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KUDOA SCIAENAE (MYXOZOA: MULTIVALVULIDAE) CYSTS DISTRIBUTION IN THE SOMATIC MUSCLES OF *STELLIFER MINOR* (TSCHUDI, 1844) (PISCES: SCIAENIDAE)

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The distribution of Kudoa sciaenae *cysts (Myxozoa), in terms of intensity and prevalence, in the somatic muscles of the sciaenid* Stellifer minor, *shows an apparent preference for the anterior body region, including the head. The observed preference seems to be a consequence of the differential distribution of muscle mass, in the defined area, because when density (cyst/g dry muscle), is considered, all the somatic areas, but not cephalic area, do no show significant differences in terms of mean intensity and prevalence.*

Key words: *Kudoa sciaenae* – *Stellifer minor* – fish parasites – prevalence – mean intensity – cysts distribution – Perú – South Pacific

Studies about *Kudoa* cysts distribution in the somatic muscles of their fish host are scattered and included papers of Mateo, 1972; Okada et al., 1981; Kabata & Whitaker, 1981 and Kudo et al., 1987, among others. The definition of body zones permit and adequate method for the study of pattern of cysts distribution.

In this paper, we analized the distribution of *Kudoa sciaenae* Terán, Llicán & Luque, 1990 cysts in the somatic muscles of the sciaenid fish *Stellifer minor* (Tschudi, 1844). We postulate that the observed pattern of cyst distribution is influenced mainly by muscle mass disponsable in each body zone.

MATERIALS AND METHODS

During February 1989 to August 1989, we analized 100 specimens of *Stellifer minor*, caugh out in the vicinity of Chorrillos (12° 30'S, 76° 50'W). Seven body zones were defined: one cephalic, three dorsal and three ventral. Dorsal and ventral zones were defined using as limit an imaginary line from the mid point of the tail to the inferior border of the eyes. Lateral line includes a row of 49 scales, the three dorsal and ventral zones were delimited at level of scales 16 and 32 (counted from the cephalic end to the caudal fin – Fig.). The search for cysts impplies the disgreggation in saline solution, of small portions of all the somatic muscles for each body zone, and microscopic observation at 40 magnifications.

Statistical analysis performed were the Log Likelihood "G" test for to determine if prevalence shows significant differences among body zones. The Kruskall-Wallis test, previous rank transformation of intensity data (Conover & Iman, 1981) and a non-parametric multiple comparison Tukey test, permit to define possible preferences for a given zone of the body. Our unpublished data shows that sex and host size do no affect the intensity of the infection. Moreover, there are not significant differences between intensities of infection on rigth and left size of the fish, and mean size of male hosts do not show significant differences with female hosts. Statistical methodology follow recomendations of Zar (1984). Terms prevalence, and mean intensity agree with the recomendations of Margolis et al. (1982).

RESULTS

The Table shows values of prevalence and mean intensity in each considered areas of the body. Differences in the prevalence values be-

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TABLE

Kudoa sciaenae Terán, Llicán & Luque, 1990 cysts distribution in somatic muscles of *Stellifer minor* (Tschudi, 1844) (Pisces: Sciaenidae)

	Body zones						
	Head	Dorsal body			Ventral body		
		Anterior	Central	Posterior	Anterior	Central	Posterior
	VII	I	III	V	II	IV	VI
P (%)	96	85	87	61	85	78	64
I	68.8	18.9	17.3	12.1	16.3	15.7	7.3

P = prevalence, I = mean intensity.

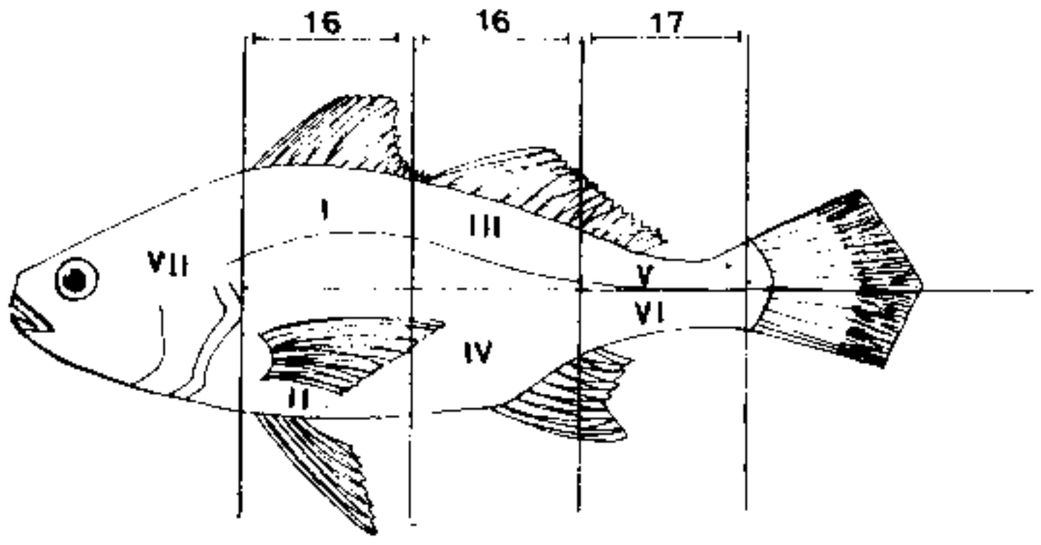

Diagram of *Stellifer minor* (Tschudi, 1844) showing the defined areas in the study of K*udoa sciaenae* Terán, Llicán & Luque (1990) cysts distribution in somatic muscles. (Arabic numbers are the lateral line scales of *S. minor* used as reference for to define the body zones).

tween zones show significant differences (G = 61.8, 0.001 > P, DF = 6). The Kruskall-Wallis test shown that the cyst distributions along the fish is not uniform (Hc = 49.49). Areas I to V, do not show significant differences. Main values of mean intensity occur in area VII.

DISCUSSION

Studies about the prevalence of *Kudoa* cysts in different body areas, has been focused by Mateo (1972) who was unable to detect differences in the prevalence values of *Kudoa peruvianus* Mateo, 1972 in *Merluccius gayi peruanus* Ginsburg from the Peruvian coast. Such results could be a consequence of the absence of a clear definition of body areas. Okada et al. (1981) studied the same host fish from Perú that Mateo (1972), but three body areas (anterior, central and posterior) were defined, and clear differences appear, showing a preference for the anterior body zone. After, Kabata & Whitaker (1981) and Kudo et al. (1987) made similar analysis in *M. productus* (Ayres) and the same six body areas were defined in both papers: anterior dorsal and ventral, central dorsal and ventral, posterior dorsal and ventral (our body zones I to VI). Results of Kabata & Whitaker (1981), Kudo et al. (1987) and those now presented, are in concordance: anterior body zones shows main prevalence values, moreover, our results also show the same pattern for mean intensity. No satisfactory explanation for the detected preference for anterior body areas has been presented.

In order to test the hipothesis of homogeneous cyst distribution, an additional sample of 20 specimens of *Stellifer minor* was taken, and analized in the same way that the first sample, but in addition, the mean dry weigth (80 °C until constant weigth) of the somatic muscles for all body zones was determined, and the density (mean number of cyst/g of dry muscle) was determinated. The results of the new analysis show that the density is homogeneous in all the body zones defined. Exception is made by cephalic zone (zone VII), but results must be considered as the critical level (0.05). Then, if 0.05 is considered as the critical level, no differences are present, but critical level of 0.10 shows significant differences between cephalic zone and the rest of the body. Mean dry weigth of zones I and VII, are significantly larger than others, and shows main prevalence and mean intensity values. Thus, the defined preference found by Kabata & Whitaker (1981) and Kudo et al. (1987), that in turn was found in this study, could be a consequence of a larger habitat (somatic muscle mass) disponsable in the zones that show main prevalence and mean intensity, and the distribution of cysts must be considered as uniform.

REFERENCES

CONOVER, W. J. & IMAN, R. A., 1981. Rank transformation as a bridge between parametric and non-parametric statistics. *Amer. Stat., 35:* 124-133.

KABATA, Z. & WITHAKER, D. J., 1981. Two species of *Kudoa* (Myxosporea: Multivalvulidae) parasitic in the flesh of *Merluccius productus* (Ayres, 1855) (Pisces: Teleostei) in the Canadian Pacific coast. *Can. J. Zool., 59:* 2085-2091.

KUDO, G.; BARNETT, H. & NELSON, R., 1987. Factors affecting cooked texture quality of Pacific whiting, *Merluccius productus* fillets, with the particular emphasis on the effect of infection by the myxosporean *Kudoa paniformis* and *K. thyrsitis. Fish. Bull., 85:* 745-756.

MATEO, C. E., 1972. Investigación parasitológica de la "merluza" (*Merluccius gayi peruanus*). *Inf. Inst. Mar Perú-Callao, 40:* 4-13.

MARGOLIS, L.; ESCH, G. W.; HOLMES, J. C.; KURIS, A. A. & SCHAD, G. A., 1982. The use of ecological terms in parasitology. (report of an ad hoc committee of the American Society of Parasitologist). *J. Parasitol., 68:* 131-133.

OKADA, M.; ARECHE, N. & YSHIKAWA, E., 1981. Myxosporidian infestation of Peruvian hake. *Jap. Soc. Sci. Fish., 47:* 229-238.

ZAR, J., 1984. *Biostatistical analysis.* Prentice Hall. Inc. New Jersey, 718 p.