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Investigation of Rhubarbs. II.[1] Isolation of Sennoside E, a New Purgative Compound

In a previous paper[1] we reported the isolation in a crystalline form of sennoside A, a principal active ingredient of rhubarbs, although Zwaving[2] had reported the presence of sennosides A, B and C in the same plant.

We have now isolated a new purgative compound, which has a similar activity to sennoside A.

A water extract of crude drug was concentrated at 60°. The dark brown residue was dissolved in water and washed with *n*-BuOH. The remaining aqueous solution was acidified to *ca.* pH=1.5 with oxalic acid, and then extracted with *n*-BuOH. After evaporation of the solvent, the dark brown residue was chromatographed on a silica gel column washed with 2M HCl previously. The purgative fraction was eluted from the column with acetone after thorough washing with a large volume of AcOEt. The active fraction was rechromatographed on silica gel by the method described by Schmid;[3] namely, silica gel was impregnated with 0.2M citrate buffer (pH=6.2) and a mixture of *n*-BuOH-EtOH-0.2M citrate buffer (ratio of 4:1:2) was used as the eluting solvent. After evaporation of the solvent, four kinds of yellow crystals were obtained.

The *Rf* values on paper partition chromatogram [Toyo-roshi No. 51, *n*-BuOH-EtOH-0.2M citrate buffer (pH=6.2) (ratio of 2:1:2), ascending method] were 0.60(I), 0.37(II), 0.24(III) and 0.18(IV), respectively. Compounds I, II, and IV, were identical with sennosides C, A, and B, respectively.

Compound III was crystallized as yellow fine needles from 70% acetone, with mp 214—215°. The infrared spectrum [ν_{max}^{KBr} 1724, 1645, 1621, 1603, 1577, 1100—1000 (broad) cm^{-1}] revealed a very similar pattern of absorption to that of sennoside A (Fig. 1). Compound III, like other sennosides, was visible as a blue black spot under a ultraviolet ray on a Lumi

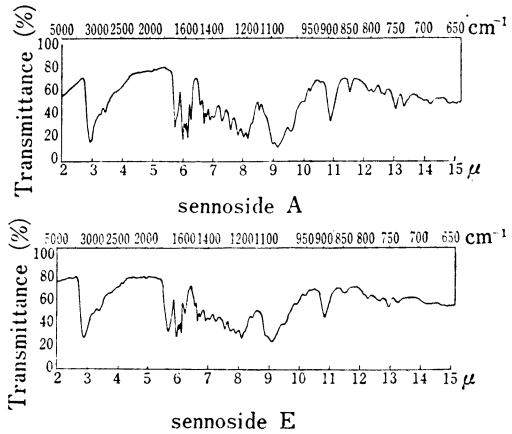

Fig. 1. IR Spectra of Sennosides A and E (KBr disk)

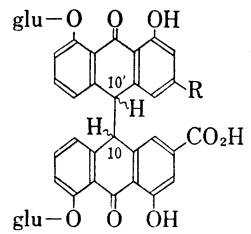

Fig. 2. Structures of Sennosides A, B, C and D

A: R=COOH (10-10′ trans)
B: R=COOH (10-10′ meso)
C: R=CH_2OH (10-10′ trans)
D: R=CH_2OH (10-10′ meso)
glu-: glucosyl

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color plate (Wako). This spot turned yellow when sprayed with an alkaline solution.

Anton[4] and Lemli[5] reported the occurrence of sennoside D in *Cassia* leaves. It has been indicated by the former author that the *Rf* value of sennoside D on paper partition chromatogram was 0.27—0.29 [solvent; *n*-PrOH–AcOEt–water (ratio of 4: 4: 3)]. However compound III showed the *Rf* value 0.42 by the same solvent.

This almost certainly demonstrates that compound III is a new sennoside different from sennoside D, and therefore we named this compound sennoside E.

The purgative activity of sennoside E was almost comparative to that of sennosides A, B and C (Table I).

Table I. The ED_{50} Purgative Activities of Sennosides A, B, C and E in Mice (mg/kg B.W.) by the Method of Fujimura[6]

Sennoside A	Sennoside B	Sennoside C	Sennoside E
13.5 (9.8—18.6)[a]	13.1 (9.5—18.1)	13.3 (9.6—18.4)	13.5 (9.5—18.6)

a) ( ) 95% C.L.

Further study on the structure of sennoside E is now under way in these laboratories.

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