Studies on the Components of the Bast of *Melia Azedarach* var. *Japonica* Makino or "Sendan" III Effects on the Roundworm

by Shun-ichi UMEZAWA
(*Zoological Laboratory, Liberal Arts Faculty, Kochi University*)
Toshihira NAKABAYASHI
(*Chemical Laboratory, Liberal Arts Faculty, Kochi University*)

(*With three Plates*)

As there are remarkable signs of the spread roundworms in Japan, it is one of the most important problems to study its prevention. It is a well known fact that the roundworm is injuriously affected by a "Sendan extract". According to Harada and his co-workers (1951), intestinal worms are driven away within thirty per cent. by treatment with the extract(1). The effective components of the Sendan, however, are as yet uncertain. Nakabayashi, one of the writers, made a study of them and reported a part of the result in 1950(2). Recently, Kobayashi (1951) concluded that one of the injurious effects of the vermifuge "Santonin" against roundworm seems to be due to the control of its movements(3).

The present paper deals with the effects of two of the components,* extracted from the bast of "Sendan", on the behavior of the roundworm *Ascaris suilla*, compared with those of Santonin. On the details of both components another report will be given later.

Material and Method

Materials used were fresh roundworms, *Ascaris suilla*, directly collected from the intestines of a slaughtered pig. After collection they were immediately reared in glass tubes which were filled up with Locke's solution** at 38°C. The glass tube was held horizontally during observation, and its inside diameter was approximately 2.5 cm. The fully grown animals, when extended, measure from 20 to 40 cm. in length. In this experiment, however, only females of about 25 cm. length were used. In all the experiments a preliminary observation was made of the movement of the worms in the Locke's solution. Thirty minutes after this observation they were put into experimental solutions which were as follows. One was called "A solution" and another "B solution". The former was Locke's solution containing 0.05 per cent. Sendan extract A, and the latter was the same solution containing 0.06 per cent. Sendan extract B. The other

* These components were extracted by Nakabayashi.

** This consists of 0.9% NaCl, 0.042% KCl, 0.024% $CaCl_2$ and 0.02% $NaHCO_3$.

experimental solution was Locke's solution saturated with Santonin.

Observation

Movements in Locke's solution (Pl. I, Fig. 1): when placed in Locke's solution, the movement was not so simple as it might seem. The moving individual was in general attached by one of the lateral sides to the bottom of the glass tube. And it was noticed that a wave-motion rose clearly from ventral to dorsal side (vice versa). In all the cases the movement began commonly at the head and ended at the tail. Consequently, a backward movement appeared in the animal itself. Occasionally, however, a forward movement appeared instead of the backward one. Although it was sometimes found that the tip of head moved backward, while the tail was stationary, or that the organism behaved very slowly, always wave-motion immediately appeared again. The life span was about 1 week.

Movements in so-called "A solution" (Pl. I, Fig. 2 and Pl. II, Fig.3): the organism exposed moved inactively. And a convulsive movement was presented in place of the wave-motion. The details of this movement were as follows. That is, the spasmodic wave appeared slowly at the head, but did not transmit itself to the tail at all. Ten or fifteen minutes after exposure, a convulsive movement began apparently from trunk to head and the tail was as yet stationary (Fig. 2, a-b). Concequently, the animal moved forward. After that, a rolling movement was frequently observed (Fig.3, a-e). Sixty minutes after the movements mentioned above disappeared gradually. Then movement was hardly observed in the animal within three hours at least (Fig. 2, e and f).

Movements in so-called "B solution" (Pl. II, Fig. 4): the details of behavior was similar to that of the above noted. Thirty minutes after exposure the rolling movement was observed (Fig. 4, a). Next, it was found that the animal moved considerably slowly and convulsively (Fig. 4, b). Afterwards the mevement became less and less gradually, and finally disappeared. The observation was continued through about five hours, but no active mevement of the organism appeared again. In preliminary experiments using A and B solutions, it was found that the wave-motion on several animals discontinued sixty or ninety minutes after exposure.

Movements in "Santonin solution" (Pl. II, Fig. 5): in an animal treated with this solution the behavior did not differ very markedly from that of both above mentioned. Forty or fifty minutes after exposure, the animal did not move anywhere. During the observation continued for four hours no active movements were found.

In these experiments from one to three individuals were used respectively and they all could live in these experimental conditions for six or seven days, the life span being scarcely shortened from that of the control.

Conclusion

According to Kobayashi (1951), the movements of roundworms treated with 0.02 per cent. Santonin solution at 32°C. become slow and gradually their body lumps itself together. But the animal can live for a long time.

In the present experiments the behavior of the worms was entirely controlled for a long period by treatment with A or B solution as well as with Santonin. Judging from the observation noted above, it may be considered that the worm is injuriously affected by the influence of both components A and B of Sendan extract as much as by that of Santonin.

Summary

1. The effects of two components of the bast of Sendan (*Melia Azedarach* var. *japonica* Makino) on the movement of the roundworm *Ascaris suilla* were studied in comparison with Santonin.

2. The behavior of the animal treated is entirely controlled for a long interval. It may be considered, therefore, that the animal is injuriously affected by the influence of both components of Sendan as well as by that of Santonin.

Literature cited

1) Harada, F., T. Suzuki and I. Miyake, 1951 Yokohama Igaku 2: 58-61.

2) Nakabayashi, T. 1950. The reports were pubilished orally at the 3rd Annual Meeting of the Chemical Society of Japan (April 1, 1950, Kyoto).

..... 1952. Rep. Kôchi Univ. Natural Sci. No. 2. Chem. pp. 55-59.

3) Kobayashi, Y. 1951. Kagaku 21: No. 8, 424-428.

(Received September 30, 1951)

Explanation of Plates

In all Figures, the left side is the head.

Plate Ⅰ

Fig. 1. Movements in Locke's solution. b, c and d were observed in succession for 13, 26 and 39 seconds respectively after the condition of a.

Fig. 2. Movements in the so-called "A solution". a-d: a convulsive movement rose from trunk to head, and b, c and d were seen for 13, 26 and 39 seconds severally after condition of a. e and f: the movement disappeared.

Plate Ⅱ

Fig. 3. Movements in the so-called "A solution". A rolling movement photographed. The intervals between the photographs were from 13 to 20 seconds.

Fig. 4. Movements in the so-called "B solution". a: a rolling, b: a convulsive movement. c and d: a stationary condition.

Plate Ⅲ

Fig. 5. Movements in Santonin solution. a-d: a convulsive movement rose from trunk to head and b, c and d were presented for 13, 26 and 39 seconds respectively after condition of a. e and f: a stationary condition.

Fig. 1.

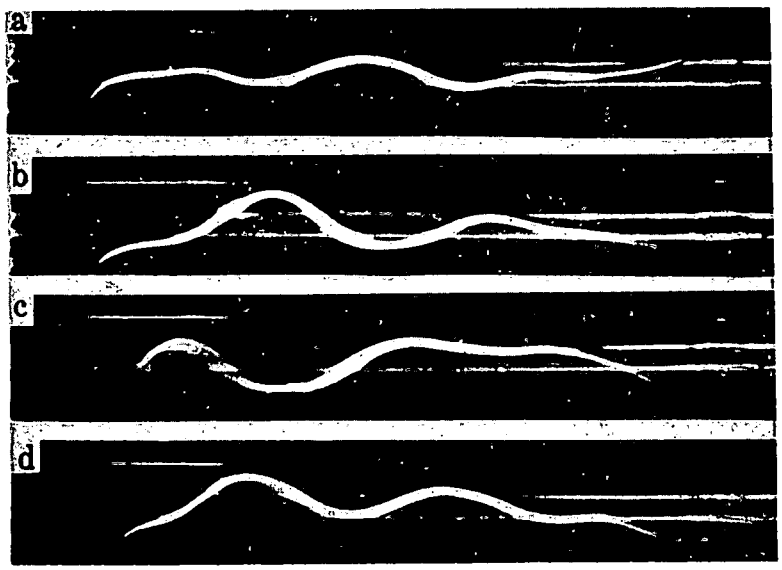
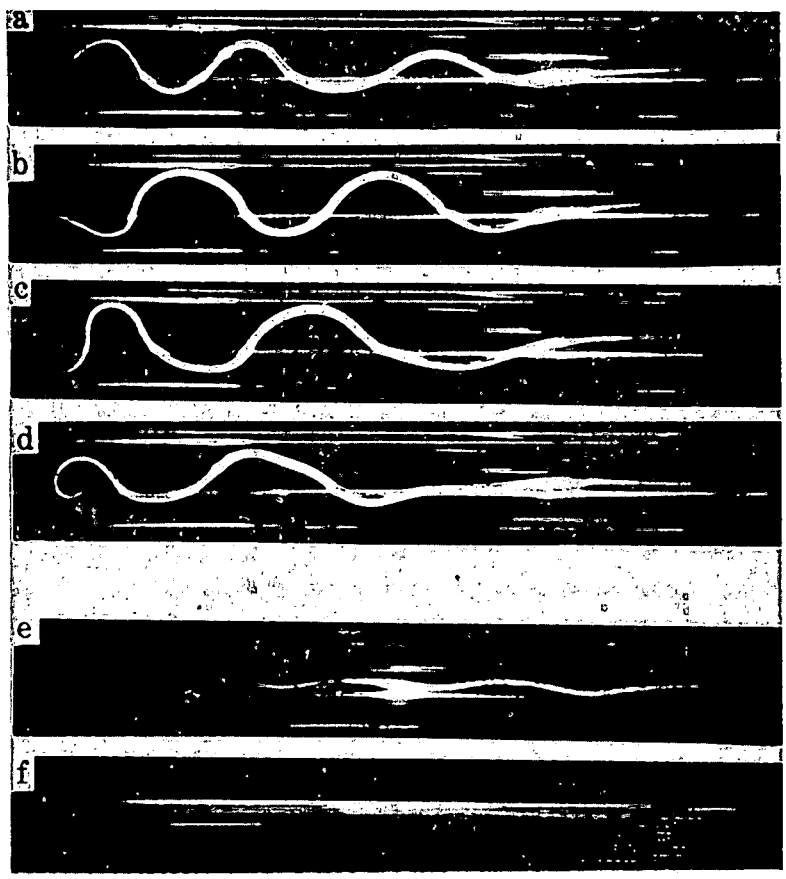


Fig. 2.



(Pl. I)

Fig. 3.

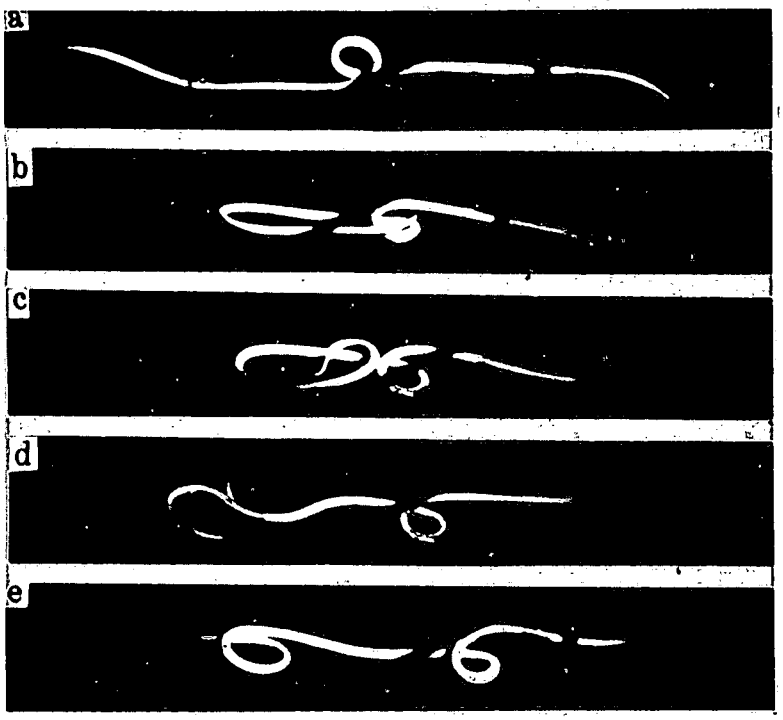


Fig. 4.

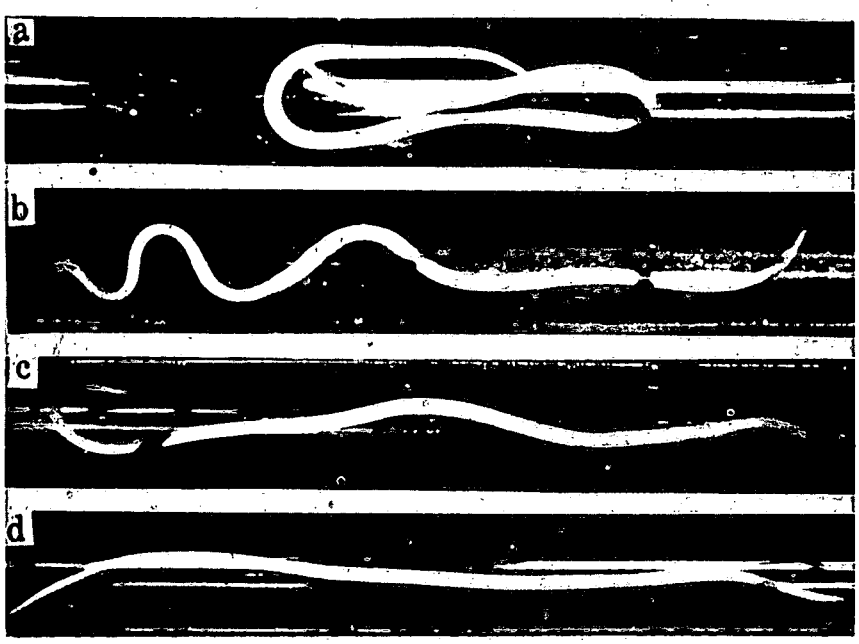


Fig. 5.