Liu 1985

ILL il:1401788 Record 1 of 1
:ILL: 1401788 :Borrower: VPI :ReqDate: 20050104 :NeedBefore: 20050203
:Status: SHIPPED :RecDate: :RenewalReq:
:OCLC: 9808405 :Source: OCLCILL :DueDate: N/A :NewDueDate:
:Lender: *IBT,ANS,WAU,HUH,HUH
:CALLNO: *Lender's OCLC LDR: 5- 1978-
:TITLE: Bei lei xue bao = Bulletin of malacology, Republic of China.
:IMPRINT: [Taipei] : Taiwan Sheng li bo wu guan, 1978-
:ARTICLE: F. G. Liu: Studies on the feeding and filtration rate of freshwater pearl mussel, Anodonta woodiana
:VOL: 11 :NO: :DATE: 1985 :PAGES: 25-34
:VERIFIED: <TN:598980>OCLC ISSN: 0250-6378 [Format: Serial]
:PATRON: Neves, Richard
:SHIP TO: Interlibrary Loan/ILL Newman Library/Virginia Tech/P.O. Box 90001/Kent St./Blacksburg, Va 24062-9001
:BILL TO: same or (BRI ACCT#51-0604) (CAS DEP ACCT#450231)
:SHIP VIA: ARIEL/Library Rate :MAXCOST: $35.00IFM
:COPYRT COMPLIANCE: CCL
:FAX: (540)231-3946//VOICE:(540)231-6344//(ARIEL.ILL.VT.EDU)or128.173.124.26
:E-MAIL: ill@vt.edu
:BORROWING NOTES: **ENGLISH ABSTRACT ONLY - THANKS** PLEASE SEND ARIEL to ARIEL.ILL.VT.EDU (128.173.124.26) IF POSSIBLE
:AFFILIATION: (VIVA)(ASERL MEMBER)
:LENDING CHARGES: $12.00 :SHIPPED: 20050107 :SHIP INSURANCE:
:LENDING RESTRICTIONS:
:LENDING NOTES:
:RETURN TO: N/A
:RETURN VIA:

Also included

page 25 and figures

on pages 27, 28, 29, 30

33, 34 – ENGLISH TEXT

BULLETIN OF MALACOLOGY
REPUBLIC OF CHINA

1985 Vol. 11

CONTENTS

淡水珍珠貝—圓蚌 (*Anodonta woodiana*)攝餌量及濾水量之研究

劉 富 光*

前言

淡水眞珠貝—圓蚌(*Anodonta woodiana*)，近二年來在本省已開始廣泛的被利用來養殖眞珠。雖然已獲得試驗性的初步成果(劉與林，1978；劉，1982)但要達到商業化的品質，則尚待研究改進。

由於養殖眞珠的色澤及其分泌能力，除了受移植手術的影響外，也與圓蚌本身的性狀(活力、健康情形等)有密切關係。(植本，1961；山口，1958；蓮尾1961b；沢由，1961)。因此，本試驗乃選取不同體型的圓蚌探究其在不同水溫，懸浮物濃度下，對攝餌量之影響，並測定濾水率，期能瞭解圓蚌的攝食生理，以建立眞珠養殖之基本資料。

材料與方法

一、攝餌量之測定：

取定量之粘土，加入0.1%之Neutral red 5cc做爲指示劑，吸取20cc試水，並將之溶解備用。試水係指事先在魚池培養好之綠水，經鏡檢發現含綠藻(*Chlorella* sp.)最多，念珠藻(*Anabanae* sp.)及柵藻(*Scenedesmus* sp.)次之，故測定綠藻的含量爲綠水之代表濃度。在試驗開始前，每個燒杯(2ℓ裝)各加1ℓ之試水(利用Spetrophometer波長480mu)測其吸光度，再求出吸光度與綠藻濃度之迴歸直線爲650.5 EX10³ cells/cc(圖1)並各放入2個圓蚌，經1－2hr之適應，俟其殼打開後，再將溶有指示劑之試水倒入。1hr後，把圓蚌取出，移放在另外一個盛有清潔水之燒杯內，放置12hr後，用吸管將糞便吸附於濾紙上。然後把濾紙移入60℃之恒溫箱中，乾燥後，秤其重量，再減去原濾紙重，即爲糞便之重量。因粘土不易爲其消化，故糞便之重量可認爲是圓蚌1hr之攝餌量。理論上，水中懸浮物由雙殼貝選擇後，再經胃腔消化後，於肛門部排出體外者即爲糞便；不進入胃腔者，經外套膜之觸手再由體前方口唇部排出體外，則爲擬糞。在原試水中之擬糞，也依同樣方法，測出其重量。

(一)圓蚌大小與懸浮物濃度對攝餌量之影響：

取粘土100，400，1600mg，分別放入試水中，即試水粘土之濃度依次爲100，400及1600mg/ℓ。每一濃度的試水再分別放三種不同體型圓蚌(大小爲殼長9.5，7.5及5.5cm)，因此，共有9個試驗組。所有試驗組燒杯，均放入大型恒溫水槽，

*：臺灣省水產試驗所

STUDIES ON THE FEEDING AND FILTRATION RATE OF FRESHWATER PEARL MUSSEL, *ANODONTA WOODIANA*

Fu-Guang Liu

Abstract

Feeding and filtration rate of freshwater pearl mussel, *Anodonta woodiana*, were determined with various body size under different suspension concentrations and water temperatures. And the results were summarized as follows:

1. The feeding rate was found to be related to water temperature, suspension concentration and the body size.
2. It seemed that feeding rate of *A. woodiana* increased with increasing suspension concentration until a certain amount were reached and the excess were excreted in the form of pseudo-feces.
3. The larger the mussel, the higher the feeding rate it had.
4. As to the filtration rate, the effect of body size and water temperature on the filtration rate was the same as those on the feeding rate.

Table 1. Feeding rate of *Anodonta woodiana* at different suspension concentrations, temperatures and body sizes.

Suspension Conc. (mg/l)	Temp. (°C)	Body size	Feeding rate (mg/hr/kg)
100	24	S	6.92
		M	20.77
		L	17.28
400	24	S	10.18
		M	26.72
		L	40.29
1,600	24	S	17.40
		M	33.96
		L	64.63
400	16	S	3.94
		M	17.76
		L	22.10
400	24	S	10.18
		M	26.77
		L	40.29
400	32	S	6.73
		M	18.87
		L	23.76

S: Small, M: Median, L: Larger.

Table 2. Water filtration of *Anodonta woodiana* at different temperatures and different body sizes.

Temperature	Body size	Mean Body Weight (wet) (g)	V (ℓ)	r (%)	f (mℓ)	P (mℓ)
16°C	Small	2.9	1	0.20	100	34
	Median	11.5	1	0.29	145	12
	Larger	20.0	1	0.34	170	8
24°C	Small	2.1	1	0.24	120	58
	Median	12.0	1	0.29	145	12
	Larger	20.5	1	0.35	175	9
32°C	Small	2.3	1	0.45	225	98
	Median	11.0	1	0.53	265	24
	Larger	20.0	1	0.57	285	13

V: Volume of water. r: Percent of Neutral red removed by mussel.

f: Filtration rate ($= r \cdot \frac{V}{\text{No. of clam}}$).

P: Rate of propel water ($= \frac{f}{w}$).

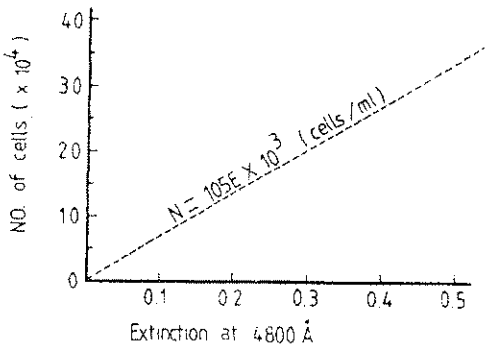

Fig. 1. Relation between number of cells of *chlorella* sp. suspended and extenction at 4800 A of spectrophotometer.

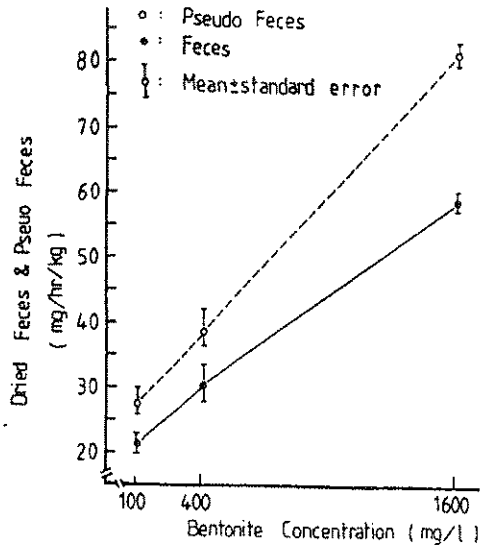

Fig. 2. Effect of bentonite concentration on feeding rate of small mussel at 24°C.

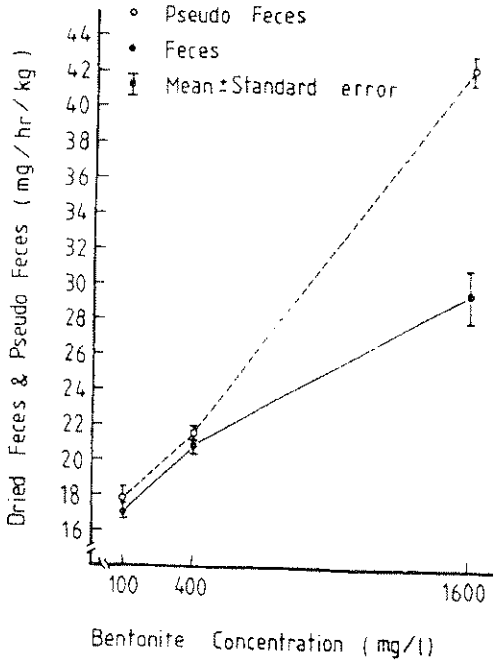

Fig. 3. Effect of bentonite concentration on feeding rate of median mussel at 24°C.

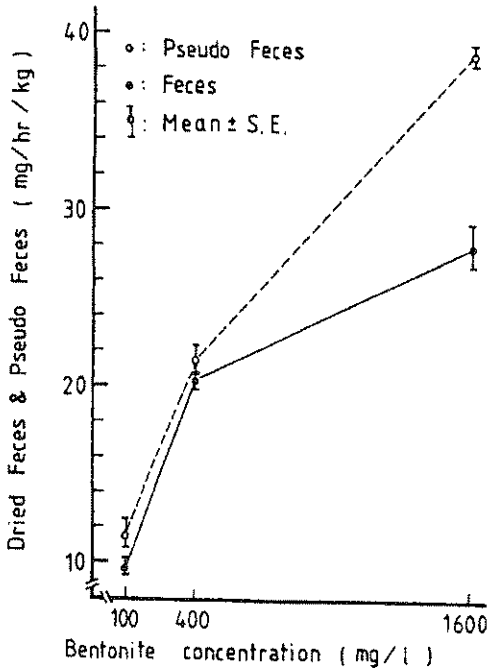

Fig. 4. Effect of bentonite concentration on feeding rate of larger mussel at 24°C.

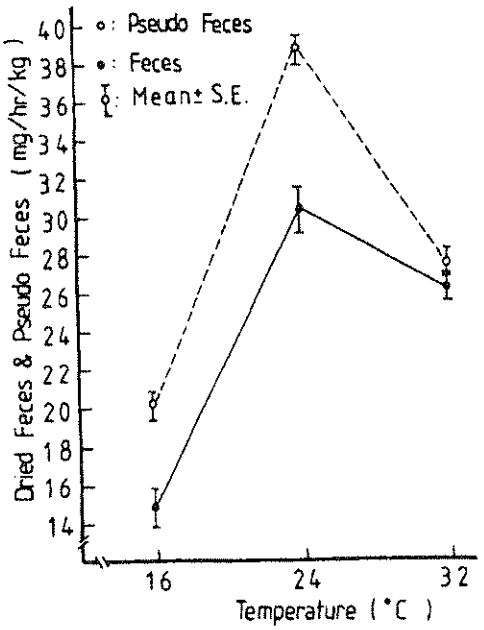

Fig. 5. Effect of water temperature on feeding rate of small mussel in bentonite concentration 400 mg/1.

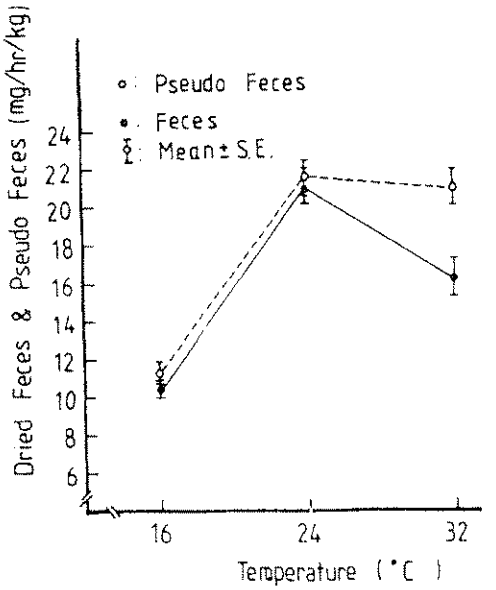

Fig. 6. Effect of water temperature on feeding rate of median mussel in bentonite concentration 400 mg/1.

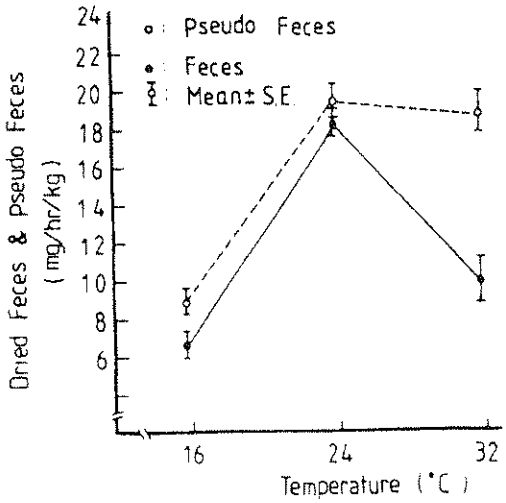

Fig. 7. Effect of water temperature on feeding rate of larger mussel in bentonite concentration 400 mg/1.

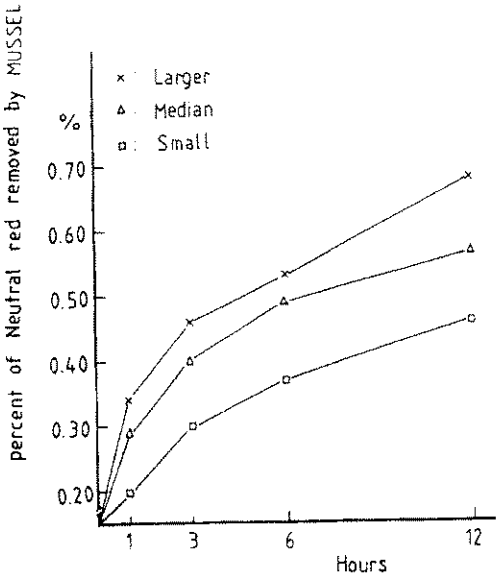

Fig. 8. Effect of body size on filtration rate at 16°C.

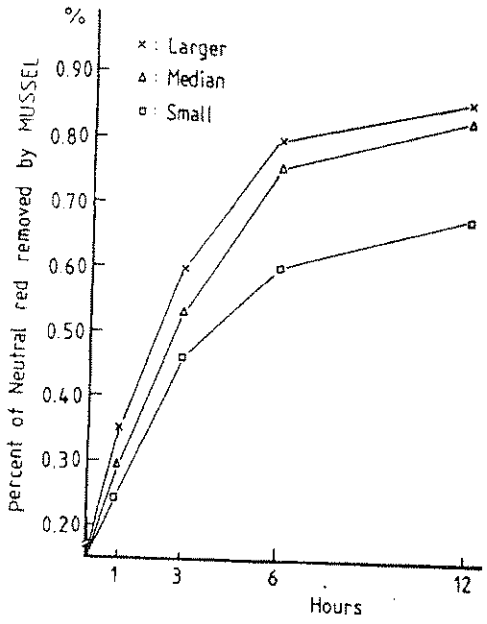

Fig. 9. Effect of body size on filtration rate at 24°C.

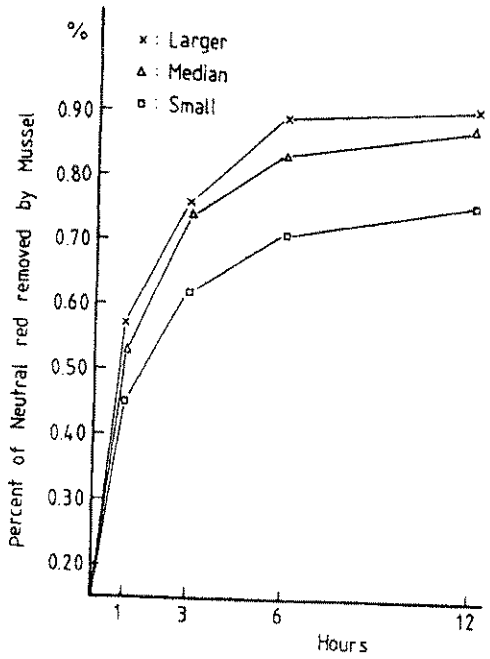

Fig. 10. Effect of body size on filtration rate at 32°C.

11. 劉清漢・林金來，1978，淡水眞珠養殖，水産養殖要覽，P.1064—1066。
12. 劉嘉剛，1982，淡水眞珠養殖，農業周刊，8（6）：14—16。
13. Chipman, W. A. & Hopkins, J. G. 1954. Water filtration by the bay scallop, *Pecten irradians*, as observed with the use of radioactive plankton. Bilo. Bull. 107:80—91.
14. Foster-smith, R. L., 1975a. The effect of Concentration of suspension on the filtration rates and pseudo faecal production for *Mytilus edulis*, *cerastoderma edule* and *venerupis pullastra*. J. Exp. Mar. Biol. Ecol., 17:1—22.
15. Hildreth, D. I., 1976. The influence of water flow rate on pumping rate in *Mytilus edulis* using a refined direct measurement apparatus. J. Mar. Biol. Assoc. U. K., 56: 311—319.
16. Jorgensen, C. B., 1949a. The rate of feeding by *Mytilus* in different kinds of suspension. J. Mar. Biol. Aoss. U. K., 28:333—344.
17. Owen, G., 1974a. Feeding and digestion in the Bivalvia. Adv. Comp. Physiol. Biochem., 5:1—35.
18. Rao, K. P., 1953. Rate of water propulsion in *Mytilus californianus* as a function of latitude. Biol. Bull. 43:283—293.
19. Schulte, E. H., 1975. Influence of algal concentration and temperature on the filtration rate of *Mytilus edulis*. Mar. Biol., 30:331—341.
20. Widdows, J., 1973. The effects of temperature on the metabolism and activity of *Mytilus edulis*. Neth. 7. Sea. Res., 7:387—398.
21. Wilson, J. H. & Seed. R., 1974. Laboratory experiment, on pumping and filtration in *Mytilus edulis* using suspensions of colloidal graphite. Ir. Fish. Invest. Ser. B. 14:1—20.
22. Winberg. G. G., 1956. Rate of metabolism and food requirements of fishes. Nauche. Trudy Belorusskovo Gosudarstvennora Universiteta imeni V. I. Lenina, Minsk (Fis. Rer. Bd. Can., Transl. Ser., No. 194, 202p.)
23. Winter, J. E., 1970. Filter feeding and food utilization in *Arctica islandica* and *Modiolus modiolus* at different food concentration. In: J. H. Steele (Editor). Marine Food Chains. Oliver and Boyd. Ednburgn, pp. 196—206.
24. Winter, J. E., 1972. Long-term Laboratory experiments on the influence of ferric hydroxide flakes on the filter-feeding Behavior, growth, iron content and mortality in *Mytilus edulis* In: M. Ruivo (Editor). Marine Pollution and sea life. Fishing News (Books.) Ltd., London, pp.392—396.