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COMPONENTS OF *Peusedanum morisonii* AND THEIR ANTIMICROBIAL AND CYTOTOXIC ACTIVITY

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Coumarins [1, 2] and furanocoumarins isoimperatorin, peucedanin [3], peumorisin [4] and flavonoids quercetin, isorhamnetin, rutin, and isorhamnetin-3-rutinoside [5, 6] have been isolated previously from *Peusedanum morisonii* Bess. (Apiaceae).

We studied components of the aerial part of *P. morisonii* collected near Ivanov Ridge (Altai) of Eastern-Kazakhstan Oblast′ in August 2007.

Air-dried raw material was extracted exhaustively with MeOH. The resulting extract (88.15 g) was evaporated and precipitated with aqueous MeOH (30%). The precipitate (6 g) was separated by column chromatography over silica gel using hexane:EtOAc of increasing polarity. Elution by hexane:EtOAc (13:3) isolated **1** (100 mg); (9:1), **2** (20 mg); (1:1), **3** (80 mg).

Compound **1** was isolated as colorless crystals, mp 183–187°C. The molecular formula $C_{12}H_8O_4$ was confirmed by mass spectra, which contained a peak for the molecular ion $[M]^+$ with *m*/*z* 216. The IR spectrum exhibited characteristic bands at 1732 (C=O) and 1627 cm^{-1} (C=C). These data and the PMR and ^{13}C NMR spectra of **1** identified it as bergapten, which was isolated previously from *Balanites aegyptiaca* [7] and *Solanum melongena* [8].

Compound **2** was isolated as colorless crystals, mp 63–67°C. The molecular formula $C_{16}H_{14}O_4$ was confirmed by mass spectra, which contained a peak for the molecular ion $[M]^+$ at *m*/*z* 270. The IR spectrum exhibited characteristic bands at 1728 (C=O) and 1672 cm^{-1} (C=C). These data and the PMR and ^{13}C NMR spectra identified **2** as isoimperatorin, which was isolated previously from this same plant [1].

Compound **3** was isolated as fine white crystals, mp 295–300°C (dec.). A comparison of the PMR spectrum with the literature [9, 10] led to the conclusion that **3** was isorhamnetin, which was isolated previously from this same plant [6]. The position of the methyl was refined using NOE spectra.

Determination of Antimicrobial Activity. The antimicrobial activity of **1**–**3** was studied by diffusion in agar against strains *S. aureus*, *E. coli*, *B. subtilis*, and *P. aeruginosa* and was compared with that of penicillin. These compounds did not exhibit antimicrobial activity.

Determination of Cytostatic Activity [11, 12]. A separatory funnel was filled with artificial seawater (55 mL), treated with *Artemia salina* eggs (200 mg), and stored for 3 d with a gentle supply of air until larvae emerged. One side of the funnel was covered with aluminum foil. After 5 min, larvae that collected on the bright side of the funnel were extracted with a Pasteur pipette. About 20-40 larvae were placed in 990 μL of seawater in each of 24 microwells. The dead larvae were counted under a microscope. DMSO solution (10 μL) was added at 10 mg/mL sample. The reference preparation was actinomycin D or staurosporin. The negative control was treated with only DMSO (10 μL). After incubation for 24 h and further storage of the microwells for 24 h (to ensure immobility), dead larvae were counted under a microscope. Samples with high cytostatic efficiency (<5% live larvae) were checked again with concentrations of 50, 10, 5, and 1 μg/mL.

Mortality P was determined using the formula:

$$P = (A - N - B)/Z \times 100,$$

where A is the number of dead larvae after 24 h; N, the number of dead larvae before performing the test; B, the average number of dead larvae in the negative control; and Z, the total number of larvae.

Based on the results, it can be assumed that **1** has potential neurotoxic activity. Larvae remained alive but were significantly immobilized.

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REFERENCES

1. E. E. Shul′ts, T. N. Petrova, M. M. Shakirov, E. I. Chernyak, L. M. Pokrovskii, S. A. Nekhoroshev, and G. A. Tolstikov, *Khim. Interesakh Ustoich. Razvit.*, **11**, No. 4, 683 (2003).
2. G. K. Nikonov and A. A. Ivashenko, *Zh. Obshch. Khim.*, **33**, 2740 (1963).
3. A. V. Ananichev and D. Pakaln, *Med. Promst. SSSR*, **20**, 51 (1966).
4. V. I. Zaretskii, N. S. Vul′fson, L. S. Chetverikova, and V. G. Zaikin, *Zh. Obshch. Khim.*, **34**, 3655 (1964).
5. A. G. Valyutskaya, *Rastit. Resur.*, **17**, 571 (1981).
6. A. G. Valyutskaya, *Khim. Prir. Soedin.*, 671 (1974).
7. A. A. Seida, A. D. Kinghorn, G. A. Cordell, and N. R. Farnsworth, *Planta Med.*, **43**, 92 (1981).
8. K. M. Ahmed, *Egypt J. Pharm. Sci.*, **37**, No. 1–6, 37 (1996).
9. E. Wollenweber and M. Doerr, *Biochem. Syst. Ecol.*, **36**, 481 (2008).
10. M. Phadungkit and O. Luanratana, *Nat. Prod. Res., Part B: Bioact. Nat. Prod.*, **20**, 693 (2006).
11. J. Reiss, *Zentralbl. Bakteriol. Hyg. I. Abt. Orig.*, **B155**, 531 (1972).
12. Z. Durackova, V. Betina, B. Hornikova, and P. Nemec, *Zentralbl. Bakteriol. Abt. II*, **32**, 294 (1977).