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Experimental hanging culture of *Pecten maximus* in the West of Ireland, with a note on tagging

by

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Abstract

The feasibility of adult culture of Pecten maximus by suspending them from vertical ropes attached by a courlene line passed through a drilled 'ear', was explored. This a technique similar to that developed in Japan for Patinopecten yessoensis (Sanders 1973). The hinge of the valves of the cultured escallops was found to degenerate and shell and muscle growth was less when compared with escallops from a commercial bed.

Method

The hanging culture was placed in four metres of water (at low water springs) over a sandy bottom at the entrance of Bertrabouy Bay, Co. Galway (Figure 1). The cultured escallops were sheltered by Innishtreh but were exposed to a swift back eddy from tidal movement in and out of the bay. The escallops used in the culture were obtained from the commercial bed in the centre of the bay. The escallops were drilled on the posterior auricle adjacent to a central position along the byssal furrow, this gave maximum purchase to the line and reduced the opportunity of the auricle edge being broken off, so freeing the line. If drilling is made too near the edge of the auricle the auricle is liable to chip. A 3mm diameter hole was made with an electric drill and through this hole courlene line of 1.5mm diameter was passed and attached to a vertical rope. Braided polypropylene sacks filled with stones substituted for an anchor, and a subtidal bouy at the other end of the rope was attached in turn to a floating marker bouy. The escallops were laid on 13-2-74 examined on 28-3-74; 21-6-74 and finally on 2-10-74. Drilled controls were retained in flow trays within a laboratory.

Results

The cultured escallops were examined by diving on five occasions during daylight and all were seen to have their tentacle margins extended. They

reacted to the divers presence by closing their valves.

A total of 36 escallops were held in culture for the full time, but 3 were lost. The cultures consisted of two strings; one of 24 and another of 12. No mortality was observed over the experimental period.

28-3-74 No growth had taken place from the time they were laid. Some diatoms on the shell were grazed by the limpet Acaemea sp. and the topshell Gibbula cinerea.

21-6-74: Shell growth had taken place and there was fouling of the shell by Ectocarpus, Laminaria and Balanus. The Balanus were abundant on the right valve, which was the more shaded.

2-10-74: The culture was lifted and examined and further growth and fouling of the shell was noted. Laminaria that had settled near the ventral edge of the shell had a holdfast which grew around the ventral edge and into the mantle. This occured in two individuals. Penetration of the holdfast into the shell cavity caused blistering and deformation of the inner shell surface and ventral edge of the shell and damaged the mantle tissue. The part of the holdfast encased in the mantle was bathed in a putrid black liquid.

The escallops, drilled as controls, laid down flake-like pieces of shell which sealed the holes of some valves. The mantle was not able to lay down new shell to the auricle edge after the time of drilling and because of this the hinge degenerated. This reduction of the effective length of the hingeline permitted a small anterior-posterior movement of each valve about the resilium. When the adductor muscle contracted the valves closed allowing the corrugations along the ventral edge of the shell to interdigitate. When fully closed no rotation could be noticed.

The two different size groups of Pecten in the hanging culture were examined and deterioration of the hinge line was observed, which can be clearly seen

compared to free escallops from the commercial bed (Figure 2). In a few individuals it was found that the hinge deteriorated to such an extent that the resilium was damaged. Valvular torque in these animals was considerable so that when the adductor muscle contracted the valves would not close because the opposing corrugations would not seat into their normal positions. In two individuals the entire left valve was dislocated from the right valve excepting for the body tissues. The adductor muscle was capable of orientating the valves to a normal to near to normal position.

The most distal edge of the auricle from the drilled hole had not been in contact with the mantle so that in some shells the shell deteriorated and broke off. In larger shells Ectocarpus and Balanus settled on the inside of the auricle. In badly damaged animals blisters were found inside the shell.

The condition of the escallops was assessed by measuring the weight of adductor muscles of free escallops and escallops in hanging culture. (Figure 3). The control drilled escallops held in the laboratory were similar in condition to those in culture. Shell growth was also noticeably lower for the suspended escallops over the time of culture, than the natural growth on the commercial beds of the bay (Figure 4).

Discussion

There is evidence to suggest that the use of drilling ear auricles for the suspension culture of Pecten maximus is detrimental. The degeneration of the hinge line and intensity of fouling and small muscle weight gain indicates that a better condition can be obtained from free animals. The ability of the escallop to recess no doubt enhances its quality because less fouling takes place. P. maximus has been held comented onto vertical lines in the Ria del Rosa in Northern Spain (Gibson Pers. comm.) This is a method which has been used in hanging oysters in this region with success. Cementing in this way P. maximus may have advantages over the drilled method but it is not certain

that fouling would be less severe. Although the escallops that were drilled and were held in culture had no observed mortality it is quite possible that if the culture was extended over a longer period of time mortalities would have occured. It is not clear whether Patinopecten yessoensis held in suspended culture in Japan experience similar problems.

Conclusion

The drilling of the 'ear' of Pecten maximus for suspended culture caused a reduction of the hinge line length which effected the mechanics of the shell movement; settlement of fouling organisms frequently took place on the inner surface of the shell 'ear' adjacent to the drilled hole from which the mantle becomes restricted. Fouling of the shell by Laminaria can damage the shell and condition of the escallop. Fouling by Ectocarpus and Balanus effect the appearance of the animal.

A note on the tagging of escallops

The tagging of escallops has been used in the past to examine movement and growth. A Pettersen disc tag has been used frequently by using a wire passed through a drilled hole in the auricles. In one recent study less than 10% of the returned escallops were alive (Bhatnagar - pers. comm.) All of these escallops showed degrees of damage to the hinge line and damage to the mantle in the region of the drilled hole.

Those escallops that were drilled through one auricle and tagged in the same study had a higher survival rate with little to no degeneration of the hinge line. The wire in these animals often became cemented into the shell.

Escallops that have been drilled on one shell and tagged would appear to give a more correct indication of movement and growth than those drilled on both valves. Tagging escallops by drilling holes in the auricle is inadvisable since this method is considered to be inefficient for examining such criteria that

was the intention to test. For tagging it is strongly recommended that an alternative method be used such as a Petterson disc tag cemented to the depression of the left valve as used by Hudson (1972) or by using gum (Tubb 1946).

References

Hudson, H. J. 1972 'Marking of scallops with quick setting cement' Proc. Nat. Shellfish. Assoc. 62:59.

Sanders, M J. 1973 'Culture of the scallop Patinopecten yessoensis (Jay), in Japan'. Fish. Cont. Victoria No. 29

Tubb, J. A. 1946 'The Tasmanian scallop (Pecten medius, Lamark). 1. First report on tagging'. J. Coun. Sci. Industr. Res. Aust. 19:202-11.

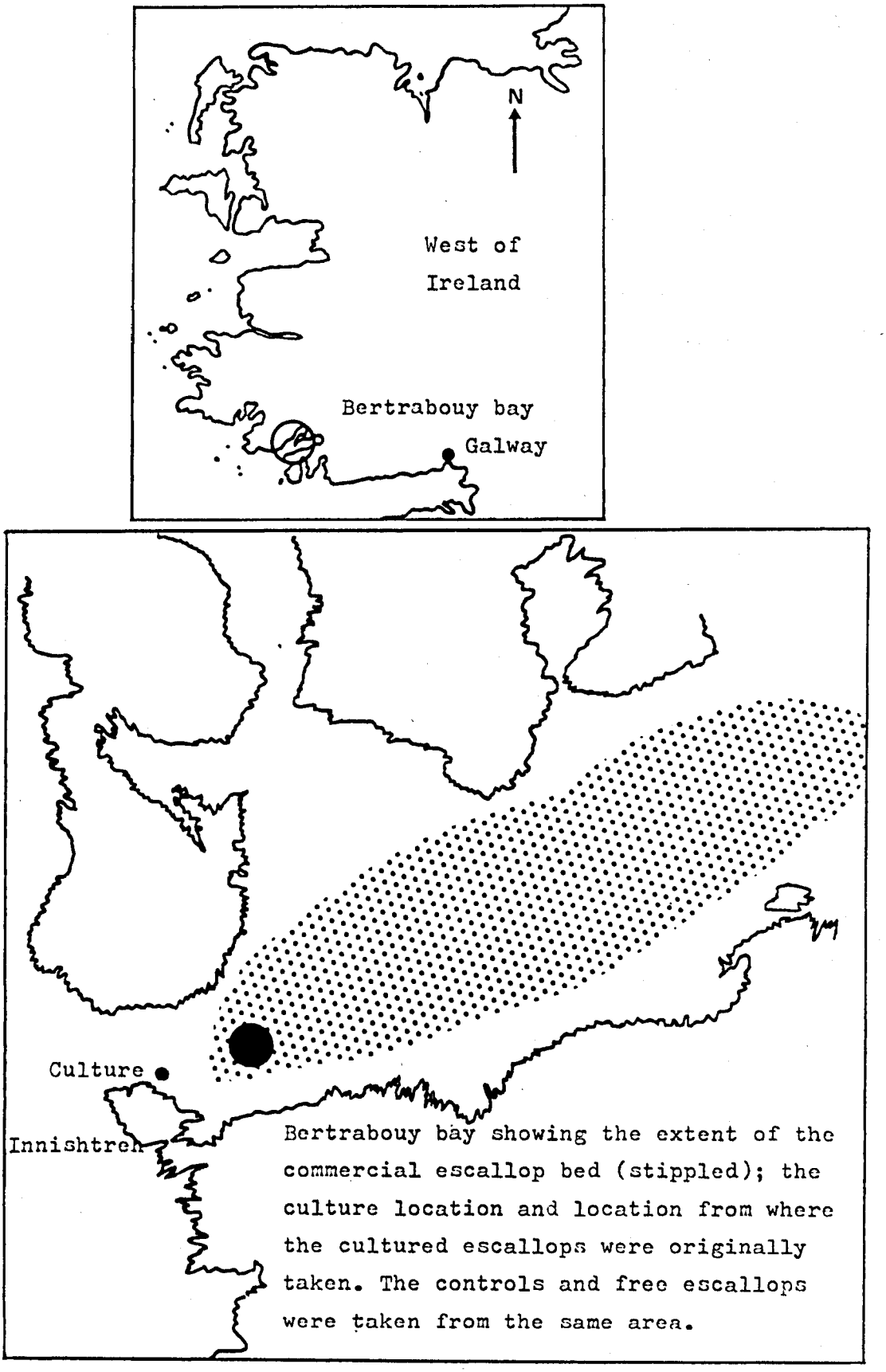

Figure 1. Location of hanging culture in Bertrabouy bay in the West of Ireland

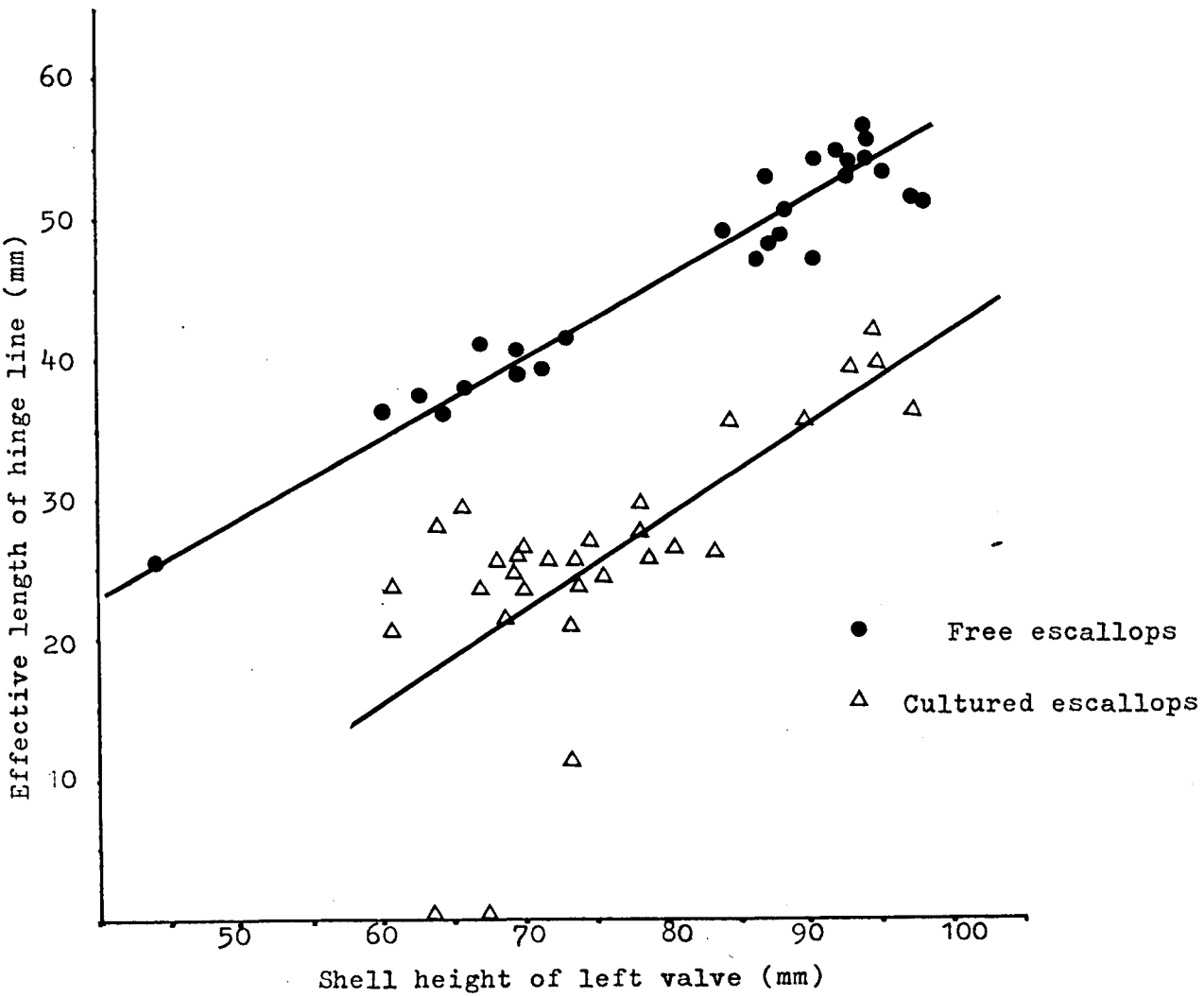

Figure 2. Comparing the effective hinge line length of drilled suspended escallops with free escallops from a nearby commercial bed. Lines fitted by eye.

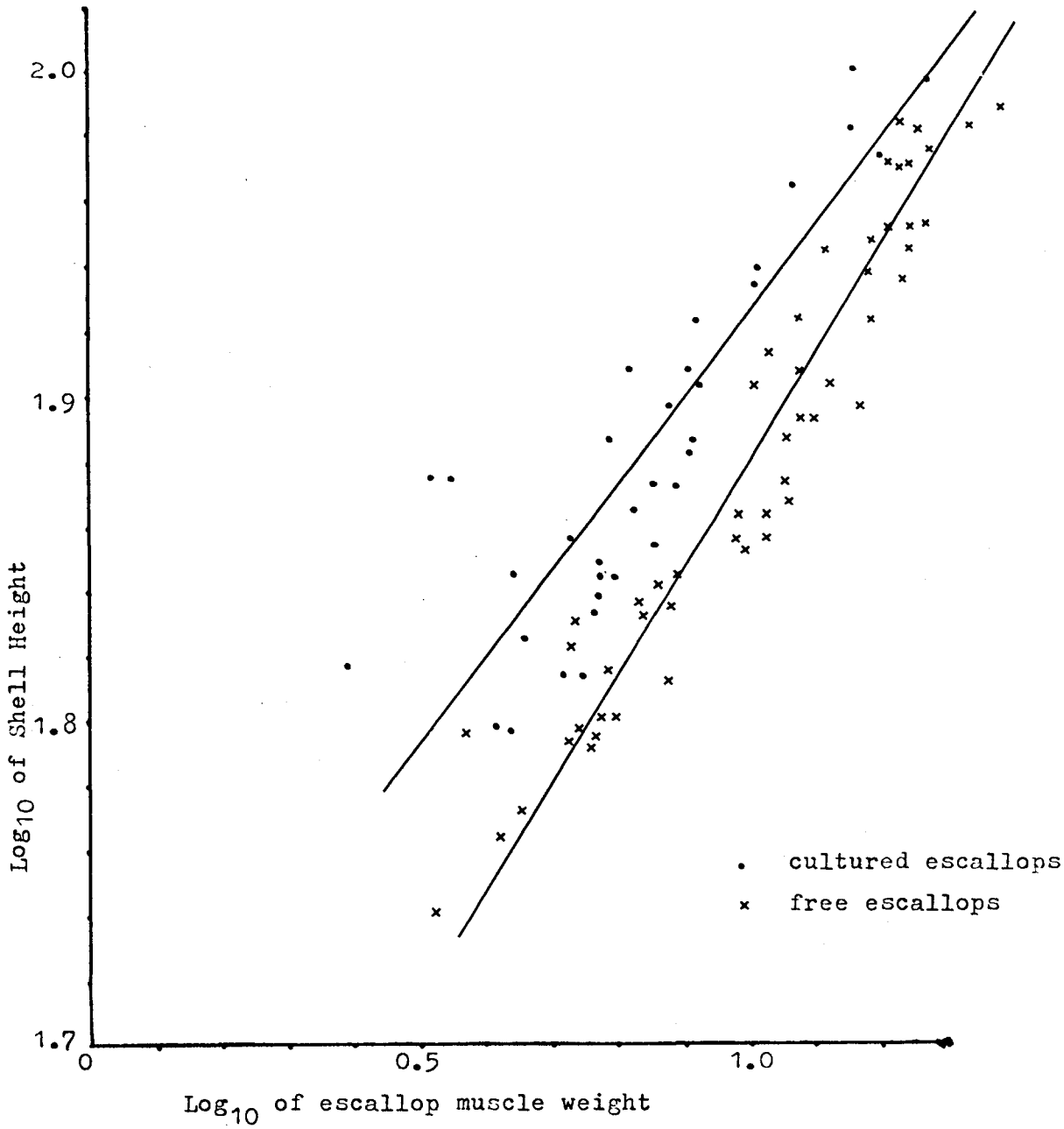

Figure 3. Comparing muscle size of escallops held in culture compared to those from a nearby commercial bed.

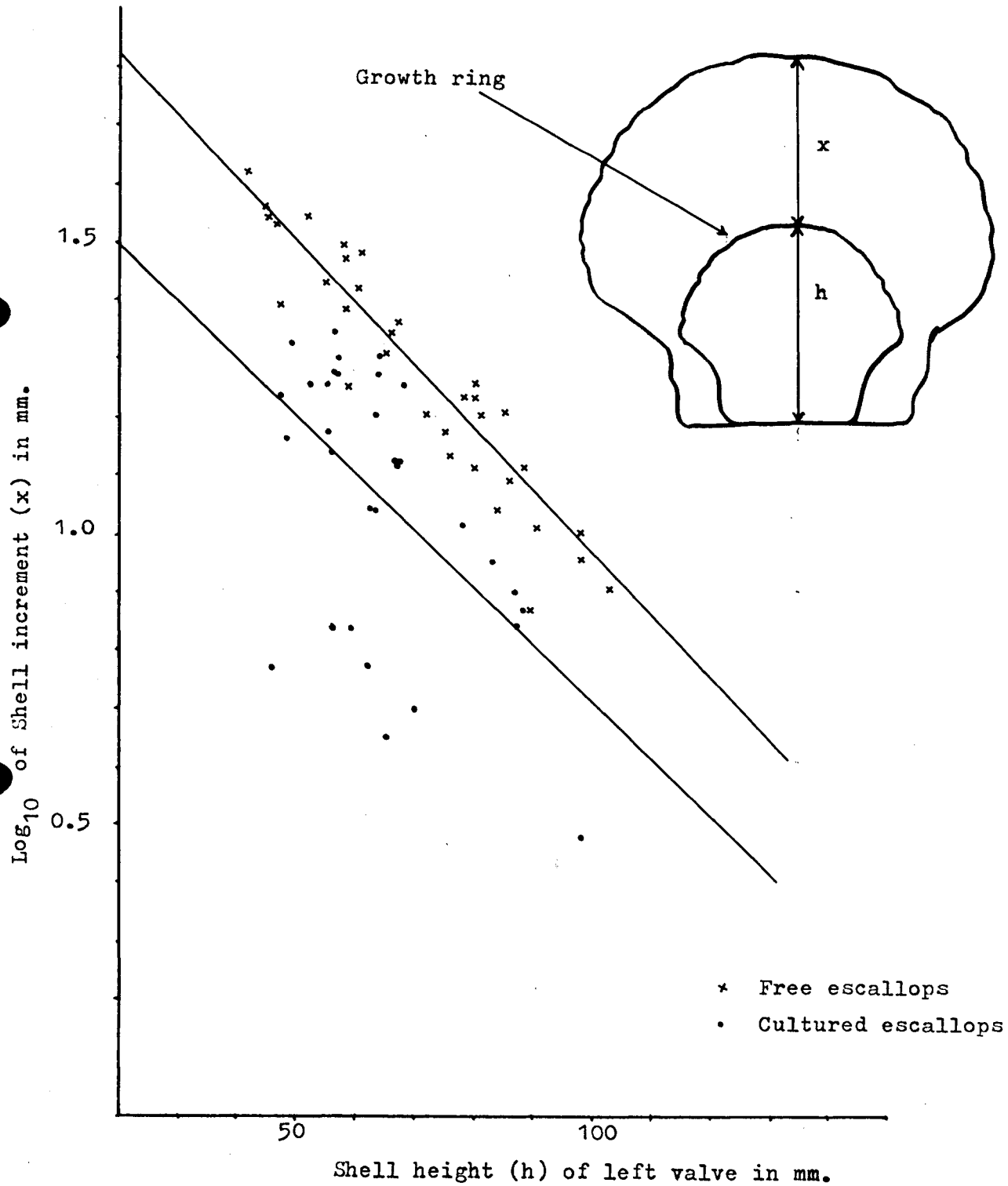

Figure 4. Comparing shell growth of free and cultured escallops.