EVOLUTION OF AEROMONAS HYDROPHILA POPULATIONS IN AQUATIC ENVIRONMENTS WITH DIFFERENT SALINITIES.

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ABSTRACT

Aeromonas hydrophila was studied in the river Gaudalhorce, its estuary, and the adjacent sea. The results show that *Aeromonas* is negatively affected by salinity increase. It forms part of the autochtonous microflora of the sea where its presence is independent of faecal contamination but it appears to be fundamentally correlated with the presence of Total Coliforms.

Bacteria of the genus *Aeromonas* are autochtonous microorganisms of naturally occurring aquatic environments. However, certain species of *Aeromonas*, in particular, *A.hydrophila* have been isolated from other environments and they are pathogens having been associated with several human diseases (2).
Because of the ecological and hygenic importance of *A.hydrophila* a study was designed and carried out to observe the population evolution in several different aquatic environments (river,estuary and sea) to determine its distribution at certain points along the salinity gradient between fresh water and the sea.
The quantitative determination were made by the membrane filtration method (I) using mA medium (3) and test " in situ " of suspect isolates. These showed that *A.hydrophila* has a positive response to the trehalose, mannitol, and oxidase test. Investigation of the other microorganisms, Aerobic Heterotrophs (HA), Total Coliforms (TC), Faecal Coliforms (FC), and Faecal Streptococci (FS), was carried out using the techniques specified in "Standard Methods, I5th Ed.(I). Salinity was calculed by the argentometric method (I).
Fifteen sample stations were employed, distributed as follows; four in the Guadalhorce river (GU,VT,COL,AZ); two in the estuary (DI and D2), and nine in the sea, in three groups of three, each group being parallel to the coast at distances from the shore of 250, 500, and I000, meters. However, as the data from the sea stations showed great homogeneity, it was decided to average them and include these figures as the results of one station, as may be seen in Table I. The samples were collected at fortnightly intervals between July '83; and July '84.
The results which express the relationship of *A. hydrophila* to the other microorganisms and the salinities at the different sample stations are shown in Table I. An inverse relation between *A. hydrophila* and salinity exists in the estuary and sea. These results agree with those of Kaper et al.(2). In the more saline ecosystems (36.48‰) the relationship between HA microorganisms and *A.hydrophila* (Table I and Fig.2) is not close ($p >> 0.I$, $0.05 < r < 0.06$) which indicates that *A.hydrophila* does not represent a significantly important percentage of the autochtonus marine microflora.
In the case of three of the other microorganisms, there does not appear to be any relation with *A.hydrophila* as the regression lines are parallel to the abcissa axis; TC is the exception, which shows a good correlation ($r=0.46$;p. 0.0I). The general lack of relation indicates that *A. hydrophila* does not originate from the sewage waters and so cannot be considered as an indicator of the degree of contamination in this ecosystem.

In less saline waters, between 0.I4 and 6.76 %o(river and estuary) the relations between A.hydrophila and the different microorganisms is closer (Fig.I) because this aquatic medium is the most appropiate for A. hydrophila. Consequently, it may be concluded that A.hydrophila formsa part of the fluvial environment but that it can be carried in sewage water in which it is in equilibrium with the faecal microorganisms.

TABLE I

STATIONS	HA/Ah	TC/Ah	FC/Ah	FS/Ah	Sal(%o)
GU	r=0.60,p< 0.I0	r=0.65,p < 0.I0	r=0.52,p > 0.I0	r=0.06,p > 0.I0	0.I5
VT	r=0.57,p< 0.I0	r=0.54,p < 0.I0	r=0.49,p > 0.I0	r=0.30,p > 0.I0	0.7I
COL	r=0.84,p < 0.0I	r=0.58,p < 0.I0	r=0.49,p < 0.0I	r=0.30,p < 0.05	I.08
AZ	r=0.5I,p > 0.I0	r=0.I9,p > 0.I0	r=0.3I,p > 0.I0	r=0.I4,p > 0.I0	I.76
DI	r=0.I7,p > 0.I0	r=0.53,p > 0.I0	r=0.39,p > 0.I0	r=0.52,p > 0.I0	4.50
D2	r=0.62,p < 0.I0	r=0.7I,p < 0.05	r=0.49,p > 0.I0	r=0.44,p > 0.I0	6.72
Sea	r=0.06,p > 0.I0	r=0.56,p < 0.05	r=0.47,p < 0.I0	r=0.52,p < 0.I0	36.48

Relationship between salinity/ A.hydrophila concentrations: y=-0.IIx+6.7I(r=0.88,p < 0.0I)

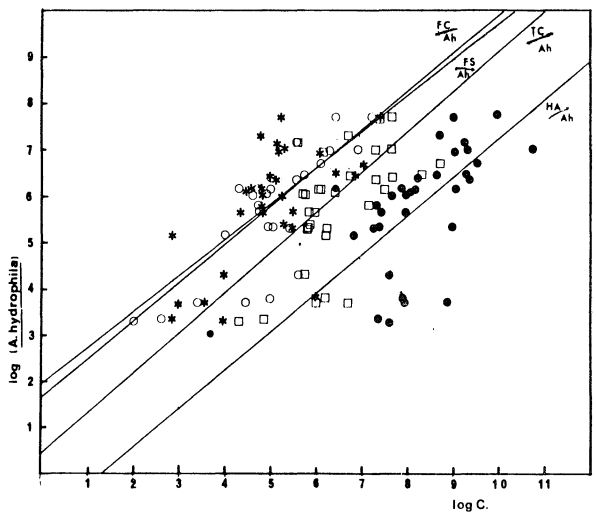

Figure 1

○—○ TC/Ah y=0.87x + 0.44 (r=0.72,p< 0.001)

□—□ FC/Ah y = 0.81x + 1.71 (r=0.79,p <0.001)r=

— FS/Ah y = 0.79x + 1.93 (r=0.66,p< 0.001)

●—● HA/Ah y = 0.84x - 1.12 (r=0.68,p < 0.001)

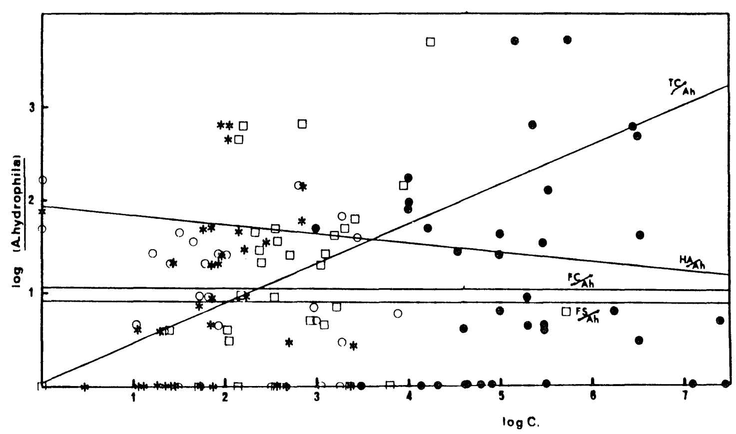

Figure 2

○—○ CT/Ah y = 0.03x + 0.43 (r=0.41,p < 0.05)

□—□ FC/Ah y = -0.01x + 1.08 (r=0.02,p > 0.1)

— FS/Ah y = -0.0002x + 0.94 (r=0.02,p >>0.1)

●—● HA/Ah y = -0.10x + 1.94 (r=0.06,p >>0.1)

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