絶食および海藻投与によるサザエとトコブシのアグマチン含量の変化

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Short Paper

Changes in Agmatine Contents in the Topshell and Abalone during Starvation and Feeding

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Previously, we found agmatine in a wide range of 0.71–2.65 mg/100 g muscle and 1.14–13.2 mg/100 g viscera in the topshell *Batillus cornutus* from 11 locations.[1] We also detected that many marine algae including *Ecklonia cava* and *Eisenia bicyclis*, natural foods for the topshell, contained a detectable amount of agmatine.[1] Based on these findings, along with the observation that arginine decarboxylase was undetectable in the topshell, it was assumed that agmatine in the topshell comes from dietary marine algae. As part of a series of studies on arginine catabolism in molluscs, attempts were made to examine the changes in agmatine and arginine contents in the topshell and abalone straved or fed with marine algae.

Live specimens of the topshell *B. cornutus* were collected at Miura Peninsula, Kanagawa Prefecture. These specimens were starved for a week before the feeding experiment. Live specimens of the abalone *Haliotis japonica* whose muscle contained no appreciable amount of agmatine,[1] were also examined. *E. cava* and *E. bicyclis* were obtained at the same location. The topshell and abalone were kept in three different tanks (starved or fed with *E. cava* and *E. bicyclis*) with running sea water at 20°C. These tanks were placed in a dark room and illuminated with 500 lx with a 12: 12 h cycle. After 3 and 6 weeks, the muscle and viscera extracts from 1 to 5 specimens were prepared, and agmatine and arginine were assayed by HPLC as described in a previous paper.[1]

Table 1 shows a significant decrease of agmatine content in the topshell muscle during starvation for 6 weeks. On the other hand, agmatine in the muscle of topshell fed with *E. cava* and *E. bicyclis* increased 1.6- and 1.3-fold over the original amounts, respectively. In the case of topshell viscera, no detectable agmatine was present after 3 weeks, whereas a significant amount of agmatine was noted in the viscera of abalone fed with *E. cava* for 6 weeks. On the other hand, the abalone muscle contained no agmatine in the original specimen, and agmatine was not accumulated in the muscle of either starved or algae-fed abalone. In the abalone muscle extract, a characteristic peak suspected to be guanidinobutylaldehyde, an oxidized product of agmatine was detected around 38 min of retention time in HPLC (data not shown). The presence of L-amino acid oxidase has been reported in molluscs *Mytilus edulis*[2] and *Cardium tuberculatum*[3] and alga *Gymnogongrus flabelliformis*,[4] with limited specificity for basic L-amino acids. Arginine content in the muscle of starved topshell decreased markedly, while those fed with algae had a constant amout of approximately 130 mg/100 g. On the other hand, arginine content in the abalone muscle slightly under both experimental conditions. Arginine content in the viscera of the starved abalone decreased, while that of the animal fed with *E. cava* did not change. These findings suggest that agmatine accumulated in the topshell muscle was derived from *E. cava* and *E. bicyclis* as food.

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Table 1. Agmatine (Agm) and arginine (Arg) contents in the muscle and viscera of topshell and abalone during starvation and feeding (mg/100 g tissue)

Feed	Breeding period (week)	Muscle				Viscera			
		Topshell		Abalone		Topshell		Abalone	
		Agm	Arg	Agm	Arg	Agm	Arg	Agm	Arg
None	0	1.09	126	ND	175	1.80	17	ND	145
	3	1.15	29	ND	163	ND	41	ND	102
	6	0.63	29	ND	155	ND	37	ND	73
Ecklonia cava	0	1.09	126	ND	175	1.80	17	ND	145
	3	1.04	110	ND	160	0.02	38	ND	136
	6	1.76	136	ND	156	0.26	57	0.19	140
Eisenia bicyclis	0	1.09	126	—	—	1.80	17	—	—
	3	1.43	127	—	—	ND	25	—	—
	6	1.46	134	—	—	0.06	31	—	—

ND, not detected; —, not analyzed.

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