Short Paper

**Chemical Composition of Skin Collagen
from "Yumushi", an Annelid
*Urechis unicinctus**¹**

Some of the classes of Polychaeta and Oligochaeta in the phylum Annelida are lacking in dermis, but have the well-developed collagenous cuticle¹⁻²⁾. The cuticle collagen differs from conventional collagens not only in chemical composition but also in molecular weight; its compositional features are the absence of hydroxylysine and the presence of galactose which is linked to threonine and serine residues¹⁻⁴⁾. As a part of the comparative studies, we have examined the skin collagen of "yumushi" *Urechis unicinctus* of another class, Echiuroidea. Results have shown that *Urechis* skin essentially does not have any cuticle collagen. We happened to find, however, that its well-

developed dermis contains a collagen rich in carbohydrate-linked hydroxylysine.

The dermis was collected from the slightly salted *Urechis* specimens, freed from the adherent tissues such as epidermis and muscle, and cut into small pieces. The skin collagen fiber was washed with successive changes of 0.5 M sodium acetate and 0.1 M acetic acid at 5°C, and finally treated with 0.1 N NaOH at 5°C for 2 h. Only a negligible amount of the soluble collagen was obtained by these treatments. A portion of the insoluble collagen fiber was hydrolyzed with 6 N HCl at 110°C for 24 h under vacuum and analyzed with an amino acid analyzer (JEOL Model JLC-3BC liquid chromatograph). The results are shown in Table 1. The amino acid composition exhibited the pattern characteristic of non-cuticle collagen. Hydroxylysine, an amino acid specific for non-cuticle collagen, was relatively rich in *Urechis* collagen (10 residues/1000 residues). Another portion of *Urechis* collagen fiber was hydrolyzed with 2 N KOH at 105°C for 20 h and analyzed for two possible glycosylated hydroxylysines, glucosylgalactosylhydroxylysine (Glc-Gal-Hyl) and galactosylhydroxylysine (Gal-Hyl), according to the method reported previously⁵⁾. The total glycosylated hydroxylysine content was 5.6 residues/1000 residues, the value being significantly higher than 0.9–2.4 residues/1000 residues for vertebrate skin collagen^{5,6)}. Our collagen was characterized by a high degree of glycosylation of hydroxylysine (56%) and an extremely high ratio of Glc-Gal-Hyl to the total glycosylated hydroxylysine (96%). It is rather comparable to cephalopod skin collagens⁵⁾ in these respects.

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Table 1. Amino acid composition and glycosylated hydroxylysine content of skin collagen from "yumushi" *Urechis unicinctus*

Amino acid	Residues/1000 residues
3-Hydroxyproline	4
4-Hydroxyproline	60
Aspartic acid	77
Threonine	30
Serine	40
Glutamic acid	111
Proline	93
Glycine	300
Alanine	88
Valine	20
Methionine	17
Isoleucine	15
Leucine	27
Tyrosine	8
Phenylalanine	10
Hydroxylysine	10
Lysine	16
Histidine	8
Arginine	66
(Amide N)	(85)
Glycosylated hydroxylysine	
Glc-Gal-Hyl	5.4
Gal-Hyl	0.2

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