Title	植物粘質物(第1報) : オオバコの種子から粘質多糖類Plantasanの単離と性質
Sub Title	Plant mucilages. I. isolation and property of a mucous polysaccharide, "plantasan", from plantago major L. var. asiatica seeds
Author	友田, 正司(Tomoda, Masashi) 宇野, 正代(Uno, Masayo)
Publisher	共立薬科大学
Publication year	1971
Jtitle	共立薬科大学研究年報 (The annual report of the Kyoritsu College of Pharmacy). No.16 (1971.) ,p.43- 45
JaLC DOI	
Abstract	
Notes	抄録
Genre	Technical Report
URL	https://koara.lib.keio.ac.jp/xoonips/modules/xoonips/detail.php?koara_id=AN00062898-00000016-0043

植物粘質物（第1報）オオバコの種子から粘質多糖類 Plantasan の単離と性質

友田正司，宇野正代

Plant Mucilages. I. Isolation and Property of a Mucous Polysaccharide, "Plantasan", from *Plantago major* L. var. *asiatica* Seeds*

Masashi Tomoda and Masayo Uno

The seed mucilages of *Plantago* genus were studied widely[1], but no report on the chemical property of the mucilage of *Plantago major* L. var. *asiatica* Decaisne seeds has been published until present time. The seeds of this species have been used as a crude drug for the purpose of antiphlogistic, expectorant, diuretic, cathartic and binding medicine. The presences of plantenolic acid, succinic acid, adenine, choline, aucubin, and oils composed of glycerides of palmitic acid, stearic acid, arachidic acid, oleic acid, linoleic acid and linolenic acid were reported by former investigators.[2] We have now isolated a mucous polysaccharide from this material, and its properties are described in the present paper.

The seeds were extracted with water, and after treatment with dilute alkali, a supernatant was obtained by centrifugation. An acidic polysaccharide was prepared from the solution by repeated precipitation with ethanol containing hydrochloric acid. For the purpose of the isolation of the main polysaccharide, the applications of DEAE-cellulose column chromatography or of a precipitation method with cetylpyridinium chloride have also been attempted, but it was found that the precipitation method with acidic ethanol is the best in respect of both the yield of pure product and the simplicity of experimental procedure. The polysaccharide was homogeneous on molecular-sieve chromatography with Sephadex G-200 and gave one spot on glass-fiber paper electrophoresis in alkaline borate buffer. The name "plantasan" is proposed for the polysaccharide. It showed a negative specific rotation ($[\alpha]_D^{25}$ −55.8° in N NaOH, c=1).

The supernatant and washings with acidic ethanol were combined and dialyzed, then applied to a DEAE-cellulose column. Although several fractions were obtained with water and gradient elution of alkaline solvent, the main fraction was heterogeneous on

* 本報告は *Chem. Pharm. Bull.* (Tokyo), **19**, 1214 (1971) に発表.

1) a) J. Mullan and E. G. V. Percival, *J. Chem. Soc.*, **1940**, 1501; b) E. Anderson, L. A. Gillette and M. G. Seeley, *J. Biol. Chem.*, **140**, 569 (1941); c) W. A. G. Nelson and E. G. V. Percival, *J. Chem. Soc.*, **1942**, 58; d) R. A. Laidlaw and E. G. V. Percival, *J. Chem. Soc.*, **1949**, 1600; e) E. G. V. Percival and I. C. Willox, *J. Chem. Soc.*, **1949**, 1608; f) F. Hostetter and H. Deuel, *Helv. Chim. Acta*, **34**, 2440 (1951); g) E. L. Hirst, E. G. V. Percival and C. B. Wylam, *J. Chem. Soc.*, **1954**, 189; h) A. J. Erskine and J. K. N. Jones, *Can. J. Chem.*, **34**, 821 (1956).

2) a) A. Ogata and R. Nishioji, *Yakugaku Zasshi*, **44**, 1040 (1924); b) T. Kashimoto, *Nihon Kagaku Zasshi*, **76**, 664 (1955).

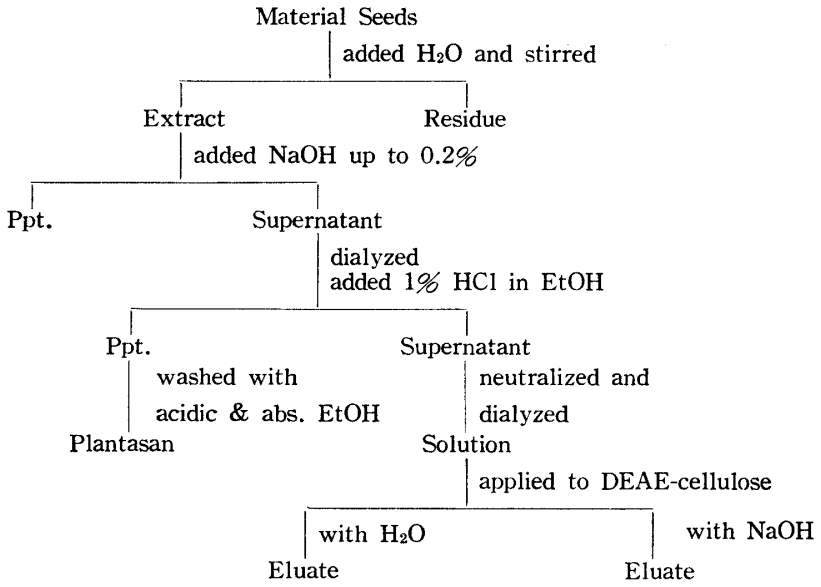

Chart 1. Isolation and Fractionation of Polysaccharides

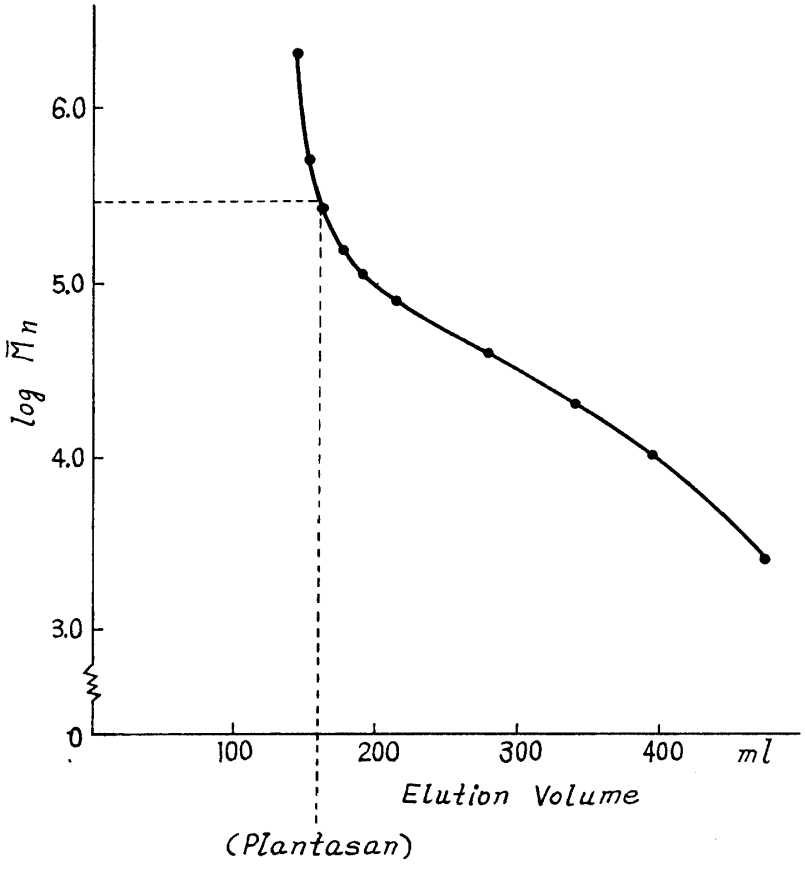

Fig. 1. Plot of Elution Volume against log $\bar{M}_n$ for Dextran Fractions on Sephadex G-200 with 0.1 M Ammonium Formate

gel chromatography with Sephadex G-100. The outline of the fractionation is shown in Chart 1.

It was shown that the component sugars of plantasan are D-xylose, L-arabinose, D-galacturonic acid, L-rhamnose and D-galactose by means of cellulose thin-layer chromatography of the hydrolysate. The same five component sugars were also found in the polysaccharide fractions obtained from the DEAE-cellulose column, but because of their low yields and heterogeneity, no further investigation on the other polysaccharides than plantasan was carried out.

Molecular-sieve chromatography of standard dextran fractions of known molecular weights on Sephadex G-200 has given the calibration curve shown in Fig. 1. The number-average molecular weight, $\bar{M}n$, of plantasan (sodium salt) thus estimated was ca. 300000, and the value was also supported by the measurement of osmotic pressure.

Quantitative determinations of the sugar components of plantasan showed that the molar ratio of them was as follows; D-xylose: L-arabinose: D-galacturonic acid: L-rhamnose: D-galactose was about 15: 3: 4: 2: 0.4. The neutral water solution of plantasan (sodium salt) gave the intrinsic viscosity value of 32.0 at 20°. And the relative viscosity of the solution of the polysaccharide is six times as high as the value of the crude water extract from the seed in the same condition. From this result and the yield of the polysaccharide, it is conceivable that plantasan is the representative substance in the mucosity of water extract from the seed.

The kind of component sugars of plantasan and the fact that D-xylose is the major constituent are similar to the properties of polysaccharides obtained from the seeds of the other species of *Plantago* genus, but the content of D-galacturonic acid is the highest among others. The detailed structure of the mucous polysaccharide will be discussed in following papers.