalities) were observed in 2002. On the contrary, and possibly due to the abnormally high water temperature (2ºC above in average), the parasite was detected in June 2003 and it persisted up to the water temperatures fell under 20 ºC, in mid October. In 2000, 95% of *S. dumerili* (404 kg in total) located in 10 different tanks were killed by the parasite. Fish showed clinical signs typical of cryptocarionosis: loss of appetite, abnormal swimming behaviour and respiratory stress. Contrary to described in other species, the parasite is not distinguishable on the skin of the fish at first sight (white spots). It affects fundamentally to the gills and sometimes to the eyes producing blindness. None of the given treatments (formalin, freshwater and copper sulphate baths) were effective once the trophonts were under the gill epithelium. During 2001 and 2003, fish mortalities seemed to minimise with the combined effect of artificial changes the photoperiod and copper sulphate baths.

INTRODUCTION

Cryptocaryon irritans is a pathogenic ciliate of marine fishes. Big mortalities have been reported in many species of fish, between them *Seriola dumerili* (Rigos *et al.*, 2001). This obligate parasite has a quadriphasic life cycle (Colorni, 1987): the parasitic stage that feeds on tissue and body fluids is called trophont. Upon maturity, trophonts became tomonts. After several divisions tomonts rupture releasing the infective stage (free-swimming tomites or therонts) that became trophont again, closing the cycle.

The biological cycle of *Cryptocaryon irritans* seems to be controlled by the photoperiod (Burgess & Matthews, 1994) and temperature (Diggles & Lester, 1996), and is very sensitive to salinity (Colorni, 1985).

MATERIALS AND METHODS

To renew our broodstock each year, juvenile Mediterranean yellowtails (weight around 100 g) are caught in September by commercial fishermen using purse seine nets or set nets and the big individuals (between 10 and 17 kg) are caught in June in a set net called “Almadraba”. The fish are transported to the facilities of the Spanish Institute of Oceanography, (Planta Experimental de Cultivos Marinos) in Mazarrón (Murcia-SE Spain), where they are held in tanks (2, 5, 10, 40 and 80 m^3). Oxygen saturation was kept at over 70%. Young fish were fed with dry food and adult individuals were only fed with frozen raw fish. Fish densities ranged between 1 and 5 kg/m^3. Salinity was kept unspoiled at around 38 ‰.

RESULTS

The first symptoms of cryptocaryonosis were observed in September 2000 and re-emerged in September of 2001, coinciding with the natural fall of the water temperature (from 26 to 20 ºC in one month) (Fig 1). Fish showed clinical signs typical of cryptocarionosis: loss of appetite, abnormal swimming behaviour and respiratory stress (slower swimming with a wide open mouth). Total tank mortality usually appears in 48 h. Baths of formalin (300 ppm / 1h) and copper sulphate (2 - 10 ppm / 1 h) in the culture tank were not effective. Contrary to observations in other species, the parasite is not distinguishable on the skin of the fish at first sight and typical white spots are, normally, very light (Fig 2). It affects fundamentally to the gills and sometimes produces eye blindness and petechias (Fig 3 and 4). The gills exam showed a big amount of parasites in all of the stages (Fig 5 – 8) and some of trophonts penetrate inside of the gill epithelium (Fig 6 - 7). In 2000, 95% of *S. dumerili* (404 kg in total) located in 10 different tanks were killed by the parasite (Fig 1) independently to the fish size (0.7 – 17 kg).

In 2002 no signs of parasitosis (nor mortalities) were observed. On the contrary, and possibly due to the abnormally high water temperature (2ºC above in average), the parasite was detected in June 2003 and it persisted up to the water temperatures fell under 20 ºC, in mid October. None of the given treatments in this year (300 ppm of formalin, or 2 – 10 ppm of copper sulphate baths of 1 h or 5 minutes of freshwater baths) were effective once the trophonts were under the gill epithelium. During 2001, two 5 m^3 tanks containing fish showing the first symptoms were kept 3 days in absolute dark followed of 3 days of 24/24 hours light. Once a day fish were treated with 2 ppm of copper sulphate / 1h. In this case fish mortalities were stopped.

In 2003, due to impossibility to dark completely the biggest tanks, photoperiod was maintained in 24/24 hours light between August and October. Besides, fish were treated 3 - 4 times per week with 8 ppm of copper sulphate 1 h baths. Fish mortalities seemed to minimise with this combined treatment.

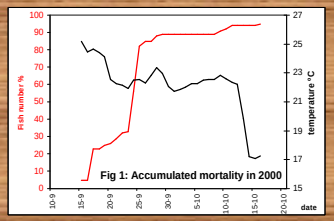

FIG. 2: WHITE SPOTS

FIG. 3: BLINDNESS

FIG. 4: PETECHIAS

FIG. 5: THERONT

FIG. 6: TROPHONTS IN GILLS

FIG. 7: TROPHONT UNDER EPITHELIUM

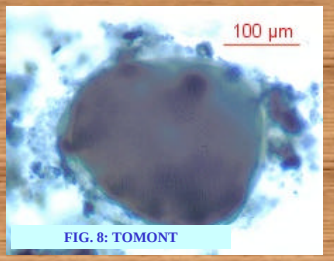

FIG. 8: TOMONT

DISCUSSION

The fact that the chemical treatments were not found to be effective against the intense parasitosis is in accordance with the results obtained by Rigos *et al.* (2001), in *Seriola dumerili*. The changes of photoperiod were done according with the observation made by Burgess & Matthews (1994). Those authors reported that tomont (Fig 8) excystment, releasing therонts (Fig. 5) occurs over the dark cycle and therонts show a photopositive response and they need light to infected a host. In this case, in the dark conditions, no infections would be produced, and in 24/24 light conditions, no theront releasing would be take place. Besides, as Yoshinaga & Dickerson (1994) have also pointed out, the copper sulphate treatments would be more effective in dark conditions when therонts were swimming free in the water.

CONCLUSION

- **None of the given treatments (formalin, freshwater and copper sulphate baths) were effective once the trophonts were under the gill epithelium.**
- **Fish mortalities seemed to minimise with the combined effect of artificial changes of the photoperiod and copper sulphate baths.**

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