Antitumor Activity of Certain Plants Due to Tannins

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Abstract □ Four plants, *i.e.*, *Rubus odoratus*, *Cornus canadensis*, *Lespedeza capitata* var. *velutina*, and *Calycogonium squamulosum*, were found to have antitumor activity against the Walker 256 (IM) carcinosarcoma. Fractionation of these plants revealed that the activity was concentrated in the water-soluble fraction. Selective removal of the tannins in each water-soluble fraction, followed by antitumor testing, revealed that the antitumor activity of these four plants was induced exclusively by the tannins present.

Keyphrases □ Antitumor activity—four plants studied, activity due to tannins □ Tannins—found responsible for antitumor activity in certain plants □ Medicinal plants—antitumor activity found due to tannins in four plants

Hartwell and Abbott (1) recently pointed out that the antitumor activity of many plant extracts against the Walker 256 (IM) carcinosarcoma can be attributed to tannins, phytosterols, and/or saponins. In the case of those extracts in which the activity is due to tannins, no further interest is shown because of the erratic and toxic nature of tannins, which would not be suitable candidates for tests against human neoplastic diseases.

In our screening program, several plant extracts were shown to be active against the Walker 256 (IM) carcinosarcoma in rats, and subsequent investigation of four of these revealed that the antitumor activity was due exclusively to the presence of tannins. The results of work on these four plants is described at this time.

EXPERIMENTAL

Plant Material—*Rubus odoratus* L. (Rosaceae) was collected near Pittsburgh, Pa., during July 1964. The whole flowering and fruiting plant was collected and extracted. *Cornus canadensis* L. (Cornaceae) was collected in Maine during July 1965. Whole flowering and fruiting plants were collected and extracted. *Lespedeza capitata* (Bickn.) Fern. var. *velutina* (Leguminosae) was collected at Gary, Ind., during September 1965. Whole fruiting plants were collected and extracted. *Calycogonium squamulosum* Cogn. (Melastomataceae) was collected at Pico del Oeste, Puerto Rico, during September 1967. Aerial parts were collected for use in the study[1].

Preliminary Extraction and Antitumor Testing—Extracts of the milled plant materials were prepared by percolation with a mixture of 95% ethanol and water (1:1). The ethanol was removed from each extract by means of a flash evaporator (*in vacuo*, 45°), and the aqueous mixture remaining was frozen and lyophilized. These extracts were submitted to the Drug Research and Development Branch, National Cancer Institute, for antitumor and cytotoxicity testing according to standard protocols (2).

Fractionation of Extracts and Separation of Tannin Fractions—The fractionation method and technique for isolation of tannin material were described by Wall *et al.* (3) and were followed in detail.

[1] The identification of *R. odoratus* (vouchers WP-793 and WP-1374), *Cornus canadensis* (voucher M-1402), and *L. capitata* var. *velutina* (voucher IN-1386) was carried out through the cooperation of Dr. L. K. Henry, Carnegie Museum, Pittsburgh, Pa.; identification of *Calycogonium squamulosum* (voucher SP-1479) was carried out by Dr. R. A. Howard. Suitable specimens for reference have been deposited in the Herbarium of the Department of Pharmacognosy and Pharmacology, College of Pharmacy, University of Illinois at the Medical Center, Chicago, IL 60612

Table I—Activity of Plant Tannins Against Walker 256 (IM) Carcinosarcoma

Plant from Which Tannin Was Isolated	Dose, mg./kg.	Percent (T/C)[a]
Calycogonium squamulosum	100	32
Cornus canadensis	50	32
Lespedeza capitata var. *velutina*	75	32
Rubus odoratus	33	41

[a] A plant extract is considered active if it induces a T/C ≦ 42% against the Walker 256 (IM) carcinosarcoma.

RESULTS

The antitumor test results for each tannin extract are presented in Table I. Although in some cases the antitumor activity is quite marked, the known toxicity of tannins, as well as their predictable erratic activity, precludes further interest in these materials as potential antitumor agents in man.

REFERENCES

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