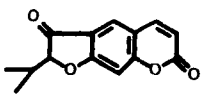
Chemistry of Natural Compounds, Vol. 34, No. 4, 1998

COUMARINS: PLANTS, STRUCTURES, PROPERTIES*

Chapter II.

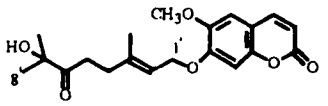
UDC 547.9; 582.89

Physical Constants and Spectral Characteristics of Coumarins (continued)



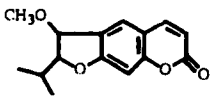
OROSELONE
Peucedanum hystrix.
$C_{14}H_{12}O_4$, mp 176-177° [1, 2]
UV: 284, 297, 315.
IR: 1720.
Mass: 244, 229, 202, 201, 189, 188, 174, 173, 161, 160, 145, 144, 133, 132, 117, 116, 88, 76. [4]
PMR: 6.33 d (10; H-3), 7.69 d (10; H-4), 7.80 s (H-5), 7.01 s (H-8), 0.86; 1.18 d (6.7; $2CH_3$), 1.66 m (CH=), 4.53 d (4,5; H-5′) [3].

1. O. Halpern, P. Waser, and H. Schmid, Helv. Chim. Acta, **40**, 757 (758).
2. E. B. Zorin, N. V. Ivashchenko, M. E. Perel'son, V. V. Vandyshev, and M. G. Pimenov, Khim. Prir. Soedin., 338 (1984).
3. Perel'son.
4. P. I. Zakharov, P. B. Terent'ev, G. K. Nikonov, L. G. Avramenko, V. S. Kabanov, and A. I. Ban'kovskii, Khim. Prir. Soedin., 560 (1974).



PEDICELLONE
Haplophyllum pedicellatum.
$C_{20}H_{24}O_6$, mp 90-92°.
UV: 205, 230, 244, 296, 346.
IR: 3450, 1718, 1695, 1620, 1570, 1520.
PMR: 6.22 (d, 1H, J = 10.0 Hz, H-3), 7.60 (d, 1H, J = 10.0 Hz, H-4), 6.88 (s, 1H, H-5), 6.82 (s, 1H, H-8), 5.50 (t, 1H, J = 7.0 Hz, H-2′), 1.76 (s, 3H, H-10′), 1.36 (s, 6H, H-8′, H-9′), 4.64 (d, 2H, J = 7.0 Hz, H-1′), 3.64 (br.s. 1H, –OH), 3.90 (s, 3H, OCH3).

G. A. Kuznetsova and N. F. Gashimov, Khim. Prir. Soedin., 113 (1973).



PEUCEDANIN
Daucus carota, Peucedanum calcareum, P. luxurians, P. oreoselinum, P. ruthenicum, P. tauricum, Phlojodicarpus turczaninovii, Seseli saxicolum. [1, 2]
$C_{15}H_{14}O_4$, mp 109°
UV: 254, 300, 348.
PMR: 6.44 (d, 1H, J = 10.0 Hz, H-3), 7.88 (d, 1H, J = 10.0 Hz, H-4), 7.35 (s, 1H, H-8), 7.64 (s, 1H, H-5), 4.02 (s, 3H, OCH_3), 3.32 (m, 1H, H-4′), 1.44 (d, 6H, J = 7.0 Hz, H-1′, H-3′). [3]

1. D. I. Baranauskaite and G. K. Nikonov, Aptechn. Delo, No. 1, 25 (1965).
2. G. K. Nikonov. Tr. N-i. Inst. Lekarstv. Aromatich. Rast., **11**, 19 (1959).
3. Perel'son.

*For the first part of this review, see Chemistry of Natural Compounds, 1988 (No. 2, p. 202; No. 3, p. 345).

Institute of the Chemistry of Plant Substances, Academy of Sciences of the Republic of Uzbekistan, Tashkent, fax (371) 140 64 75. Translated from Khimiya Prirodnykh Soedinenii, No. 4, pp. 560-593, July-August, 1998.

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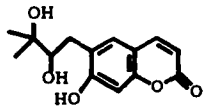


PEUCEDANOL

Peucedanum turczaninovii.

$C_{14}H_{16}O_5$, mp 174-175°

$[\alpha]_D^{20}$ –31.2° (alc) [1].

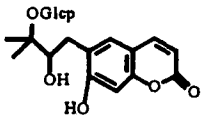
UV: 223, 248, 257, 335. [2]

PMR: 6.13 (d, 1H, J = 9.5 Hz, H-3), 7.78 (d, 1H, J = 9.5 Hz, H-4), 6.70 (s, 1H, H-8), 7.35 (s, 1H, H-5), 3.08 (q, 1H, $J_1 \backsimeq 10.0$; J_2 = 2.5 Hz, H-1′), 3.63 (q, J_1 = 10.0; J_2 = 2.5 Hz, H-2′), 1.27 (s, 6H, H-4′, H-5′). [2]

^{13}C NMR [1]:

C-2	164.3	7	161.7	3′	74.1
3	112.5	8	103.5	4′	25.5
4	146.5	8a	156.1	5′	25.4
4a	113.3				
5	131.9	1′	33.7		
6	126.9	2′	79.6		

1. D. Gantimur, A. I. Syrchina, and A. A. Semenov, Khim. Prir. Soedin., 190 (1985).
2. Perel'son.



PEUCEDANOL 3′-β-*D*-GLUCOPYRANOSIDE

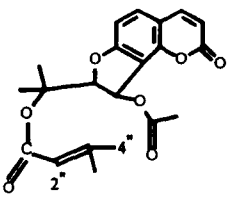
Phlojodicarpus turczaninovii.

$C_{20}H_{22}O_{10} \cdot C_2H_5OH$, mp 160-162°

IR: 3350, 1690, 1610.

PMR: 6.08 (d, 1H, J = 9.0 Hz, H-3), 7.72 (d, 1H, J = 9.0 Hz, H-4), 6.63 (s, 1H, H-8), 7.30 (s, 1H, H-5), 5.18 (br.s, 1H, -OH), 4.47 (d, 1H, J = 6.3 Hz, H-2′), 3.40-2.90 (m, 2H, H-1′), 1.30; 1.26 (s, each 3H, H-4′, H-5′).

D. Gantimur, A. I. Syrchina, and A. A. Semenov, Khim. Prir. Soedin., 190 (1985).



PEUCENIDIN

Peucedanum oreoselinum, P. ruthenicum, P. tauricum, Phlojodicarpus turczaninovii, Seseli laxicolum [1].

$C_{21}H_{22}O_7$, M^+ 386, mp 124.5-125.5°

$[\alpha]_D^{20}$ –46° (chlf.).

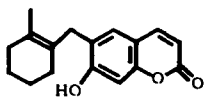
UV: 246, 257, 298, 318.

IR: 3106, 3060, 1729, 1645, 1618, 1579. [2]

Mass: 386, 326, 311, 303, 286, 271, 261, 244, 243, 229, 227, 213, 203, 201, 198, 187, 186, 83. [1]

PMR: 6.26 (d, 1H, J = 9.5 Hz, H-3), 7.65 (d, 1H, J = 9.5 Hz, H-4), 6.87 (d, 1H, J = 8.5 Hz, H-6), 7.44 (d, 1H, J = 8.5 Hz, H-5), 7.04 (d, 1H, J = 7 Hz, H-4′), 5.22 (d, J = 7.0 Hz, H-5′), 1.93 (s, 6H, H-4″, H-5″), 5.64 (br.s, 1 H, H-2″), 1.68; 1.74 (br.s, each 3H, H-1′, H-3′), 2.05 (s, 3H, OAc). [3]

1. P. I. Zakharov, P. B. Terent'ev, G. K. Nikonov, A. I. Ban'kovskii, N. D. Antipova, and A. P. Prokopenko, Khim. Prir. Soedin., 271 (1972).
2. Perel'son.
3. A. I. Sokolova, Yu. E. Sklyar, and M. G. Pimenov, Khim. Prir. Soedin., 715 (1980).



PEUCENOL

Peucedanum morissonii.

$C_{20}H_{22}O_3$, mp 155-156°.

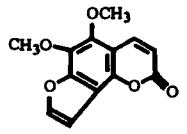
UV: 220, 250, 260, 335.

IR: 3170, 1684, 1619, 1605, 1568. [1]

Mass: 312, 297, 241, 190, 189, 177, 123. [2]

PMR: 6.17 (d, 1H, J = 9.5 Hz, H-3), 7.57 (d, 1H, J = 9.5 Hz, H-4), 6.94 (s, 1H, H-8), 7.04 (s, 1H, H-5), 3.37 (s, 2H, H-1′), 1.79 (s, 3H, H-8′), 1.38 (t, 2H, J = 6.5 Hz, H-4′). [3]

1. G. K. Nikonov and A. A. Ivashchenko, Zh. Obshch. Khim., 2740 (1963).
2. V. I. Zaretskii, N. S. Vul'fson, L. S. Chetverikova, and V. G. Zaikin, Zh. Obshch. Khim., 3655 (1964).
3. Perel'son.

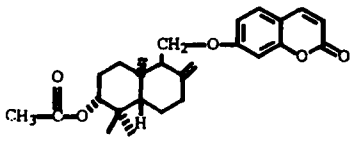


PIMPINELLIN

Angelica brevicaulis, Heracleum aconitifolium, H. asperum, H. antasiaticum, H. cyclocarpum, H. dissectum, H. grandiflorum, H. lehmannianum, H. ligusticifolium, H. moellendorffii, H. ponticum, H. sommieri, H. sosnowskyi, H. stevenii, H. sibiricum, H. wilhelmsii, Platitaenia pimpinelloides, Symphyoloma graveolens.

$C_{13}H_{10}O_5$, mp 117-119°
UV: 257, 305, 365 [1, 2]
IR: 3166, 3137, 3117, 1741, 1628, 1585, 1547 [3].

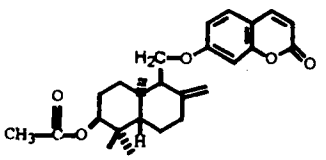
1. Murray.
2. Kuznetsova.
3. Perel'son.



POLYANTHIN

Ferula polyantha.
$C_{26}H_{32}O_5$, M^+ 424
mp 148-149°
$[\alpha]_D$ –50° (c 0.8: chlf).
UV: 249, 297, 324 nm (log ε 3.28; 3.93; 4.12).
IR: 1730, 1720, 1615, 1560, 1490
Mass: 424, 382, 220, 175, 162.
PMR: 0.85; 0.90; 0.98 (s, each 3H, H-11′, H-12′, H-15′), 2.02 (s, 3H, H-2″), 3.95 and 4.25 (q, each 1H, J_1 = 10.5 Hz, J_2 = 6 Hz, H-13′), 4.62 and 4.72 (br.s, each 1H, H-14′), 4.43 (m, 1H, Σ 1/2 = 16 Hz, H-6′), 6.18 (d, 1H, J = 9.5 Hz, H-3), 7.53 (d, 1H, J = 9.5 Hz, H-4), 7.28 (d, 1H, J = 8.5 Hz, H-5), 6.70 (q, 1H, J_1 = 8.5 Hz, J_2 = 2.5 Hz, H-6), 6.68 (d, 1H, J = 2.5 Hz, H-8). [1, 2]
Rel. conf. [2]
Abs. conf. [3]

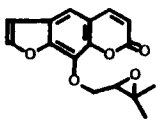
1. T. Kh. Khasanov, A. I. Saidkhodzhaev, and G. K. Nikonov, Khim. Prir. Soedin., 517 (1974).
2. M. E. Perel'son, Khim. Prir. Soedin., 249 (1975).
3. A. I. Saidkhodzhaev and V. M. Malikov, Khim. Prir. Soedin., 707 (1978).



POLYANTHININ

Ferula polyantha.
$C_{26}H_{32}O_5$, M^+ 424
mp 127-129°
$[\alpha]_D$ –32° (s 0.8; chlf).
UV: 249, 297, 324 nm (log ε 3.28; 3.93; 4.12).
IR: 1730, 1720, 1620, 1560, 1485, 1250 cm^{-1}.
Mass: 424, 382, 220, 175, 162.
PMR: 0.88; 0.92; 1.02 (s, each 3H, H-11′, H-12′, H-15′), 2.05 (s, 3H, H-2″), 4.00 and 4.30 (q, each, J_1 = 10.5 Hz, J_2 = 6 Hz, H-13′), 4.65 and 4.75 (br.s, each 1H, H-14′), 4.63 (br.s, 1H, W 1/2 = 6 Hz, H-6′), 6.20 (d, 1H, J = 9.5 Hz, H-3), 7.55 (d, 1H, J = 9.5 Hz, H-4), 7.30 (d, 1H, J = 8.5 Hz, H-5), 6.72 (q, 1H, J_1 = 8.5 Hz, J_2 = 2.5 Hz, H-6), 6.70 (d, 1H, J = 2.5 Hz, H-8). [1, 2]
Rel. conf. [2]
Abs. conf. [3].

1. T. Kh. Khasanov, A. I. Saidkhodzhaev, and G. K. Nikonov, Khim. Prir. Soedin., 517 (1974).
2. M. E. Perel'son, Khim. Prir. Soedin., 249 (1975).
3. A. I. Saidkhodzhaev and V. M. Malikov, Khim. Prir. Soedin., 707 (1978).

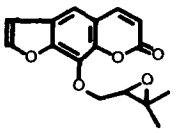


(+)-PRANGENIN (HERACLENIN)

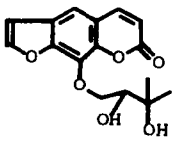
Cachrys odontalgica, Cryptodiscus didymus, Hippomarathrum caspicum, H. microcarpum, Laser trilobum, Prangos bucharica, P. fedtschenkoi, P. lipskyi, P. sarawschanica.
$C_{16}H_{14}O_5$, mp 111°

$[\alpha]_D^{32}$ +22° (pyr).
UV: 250, 305.
IR: 3141, 3118, 3075, 1728, 1628, 1588, 1545. [1, 2]

1. Kuznetsova.
2. Murray.

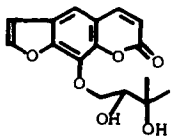


PRANGENIN
Prangos pabularia, P. sarawschanica.
$C_{16}H_{14}O_5$, mp 114-114.5°
UV: 248, 261-263, 299.
IR: 3141, 3118, 3075, 1728, 1628, 1588, 1545.
G. V. Pigulevskii and G. A. Kuznetsova, Zh. Obshch. Khim., **23**, 1237 (1953).

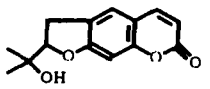


PRANGENIN HYDRATE
Prangos uloptera.
$C_{16}H_{16}O_6$, mp 126.5-128° [1]
IR: 3570, 3330, 3145, 3125, 3095, 1736, 1624, 1587, 1550. [2]
PMR: 6.39 (d, 1H, J = 10.0 Hz, H-3), 7.80 (d, 1H, J = 10.0 Hz, H-4), 6.96 (d, 1H, J = 2 Hz, H-5'), 7.75 (d, 1H, J = 2.0 Hz, H-4'), 7.41 (s, 1H, H-5), 1.35 (s, 6H, H-4', H-5'), 3.85-4.55 (m, 3H, H-1'', H-2''), 2.73 (br.s, 1H, OH). [1]

1. A. Z. Abyshev and P. P. Denisenko, Khim. Prir. Soedin., 111 (1973).
2. Perel'son.

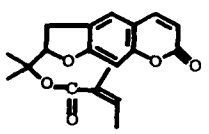


(–)-PRANGENIN HYDRATE
Prangos quasiperforata, Prangos pabularia.
$C_{16}H_{16}O_6$, mp 127°
$[\alpha]_D$ –9° (alc).
IR: 3570, 3330, 3145, 3125, 3095, 1736, 1624, 1587, 1550.
L. I. Shagova, M. G. Pimenov, and G. A. Kuznetsova, Khim. Prir. Soedin., 386 (1970).



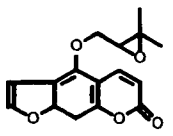
PRANGEFEROL (±MARMESIN)
Prangos ferulaceae.
$C_{14}H_{14}O_4$, mp 176.5°
$[\alpha]_D \pm 0°$
UV: 224, 248, 332, 336.
IR: 3455, 1710, 1635, 1570, 1495.
Mass: 246, 59 (M^+).
PMR: 6.22 (d, 1H, J = 9.8 Hz, H-3), 7.60 (d, 1H, J = 9.8 Hz, H-4), 6.71 (s, 1H, H-8), 7.22 (s, 1H, H-5), 4.81 (t, 1H, J = 8.0 Hz, H-5'), 3.24 (d, 2H, J = 8.0 Hz, H-4'), 2.20 (b.s, 1H, -OH), 1.24; 1.38 (s, each 3H, H-1', H-3').

A. Z. Abyshev and P. P. Denisenko, Khim. Prir. Soedin., 114 (1972).



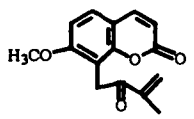
PRANGEFEROL ANGELATE
Seseli peucedanoides.
$C_{19}H_{20}O_5$, mp 108-109°
PMR: 6.23 (d, 1H, J = 10 Hz, H-3), 7.50 (4, 1H, J = 10.0 Hz, H-4), 6.64 (s, 1H, H-8), 7.11 (s, 1H, H-5), 5.93 (m, 1H, H-3''), 4.98 (t, 1H, J = 6.5 Hz, H-5'), 3.24 (d, 2H, J = 6.5 Hz, H-4'), 1.76; 1.84 (br.s, each 3H, H-4'', H-5''), 1.52 (s, 6H, H-1', H-3').

A. Z. Abyshev and D. Z. Abyshev, Khim. Prir. Soedin., 248 (1984).



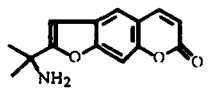
PRANGOLARIN (+)-OXYPEUCEDANIN
Prangos pabularia, Prangos bucharica.
$C_{16}H_{14}O_5$, mp 104-105°
$[\alpha]_D^{27}$ +17° (chl).
UV: 222, 248, 313.
IR: 3175, 3155, 3095, 3055, 1729, 1625, 1610, 1580, 1547. [1, 2]

1. Murray.
2. Kuznetsova.



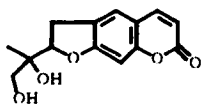
PRANGONE
Prangos ferulaceae.
$C_{16}H_{14}O_5$, mp 92-94°
PMR: 6.15 (d, 1H, J = 10.0 Hz, H-3), 7.62 (d, 1H, J = 10.0 Hz, H-4), 7.50 (d, 1H, J = 8.5 Hz, H-5), 6.75 (d, 1H, J = 8.5 Hz, H-6), 5.20 (br.s, each, 1H, H-5′), 3.95 (s, 3H, OCH_3), 3.54 (d, 2H, J = 7.0 Hz, H-1′), 1.72 (s, 3H, H-4′).

A. Z. Abyshev, Khim. Prir. Soedin., 568 (1974).



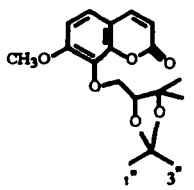
PRANGOSINE
Prangos pabularia.
$C_{16}H_{13}O_3$, mp 131-132°
UV: 250, 292, 322.
IR: 3350, 3290, 1715, 1600, 1580, 1382, 1365.
Mass: 243 (M^+), 228, 227, 213, 198, 183, 153.
PMR: 6.22 (d, 1H, J = 10.0 Hz, H-3), 7.77 (d, 1H, J = 10.0 Hz, H-4), 7.25 (s, 1H, H-8), 7.45 (s, 1H, H-5), 6.44 (s, 1H, H-4′), 1.86 (s, 2H, $-NH_2$), 1.50 (s, 6H, H-1′, H-3′).

Kh. S. Mukhamedova, S. T. Akramov, and S. Yu. Yunusov, Khim. Prir. Soedin., 117, 287, 357 (1967).



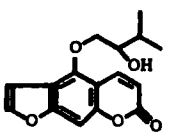
PRANDIOL
Prangos biebersteinii.
$C_{14}H_{14}O_5$, mp 131-132°
PMR: 6.16 (d, 1H, J = 10.0 Hz, H-3), 7.79 (d, 1H, J = 10.0 Hz, H-4), 7.37 (s, 1H, H-5), 6.66 (s, 1H, H-8), 4.95 (t, 1H, J = 8.5 Hz, H-5′), 3.27 (d, 2H, J = 8.5 Hz, H-4′), 1.20 (s, 3H, H-3′), 3.54 (br.s, 2H, 2-OH)

1. A. Z. Abyshev and A. V. Brodskii, Khim. Prir. Soedin., 574 (1974).



PRANFERIN (MERANZIN HYDRATE ACETONIDE)
Prangos ferulaceae.
$C_{18}H_{22}O_5$, M^+ 318, mp 167.5-169°
UV: 246, 256, 320.
IR: 1730-1710, 1610, 1570, 1505.
PMR: 6.20 (d, 1H, J = 9.0 Hz, H-3), 7.60 (d, 1H, J = 9.0 Hz, H-4), 6.84 (d, 1H, J = 8.3 Hz, H-6), 7.33 (d, 1H, J = 8.3 Hz, H-5), 4.06 (q, J_1 = 10.5 Hz, J_2 = 6.0 Hz, H-2′), 1.19; 1.29 (s, each 3H, H-4′, H-5′), 1.43 (s, 6H, H-1″, H–3″), 0.92 (s, 3H, OCH_3). [1, 2]

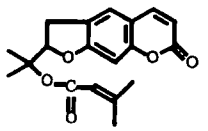
1. A. Z. Abyshev, P. P. Denisenko, N. P. Kostyuchenko, O. E. Anisimov, A. I. Ermakov, and Yu. N. Sheinker, Khim. Prir. Soedin., 675 (1970).
2. G. K. Nikonov and A. I. Saidkhodzhaev, Khim. Prir. Soedin., 255 (1971).



PRANFEROL
Prangos ferulaceae.
$C_{16}H_{16}O_5$, mp 133°
$[\alpha]_D \pm 0°$ (chl).
UV: 222, 250, 258, 266, 310.

IR: 3455, 1715, 1630, 1610, 1585, 1555, 760, 748.
PMR: 6.03 (d, 1H, J = 9.5 Hz, H-3), 7.87 (d, 1H, J = 9.5 Hz, H-4), 6.71 (d, 1H, J = 2.0 Hz, H-4′), 7.34 (d, 1H, J = 2.0 Hz, H-5′), 6.87 (s, 1H, H-8), 4.23 (d, 2H, J = 6.0 Hz, H-1″), 3.70 (t, 1H, J = 6.0 Hz, H-2″), 1.02 (s, 6H, H-4″, H-5″). [1, 2]

1. G. A. Kuznetsova, A. Z. Abyshev, M. E. Perel'son, and Yu. N. Sheinker, Khim. Prir. Soedin., 310 (1966).
2. A. Z. Abyshev, Khim. Prir. Soedin., 3 (1969).



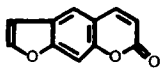
PRANCHIMGIN

Cachrys odontalgica, Cryptodiscus didymus, Ferulago sylvatica, Prangos ispairamica, P. bucharica, P. fedtschenkoi, P. latiloba, P. lipskyi, P. lophoptera, P. tschimganica, P. uloptera, Seseli peucedanoides, S. rigidum.

$C_{19}H_2O_5$, mp 138-140°

$[\alpha]_D^{20}$ –23° (chl).
UV: 254-258, 328.
IR: 1712, 1654, 1627, 1568, 1387, 1364. [1]
Mass: 328, 246, 228, 214, 213, 176, 175, 171, 147, 131, 83, 77, 55. [2]
PMR: 6.08 (d, 1H, J = 10.0 Hz, H-3), 7.56 (d, 1H, J = 10.0 Hz, H-4), 6.66 (s, 1H, H-8), 7.18 (s, 1H, H-5), 3.18 (d, 2H, J = 6.5 Hz, H-4′), 3.09 (t, 1H, J = 6.5 Hz, H-5′), 1.53; 1.48 (br.s, each 3H, H-1′, H-3′), 1.79; 2.04 (br.s, each 3H, H-4″, H-5″), 5.46 (br.s, 1H, H-2″). [3]

1. G. A. Kuznetsova and L. M. Belenovskaya, Khim. Prir. Soedin., 235 (1966).
2. P. I. Zakharov, P. B. Terent'ev, G. K. Nikonov, and A. I. Ban'kovskii, Khim. Prir. Soedin., 431 (1972).
3. Perel'son.

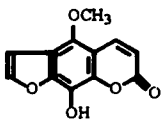


PSORALEN

Coronilla scorpioides, Distamnus angustifolius, D. dasycarpus, Ficus carica, Heracleum aconitofolium, H. antasiaticum, H. carpaticum, H. grandiflorum, H. lehmannianum, H. ligusticifolium, H. leskovii, Prangos acaulis, P. aris-romonae, P. equisetoides, P. lamellata, P. lipskyi, Psoralea drupaceae, Seseli asperulum, S. coronatum, S. gracille, Symphyoloma graveolens.

$C_{11}H_6O_3$, mp 161-163°
UV: 291, 328.
IR: 3161, 3122, 3064, 1732, 1640, 1625, 1584, 1546. [1, 2]
PMR: 6.37 d (9.6; H-3), 7.80 d (9.6; H-4), 7.70 s (H-5), 7.46 s (H-8), 6.85 d (2,3; H-4′). 7.72 d (2,3; H-5′). [3]

1. Murray.
2. Kuznetsova.
3. Perel'son.

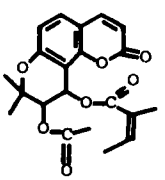


8-HYDROXY-5-METHOXYPSORALEN

Peucedanum baicalense.

$C_{12}H_8O_5$, mp 223-224° [1, 2]

1. Murray.
2. L. G. Avramenko, Yu. E. Sklyar, and M. G. Pimenov, Khim. Prir. Soedin., 421 (1975).



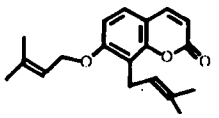
PTERYXIN

Libonotis condensata, L. lehmaniana, Seseli mucronatum, S. nemorosum, S. jomuticum, S. valentine.

$C_{21}H_{22}O_7$, mp 78-80°
$[\alpha]_D^{24}$ +12.9° (alc).
UV: 246, 256, 323.
IR: 3095, 3045, 1748, 1615, 1579, 1321, 1234, 1107. [1, 2]
Mass: 386, 326, 311, 303, 287, 261, 245, 229, 189, 175, 119, 83. [3]

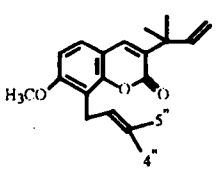
PMR: 6.23 (d, 1H, J = 9.3 Hz, H-3), 7.62 (d, 1H, J = 9.3 Hz, H-4), 6.82 (d, 1H, J = 8.6 Hz, H-6), 7.39 (d, 1H, J = 8.6 Hz, H-5), 5.35 (d, 2H, J = 4.9 Hz, H-3′), 6.63 (d, 1H, J = 4.9 Hz, H-4′), 1.86 (br.s, 3H, H-1′, H-3′), 1.97 (d.d., 3H, J_1 = 7.2; J_2 = 2.0 Hz, H-4″), 6.00 (m, 1H, H-3″), 2.10 (s, 3H, OAc). [4]

1. G. K. Nikonov, F. V. Babilev, and N. E. Ermatov, Khim. Prir. Soedin., 214 (1966).
2. R. E. Willet and T. O. Soine, J. Pharm. Sci., **51**, 149 (1962).
3. P. I. Zakharov, P. B. Terent'ev, G. K. Nikonov, and A. I. Ban'kovskii, Khim. Prir. Soedin., 704 (1970).
4. Perel'son.



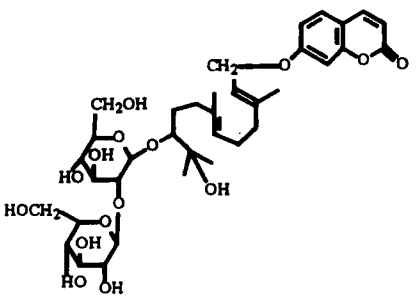
RAMOSIN
Haplophyllum ramosissimum.
$C_{19}H_{22}O_9$, M^+ 298
mp 68-69°
IR: 1730, 1610, 1570, 1500.
PMR: 6.16 (d, 1H, J = 10.0 Hz, H-3), 7.54 (d, 1H, J = 10.0 Hz, H-4), 6.80 (d, 1H, J = 8.5 Hz, H-6), 7.24 (d, 1H, J = 8.5 Hz, H-5), 1.64; 1.70; 1.74; 1.80 (s, each 3H, H-4′, H-5′, H-4″, H-5″), 3.50 (d, 2H, J = 7.0 Hz, H-1′), 4.60 (d, 2H, J = 7.0 Hz, H-1″), 5.24; 5.48 (d, each 1H, J = 7 Hz, H-2″, H-2′).

N. F. Gashimov, A. Z. Abyshev, A. A. Kagramanov, and L. I. Rozhkova, Khim. Prir. Soedin., 15 (1974).



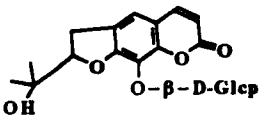
RAMOSININ
Haplophyllum ramosissimum.
$C_{20}H_{24}O_3$, M^+ 312
mp 85-86°
IR: 1710, 1620, 1570, 1510.
PMR: 6.80 (d, 1H, J = 8.5 Hz, H-6), 7.24 (d, 1H, J = 8.5 Hz, H-5), 7.50 (s, 1H, H-4), 5.10; 5.19 (q, 1H, J_1 = 18; J_2 = 2 Hz, H-3′), 6.20 (q, 1H, J_1 = 18; J_2 = 10.5 Hz, H-5′), 1.46 (s, 6H, H-1′, H-4′), 1.66; 1.82 (s, each 3H, H-4″, H-5″), 3.50 (d, 2H, J = 7.0 Hz, H-1″), 5.20 (t, 1 Hz, J = 7.0 Hz, H-2″), 3.86 (s, 3H, OCH_3).

N. F. Gashimov, A. Z. Abyshev, A. A. Kagramanov, and L. I. Rozhkova, Khim. Prir. Soedin., 15 (1974).



REOSELIN A
Ferula korshinskyi.
$C_{36}H_{52}O_{15}$, M^+ 724.
mp 160-161°
$[\alpha]_D$ –73.5° (chl)
UV: 245, 255, 326, (log ε 3.33; 3.03; 4.04).
IR: 3200-3600, 1720, 1520, 1560, 1615.
PMR: 1.10 and 1.21 (s, each 3H, H-11′, H-12′) 1.5 and 1.7 (s, each 3H, H-15′, H-14′), 5.05 and 5.30 (m, each 1H, H-1′, H-10′), 3.4 (m, 1H, H-6′), 4.35 (d, 2H, J = 7 Hz, H-13′), 3.5-4.5 (m, 14H, H-OGl*p*), 6.10 (d, 1H, J = 9.5 Hz, H-3), 7.50 (d, 1H, J = 9.5 Hz, H-4), 7.35 (d, 1H, J = 9.0 Hz, H-5), 6.82 (q, 1H, J_1 = 9.0, J_2 = 2.5 Hz, H = 6), 6.79 (d, 1H, J = 2.5 Hz, H-8).

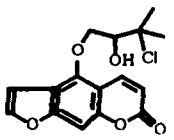
A. Sh. Kadyrov, A. I. Saidkhodzhaev, and G. K. Nikonov, Khim. Prir. Soedin., 574 (1975).



RUTARIN (CAMPESENIN)
Seseli grandivittatum, S. campestre.
$C_{20}H_{24}O_{10}$, mp 140-142°
$[\alpha]_D^{20}$ –47.1° (alc)
IR: 3600-3200, 1700, 1620, 1590. [1]
PMR: 6.20 (d, 1H, J = 9.5 Hz, H-3), 8.0 (d, 1H, J = 9.5 Hz, H-4), 7.20 (s, 1H, H-5), 3.20 (d, 2H, J = 6.5 Hz, H-4′), 4.70 (t, 1H, J = 6.5 Hz, H-5′), 1.10; 1.20 (s, each 3H, H-1′, H-3′), 3.30-5.5 (m, protons of the sugar moiety), 5.10 (d, 1H, J = 7.0 Hz, H-1″). [2]
^{13}C NMR [2]:

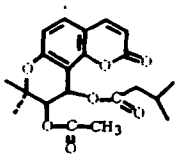
C-2	160.32	8 126.17	4″ 73.97
3	111.52	9 152.83	5″ 76.93
4	144.96	10 113.06	6″ 77.46
4′	29.06	11 70.9	7″ 60.78
5	117.46	12 25.99	
5′	91.49	13 25.31	
6	146.03	2″ 101.51	
7	128.18	3″ 69.89	

1. L. I. Shagova, V. N. Frolova, G. A. Kuznetsova, and M. E. Perel'son, Khim. Prir. Soedin., 665 (1973).
2. A. Z. Abyshev, É. M. Agaev, and M. A. Balabudkin, Khim. Prir. Soedin., 298 (1993).



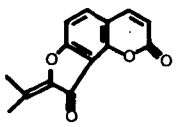
SAXALIN
Angelica saxatilis.
$C_{16}H_{15}O_5Cl$, mp 159-161°
UV: 223, 250, 266, 309.
IR: 3480, 3140, 1711, 1625, 1578, 825.
PMR: 6.21 (d, 1H, J = 10.0 Hz, H-3), 8.33 (d, 1H, J = 10.0 Hz, H-4). 7.23 (d, 1H, J = 2.5 Hz, H-5′), 7.83 (d, 1H, J = 2.5 Hz, H-4′), 7.15 (s, 1H, H-8), 4.92 (d, 1H, J = 6.0 Hz, H-1″), 4.50 (q, 1H, J_1 = 10 Hz, J_2 = 6 Hz, H-2″), 1.64; 1.68 (s, each 3H, H-4″, H-5″).

L. G. Avramenko and G. K. Nikonov, Khim. Prir. Soedin., 830 (1971).



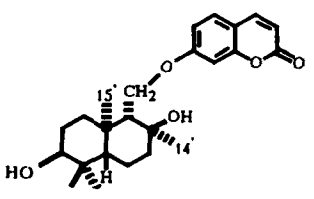
SUKSDORFIN
Phlojodicarpus sibiricus.
$C_{21}H_{24}O_7$, mp 140-141°
$[\alpha]_D^{24}$ +4° (alc)
UV: 328, 258, 245.
IR: 1740, 1670, 1620.

D. Gantimur, A. I. Syrchina, and A. A. Semenov, Khim. Prir. Soedin., 108 (1986).



SAXICOLONE
Seseli saxicolum.
$C_{14}H_{10}O_4$, M^+ 242, mp 238-240°
UV: 1765, 1745, 1705
PMR: 6.33 (d, 1H, J = 10.0 Hz, H-3), 7.65 (d, 1H, J = 10.0 Hz, H-4), 7.62 (d, 1H, J = 8.5 Hz, H-5), 7.05 (d, 1H, J = 8.5 Hz, H-6), 2.13; 2.39 (s, each 3H, H-1′, H-3′).

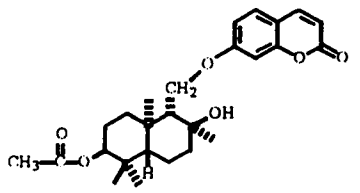
A. I. Sokolova, Yu. E. Sklyar, and A. A. Semenov, Khim. Prir. Soedin., 715 (1980).



SAMARCANDIN (MOGOLTAVIDIN)
F. samarcandica, F. iliensis, F. mogoltavica.
$C_{24}H_{32}O_5$, 400 M^+
mp 176-177° (ee) [1]
$[\alpha]_D$ +24° (chlf)
UV: 218, 245, 254, 327 nm (log ε 4.11; 3.60; 3.50; 4.17).
IR: 3400-3600, 1720, 1620, 1560, 1460 cm^{-1}.
Mass: 400, 382, 238, 221, 203, 175, 162 [2]
PMR: 0.78 (s, 3H, H-15′), 0.90 (s, 6H, H-11′, H-12′), 1.16 (s, 3H, H-14′), 3.28 (br.s, 1H, H-6′), 4.0 and 4.05 (q, each 1H, J_1 = 10.5 Hz, J_2 = 4.0 Hz, H-13′), 6.16 (d, 1H, J = 9.5 Hz, H-3), 7.52 (d, 1H, J = 9.5 Hz, H-4), 7.28 (d, 1H, J = 8.5 Hz, H-5), 6.76 (q, 1H, J_1 = 8.5 Hz, J_2 = 2.5 Hz, H-6), 6.72 (d, 1H, J = 2.0 Hz, H-8). [2, 3]
Abs. conf. [4].
XSA [5]

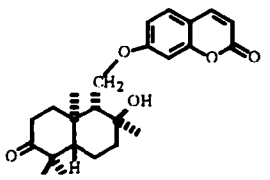
1. N. P. Kiryalov and S. D. Movchan, Khim. Prir. Soedin., 13 (1968).
2. T. Kh. Khasanov, A. I. Saidkhodzhaev, and V. M. Malikov, Khim. Prir. Soedin., 10 (1974).

3. M. E. Perel'son, V. I. Sheichenko, Yu. E. Sklyar, and V. B. Andrianova, Khim.-farm. Zh., 33 (1977)
4. A. I. Saidkhodzhaev and V. M. Malikov, Khim. Prir. Soedin., 707 (1978).
5. S. M. Nasirov, T. Kh. Khasanov, A. I. Saidkhodzhaev, M. R. Yagudaev, and V. M. Malikov, Khim. Prir. Soedin., 184 (1985).



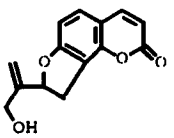
SAMARCANDIN ACETATE (MOGOLTAVICIN)
F. samarcandica.
$C_{26}H_{34}O_6$, M^+ 442
mp 151-152° (Petrol. ether-ether)
$[\alpha]_D$ −12° (alc)
UV: 220, 243, 255, 325 nm (log ε 4.11; 3.60; 3.50; 4.17).
IR: 3500-3400, 1735, 1720, 1615, 1575, 1490 cm^{-1}.
Mass: 442, 400, 382, 238, 221, 203, 175, 162.
PMR: 0.80, 0.86, 0.91 (s, each 3H, H-15′, H-11′, H-12′), 1.16 (s, 3H, H-14′), 1.98 (s, 3H, H-2″), 4.05 (q, 1H, J_1 = 10.5 Hz, J_2 = 6.5 Hz, H-13′) 4.40 (q, 1H, J_1 = 10.5 Hz, J_2 = 5.5 Hz, H-13′), 4.45 (br.s, 1H, H-6′), 6.15 (d, 1H, J = 9.5 Hz, H-3), 7.52 (d, 1H, J = 9.5 Hz, H-4), 7.25 (d, 1H, J = 8.5 Hz, H-5), 6.75 (q, 1H, J_1 = 8.5 Hz, J_2 = 2.5 Hz, H-6), 6.70 (d, 1H, J = 2.5 Hz, H-8). [1]
Abs. conf. [2].

1. T. Kh. Khasanov, A. I. Saidkhodzhaev, and G. K. Nikonov, Khim. Prir. Soedin., 10 (1974)
2. A. I. Saidkhodzhaev and V. M. Malikov, Khim. Prir. Soedin., 707 (1978).



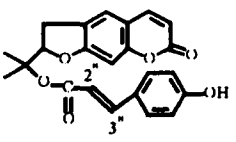
SAMARCANDONE
Ferula samarcandica.
$C_{24}H_{30}O_5$
mp 222-224°
$[\alpha]_D$ +30° (s 1.0; chlf)
UV: 224, 245, 252, 294, 322.
IR: 1720, 1710, 1620, 1580, 1515, 3200-3400 cm^{-1}
PMR: 0.95 (s, 3H, H-15′), 1.00 (s, 3H, H-11′), 1.07 (s, 3H, H-12′), 1.26 (s, 3H, H-14′), 4.35 (m, 2H, H-13′), 6.16 (d, 1H, J = 10.0 Hz, H-3), 7.54 (d, 1H, J = 10.0 Hz, H-4), 7.27 (d, 1H, J = 8.8 Hz, H-5). 6.75 (q, J_1 = 8.8 Hz, J_2 = 2.2 Hz, H-6), 6.78 (d, 1H, J = 2.2 Hz, H-8). [2]

1. N. P. Kir'yalov and S. D. Movchan, Khim. Prir. Soedin., 73 (1968).
2. M. E. Perel'son, V. I. Sheichenko, Yu. E. Sklyar, and V. B. Andrianova, Khim.-farm. Zh., 33 (1977).



SAXALININ
Angelica sachalinensis.
$C_{14}H_{12}O_4$, M^+, mp 132-134°
$[\alpha]_D^{25}$ −187, 1° (alc)
UV: 214, 252, 261, 325.
IR: 3384, 3324, 3160, 1739, 1626, 1582, 898, 855, 831.
PMR: 6.12 (d, 1H, J = 10.0 Hz, H-3), 7.51 (d, 1H, J = 10.0 Hz, H-4), 6.25 (d, 1H, J = 9.0 Hz, H-6), 7.15 (d, 1H, J = 9.0 Hz, H-6), 3.25 (m, 2H, H-4′), 5.47 (t, 1H, J = 6.0 Hz, H-5′), 5.24; 5.38 (br.s, each 1H, H-1′), 4.38 (br.s, 2H, H-3′), 6.49 (br.s, 1H, OH).

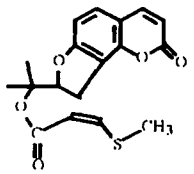
G. K. Nikonov, Khim. Prir. Soedin., 623 (1970); 436 (1966).



SECORIN
Seseli coronatum, Libanotis transcaucasica.
$C_{23}H_{20}O_6$, M^+ 392, mp 212-213°
$[\alpha]_D$ −220° (alc)
UV: 218, 247, 258, 302, 319.
IR: 3350, 1720, 1690. [1]

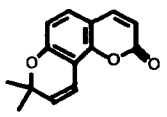
PMR: 6.22 (d, 1H, J = 10.0 Hz, H-3), 7.59 (d, 1H, J = 10.0 Hz, H-4), 6.69 (s, 1H, H-8), 7.34 (s, 1H, H-5), 3.28 (d, 2H, J = 8.0 Hz, H-4′), 5.11 (t, 1H, J = 8.0 Hz, H-5′), 6.03 (d, 1H, J = 15.8 Hz, H-2″), 7.09 (d, 1H, J = 15.8 Hz, H-3″), 7.16 (d, 2H, J = 8.8 Hz, H-2‴, H-6‴), 6.70 (d, 2H, J = 8.8 Hz, H-3‴, H-5‴). [2]

1. L. I. Dukhovlinova, Yu. E. Sklyar, and M. E. Perel'son, Khim. Prir. Soedin., 663 (1973).
2. Perel'son.



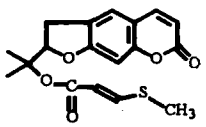
SECROLIN
Seseli mucronatum.
$C_{18}H_{18}O_5S$, M^+ 436, mp 78-82°
$[\alpha]_D^{20}$ +233.5° (chlf)
UV: 217, 263, 278, 328.
IR: 1740-1560.
PMR: 6.04 (d, 1H, J = 9.5 Hz, H-3), 7.48 (d, 1H, J = 9.5 Hz, H-4), 6.22 (d, 1H, J = 8.5 Hz, H-6), 7.18 (d, 1H, J = 8.5 Hz, H-5), 5.19 (t, 1H, J = 9.5 Hz, H-5′), 3.32 (d, 2H, J = 9.5 Hz, H-4′), 1.47; 1.57 (s, each 3H, H-1′, H-3′).

L. I. Dukhovlinova, Yu. E. Sklyar, L. I. Sdobnina, and M. G. Pimenov, Khim. Prir. Soedin., 721 (1979).



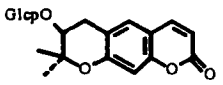
SESELIN
Haplophyllum dibium.
$C_{14}H_{12}O_3$, mp 119-120° [1, 2]
UV: 218, 284, 294, 330. [3]
PMR: 6.10 d (9.0; H-3), 7.54 d (9.0; H-4), 7.17 d (9.0; H-5), 6.62 d (9.0; H-6), 1.47 ($2CH_3$) 5.68 (10, H-3′; 4′)

1. Murray.
2. L. I. Tikhomirova, G. A. Kuznetsova, and M. G. Pimenov, Khim. Prir. Soedin., 859 (1977).
3. Perel'son.



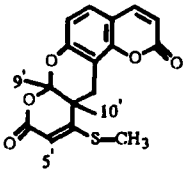
SESELIFLORIN
Seseli sesseliflorum.
$C_{18}H_{18}O_5S$, mp 142-144°
$[\alpha]_D^{19}$ –58.4° (chlf)
UV: 224, 249, 260, 292, 296, 334.
IR: 1730, 1700, 1635, 1565. [1]
Mass: 346, 246, 229, 228, 214, 171, 159, 158, 147, 131, 102, 101, 77, 73, 57. [2]
PMR: 6.05 (d, 1H, J = 9.8 Hz, H-3), 7.41 (d, 1H, J = 9.8 Hz, H-4), 6.64 (s, 1H, H-8), 7.07 (s, 1H, H-5), 3.20 (d, 2H, J = 8.8 Hz, H-4′), 5.19 (t, 1H, J = 8.8 Hz, H-5′), 1.48; 1.64 (s, each 3H, H-1′, H-3′), 5.63; 6.36 (d, each 1H, J = 10.0 Hz, H-2″, H-3″), 2.36 (s, 3H, S-CH_3). [3]

1. A. A. Savina, G. K. Nikonov, and A. I. Ban'kovskii, Khim. Prir. Soedin., 522 (1970); 831 (1971).
2. P. I. Zakharov, P. B. Terent'ev, G. K. Nikonov, and A. I. Ban'kovskii, Khim. Prir. Soedin., 431 (1972).
3. Perel'son.



SESELOSIDE
Seseli peucedanoides.
$C_{20}H_{24}O_{10}$, mp 257-259°
$[\alpha]_D^{20}$ –24.58° (pyr.)
IR: 3600-3100, 1715, 1630, 1590, 1350.
PMR: 6.20 (d, 1H, J = 10.0 Hz, H-3), 7.60 (d, 1H, J = 10.0 Hz, H-4), 6.70 (s, 1H, H-5), 3.65-4.25 (m, protons of the sugar moiety), 5.05 (d, 2H, J = 7 Hz, H-4′), 1.45 (s, 6H, H-1, H-3′).

V. Yu. Bagirov and M. B. Belyi, Khim. Prir. Soedin., 796 (1986).



SECHULIN

Seseli tschuense.

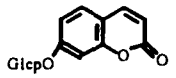
$C_{18}H_{16}O_5S$, mp 245-246.5°, $[\alpha]_D$ +833.3° (chlf)

UV: 260, 310

IR: 1730, 1720, 1610, 1572, 1490

PMR: 6.17 (d, 1H, J = 10.0 Hz, H-3), 7.60 (d, 1H, J = 10.0 Hz, H-4), 7.22 (d, 1H, J = 8.5 Hz, H-5), 6.70 (d, 1H, J = 8.5 Hz, H-6), 4.43 (s, each 2H, H-8′), 1.18 and 1.57 (s, each 3H, H-9′, H-10′), 7.90 (s, 1H, H-5′), 2.43 (s, 3H, S-CH_3)

A. M. Aminov and G. K. Nikonov, Khim. Prir. Soedin., 152 (1974).



SKIMMIN

Haplophyllum davuricum.

$C_{15}H_{16}O_8$, mp 211-213°

$[\alpha]_D$ -78.6° (Py.)

UV: 215, 240, 251, 295, 320.

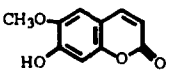
IR: 3520-3225, 1715, 1628, 1570, 1079, 1050, 1022.

(Py-d_5): 3.82-4.32 (m, glucose protons), 5.50 (d, 1H, O = 7.0 Hz, H-1′), 6.14 (d, 1H, J = 10.0 Hz, H-3), 6.92 (dd, q, 1H, J_1 = 8.0; J_2 = 2.0 Hz, H-6), 7.01 (br.s, 1H, H-8), 7.18 (d, 1H, J = 8.0 Hz, H-5), 7.45 (d, 1H, J = 10.0 Hz, H-4). [1, 2]

^{13}C NMR [3]:

C-2 160.3	7 160.3	1′ 100.3	6′ 60.9
3 113.2	8 103.4	2′ 73.3	
4 144.2	9 155.1	3′ 77.2	
5 129.5	10 113.4	4′ 69.9	
6 113.8		5′ 76.6	

1. Kuznetsova.
2. Murray.
3. D. Batsurén, É. Kh. Batirov, and V. M. Malikov, Khim. Prir. Soedin., 659 (1981).



SCOPOLETIN

Achillea biebershteinia, Adonis amurensis, A. mongolica, Althaea armenica, A. officinalis, Anethum graveolens, Artemisia annua, A. adamsii, A. absinthium, A. chamaemelifolia, A. dracunculus, A. glauca, A. gmelinii, A. gorjaevii, A. japonica, A. persica, A. freyniana, A. saissanica, A. santolinofolia, A. scotina, A. scoparia, A. sieversiana, A. vulgaris, Astragalus onobrychus, Bidens triportita, Calendula officinalis, Caragana frutex, Centauria cyamus, Cichorium intubus, Cicer arietinum, Cicuta virosa, Coronilla cretica, C. elegans, C. scorpioides, C. varia, Distamnus dasycarpus, D. angustifolia, Eleutherococcus senticosus, Galium tauricum, Haplophyllum bungei, H. davuricum, H. komalenskyi, H. pedicellatum, H. perforatum, H. tenue, H. ramosissimum, H. villosum, Herniaria auxina, H. polygonum, Helichrysum arenarium, H. italicum, H. macedonicum, Heracleum antasiaticum, H. apiifolium, H. lehmannianum, Leucanthemum sibiricum, Ledium palustra, Matricaria recutita, Onobrychys kemularia, Passifora incarnata, Pepiploca sepium, Phaseolus aurens, P. vurgaris, Physochlaina physaloides, Phlojodicarpus sibiricus, Platytaenia dasycarpa, Potentilla anserina, P. erecta, Ptarmica bisserata, P. impatiens, P. ptarmicifolia, Prunella vulgaria, Rhodea japonica, Rhodiola quadrifida, Rhododendron dahuricum, Rh. luteum, Rh. ungernii, Seruligera securidaca, Seseli foliosum, Symphyoloma graveolens, Sida haermaphrodita, Stevia rebaudiana, Taraxacum officinala, Vicia sativa, V. truncatula.

$C_{10}H_8O_4$, mp 201-204°

UV: 229, 254, 298, 346.

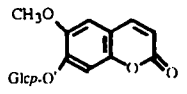
IR: 3115, 3045, 1710, 1631, 1613, 1570, 1520. [1, 2]

PMR: 6.18 (d, 1H, J = 9.5 Hz, H-3), 7.80 (d, 1H, J = 9.5 Hz, H-4), 6.75 (s, 1H, H-8), 7.07 (s, 1H, H-5), 3.91 (s, 3H, OCH_3). [3]

^{13}C NMR [4]:

C-2 160.4	5 109.0	8 99.9	OCH_3 56.3
3 112.5	6 145.8	9 149.1	
4 144.2	7 152.4	10 111.2	

1. Kuznetsova.
2. Perel'son.
3. O. K. Antonov and B. V. Shemeryakin, Khim. Prir. Soedin., 757 (1981).
4. A. Z. Abyshev and V. P. Zmeikov, Khim. Prir. Soedin., 294 (1982).



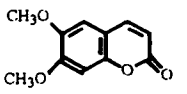
SCOPOLIN

Althaea armenica, A. officinalis, Artemisia annua, A. chamaemelifolia, A. persica, Astragalus falcatus, Physochlaina physaloides, Ptarmica bisserata, P. impatiens, Thea sinensis, Haplophyllum perforatum.

$C_{16}H_{18}O_9$, mp 207-209°
$[\alpha]_D$ –65.6° (DMFA).
UV: 229, 239, 280. [1]
IR: 3600-3250, 2930, 1735, 1610, 1596, 1082, 1054, 1012.
Mass: 354(M^+), 235, 234, 213, 193, 192, 177, 164, 149, 135.
PMR: 3.63 (s, 3H, OCH_3), 4.00-4.45 (m, protons of the sugar moiety), 5.64 (m, 1H, H-1), 6.21 (d, 1H, J = 10 Hz, H-3), 6.91 (s, 1H, H-8), 7.35 (s, 1H, H-5), 7.57 (d, 1H, J = 10 Hz, H-4).
^{13}C NMR [2]:

C-2	160.5	8	102.7	4′	69.6
3	112.6	9	149.6	5′	79.7
4	144.2	10	110.5	6′	60.6
5	109.5	1′	99.6	OCH_3	56.1
6	145.2	2′	73.0		
7	151.1	3′	77.0		

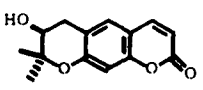
1. Murray.
2. M. P. Yuldashev, É. Kh. Batirov, and V. M. Malikov, Khim. Prir. Soedin., 168 (1980).



SCOPARONE

Ptarmica bisserata.
$C_{11}H_{10}O_4$, M^+ 260, mp 144-146°
UV: 229, 295, 313.
IR: 1720, 1610, 1550, 1510.

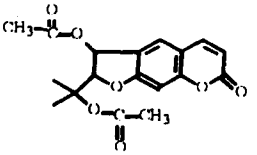
É. S. Davidyan, A. I. Yunusov, and V. A. Bandyukova, Khim. Prir. Soedin., 539 (1982).



SMIRNIOL

Smyrniopsis aucheri.
$C_{14}H_{14}O_4$, mp 179-180°
$[\alpha]_D^{24}$ +16.8° (chlf)
UV: 210, 225, 250, 260, 300, 325.
IR: 3500, 1730, 1620, 1585, 1455.
Mass: 246(M^+), 230, 216, 185, 162.
PMR: 6.08 (d, 1H, J = 9.5 Hz, H-3), 7.73 (d, 1H, J = 9.5 Hz, H-4), 6.64 (s, 1H, H-8), 7.30 (s, 1H, H-5), 3.55 (q, 1H, J_1 = 10.5 Hz, J_2 = 2.0 Hz, H-3′), 2.46 (q, 1H, J_1 = 13.8 Hz, J_2 = 2.0 Hz, H-4′), 1.19 (s, 6H, H-1′, H-5′).

Z. R. Dzhaffarov, Z. A. Kuliev, A. D. Vdovin, A. A. Kuliev, V. M. Malikov, and N. M. Ismailov, Khim. Prir. Soedin., 36 (1982).

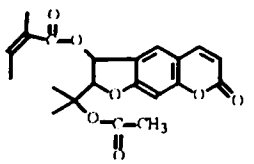


SMYRNIORIN

Smyrniopsis aucherii.
$C_{18}H_{18}O_7$, M^+ 346, mp 143-145°
$[\alpha]_D^{20}$ –138° (alc)
UV: 220, 246, 257, 300, 323.
IR: 1730, 1630, 1575, 1495 [1]
Mass: 346, 326, 311, 303, 286, 271, 261, 244, 243, 229, 227, 213, 198, 191, 187, 186, 57. [2]

PMR: 1.66; 1.72 (s, each 3H, H-1′, H-3′), 2.02; 2.05 (s, each 3H, 2-oAc), 6.22 (d, 1H, J = 10.0 Hz, H-3), 7.60 (d, 1H, J = 10.0 Hz, H-4), 7.52 (s, 1H, H-5), 6.80 (s, 1H, H-8), 5.40 (d, 1H, J = 6.5 Hz, H-5′), 6.37 (d, 1H, J = 6.5 Hz, H-4′). [3]

1. A. A. Savina, G. K. Nikonov, and M. E. Perel'son, Khim. Prir. Soedin., 592 (1969).
2. P. I. Zakharov, P. B. Terent'ev, G. K. Nikonov, A. I. Ban'kovskii, N. D. Antonova, and A. P. Prokopenko, Khim. Prir. Soedin., 271 (1972).
3. Perel'son.



SMYRNIORIDIN

Smyrniopsis aucherii.

$C_{21}H_{22}O_7$, M^+ 386, mp 126-128°

$[\alpha]_D$ −229° (chlf.)

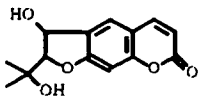
UV: 222, 300, 326.

IR: 1738, 1725, 1632, 1577. [1]

Mass: 386, 326, 311, 286, 271, 244, 243, 229, 227, 213, 203, 198, 191, 187, 186, 83. [2]

PMR: 6.10 (d, 1H, J = 9.5 Hz, H-3), 7.52 (d, 1H, J = 9.5 Hz, H-4), 6.71 (s, 1H, H-8), 7.45 (s, 1H, H-5), 6.40 (d, 1H, J = 6.6 Hz, H-4′), 5.15 (d, 1H, J = 6.6 Hz, H-5′), 1.95 (s, 3H, oAc), 1.65; 1.71 (s, each 3H, H-1′, H-3′), 1.81; 1.98 (s, each 3H, H-4″, H-5″), 6.0 (m, 1H, H-″). [3]

1. A. A. Savina, M. E. Perel'son, and G. K. Nikonov, Khim. Prir. Soedin., 185 (1970).
2. P. I. Zakharov, P. B. Terent'ev, G. K. Nikonov, A. I. Ban'kovskii, N. D. Antonova, and A. P. Prokopenko, Khim. Prir. Soedin., 271 (1972).
3. Perel'son.



SMYRINDIOL

Smirniopsis aucherii.

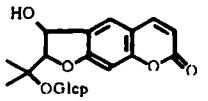
$C_{14}H_{14}O_5$, M^+ 262, mp 168-170°

$[\alpha]_D^{24}$ +30° (alc)

PMR: 6.03 (d, 1H, J = 10.0 Hz, H-3), 7.45 (d, 1H, J = 10.0 Hz, H-4), 6.51 (s, 1H, H-5), 7.34 (s, 1H, H-8), 5.28 (dd, 1H, J_1 = 9.0 Hz, J_2 = 6.6 Hz, H-4′), 4.23 (d, 1H, J = 6.6 Hz, H-5′), 1.45; 1.50 (s, each 3H, H-1′, H-3′), 5.08 (d, 1H, J = 6.6 Hz, H-4′), 3.90 (s, 1H, –OH). [1]

XSA [2]

1. Z. R. Dzhaffarov, Z. A. Kuliev, A. D. Vdovin, A. A. Kuliev, V. M. Malikov, and N. M. Ismailov, Khim. Prir. Soedin., 36 (1982).
2. B. Tashkhodzhaev, Z. A. Kuliev, and Z. R. Dzhaffarov, Khim. Prir. Soedin., 627 (1992).



SMYRINDIOLOSIDE

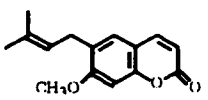
Smirniopsis aucherii.

$C_{20}H_{24}O_{10}$, M^+ 424, mp 253-254°

$[\alpha]_D^{24}$ +40° (DMFA)

PMR: 6.13 (d, 1H, J = 10.0 Hz, H-3), 7.47 (d, 1H, J = 10.0 Hz, H-4), 6.71 (s, 1H, H-8), 7.42 (s, 1H, H-5), 4.58 (d, 1H, J = 6.8 Hz, H-5′), 5.47 (dd, 1H, J_1 = 8 Hz, J_2 = 6.8 Hz, H-4′), 1.73 (s, 6H, H-1′, H-3′), 5.19 (d, 1H, J = 7.0 Hz, H-1″), 4.04-4.13 (m), 3.76 (m, protons of the sugar moiety)

Z. R. Dzhaffarov, Z. A. Kuliev, A. D. Vdovin, A. A. Kuliev, V. M. Malikov, and N. M. Ismailov, Khim. Prir. Soedin., 36 (1982).



SUBEROSIN

Peucedanum litorale, Prangos acaulis, P. aris-romonae, P. equisetoides, P. lipskyi, P. lophoptera, Platitaenia absinthifolia, P.dasycarpa, P. pimpinelloides, Seseli foliosum.

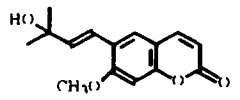
$C_{15}H_{16}O_3$, mp 85°

UV: 224, 255, 330.

IR: 1720, 1620, 1560, 1500, 1370, 1355.

PMR: 6.19 (d, 1H, J = 9.0 Hz, H-3), 7.59 (d, 1H, J = 9.0 Hz, H-4), 6.76 (s, 1H, H-8), 7.14 (s, 1H, H-5), 3.89 (s, 3H, OCH_3), 1.70; 1.76 (s, each 3H, H-4′, H-5′), 3.30 (d, 2H, J = 6.5 Hz, H-1′), 5.15 (m, 1H, H-2′). [1, 2]

1. G. A. Zhukov and T. S. Kozlov, Khim. Prir. Soedin., 574 (1977)
2. G. K. Nikonov, M. E. Perel'son, and M. G. Pimenov, Khim. Prir. Soedin., 285 (1966)



SUBERENOL

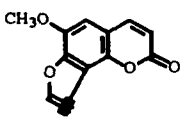
Prangos lophoptera.

$C_{15}H_{16}O_4$, mp 172-174° [1]

UV: 255, 296, 305, 337.

PMR: 6.23 d (9.5, H-3), 7.61 d (9.5, H-4), 7.46 d (9.5, H-5), 6.75 d (0.5, H-8), 6.88 d (16.5 H-1′), 6.32 d (16.5, H-2′), 1.44, 1.77 s (H-4′, H-5′). 3.9 (OCH_3). [2]

1. A. Z. Abyshev, Khim. Prir. Soedin., 708 (1974)
2. Perel'son.



SPHONDIN

Ammi majus, Angelica brevicaulis, Heracleum aconitifolium, H. antasiaticum, H. asperum, H. cyclocarpum, H. dissectum, H. grandiflorum, H. lehmannianum, H. ligusticifolium, H. leskovii, H. sommieri, H. sosnowskyi, H. stevenii, H. sibiricum, H. wilhelmsii, Pastinaca sativa, Platitaenia pimpinelloides, Psoralea drupaceae, Symphyoloma graveolens.

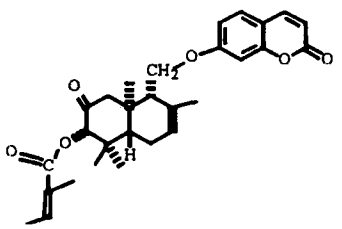
$C_{12}H_8O_4$, mp 189-191°

UV: 216, 221, 243, 250, 266, 298, 305, 343.

IR: 3135, 3113, 3064, 3005, 1720, 1632, 1581, 1540.

PMR: 6.39 d (9.7; H-3), 7.76 d (9.7; H-3), 6.77 s (H-5), 7.12 d (2.3; H-4′), 7.67 d (2.3; H-5′), 4.03 s (OCH_3).

1. Murray.
2. Perel'son.



TAVIMOLIDIN

Peucedanum mogoltavicum.

$C_{29}H_{34}O_6$.

mp 144-146°, $[\alpha]_D$ –110° (s, 1.0; chlf).

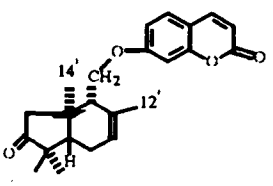
UV: 216, 242, 253, 325 nm (log ε 4.29; 3.63; 3.37; 4.04).

IR: 1738, 1730, 1715, 1617, 1560 cm^{-1}.

Mass: 478, 395, 316, 163, 162.

PMR: 0.90 (s, 6H, H-11′, H-15′), 1.08 (s, 3H, H-12′), 1.68 (br.s, 3H, H-14′), 1.95 and 1.99 (s, each 3H, H-4″, H-5″), 4.40 (m, 2H, H-13′), 5.00 (s, 1H, H-6′), 5.57 (br.s, 1H, H-3′), 6.15 (d, 1H, J = 9.0 Hz, H-3), 7.55 (d, 1H, J = 9.0 Hz, H-4), 7.28 (d, 1H, J = 9.0 Hz, H-5), 6.76 (q, 1H, J_1 = 9.0 Hz, J_2 = 2.0 Hz, H-6), 6.75 (d, 1H, J = 2.0 Hz, H-8).

T. Kh. Khasanov, V. M. Malikov, and S. Melibaev, Khim. Prir. Soedin., 480 (1979).



TAVICONE

Ferula karatavica.

$C_{23}H_{26}O_4$

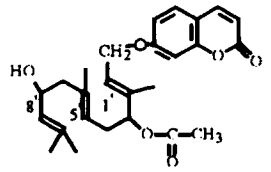
mp 141-142° $[\alpha]_D$ –77° (chlf)

UV: 224, 246, 295, 320

IR: 1700, 1720, 1660, 1610, 1580, 1520 [1]

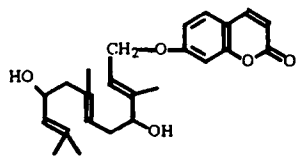
PMR: 0.91 (s, 3H, H-14′), 1.01 and 1.10 (s, each 3H, H-10′, H-11′), 4.10 (m, 2H, H-13′), 5.35 (t, 1H, J = 7.5 Hz, H-3′), 6.15 (d, 1H, J = 9.5 Hz, H-3), 7.52 (d, 1H, J = 9.5 Hz, H-4), 7.25 (d, 1H, J = 8.8 Hz, H-5), 6.73 (q, 1H, J_1 = 8.8 Hz, J_2 = 2.2 Hz, H-6), 6.75 (d, 1H, J = 2.2 Hz, H-8). [2]

1. V. Yu. Bagirov, N. P. Kir'yalov, and V. I. Sheichenko, Khim. Prir. Soedin., 591 (1969).
2. V. Yu. Bagirov and V. I. Sheichenko, Khim. Prir. Soedin., 452 (1976).



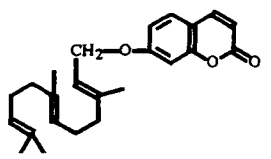
TADSHIKORIN
Ferula tadshikorum.
$C_{26}H_{32}O_6$.
$[\alpha])_D$ +15° (s 0.82; chlf).
UV: 243, 251, 325 nm (log ε 3.65; 3.53; 4.19).
PMR: 1.64 (s, 6H, H-11′, H-12′), 1.59 (s, 3H, H-15′), 1.79 (s, 3H, H-14′), 4.94 (t, 1H, J = 6 Hz, H-5′), 4.46 (m, 1H, H-8′), 5.37 (d, 1H, J = 8 Hz, H-9′), 4.57 (d, 2H, J = 6.5 Hz, H-13′), 5.67 (t, 1H, J = 6.5 Hz, H-1′), 4.94 (t, 1H, H-3′), 1.95 (s, 3H, H-2″), 6.20 (d, 1H, J = 9.5 Hz, H-3), 7.55 (d, 1H, J = 9.5 Hz, H-4), 7.30 (d, 1H, J = 8.5 Hz, H-5), 6.80 (q, 1H, J_1 = 8.0 Hz, J_2 = 2.0 Hz, H-6), 6.75 (d, 1H, J = 2.0 Hz, H-8).

M. E. Perel'son, V. V. Vandyshev, Yu. E. Sklyar, K. Vezhkhovska-Renke, N. V. Veselovskaya, and M. G. Pimenov, Khim. Prir. Soedin., 593 (1976).



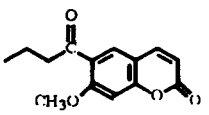
DEACETYLYTADSHIKORIN
Ferula tadshikorum.
$C_{24}H_{30}O_5$, 398 M^+
mp 64-66°.
IR: 3300.
PMR: 1.61; 1.81 (s, each 3H, H-14′, H-15′), 1.69 (s, 6H, H-11′, H-12′), 4.60 (d, 2H, J = 7 Hz, H-13′), 5.06 (t, 1H, Σ J = 14 Hz, H-1′), 5.44 (d, 1H, J = 9 Hz, H-6′), 5.57 (t, 1H, Σ J = 14 Hz, H-9′), 6.24 (d, 1H, J = 9.5 Hz, H-3), 7.63 (d, 1H, J = 9.5 Hz, H-4), 7.35 (d, 1H, J = 9 Hz, H-5), 6.84 (q, 1H, J_1 = 9.0 Hz, J_2 = 2.5 Hz, H-6), 6.79 (1H, br.s, $W_{1/2}$ = 2.5 Hz, H-8). [1]

N. V. Veselovskaya and Yu. E. Sklyar, Khim. Prir. Soedin., 386 (1984).



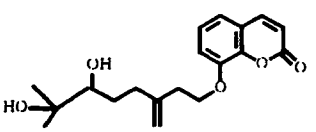
TADSHIFERIN
Ferula tadshikorum.
$C_{24}H_{30}O_4$.
mp 68-70° $[\alpha]_D$ +8° (chlf).
UV: 243, 251, 295, 325 nm (log ε 3.65; 3.51; 3.92, 4.18).
PMR: 1.66 (s, 6H, H-11′, H-12′), 1.58 (s, 3H, H-15′), 1.81 (s, 3H, H-14′), 4.58 (d, 2H, J = 6.8 Hz, H-13′), 5.51 (t, 1H, J = 6.8 Hz, H-1′), 5.15 (d, 1H, J = 9 Hz, H-9′), 4.46 (m, 1H, H-8′), 5.04 (t, 1H, J = 6 Hz, H-5′), 1.96-2.20 (4H, m, H-3′, H-4′), 6.15 (d, 1H, J = 9.5 Hz, H-3), 7.52 (d, 1H, J = 9.5 Hz, H-4), 7.25 (d, 1H, J = 8.5 Hz, H-5), 6.75 (q, 1H, J_1 = 8.5 Hz, J_2 = 2.5 Hz, H-6), 6.79 (d, 1H, J = 2.5 Hz, H-8).

M. E. Perel'son, V. V. Vandyshev, Yu. E. Sklyar, K. Vezhkhovska-Renke, N. V. Veselovskaya, and M. G. Pimenov, Khim. Prir. Soedin., 593 (1976).



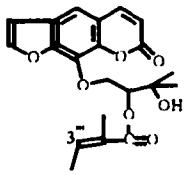
TENUIDIN
Haplophyllum villosum, H. tenue.
$C_{14}H_{14}O_3$, mp 74-75.5°.
IR: 1725, 1700, 1655, 1610, 1515.
PMR: 6.26 (d, 1H, J = 10.0 Hz, H-3), 7.66 (d, 1H, J = 10.0 Hz, H-4), 6.80 (s, 1H, H-5,), 6.91 (s, 1H, H-8), 3.95 (s, 3H, OCH_3), 2.68 (m, 4H, H-2′, H-3′), 1.28 (t, 3H, H-4′).

A. Z. Abyshev, N. Ya. Isaev, and Yu. B. Kerimov, Khim. Prir. Soedin., 800 (1980).



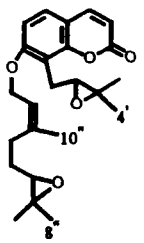
TENUDIOL
Haplophyllum tenue.
$C_{20}H_{26}O_6$
IR: 3350
PMR: 6.33; 7.73 (d, J = 10.0 Hz, H-3, H-4), 7.37; 6.90 (d, J = 9.0 Hz, H-5, H-6).

A. Z. Abyshev, N. Ya. Isaev, and Yu. B. Kerimov, Khim. Prir. Soedin., 800 (1980).



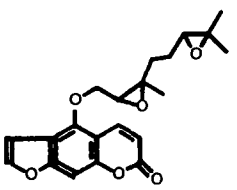
TOMASIN
Xanthogallum purpurascens.
$C_{21}H_{22}O_7$, mp 104-105°.
$[\alpha]_D^{20}$ +19° (alc).
UV: 218, 250, 301.
IR: 3484, 3137, 1716, 1650, 1614, 1589.
PMR: 6.29 (d, 1H, J = 10.0 Hz, H-3), 7.71 (d, 1H, J = 10.0 Hz, H-4),,7.33 (s, 1H, H-5), 6.76 (d, 1H, J = 2.3 Hz, H-5′), 7.61 (d, 1H, J = 2.3 Hz, H-4′), 2.60 (d, 2H, J = 6.0 Hz, H-1″), 1.41; 1.45 (s, each 3H, H-4″, H-5″), 3.95 (d, 1H, J = 6.0 Hz, H-2″), 1.86; 1.95 (s, each 3H, H-4‴, H-5‴), 6.05 (m, 1H, H-3‴).

A. I. Sokolova, M. E. Perel'son, and G. K. Nikonov, Khim. Prir. Soedin., 359 (1969).



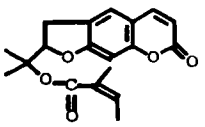
TORTUOSIDIN
Seseli tortuosum.
$C_{24}H_{30}O_5$.
$[\alpha]_D^{22}$ –45° (alc).
IR: 1720, 1625, 1580, 1505.
PMR: 6.09 (d, 1H, J = 10.0 Hz, H-3), 7.49 (d, J = 10.0 Hz, H-4) 6.64 (d, 1H, J = 9.0 Hz, H-6), 7.16 (d, 1H, J = 9.0 Hz, H-5), 1.18 (s, 6H, H-4′, H-5′), 1.25; 1.37 (s, each 3H, H-8″, H-9″), 1.78 (s, 3H, H-10″), 3.30 (d, 2H, J = 8.5 Hz, H-1″), 4.40-4.65 (m, 2H, H-1′), 5.30 (t, 1H, J = 6.5 Hz, H-2″), 2.50-2.80 (m, 4H, H-4″, H-5″).

A. Z. Abyshev and D. Z. Abyshev, Khim. Prir. Soedin., 704 (1983)



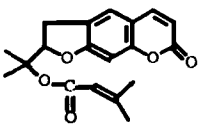
TORTUOSIN
Seseli tortuosum.
$C_{21}H_{22}O_6$, mp 156-157°.
IR: 1727, 1628, 1595, 1575, 1550.
PMR: 6.20 (d, 1H, J = 10.0 Hz, H-3), 8.11 (d, 1H, J = 10.0 Hz, H-4), 6.87 (d, 1H, J = 2.5 Hz, H-4′), 7.53 (d, 1H, J = 2.5 Hz, H-5′), 7.11 (s, 1H, H-8), 1.20; 1.29; 1.36 (s, each 3H, H-8″, H-9″, H-10″), 3.13 (t, 2H, J = 6.5 Hz, H-2″, H-6″), 4.42 (m, 2H, H-1″).

A. Z. Abyshev and D. Z. Abyshev, Khim. Prir. Soedin., 704 (1983)



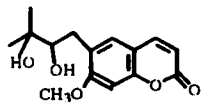
TORTUOSININ
Seseli tortuosum.
$C_{19}H_{20}O_5$, mp 109°.
IR: 1715, 1630, 1565, 1515.
PMR: 6.23 (d, 1H, J = 10.0 Hz, H-3), 7.50 (d, 1H, J = 10.0 Hz, H-4), 6.64 (s, 1H, H-6), 7.11 (s, 1H, H-5), 5.93 (q, 1H, J_1 = 12 Hz, J_2 = 6.0 Hz, H-3″), 4.98 (t, 1H, J = 7.5 Hz, H-5′), 3.24 (d, 2H, J = 7.5 Hz, H-4′), 1.52 (s, 6H, H-1′, H-3′), 1.76; 1.84 (s, each 3H, H-4″, H-5″).

A. Z. Abyshev and D. Z. Abyshev, Khim. Prir. Soedin., 704 (1983)



TORTUOSINOL
Seseli tortuosum.
$C_{19}H_{20}O_5$, mp 79-81°.
IR: 3430, 1720-1735, 1625, 1585, 1560, 1510.
PMR: 5.01 (t, 1H, J = 7.0 Hz, H-5′), 5.15 (br.s, 1H, H-2″), 4.03 (t, 2H, H-4′), 3.27 (d, 2H, J = 8.5 Hz, H-5′), 1.54 (s, 6H, H-1′, H-3′), 1.84; 2.04 (s, each 3H, H-4″, H-5″).

A. Z. Abyshev and D. Z. Abyshev, Khim. Prir. Soedin., 704 (1983)



ULOPTEROLE

Prangos uloptera.

$C_{15}H_{18}O_5$, mp 141.5-142.5°.

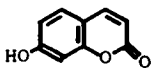
UV: 222, 252, 300, 334

IR: 3300, 1735, 1621, 1563, 1505, 1382, 870.

Mass: 278 (M^+), 260, 220, 219, 188, 177, 159.

PMR: 6.20 (d, 1H, J = 10.0 Hz, H-3), 7.59 (d, 1H, J = 10.0 Hz, H-4), 6.77 (s, 1H, H-5), 7.30 (s, 1H, H-5), 3.89 (s, 3H, OCH_3), 1.26; 1.31 (s, each 3H, H-4′, H-5′), 2.90-3.70 (m, 3H, H-1′, H-2′).

A. Z. Abyshev, A. M. Kutnevich, N. N. Kostyuchenko, O. A. Anisimova, A. I. Ermakov, and Yu. N. Sheinker, Khim. Prir. Soedin., 300 (1970).



UMBELLIFERONE

Achillea bieberschteinia, Adonis aunurensii, A. mongolica, Althaea armenica, A. arietinum, Anethum graveolens, Archangelica decurrens, Artemisia absinthium, A. glaura, A. sieversiana, A. scobina, A. vulgaris, Bidens tripartita, Caragana frutex, Calendula officinalis, Centaurea cynanus, Cicer arietinum, Cicuta virosa, Coronilla cretica, C. elegans, C. scorpioides, C. varia, Daphne mezereum. Dictamnus angustifolia, Doronicum macrophyllum, Ferula assafoetida, F. badrakema, F. caspica, F. communus, F. diversivittata, F. foliosa, F. gigantea, F. gummosa, F. jaeschkeana, F. karatavica, F. kokanica, F. korshinkyi, F. moschata, F. penninernis, F. samarcandica, Foeniculum vulgarae, Galium tauricum, Haplophyllum bungei, H. davuricum, Helichrysum macedonicum, H. orenarium, Heracleum antasiaticum, H. lehmanianum, Herniaria auxina, H. polygonum, Hippomaratrum caspicum, H. microcarpum, Ledum palustra, Matricaria recutita, Onobrychis kemularia, Passiflora incarnata, Phaseolus aurens, P. vulgaris, Physochlaina physoloides, Phlojodicarpus sibiricus, Ph. villosus, Platytaenia dasycarpa, Potentilla anserina, P. erecta, Prangos biebersteina, P. latiloba, P. lophoptera, Prunella vulgaria, Psoralea drupaceae, Rhodiola quadrifida, Rhodea japonica, Rhododendron dahuricum, Rh. ungernii, Sedum ewersii, Securigera securidaca, Seseli foliosum, Stellera chamaejasme, Stevia reboudiana, Symphyoloma graveolens, Vicia sativa.

$C_9H_6O_3$, mp 231-233°.

UV: 216, 244, 254, 300, 324 [1, 2].

IR: 3182, 1713, 1688, 1622, 1613, 1575, 1512 [1, 2].

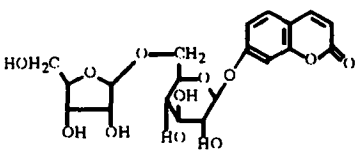
Mass: 162 (M^+).

PMR: 6.15 (d, 1H, J = 9.5 Hz, H-3), 7.79 (d, 1H, J = 9.5 Hz, H-4), 6.84-6.88 (m, 2H, H-6, H-8), 7.42 (d, 1H, J = 8 Hz, H-5) [3].

^{13}C NMR [4]:

C-2	160.8	7	161.7
3	111.6	8	102.8
4	144.3	9	155.9
5	130.0	10	111.6
6	113.4		

1. Kuznetsova.
2. Perel'son.
3. O. K. Antonova and B. V. Shemeryankin, Khim. Prir. Soedin., 797 (1981).
4. A. Z. Abyshev and V. P. Zmeikov, Khim. Prir. Soedin., 294 (1982).



UMBELLIFERONE β-*D*-APIOSYL-β-*D*-GLUCOPYRANOSIDE

Phlojodicarpus villosus, P. sibiricus.

$C_{20}H_{24}O_{12}$, mp 204-205°.

$[\alpha]_D^{20}$ +169° (alc)

UV: 248, 292, 318.

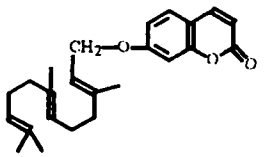
PMR: 6.32 (d, 1H, J = 10.0 Hz, H-3), 7.99 (d, 1H, J = 10.0 Hz, H-4), 7.04 (m, 2H, H-6, H-8), 7.65 (d, 1H, J = 9.0 Hz, H-5), 5.02 (d, 1H, J = 7.0 , H-1′), 4.80 (d, 1H, J = 3.0 Hz, H-1″), 3.15-3.88 (m, protons of the sugar moiety).

^{13}C-NMR

C-2	160.9.	1′-	101.0	1″-	110.1
3	114.0.	2′-	73.9	2″-	76.1
4	144.8.	3′-	76.8	3″-	79.1

4a	114.1	4'-70.7.	4''-72.2.
5	130.2	5'-77.2.	5''-64.3.
6	114.2	6'-68.3.	
7	160.9		
8	104.2		
8a	155.7		

D. Gantimur, A. I. Syrchina, and A. A. Semenov, Khim. Prir. Soedin., 36 (1986).



UMBELLIPRENIN

Anethum graveolens, Angelica decursiva, A. komorovii, A. tschimganica, Archangelica decurrens, A. tschimganica, Artemisia palustris, Cryplodiscus didymis, Ferula conocaulu, F. caspica, F. kokanica, F. korshinskyi, F. polyantha, Scobiosa comosa, Xanthogalum sacllokianum.

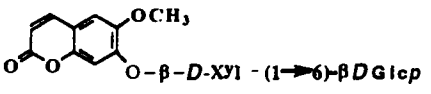
$C_{24}H_{30}O_3$, mp 61-63°

UV: 216, 326.

IR: 3106, 3054, 3023, 1730, 1620, 1590, 1509 [1, 2]

PMR: 6.15 d (9.6, H-3), 7.53 d (9.6, H-4), 7.28 d (9.5, H-5), 6.80 m (H-7, H-8), 4.56 d (6.0, H-1'), 5.44 t (6.0, H-9'), 1.57 us (H-15'), 1.8-2.2 m (H-4'), 5.07 m (H-5'), 1.74; 1.64 s (H-11, H-12') [3, 4]

1. N. P. Kir'yalov, Tr. Bot. Inst. AN SSSR, Ser. 5, **8**, 7 (1961).
2. Kuznetsova.
3. Perel'son.
4. G. K. Nikonov, R. K. Veremei, and V. B. Kuvaev, Zh. Obshch. Khim., 2744 (1963)



FABIATRIN

Physochlaina physaloides.

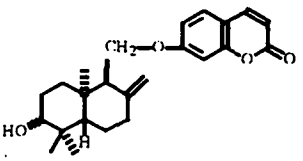
$C_{21}H_{26}O_{13}$, mp 234-236°

UV: 230, 283, 340 [1, 2]

^{13}C NMR [2]

C-2	160.6	OCH_3-56.1		C-1''	104.2
3	113.4	C-1'-99.6		2''	73.1
4	144.3	2'-73.4		3''	76.7
5	109.9	3'-75.5		4''	69.3
6	146.1	4'-69.6		5''	63.7
7	149.9	5'-76.7			
8	103.2	6'-68.3			
9	149.0				
10	112.4				

1. Murray.
2. G. Daandai, R. Naran, D. Gantimur, A. M. Syrchina, M. F. Darin, and A. A. Semenova, Khim. Prir. Soedin., 130 (1978).



FARNESIFEROL A (MOGOLTADIN)

F. assafoetida, F. samarcandica.

$C_{24}H_{30}O_4$,

mp 154-155°, (ee)

$[\alpha]_D$ –55° (alc). [1].

UV: 224, 245, 252, 326 (log ε 3.79; 3.43; 3.24; 4.14).

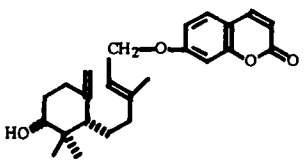
IR: 3600-3400, 1735, 1620, 1510 [2].

Mass: 382, 221, 203, 187, 175, 163, 162, 147, 135, 119, 107, 95, 81, 69, 55 [3].

PMR: 0.75 (s, 3H, H-15'), 0.92 (s, 3H, H-11'), 0.98 (s, 3H, H-12'), 3.95 (q, 1H, J_1 = 10.5 Hz; J_2 = 6.0 Hz, H-13'), 4.08 (q, 1H, J_1 = 10.5 Hz, J_2 = 5.5 Hz, H-13'), 3.20 (1, 1H, J_1 = 10.5 Hz, J_2 = 6.0 Hz, H-6'), 4.65 and 4.75 (br.s, each 1H,

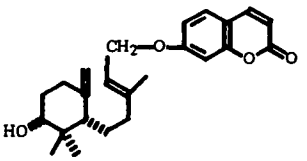
H-14′), 6.15 (d, 1H, J = 9.5 Hz, H-3′), 7.51 (d, 1H, J = 9.5 Hz, H-4), 7.25 (d, 1H, J = 8.5 Hz, H-5), 6.75 (q, 1H, J_1 = 8.5 Hz, J_2 = 2.5 Hz, H-6), 6.70 (d, 1H, J = 2.5 Hz, H-8). [2, 4, 5].
Abs. conf. [1].

1. Z. O. Caglioti, H. Naef, D. Arigoni, and O. Jeger, Helv. Chim. Acta, **41**, 2278 (1958).
2. T. Kh. Khasanov, A. I. Saidkhodzhaev, and G. K. Nikonov, Khim. Prir. Soedin., 10 (1974).
3. P. B. Terent'ev, P. I. Zakharov, G. K. Nikonov, T. Kh. Khasanov, and A. I. Saidkhodzhaev, Khim. Prir. Soedin., 207 (1977).
4. M. E. Perel'son, I. P. Kir'yalov, and A. I. Ban'kovskii, Khim. Prir. Soedin., 244 (1975).
5. M. E. Perel'son, A. A. Kir'yanov, A. I. Ban'kovskii, N. P. Kir'yalov, and T. V. Bukreeva, Khim. Prir. Soedin., 442 (1976).



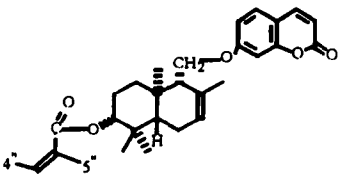
FARNESIFEROL B
Ferula assafoetida.
$C_{24}H_{30}O_4$
mp 115-117°, $[\alpha]_D$ +10° (alc)
UV: 242, 252, 298, 326 (log ε 3.60; 3.48; 3.93; 4.18)
IR: 1726, 1605, 1100, 3590 [1]
PMR: 6.45 (d, 1H, J = 9.7 Hz, H-3), 7.50 (d, 1H, J = 9.5 Hz, H-4), 6.72 (q, J_1 = 7.3 Hz, J_2 = 2.5 Hz, H-6), 7.22 (d, 1H, J = 7.3 Hz, H-5), 6.62 (d, 1H, J = 2.5 Hz, H-8), 4.5 (d, 1H, J = 6.0 Hz, H-13′), 5.45 (d, 1H, J = 6.0 Hz, H-1′), 4.52 and 4.72 (s, each 1H, H-15′), 3.28 (q, 1H, J_1 = 9.5 Hz, J_2 = 3.5 Hz, H-6′). [2]
Rel. conf. [3]

1. Z. O. Caglioti, H. Naef, D. Arigoni, and O. Jeger, Helv. Chim. Acta, **41**, 2557 (1959).
2. Kh. M. Kamilov and G. K. Nikonov, Khim. Prir. Soedin., 442 (1974).
3. A. I. Saidkhodzhaev, Khim. Prir. Soedin., 437 (1979).



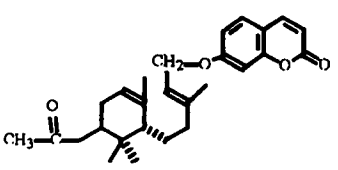
FARNESIFEROL C
Ferula assafoetida, F. szovitsiana.
$C_{24}H_{30}O_4$
mp 84-85° $[\alpha]_D$ -29° (alc)
UV: 244, 255, 297, 324 (log ε 3.55; 3.44; 3.50; 4.13)
IR: 1720, 1620, 1580, 1520 [1].

1. Z. O. Caglioti, H. Naef, D. Arigoni, and O. Jeger, Helv. Chim. Acta, **42**, 2257 (1958).
2. A. I. Saidkhodzhaev, Khim. Prir. Soedin., 437 (1979).



FESELOL (MOSCHATOL) ANGELATE
Ferula diversivitata.
$C_{29}H_{36}O_5$, M^+ 464
mp 66-68°, $[\alpha]_D^{22}$ -35.8° (s 0.57; chlf)
UV: 217, 254, 324 (log ε 4.35; 3.35; 4.15)
IR: 1730, 1715, 1617, 1560, 1515.
PMR: 6.05 (d, J = 9.3 Hz, H-3), 7.45 (d, 1H, J = 9.3 Hz, H-4), 7.20 (d, 1H, J = 9.0 Hz, H-5), 6.66 (m, 2H, H-6, H-8), 3.91 (q, 1H, J = 10.0 Hz, J_2 = 6.0 Hz, H-13′), 4.09 (q, 1H, J = 10.0 Hz, J_2 = 4.0 Hz, H-13′), 5.42 (br.s, 1H, H-3′), 5.99 (m, 1H, H-3″), 4.24 (q, J_1 = 9.0 Hz, J_2 = 6.0 Hz, H-6′), 1.83 (s, 3H, H-4″), 1.92 (d, 3H, J = 7 Hz, H-4″), 0.79; 0.82 (s, each 3H, H-11′, H-12′), 0.9 (s, 3H, H-15′), 1.60 (br.s, 3H, H-4).

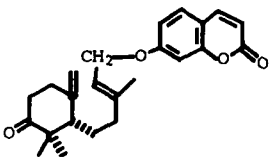
A. A. Nabiev, T. Kh. Khasanov, and S. Melibaev, Khim. Prir. Soedin., 517 (1978).



FEKOLIN
Ferula kopetdagherisis.
$C_{26}H_{32}O_5$, 424.
n_D 1.5607; $[\alpha]_D^{18}$ +29.8° (chlf).
UV: 223, 245, 256, 296, 327 nm (log ε 4.14; 3.64; 3.51; 3.87; 4.07).
IR: 1738, 1730, 1617, 1560 cm^{-1}.

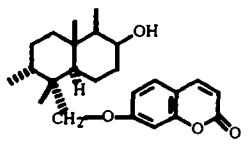
Mass: 424, 381, 364, 263, 161.
PMR: 0.84 (s, 6H, H-11′, H-12′), 1.67 and 1.73 (s, each 3H, H-15′, H-14′), 1.99 (s, 3H, H-2″), 4.56 (d, J = 6.0 Hz, 2H, H-13′), 4.61 (m, Σ J = 15.0 Hz, 1H, H-6′), 5.19 (br.s, $W_{1/2}$ = 10.0 Hz, 1H, H-8′), 5.41 (t, 1H, J = 6 Hz, H-1′), 6.18 (d, 1H, J = 9.5 Hz, H-3), 7.52 (d, 1H, J = 9.5 Hz, H-4), 7.28 (d, 1H, J = 9.0 Hz, H-5), 6.76 (q, 1H, J_1 = 9.0 Hz, J_2 = 2.0 Hz, H-6), 6.74 (d, 1H, J = 2.0 Hz, H-8).

A. A. Nabiev, T. Kh. Khasanov, and V. M. Malikov, Khim. Prir. Soedin., 516 (1978).



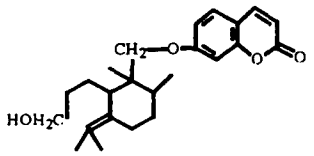
FEKALONE
Ferula kopetdagkensis. [1]. F. krylovii. [2].
$C_{24}H_{28}O_4$, M^+ 380.
n_D^{20} 1.5837; $[\alpha]_D^{20}$ +47° (chlf)
UV: 221, 254, 296, 327 nm (log ε 4.21; 3.28; 3.75; 4.04).
IR: 1740, 1710, 1615, 1555, 1510.
Mass: 380, 218, 162.
PMR: 0.97 (s, 3H, H-11′), 1.11 (s, 3H, H-12′), 1.65 (s, 3H, H-14′), 4.63 and 4.91 (m.s, each 1H, H-15′), 5.32 (t, 1H, J = 7.0 H, H-1′), 4.50 (d, J = 7.0 Hz, H-13′), 6.15 (d, 1H, J = 9.0 Hz, H-3), 7.50 (d, 1H, J = 9.0 Hz, H-4), 7.28 (d, 1H, J = 9.0 Hz, H-5), 6.77 (q, 1H, J_1 = 9.0 Hz, J_2 = 2.0 Hz, H-6), 6.76 (d, 1H, J = 2.0 Hz, H-8). [1, 2].

1. A. A. Nabiev, T. Kh. Khasanov, and V. M. Malikov, Khim. Prir. Soedin., 516 (1978).
2. N. V. Veselovskaya, Yu. E. Sklyar, M. E. Perel'son, and M. G. Pimenov, Khim. Prir. Soedin., 227 (1979).



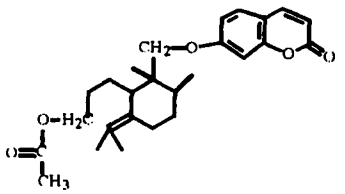
FECARPIN
Ferula microcarpa.
$C_{24}H_{32}O_4$, M^+ 384
mp 166-168° $[\alpha]_D^{22}$ -20° (s 1.0; chlf)
UV: 220, 243, 290, 327 (log ε 4.14, 3.58; 3.78; 3.98)
IR: 3530, 1715, 1615 1570, 1514

L. A. Golovina, T. Kh. Khasanov, A. I. Saidkhodzhaev, V. M. Malikov, and U. Rakhmankulov, Khim. Prir. Soedin., 566 (1978).



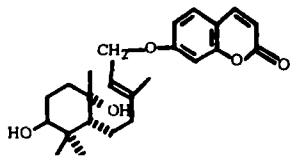
FEKRYNOL
Ferula krylovii.
$C_{24}H_{32}O_4$.
$[\alpha]_D$ +18 (alc)
PMR: 0.91 (d, 3H, J = 7.0 Hz, H-14′), 1.18 (s, 3H, H-15′), 1.45 and 1.58 (s, each 3H, H-11′, H-12′), 3.52 (t, 2H, J = 6.0 Hz, H-6′), 3.80 (q, 2H, H-13′), 6.16 (d, 1H, J = 9.5 Hz, H-3), 7.52 (d, 1H, J = 9.5 Hz, H-4), 7.30 (d, 1H, J = 9.0 Hz, H-5), 6.79 (q, 1H, J_1 = 9.0 Hz, J_2 = 2.0 Hz, H-6), 6.73 (d, 1H, J = 2.0 Hz, H-8).

N. V. Veselovskaya, Yu. E. Sklyar, and A. A. Savina, Khim. Prir. Soedin., 798 (1981).



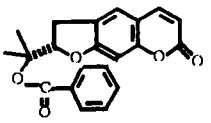
FEKRYNOL ACETATE
Ferula krylovii.
$C_{26}H_{34}O_5$, 426 M^+.
mp 80-82°. $[\alpha]_D$ -26.8° (s, 1.0; chlf).
UV: 325 nm (log ε 4.19).
IR: 1710, 1720, 1730.
PMR: 0.91 (d, 3H, J = 7.0 Hz, H-14′), 1.09 (s, 3H, H-15′), 1.44 and 1.61 (s, each 3H, H-11′, H-12′), 2.94 (t, 1H, H-9′), 3.64 and 3.87 (d, each 1H, J = 8.0 Hz, H-13′), 1.98 (s, 3H, H-2″), 3.96 (t, 2H, H-6′), 6.16 (d, 1H, J = 9.0 Hz, H-3), 7.55 (d, 1H, J = 9.0 Hz, H-4), 7.30 (d, 1H, J = 9.0 Hz, H-5), 6.76 (q, 1H, J_1 = 9.0 Hz, J_2 = 2.0 Hz, H-6), 6.74 (d, 1H, J = 2.0 Hz, H-8).

N. V. Veselovskaya, Yu. E. Sklyar, and A. A. Savina, Khim. Prir. Soedin., 798 (1981).



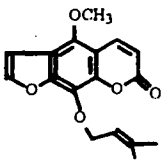
FEKROL
Ferula krylovii
$C_{24}H_{32}O_5$.
mp 172-174°.
IR: 3330, 1725, 1620, 1560, 1510.
PMR: 0.7 and 0.98 (s, each 3H, H-11′, H-12′), 1.01 (s, 3H, H-15′), 1.73 (s, 3H, H-14′), 3.38 (br.s, 1H, H-6′), 4.57 (d, 2H, J = 7.0 Hz, H-13′), 5.48 (t, 1H, J = 7.0 Hz, H-1′), 6.15 (d, 1H, J = 9.0 Hz, H-3), 7.60 (d, 1H, J = 9.0 Hz, H-4), 7.30 (d, 1H, J = 9.0 Hz, H-5), 6.76 (q, 1H, J = 2.0 Hz, H-6), 6.74 (d, 1H, J = 2 Hz, H-8). [1, 2].

1. N. V. Veselovskaya, Yu. E. Sklyar, D. A. Fesenko, and M. G. Pimenov, Khim. Prir. Soedin., 851 (1979).
2. A. I. Saidkhodzhaev, Khim. Prir. Soedin., 437 (1979).



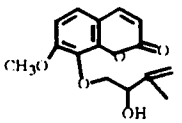
FELAMEDIN
Ferulago sylvatica.
$C_{21}H_{18}O_5$, mp 133-134°
$[\alpha]_D^{19}$ –101.4° (alc) [1, 2]

1. Murray.
2. Yu. E. Sklyar, V. B. Andrianova, and M. G. Pimenov, Khim. Prir. Soedin., 518 (1982).



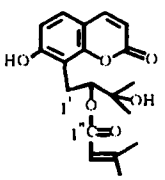
PHELLOPTERIN
Angelica komarovii, Archangelica decurrens, Heracleum asperum, H. leskovii, H. moellendorfii, Komarovia anisospermum, Peucedanum baicalense.
$C_{17}H_{16}O_5$, mp 100-101°.
PMR: 6.05 (d, 1H, J = 9.5 Hz, H-3), 7.85 (d, 1H, J = 9.5 Hz, H-4), 6.87 (d, 1H, J = 2.0 Hz, H-4′), 7.49 (d, 1H, J = 2.0 Hz, H-5′), 4.09 (s, 3H, OCH_3), 4.69 (d, 2H, J = 7.0 Hz, H-1″), 5.48 (t, 1H, J = 7.0 Hz, H-2″), 1.66 (s, 6H, H-4″, H-5″).

A. I. Sokolova, Yu. E. Sklyar, M. E. Perel'son, and M. G. Pimenov, Khim. Prir. Soedin., 166 (1976).



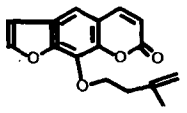
FERUDENOL
Prangos ferulaceae.
$C_{15}H_{16}O_5$, mp 98.5-101°.
IR: 3500, 1725, 1620, 1570, 1500.
PMR: 6.22 (d, 1H, J = 9.5 Hz, H-3), 7.60 (d, 1H, J = 9.5 Hz, H-4), 6.84 (d, 1H, J = 9.0 Hz, H-6), 7.30 (d, 1H, J = 9.0 Hz, H-5), 4.76; 4.86 (br.s, each 1H, H-5′), 4.40 (d, 2H, J = 6.5 Hz, H-1′), 2.87 (t, 1H, J = 6.5 Hz, H-2′), 3.91 (s, 3H, OCH_3), 1.87 (br.s, 1H, –OH), 1.78 (s, 3H, H-4′).

A. Z. Abyshev, Khim. Prir. Soedin., 568 (1974).



FERUDIOL
Prangos ferulaceae.
$C_{19}H_{22}O_6$. (l).
IR: 3300, 1730, 1710, 1615, 1510, 1410, 1390.
PMR: 6.17 (d, 1H, J = 10.0 Hz, H-3), 7.57 (d, 1H, J = 10.0 Hz, H-4), 6.85 (d, 1H, J = 9.5 Hz, H-6), 7.14 (d, 1H, J = 9.5 Hz, H-5), 5.26 (br.s, 1H, H-2″), 5.03 (br.s, 2H, 2-OH), 3.55 (d, 2H, J = 8.0 Hz, H-1′), 1.65; 1.81 (s, 3H, H-4″, H-5″), 1.27, 1.30 (s, each 3H, H-4′, H-5′).

A. Z. Abyshev, Khim. Prir. Soedin., 568 (1974).



FERULIDEN

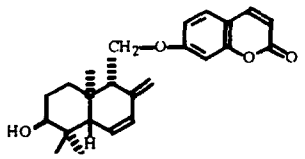
Prangos ferulaceae.

$C_{16}H_{14}O_4$, M^+ 270, mp 119-120°.

IR: 1725, 1630, 1608, 1210, 820.

PMR: 6.12 (d, 1H, J = 10.0 Hz, H-3), 8.20 (d, 1H, J = 10.0 Hz, H-4), 6.95 (d, 1H, J = 2.5 Hz, H-4′), 7.65 (d, 1H, J = 2.5 Hz, H-5′), 7.42 (s, 1H, H-5), 4.80; 4.92 (s, each 1H, H-5″), 3.72 (m, 2H, H-1″), 1.84 (s, each 2H, H-2″), 1.67 (s, 3H, H-4″).

A. Z. Abyshev, Khim. Prir. Soedin., 568 (1974).



FERILIN

Ferula iliensis.

$C_{24}H_{28}O_4$, 380 M^+

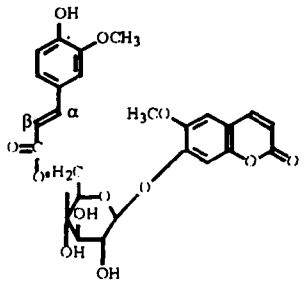
mp 172-174°, $[\alpha]_D$ –66.9° (chlf).

IR: 3620

PMR: 0.83; 0.86; 1.02 (s, each 3H H-15′, H-11′, H-12′)

2.54 (1H, br.s, $W_{1/2}$ = 9.0 Hz, –OH), 3.49 (br.s, 1H, $W_{1/2}$ = 9.0 Hz, H-6′), 4.24 (m, 2H, H-13′), 4.95 (d, 2H, J = 8.0 Hz, H-14′), 5.70 (d, 1H, J = 10.0 Hz, H-3′), 6.25 (d, 1H, J = 10.0, H-4′), 6.22 (d, 1H, J = 9.5 Hz, H-3), 7.61 (d, 1H, J = 9.5 Hz, H-4), 7.34 (d, 1H, J = 9.0 Hz, H-5), 6.83 (m, 2H, H-6, H-8).

I. V. Veselovskaya and Yu. E. Sklyar, Khim. Prir. Soedin., 387 (1984).



FERULOYLSCOPOLIN

Haplophyllum obtusifolium.

$C_{26}H_{26}O_{12}$, mp 206-208°.

$[\alpha]_D$ –110.5° (Py).

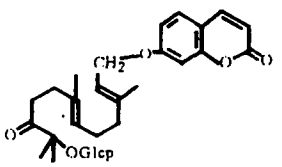
UV: 229, 249, 297, 332.

IR: 3540-3210, 1736, 1717, 1639, 1610, 1575, 1523

Mass: 530 (M^+), 338, 194, 193, 192, 178, 177, 164, 150, 149, 135, 121, 107, 79, 69.

PMR: 3.54; 3.74 (s, each 3H, $2OCH_3$), 3.95-4.45 (m, of the sugar moiety) 4.83 (d, 2H, J = 12.0 Hz, H-5′), 5.50 (d, 1H, J = 6.5 Hz, H-1′), 6.08 (d, 1H, J = 10.0 Hz, H-3), 6.47 (d, 1H, J = 16.0 Hz, H-α), 6.81 (s, 1H, H-5), 7.07 (m, 3H, H-2″, H-3″, H-6″), 7.32 (s, 1H, H-8), 7.43 (d, 1H, J = 10.0 Hz, H-4), 7.70 (d, 1H, J = 16.0 Hz, H-β). [1, 2]

1. E. Seitmuratov, A. D. Matkarimov, É. Kh. Batirov, and V. M. Malikov, in: Abstracts of Lectures at the IVth All-Union Symposium on Phenolic Compounds [in Russian], Tashkent (1982), p. 71.
2. É. Kh. Batirov, A. D. Matkarimov, V. M. Malikov, and E. Seitmuratov, Khim. Prir. Soedin., 691 (1982).



FEROSIDE

Ferula korshinskyi.

$C_{30}H_{42}O_{10}$, 562 M^+.

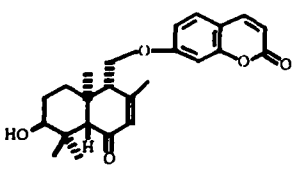
mp 110-111°, $[\alpha]_D$ +18.1° (alc).

UV: 222, 245, 330 (log ε 3.99; 2.97; 4.06).

IR: 3100-3600, 1720, 1710, 1620, 1560, 1520, 1000-1150.

PMR: 1.1 (s, 6H, H-11′, H-12′), 1.62 and 1.72 (s, each 3H, H-15′, H-14′), 4.35 (d, 2H, J = 6.5 Hz, H-13′), 3.5-5.0 (5H, H-Glc*p*), 6.16 (d, 1H, J = 9.5 Hz, H-3), 7.55 (d, 1H, J = 9.5 Hz, H-4), 7.34 (d, J = 9.0 Hz, H-5), 6.83 (q, 1H, J_1 = 9.0 Hz, J_2 = 2.5 Hz, H-6), 6.80 (d, 1H, J = 2.5 Hz, H-8).

A. Sh. Kadyrov, A. I. Saidkhodzhaev, and G. K. Nikonov, Khim. Prir. Soedin., 574 (1975).



FEROCAULIDIN

Ferula conocaula.

$C_{24}H_{28}O_5$.

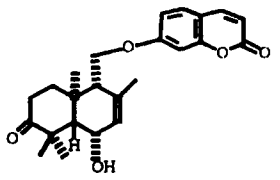
mp 75-77°, $[\alpha]_D$ –75°.(alc)

IR: 3480, 1730, 1710, 1615, 1560, 1515 cm^{-1}.

Mass: 396, 378, 363, 217, 162.

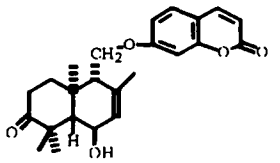
PMR: 1.0; 1.14; 1.18 (s, each 3H, H-11′, H-12′, H-15′), 1.90 (s, 3H, H-14′), 2.58 (s, 1H, H-10′), 2.70 (m, 1H, H-1′), 3.20 (br.s, 1H, $W_{1/2}$ = 7.0 Hz, H-6′), 4.18 (m, 2H, H-13′), 5.82 (br.s, 1H, $W_{1/2}$ = 6.0 Hz, H-3′).

Z. A. Kuliev and T. Kh. Khasanov, Khim. Prir. Soedin., 322 (1978).



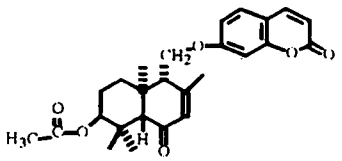
FEROCAULIN
Ferula conocaula.
$C_{24}H_{28}O_5$.
mp 120-121°.
$[\alpha]_D$ –20° (alc)
UV: 217, 243, 253, 297, 326.
IR: 3510, 1730, 1714, 1618, 1560, 1518.
Mass: 396, 381, 378, 235, 162.
PMR: 1.17; 1.36; 1.46 (s, each 3H, H-11′, H-12′, H-15′), 1.75 (s, 3H, H-14′), 4.12 (m, 2H, H-13′), 4.40 (br.s, 1H, H-4′), 5.70 (br.s, 1H, H-3′), 6.20 (d, 1H, J = 9.5 Hz, H-3), 7.62 (d, 1H, J = 9.5 Hz, H-4), 7.37 (d, 1H, J = 9.0 Hz, H-5), 6.87 (m, 2H, H-6, H-8).

Z. A. Kuliev and T. Kh. Khasanov, Khim. Prir. Soedin., 322 (1978).



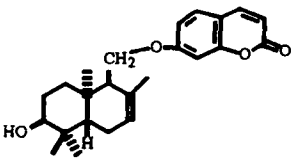
FEROCAULININ
Ferula conocaula.
$C_{24}H_{28}O_5$, mp 84-85°
$[\alpha]_D$ –40° (chlf)
UV: 216, 242, 253, 325 (log ε 4.26; 3.76; 3.60; 3.97)
IR: 3460, 1733, 1712, 1617, 1560, 1516
Mass: 396, 378, 381, 235, 162.
PMR: 1.06; 1.20; 1.28 (s, each, 3H, H-11′, H-12′, H-15′), 1.77 (s, 3H, H-14′), 4.14 (m, 2H, H-13′), 4.28 (m, 1H, $W_{1/2}$ = 17 Hz, H-4′), 5.65 (br.s, 1H, H-3′), 6.18 (d, 1H, J = 9.5 Hz, H-3), 7.60 (d, 1H, J = 9.5 Hz, H-4), 7.35 (d, 1H, J = 9.0 Hz, H-5), 6.85 (m, 2H, H-6, H-8).

Z. A. Kuliev and T. Kh. Khasanov, Khim. Prir. Soedin., 322 (1978).



FEROCAULICIN
Ferula conocaula.
$C_{26}H_{30}O_6$, 438 M^+
mp 162-162.5°. $[\alpha]_D$ –120°. (alc)
IR: 1670, 1730, 1745.
PMR: 1.02; 1.10; 1.21 (s, each 3H, H-11′, H-12′, H-15′), 1.94 (s, 8H, H-14′), 2.02 (s, 3H, H-2″), 2.52 (s, 1H, H-10′), 2.72 (m, 1H, H-1′), 4.55 (br.s, 1H, $W_{1/2}$ = 7.0 Hz, H-6′), 4.20 (m, 2H, H-13′), 5.85 (br.s, $W_{1/2}$ = 6.0 Hz, H-3′).

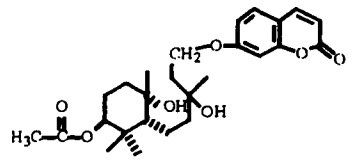
Z. A. Kuliev and T. Kh. Khasanov, Khim. Prir. Soedin., 322 (1978).



FEROPOLIDIN
Ferula polyantha.
$C_{24}H_{30}O_4$.
mp 154-155° (alc).
$[\alpha]_D$ +154° (chlf).
UV: 218, 243, 327 (log ε 4.12; 3.57; 4.18).
IR: 3600-3300, 1715, 1670, 1620, 1580, 1530.
Mass: 382, 238, 220, 172, 162.
PMR: 0.85 (s, 3H, H-15′), 0.88 (s, 3H, H-11′), 0.90 (s, 3H, H-12′), 1.68 (s, 3H, H-14′), 3.80 (q, 1H, J_1 = 10.5 Hz, J_2 = 1.5 Hz, H-13′), 4.12 (1H, q, J_1 = 10.5 Hz, J_2 = 6 Hz, H-13′), 3.35 (br.s, 1H, H-6′), 5.43 (br.s, 1H, H-3′), 6.18 (d, 1H, J = 9.5 Hz, H-3), 7.56 (d, 1H, J = 9.5 Hz, H-4), 7.30 (d, 1H, J = 8.5 Hz, H-5), 6.80 (d, 1H, J_1 = 8.5 Hz, J_2 = 2.5 Hz, H-6), 6.72 (d, 1H, J = 2.5 Hz, H-8). [1, 2].

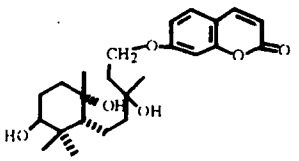
Abs. conf. [3].

1. T. Kh. Khasanov, A. I. Saidkhodzhaev, and G. K. Nikonov, Khim. Prir. Soedin., 91 (1976).
2. A. I. Saidkhodzhaev and V. M. Malikov, Khim. Prir. Soedin., 799 (1978).
3. A. I. Saidkhodzhaev and V. M. Malikov, Khim. Prir. Soedin., 707 (1978).



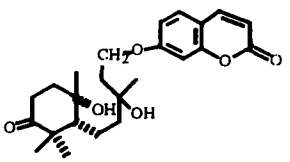
FEROPOLIN
Ferula polyantha.
$C_{26}H_{36}O_7$, 460 M^+.
mp 63-65° (pet. ether).
$[\alpha]_D$ +85° (chlf).
UV: 217, 245, 297, 326 (log ε 4.20; 3.76; 3.97; 4.17).
IR: 3600-3300, 1730, 1720, 1615, 1580, 1530.
PMR: 0.82 (3H, s, H-11′), 0.87 (s, 3H, H-12′), 1.25 (s, 3H, H-15′), 1.30 (s, 3H, H-14′), 2.02 (s, 3H, H-2″), 4.12 (m, 2H, H-13′), 4.58 (br.s, 1H, H-6′), 6.16 (d, 1H, J = 9.5 Hz, H-3), 7.52 (d, 1H, J = 9.5 Hz, H-4), 7.30 (d, 1H, J = 8.5 Hz, H-5), 6.79 (q, 1H, J_1 = 8.5 Hz, J_2 = 2.5 Hz, H-6), 6.73 (d, 1H, J = 2.5 Hz, H-8). [1, 2].
Rel. conf. [3].

1. T. Kh. Khasanov, A. I. Saidkhodzhaev, and G. K. Nikonov, Khim. Prir. Soedin., 91 (1976).
2. A. I. Saidkhodzhaev and V. M. Malikov, Khim. Prir. Soedin., 799 (1978).
3. A. I. Saidkhodzhaev, Khim. Prir. Soedin., 437 (1979).



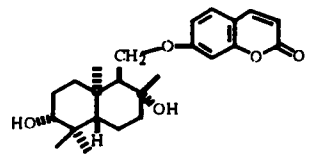
FEROPOLOL
Ferula polyantha.
$C_{24}H_{34}O_6$.
mp 96-98°.
$[\alpha]_D$ +38.2° (chlf)
UV: 220, 244, 290, 328 (log ε 4.16; 3.80; 3.83; 4.15).
IR: 3600-3200, 1720, 1620, 1560, 1520.
Mass: 418, 256, 238, 221, 203, 175, 163, 162.
PMR: 0.84 (s, 3H, H-11′), 0.95 (s, 3H, H-12′), 1.24 (s, 3H, H-15′), 1.28 (s, 3H, H-14′), 3.43 (br.s, 1H, H-6′), 4.09 (m, 2H, H-13′), 6.16 (d, 1H, J = 9.5 Hz, H-3), 7.54 (d, 1H, J = 9.5 Hz, H-4), 7.30 (d, 1H, J = 8.5 Hz, H-5), 6.78 (q, 1H, J_1 = 8.5 Hz, J_2 = 2.5 Hz, H-6), 6.73 (d, 1H, J = 2.5 Hz, H-8). [1, 2].
Rel. conf. [3].

1. T. Kh. Khasanov, A. I. Saidkhodzhaev, and G. K. Nikonov, Khim. Prir. Soedin., 91 (1976).
2. A. I. Saidkhodzhaev and V. M. Malikov, Khim. Prir. Soedin., 799 (1978).
3. A. I. Saidkhodzhaev, Khim. Prir. Soedin., 437 (1979).



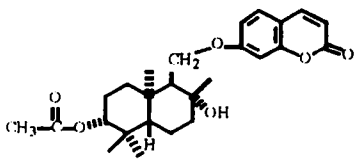
FEROPOLONE
Ferula polyantha.
$C_{24}H_{32}O_6$.
mp 225-226° (alc).
$[\alpha]_D$ −7.5° (chlf).
UV: 218, 242, 296, 324 (log ε 4.11; 3.53; 3.86; 4.11).
IR: 3600-3200, 1720, 1710, 1620, 1580.
Mass: 416, 254, 236, 219, 201, 175, 162.
PMR: 1.02 (s, 3H, H-11′), 1.08 (s, 3H, H-12′), 1.30 (s, 3H, H-15′), 1.48 (s, 3H, H-14′), 4.15 (m, 2H, H-13′), 6.17 (d, 1H, J = 9.5 Hz, H-3), 7.55 (d, 1H, J = 9.5 Hz, H-4), 7.32 (d, 1H, J = 8.5 Hz, H-5), 6.79 (q, 1H, J_1 = 8.5 Hz, J_2 = 2.5 Hz, H-6), 6.73 (d, 1H, J = 2.5 Hz, H-8). [1, 2].
Rel. conf. [3].

1. T. Kh. Khasanov, A. I. Saidkhodzhaev, and G. K. Nikonov, Khim. Prir. Soedin., 91 (1976).
2. A. I. Saidkhodzhaev and V. M. Malikov, Khim. Prir. Soedin., 799 (1978).
3. A. I. Saidkhodzhaev, Khim. Prir. Soedin., 437 (1979).



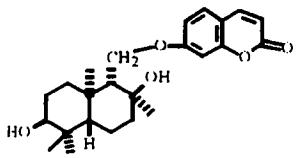
FERUCRIN
F. krylovii.
$C_{24}H_{32}O_5$, 400 M^+.
mp 213-215°, $[\alpha]_D$ +32° (alc).
UV: 217, 242, 252, 325 (log ε 3.90; 330; 3.20; 3.98).
IR: 3500, 3600 cm^{-1}.
PMR: 0.84 (s, 3H, H-11′), 1.04 (s, 3H, H-12′), 1.30 (s, 3H, H-15′), 1.33 (s, 3H, H-14′), 4.12 (m, 2H, H-13′), 3.15 (m, 1H, $\sum J$ = 15.5 Hz, H-6′), 6.25 (d, 1H, J = 9.5 Hz, H-3), 7.64 (d, 1H, J = 9.5 Hz, H-4), 7.37 (d, 1H, J = 9.0 Hz, H-5), 6.82 (m, 2H, H-6, H-8).

M. E. Perel'son, Yu. E. Sklyar, I. V. Veselovskaya, and M. G. Pimenov, Khim.-farm. Zh., No. 3, 78 (1977).



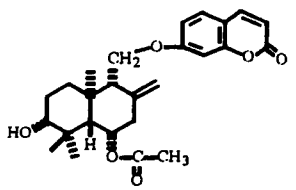
FERUCRIN ACETATE
Ferula kopetdaghensis.
$C_{26}H_{34}O_6$.
mp 145-147°, $[\alpha]_D$ +20° (s 1.0; alc)
UV: 218, 242, 253, 325 (log ε 4.08; 3.52; 3.34; 4.11)
IR: 3550, 1732, 1718, 1618, 1565, 1517.
Mass: 442(M^+). 424, 399, 262, 221, 162.

A. A. Nabiev, T. Kh. Khasanov and V. M. Malikov, Khim. Prir. Soedin., 17 (1979).



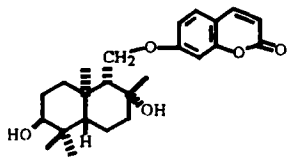
FEPALDIN
Ferula pallida.
$C_{24}H_{32}O_5$.
mp 219-221°, $[\alpha]_D$ –55° (chlf).
UV: 217, 245, 255, 296, 327 (log ε 4.15; 3.58; 3.47; 3.90; 4.16).
IR: 3620, 3570-3400, 1720, 1620, 1580, 1520, cm^{-1}.
Mass: 400, 382, 238, 220, 205, 202, 162.
PMR: 0.86; 0.96; 1.08 (s, each 3H, H-15′, H-11′, H-12′), 1.20 (s, 3H, H-14′), 3.38 (br.s, 1H, H-6′), 4.08 and 4.32 (q, each 1H, J_1 = 10.0 Hz, J_2 = 3.0 Hz, H-13′), 6.15 (d, 1H, J = 9.0 Hz, H-3), 7.55 (d, 1H, J = 9.0 Hz, H-4), 7.28 (d, 1H, J = 9.0 Hz, H-5), 6.78 (q, 1H, J_1 = 9.0 Hz, J_2 = 2.0 Hz, H-6), 6.76 (d, 1H, J = 2.0 Hz, H-8).

A. I. Saidkhodzhaev, A. Yu. Kushmuradov, A. Sh. Kadyrov, and V. M. Malikov, Khim. Prir. Soedin., 716 (1980).



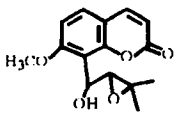
FETERIN
Ferula teterrima, F. iliensis.
$C_{26}H_{32}O_6$, 440 M^+.
mp 161-162° (alc).
$[\alpha]_D$ –52° (c. 1.02; chlf).
UV: 216; 252.5; 324 nm (log ε 3.97; 3.29; 3.98).
IR: 3545, 1710-1720 cm^{-1}.
PMR: 0.93 (s, 3H, H-15′), 0.89 and 1.18 (s, each 3H, H-11′), 2.06 (s, 3H, H-2″), 3.34 (q, 1H, J_1 = 8.0 Hz, J_2 = 5.0 Hz, H-6′), 2.18 (q, 1H, J_1 = 11.0 Hz, J_2 = 13.5 Hz, H-3′a), 2.77 (q, 1H, J_1 = 13.5 Hz, J_2 = 5.0 Hz, H-3′e), 4.20 (m, 2H, H-13′), 4.69 and 5.02 (br.s, each 1H, H-14′), 5.18 (sex, 1H, J_1 = 11.0 Hz, J_2 = 12.0 Hz, J_3 = 5.0 Hz, H-4′), 6.15 (d, 1H, J = 9.5 Hz, H-3), 7.55 (d, 1H, J = 9.5 Hz, H-4), 7.25 (d, 1H, J = 8.5 Hz, H-5), 6.75 (q, 1H, J_1 = 8.5 Hz, J_2 = 2.5 Hz, H-6), 6.70 (d, 1H, J = 2.5 Hz, H-8).

M. E. Perel'son, A. I. Sokolova, and Yu. E. Sklyar, Khim. Prir. Soedin., 318 (1978).



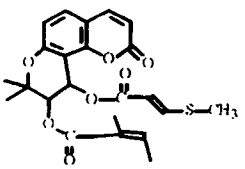
FESHURIN
Ferula schtschurovskyana.
$C_{24}H_{32}O_5$, 400 M^+.
mp 212-214°, $[\alpha]_D$ –51° (s. 0.51; pyr).
UV: 220, 245, 254, 326 nm (log ε 4.10; 3.61; 3.51; 4.16).
IR: 3615-3580, 1720, 1610, 1570, 1515, cm^{-1}.
PMR: 0.85; 1.13; 1.23 (s, each 3H, H-11′, H-12′, H-15′), 1.28 (s, 3H, H-14′), 3.51 (br.s, 1H, H-6′), 4.10 (q, 1H, J_1 = 10.0 Hz, J_2 = 3.0 Hz, H-13′), 4.41 (q, 1H, J_1 = 10.0 Hz, J_2 = 6.0 Hz, H-13′), 6.20 (d, 1H, J = 9.0 Hz, H-3), 7.56 (d, 1H, J = 9.0 Hz, H-4), 7.30 (d, 1H, J = 9.0 Hz, H-5), 6.80 (q, 1H, J_1 = 9.0 Hz, J_2 = 2.0 Hz, H-6), 6.76 (d, 1H, J = 2.0 Hz, H-8). [1].
Rel. conf. [2].

1. A. Sh. Kadyrov, A. I. Saidkhodzhaev, and V. M. Malikov, Khim. Prir. Soedin., 228 (1979).
2. A. I. Saidkhodzhaev, A. Sh. Kadyrov, and V. M. Malikov, Khim. Prir. Soedin., 308 (1979).



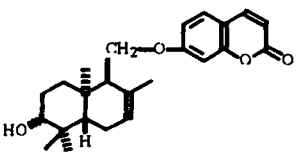
PHLOJODICARPIN
Phlojodicarpus sibiricus.
$C_{15}H_{16}O_5$, mp 143-145°.
$[\alpha]_D^{25}$ –37.5° (met).
IR: 3440, 3000; 2925; 1705; 1249; 1612; 937; 843.
Mass: 276 (M^+), 246, 206, 205, 204, 191, 189, 176, 175, 161, 148, 147, 146.
PMR: 6.09 (d, 1H, J = 9.0 Hz, H-3), 7.49 (d, 1H, J = 10.0 Hz, H-4), 6.69 (d, 1H, J = 10.0 Hz, H-6), 7.15 (d, 1H, J = 10.0 Hz, H-5), 4.50 (d, 1H, J = 3.0 Hz, H-2′), 2.90 (d, 1H, J = 3.0 Hz, H-1′), 3.65 (s, 3H, OCH_3), 3.84 (br.s, 1H, –OH), 1.34; 1.41 (s, each 3H, H-4′, H-5′).

D. Gantimur and A. A. Semenov, Khim. Prir. Soedin., 47 (1981).



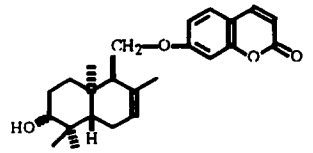
FLOROSELIN
Seseli sesseliflorum.
$C_{23}H_{24}O_7S$, mp 161.5-163°.
$[\alpha]_D$ –121.2° (chlf.).
UV: 256, 294, 320.
IR: 1730; 1700; 1607; 1570.
PMR: 6.19 (d, 1H, J = 10.0 Hz, H-3), 7.58 (d, 1H, J = 10.0 Hz, H-4), 6.79 (d, 1H, J = 8.5 Hz, H-6), 7.35 (d, 1H, J = 8.5 Hz, H-5), 5.43 (d, 1H, J = 5.0 Hz, H-3′), 6.65 (d, 1H, J = 5.0 Hz, H-4′), 1.44; 1.49 (s, each 3H, H-1′, H-5′), 1.80-2.00 (m, 6H, H-4″, H-5″), 6.05 (m, 1H, H-3″), 2.42 (s, 3H, S-CH_3), 5.87; 7.19 (d, each 1H, H-2‴, H-3‴).

A. A. Savina, M. E. Perel'son, G. K. Nikonov, and A. I. Ban'kovskii, Khim. Prir. Soedin., 517 (1970); 831 (1971).



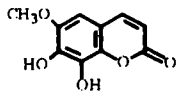
FOLIFERIDIN
Ferula foliosa.
$C_{24}H_{30}O_4$.
mp 154-155°.
$[\alpha]_D$ +155° (chlf.).
UV: 218, 244, 328 (log ε 4.12; 3.65; 4.17).
IR: 3600-3300, 1718, 1670, 1580, 1530.
Mass: 382, 220, 175, 162.
PMR: 0.85 (s, 3H, H-11′), 0.91 (s, 3H, H-15′), 0.99 (s, 3H, H-12′), 1.71 (br.s, 3H, H-14′), 3.95 (1H, q, J_1 = 10.5 Hz, J_2 = 4.5 Hz, H-13′), 4.15 (1H, q, J_1 = 10.5 Hz, J_2 = 6.5 Hz, H-13′), 3.15 (m, 1H, H-6′), 5.47 (br.s, 1H, H-3′), 6.18 (d, 1H, J = 9.5 Hz, H-3), 7.58 (d, 1H, J = 9.5 Hz, H-4), 7.31 (d, 1H, J = 8.5 Hz, H-5), 6.79 (q, 1H, J_1 = 8.5 Hz, J_2 = 2.5 Hz, H-6), 6.74 (d, 1H, J = 2.5 Hz, H-8) [1].
Rel. conf. [2].

1. A. I. Saidkhodzhaev and V. M. Malikov, Khim. Prir. Soedin., 707 (1978).
2. A. I. Saidkhodzhaev, Khim. Prir. Soedin., 437 (1979).



FOLIFERIN
Ferula foliosa.
$C_{24}H_{34}O_6$.
mp 240-241°.
$[\alpha]_D$ +128° (chlf.).
UV: 220, 244, 255, 290, 328 (log ε 4.12; 3.46; 3.26; 3.85; 4.18).
IR: 1515, 1560, 1620, 1725, 3510-3610.
Mass: 418, 256, 238, 221, 203, 175, 163, 162.
PMR: 1.04 (s, 3H, H-11′), 1.19 (s, 3H, H-12′), 1.42 (s, 3H, H-15′), 1.59 (s, 3H, H-14′), 3.40 (m, 1H, H-6′), 4.17 (m, 2H, H-13′), 6.20 (d, 1H, J = 9.5 Hz, H-3), 7.60 (d, 1H, J = 9.5 Hz, H-4), 7.32 (d, 1H, J = 8.5 Hz, H-5), 6.80 (q, 1H, J_1 = 8.5 Hz, J_2 = 2.5 Hz, H-6), 6.74 (d, 1H, J = 2.5 Hz, H-8). [1].
Rel. conf. [2].

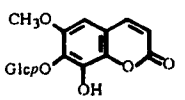
1. A. Sh. Kadyrov, A. I. Saidkhodzhaev, and V. M. Malikov, Khim. Prir. Soedin., 518 (1978)
2. A. I. Saidkhodzhaev, Khim. Prir. Soedin., 437 (1979).



FRAXETIN
Haplophyllum obtusifolium, Salsola laricifolia.
$C_{10}H_8O_5$, mp 228-230°.
UV: 230, 261, 345.
IR: 3440-3250, 1693, 1612, 1583, 1514.
Mass: 208 (M^+), 193, 180, 165, 137, 109, 81.
PMR: 3.68 (s, 3H, OCH_3), 6.15 (d, 1H, J = 9.8 Hz, H-3), 6.53 (s, 1H, H-5), 7.56 (d, 1H, J = 9.8 Hz, H-4), 11.68 (br.s, 1H, –OH). [1].
^{13}NMR [2]:

C-2	159.8.	7	138.8.
3	111.4.	8	132.3.
4	149.9.	9	138.8.
5	100.0.	10	110.0.
6	144.7.		

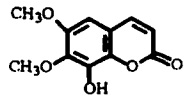
1. É. Kh. Batirov, A. D. Matkarimov, V. M. Malikov, M. R. Yagudaev, and E. Seitmuratov, Khim. Prir. Soedin., 785 (1980).
2. A. D. Vdovin, É. Kh. Batirov, A. D. Matkarimov, M. R. Yagudaev, and V. M. Malikov, Khim. Prir. Soedin., 796 (1987).



FRAXETIN 7-O-β-*D*-GLUCOPYRANOSIDE
Haplophyllum obtusifolium.
$C_{16}H_{18}O_{10}$, mp 164-166°.
$[\alpha]_D^{20}$ –52.4° (DMFA). [1].
UV: 228, 257, 326.
IR: 3475-3130, 1732, 1626, 1585, 1500.
Mass: 270 (M^+), 251, 237, 221, 220, 219, 210, 209, 208, 207, 194, 193, 190, 180, 179, 178, 165, 162, 152, 149, 137, 134, 123, 109, 89, 77. [2].
^{13}C NMR [3]:

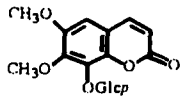
C-2	160.0	8	137.2	4′	69.6
3	115.0	9	138.4	5′	76.2
4	144.4	10	115.4	6′	60.7
5	100.9	1′	104.5	OCH_3	56.5
6	149.4	2′	73.8		
7	138.2	3′	77.3		

1. Murray.
2. É. Kh. Batirov, A. D. Matkarimov, V. M. Malikov, and E. Seitmuratov, Khim. Prir. Soedin., 691 (1982).
3. A. D. Vdovin, É. Kh. Batirov, A. D. Matkarimov, M. R. Yagudaev, and V. M. Malikov, Khim. Prir. Soedin., 796 (1987).



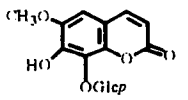
FRAXIDIN
Salsola laricifolia.
$C_{11}H_{10}O_5$, mp 195-197°.
UV: 210, 257, 313. [1, 2].

1. Kuznetsova.
2. S. Narantuya, D. Batsurén, É. Kh. Batirov, and V. M. Malikov, Khim. Prir. Soedin., 243 (1986).



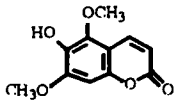
FRAXIDIN 8-GLUCOPYRANOSIDE
Salsola laricifolia.
$C_{17}H_{20}O_{10}$, mp 191-192°.
$[\alpha]_D^{20}$ –49° (met).
UV: 228, 293, 338. [1]
PMR: 6.35 (d, 1H, J = 9.8 Hz, H-3), 7.62 (d, 1H, J = 9.8 Hz, H-4), 6.80 (s, 1H, H-5), 3.64; 4.03 (s, each 3H, $2OCH_3$), 6.05 (d, 1H, J = 6.5 Hz, H-1′), and other protons of the sugar moiety [2].

1. Kuznetsova.
2. S. Narantuya, D. Batsurén, É. Kh. Batirov, and V. M. Malikov, Khim. Prir. Soedin., 243 (1986).



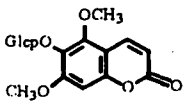
FRAXIN
Fraxinus mandschurica, F. potamophyla, Salsola laricifolia.
$C_{16}H_{18}O_{10}$, mp 203°.
$[\alpha]_D^{25}$ –85.6° (met).
UV: 350.
IR: 3550-3200, 1750-1550, 1090, 1070, 1050, 860, 850, 830.
PMR: 6.05 (d, 1H, J = 9.5 Hz, H-3), 7.45 (d, 1H, J = 9.5 Hz, H-4), 7.20 (s, 1H, H-5), 3.61 (s, 3H, OCH_3), 5.52 (d, 1H, J = 7 Hz, H-1′), 6.60-6.80 (m, 5H, 5OH).

M. V. Artem'eva, G. K. Nikonov, and M. O. Karryev, Khim. Prir. Soedin., 620 (1973).



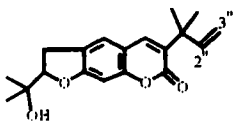
FRAXINOL
Fraxinus mandschurica.
$C_{11}H_{10}O_5$, mp 171-172°.
UV: 234, 315, 345.
IR: 3400-3200.
Mass: 222 [1, 2].

1. Murray.
2. M. V. Artme'eva, G. K. Nikonov, and M. O. Karryev, Khim. Prir. Soedin., 493 (1973).



FRAXINOSIDE
Fraxinus mandschurica, F. potamophyla.
$C_{17}H_{20}O_{10}$, mp 134-136°.
$[\alpha]_D^{17}$ –35 (met).
UV: 330.
IR: 3550-3200, 2970-2900, 1750, 1615, 1560, 1490, 1095, 1080, 1030, 830.
PMR: 6.10 (d, 1H, J = 9.7 Hz, H-3), 7.67 (d, 1H, J = 9.7 Hz, H-4), 6.50 (s, 1H, H-8), 3.58; 3.97 (s, each 3H, $2OCH_3$), 5.60 (d, 1H, J = 6.0 Hz, H-1′), 5.30-7.50 (m, 4-OH).

M. V. Artme'eva, G. K. Nikonov, and M. O. Karryev, Khim. Prir. Soedin., 620 (1973).



CHALEPIN

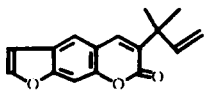
Ruta graveolens.

$C_{19}H_{22}O_4$, mp 118-119°.

$[\alpha]_D$ +28° (chlf.)

PMR: 7.75 (s, 1H, H-4), 7.70 (s, 1H, H-5), 7.45 (s, 1H, H-8), 1.58 (s, 6H, H-1′, H-3′), 3.25 (d, 2H, J = 8.5 Hz, H-4′), 4.70 (t, 1H, J = 6.5 Hz, H-5′), 1.20; 1.30 (s, each 3H, H-4″, H-5″), 5.10 (m, 2H, H-3″), 6.20 (m, 1H, H-2″).

1. A. Z. Abyshev, V. A. Pendin, Yu. B. Kerimov, É. I. Ismailov, É. M. Agaev, and N. Ya. Isaev, Khim. Prir. Soedin., 438 (1992).
2. R. M. Brooker, J. N. Eble, and N. A. Starkowsky, Lloydia, 73 (1967).



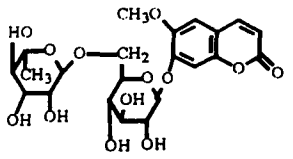
CHALEPENSIN

Ruta graveolens.

$C_{16}H_{14}O_3$, mp 89-90°.

PMR: 7.75 (s, 1H, H-4), 7.70 (s, 1H, H-5), 7.45 (s, 1H, H-8), 7.65 (d, 1H, J = 2.5 Hz, H-4′), 6.85 (d, 1H, J = 2.5 Hz, H-5′), 1.55 (s, 6H, H-4″, H-5″), 5.10 (m, 2H, H-3″), 6.20 (m, 1H, H-2″).

1. A. Z. Abyshev, V. A. Pendin, Yu. B. Kerimov, É. I. Ismailov, É. M. Agaev, and N. Ya. Isaev, Khim. Prir. Soedin., 438 (1992).
2. R. M. Brooker, J. N. Eble, and N. A. Starkowsky, Lloydia, 73 (1967).



HAPLOPEROSIDE A

Haplophyllum perforatum

$C_{22}H_{28}O_{13}$, mp 212-213°.

$[\alpha]_D^{20}$ –37.0° (met)

UV: 230, 252, 260, 291, 344.

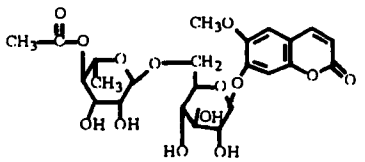
IR: 3600-3200, 2930, 1710, 1617, 1570, 1518, 1459, 1429, 1390, 1281, 1254, 1145, 1120-1015, 940.

PMR: 1.45 (d, 3H, J = 5.0 Hz, H-6″), 3.70-4.65 (m, protons of the sugar moiety), 3.57 (s, 3H, OCH_3), 5.26 (br.s, 1H, H-1″), 5.48 (d, 1H, J = 7.0 Hz, H-1′), 6.21 (d, 1H, J = 10 Hz, H-3), 6.93 (s, 1H, H-8), 7.50 (s, 1H, H-5), 7.58 (d, 1H, J = 10.0, H-4).

^{13}C NMR:

C-2	160.5	9	149.6	1′-	100.2	1″	99.8
3	113.0	10	112.0	2′-	72.9	2″	70.2
4	144.0			3′-	76.5	3″	70.5
5	109.6			4′-	69.5	4″	71.7
6	145.8			5′-	75.4	5″	63.1
7	148.5			6′-	65.8	6″	17.1
8	103.1			OCH_3	56.0		

M. P. Yuldashev, É. Kh. Batirov, and V. M. Malikov, Khim. Prir. Soedin., 168 (1980).



HAPLOPEROSIDE B

Haplophyllum perforatum.

$C_{24}H_{30}O_{14}$, mp 222-224°.

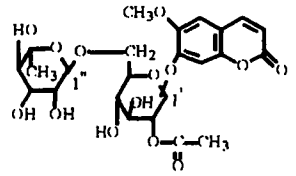
$[\alpha]_D^{20}$ –45.0° (met.).

UV: 228, 252, 291, 326.

IR: 3600-3250, 1727-1700, 1616, 1567, 1517, 1125-1100.

PMR: 1.92 (s, 3H, OAc), 3.31 (s, 3H, OCH_3), 3.04-4.16 (m, protons of the sugars moiety), 4.72 (br.s, 1H, H-1″), 4.76 (d, 1H, J = 8.0 Hz, H-1′), 5.37 (t, 1H, J = 9.5 Hz, H-4″), 5.96 (d, 1H, J = 10.0 Hz, H-3), 6.16 (s, 1H, H-8), 6.65 (d, 1H, J = 10.0 Hz, H-4), 6.92 (s, 1H, H-5). [1, 2]

1. M. P. Yuldashev, É. Kh. Batirov, and V. M. Malikov, Khim. Prir. Soedin., 412 (1980).
2. M. P. Yuldashev, É. Kh. Batirov, V. M. Malikov, and M. E. Perel'son, Khim. Prir. Soedin., 718 (1981).



HAPLOPEROSIDE C

Haplophyllum perforatum.

$C_{24}H_{30}O_{14}$, mp 155-157°.

$[\alpha]_D^{20}$ –27.4° (met).

UV: 229, 252, 260, 291, 344.

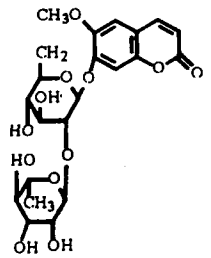
IR: 3600-3200, 2930, 1749, 1716, 1617, 1574, 1531, 1105-1000.

PMR: 1.44 (d, 3H, J = 5.0 Hz, H-6″), 1.98 (s, 3H, OAc), 3.70-4.62 (m, protons of the sugar moiety), 5.18 (br.s., 1H, H-1″), 5.31 (δ, 1H, 9 = 9.0 Hz, H–1′), 6.15 (d, 1H, J = 10.0 Hz, H-3), 6.84 (s, 1H, H-8), 7.48 (s, 1H, H-5), 7.52 (d, 1H, J = 10.0 Hz, H-4).

^{13}C NMR.

C-2	159.3	9	148.3	1′-	98.1	1″	99.7
3	112.9	10	112.5	2′-	73.2	2″	70.0
4	143.0			3′-	72.7	3″	70.2
5	109.6			4′-	69.4	4″	71.3
6	145.3			5′-	75.1	5″	67.8
7	147.4			6′-	65.4	OCH_3	56.2
8	104.1						

M. P. Yuldashev, É. Kh. Batirov, A. D. Vdovin, V. M. Malikov, and M. R. Yagudaev, Khim. Prir. Soedin., 27 (1985).



HAPLOPEROSIDE D

Haplophyllum perforatum.

$C_{22}H_{28}O_{13}$, mp 249-251°

$[\alpha]_D^{20}$ –20-37.8° (DMFA).

UV: 230, 253, 261, 292, 345.

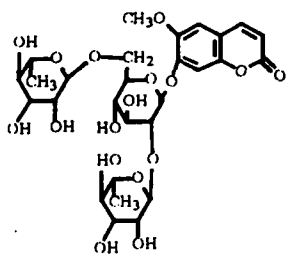
IR: 3600-3200, 2920, 1695, 1617, 1568, 1519, 1108-1000.

PMR: 1.63 (d, 3H, J = 6.0 Hz, H-6″), 3.72 (s, 3H, OCH_3), 3.75-4.80 (protons of the sugar moiety), 4.59 (d, 1H, J = 2 Hz, H-2″), 5.54 (d, 1H, J = 8.0 Hz, H-1′), 6.30 (d, 1H, J = 9.5 Hz, H-3), 6.92 (s, 1H, H-8), 7.36 (s, 1H, H-5), 7.51 (d, 1H, J = 9.5 Hz, H-4).

^{13}C NMR:

C-2	158.9.	1′-	97.7.	1″	99.1.		
3	112.4.	2′-	77.1.	2″	70.2.		
4	142.7.	3′-	75.5.	3″	70.2.		
5	109.1.	4′-	69.8.	4″	71.7.		
6	145.4.	5′-	76.5.	5″	67.8.		
7	147.6.	6′-	60.5.	6″	17.8.		
8	102.8.			OCH_3	55.9.		
9	148.5.						
10	111.6.						

M. P. Yuldashev, É. Kh. Batirov, A. D. Vdovin, V. M. Malikov, and M. R. Yagudaev, Khim. Prir. Soedin., 27 (1985).



HAPLOPEROSIDE E

Haplophyllum perforatum.

$C_{28}H_{38}O_{17}$, mp 175-177°.

$[\alpha]_D$ –56.4 (met).

UV: 231, 252, 261, 289, 345.

IR: 3600-3250, 2920, 1709, 1605, 1567, 1516, 1122-1000.

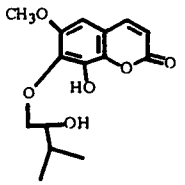
PMR (DMSO-d_6): 1.01 (d, 3H, J = 6.0 Hz, H-6″), 1.11 (m, 3H, H-6‴), 3.72 (s, 3H, OCH_3), 2.85-3.84; 4.10-5.37 (protons of the sugar moiety), 6.23 (d, 1H, J = 9.5 Hz, H-3), 7.07 (s, 1H, H-8), 7.18 (s, 1H, H-5), 7.85 (d, 1H, J = 9.5 Hz, H-4).

PMR (Py-d_5): 1.48 (m, 3H, H-6‴), 1.67 (d, 3H, J = 6.0 Hz, H-6″), 3.52-5.01 (protons of the sugar moiety), 3.74 (s, 3H, OCH_3), 5.19 (br.s, 1H, H-1″), 5.38 (d, 1H, J = 9.0 Hz, H-1′), 6.39 (d, 1H, J = 10.0 Hz, H-3), 6.78 (s, 1H, H-8), 7.45 (s, 1H, H-5), 7.55 (d, 1H, J = 10.0 Hz, H-4).

^{13}C NMR:

C-2	160.1	1′-	97.5	1″	99-.5	1‴-	99.9
3	112.6	2′-	77.4	2″	70.2	2‴-	70.2
4	143.6	3′-	75.2	3″	70.2	3‴-	70.2
5	108.8	4′-	69.8	4″	71.7	4‴-	71.2
6	145.5	5′-	76.5	5″	68.1	5″-	68.1
7	147.8	6′-	65.9	6″	18.0	6‴-	18.3
8	102.8					OCH_3	55.9
9	148.6						
10	112.0						

M. P. Yuldashev, É. Kh. Batirov, A. D. Vdovin, V. M. Malikov, and M. R. Yagudaev, Khim. Prir. Soedin., 27 (1985).



HAPTUSINOL

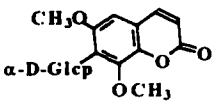
Haplophyllum obtusifolium.

$C_{15}H_{18}O_6$, mp 119-120°.

IR: 3370, 1705, 1615, 1580, 1505.

PMR: 6.29 (d, 1H, J = 9.5 Hz, H-3), 7.55 (d, 1H, J = 9.5 Hz, H-4), 6.85 (s, 1H, H-5), 3.77 (m, 3H, H-1′, H-2′), 2.84 (br.s, 1H, OH), 3.89 (s, 3H, OCH_3), 1.24; 1.30 (d, each 3H, J = 6.5 Hz, H-4′, H-5′); 8.0 (br.s, 1H, OH).

A. Z. Abyshev and I. F. Gashimov, Khim. Prir. Soedin., 845 (1979).



ELEUTHEROSIDE B

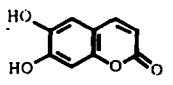
Eleutherococcus senticosus.

$C_{17}H_{20}O_{10}$, mp 211-213°.

$[\alpha]_D^{20}$ +80° (met).

UV: 230, 298, 340. [1, 2]

1. Murray.
2. V. A. Kurkin, G. G. Zapesochnaya, and V. V. Vandyshev, Khim. Prir. Soedin., 854 (1991).



AESCULETIN (ESCULETIN)

Althaea armenica, A. officinalis, Artemisia absinthium, A. sieversiana, A. jacutica, A. vulgaris, Ajuga chia, Anethum graveolens, Caragana frutex, Calendula officinalis, Cichorium intybus, Berberis vulgaris, Bidens tripartita, Dictamnus angustifolia, Fraxinus mandschurica, Helichrysum morocandicum, H. italicum, Phaseolus vulgaris, Potentilla anserina, P. erecta, Sedum caucasicums, S. ewersii, Syringa vulgaris, Vicia sativa.

$C_9H_6O_4$, mp 268-270°. [1, 2].

UV: 230, 259, 300, 362.

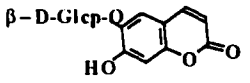
IR: 3340, 3220, 3080, 1715, 1672, 1625, 1570. [3].

PMR: 6.32 (d, 1H, J = 9.5 Hz, H-3), 7.76 (d, 1H, J = 9.5 Hz, H-4), 6.76 (s, 1H, H-8), 7.00 (s, 1H, H-5), 3.40 (br.s, 2H, 2-OH). [4].

^{13}C NMR [5]

C-2-	161.0	C-7-	150.5
3-	111.8	8-	102.9
4-	144.5	9-	148.8
5-	112.5	10-	111.0
6-	143.1		

1. Murray.
2. S. F. Dzumyrko, Khim. Prir. Soedin., 537 (1976).
3. Perel'son.
4. B. S. Karasartov, V. A. Kurkin, and G. G. Zapesochnaya, Khim. Prir. Soedin., 577 (1992).
5. A. Z. Abyshev and V. P. Zmeikov, Khim. Prir. Soedin., 294 (1982).



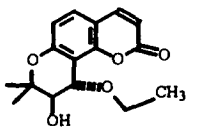
AESCULIN (ESCULIN)

Althaea armenica, A. officinalis, Artemisia absinthium, A. jacutica, A. sieversiana, A. vulgaris, Cichorium intybus, Phaseolus vulgaris.

$C_{16}H_{18}O_9$, mp 204-205°.

$[\alpha]_D^{15}$ –146° (met). [1, 2].

1. S. F. Dzhumyrko, Khim. Prir. Soedin., 537 (1976).
2. Murray.

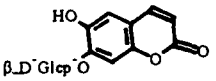


4′-ETHYL ETHER OF (–)-*TRANS*-KHELLACTONE (CAMPESELOL)

Seseli campestre

$C_{15}H_{16}O_5$, mp 164-165° [1, 2]

1. J. Lemmich, P. A. Pedersen, and B. E. Nielsen, Tetrahedron Lett., 3365 (1969).
2. A. Z. Abyshev, I. P. Sidorova, D. Z. Abyshev, V. I. Florya, V. P. Zmeikov, and Yu. B. Kerimov, Khim. Prir. Soedin., 434 (1982).



CICHORIIN

Althaea armenica, A. officinalis, Cichorium intybus, Koelpinia linearis, Fraxinus mandschurica, F. potomophyla.

$C_{15}H_{16}O_9$, mp 214-215°.

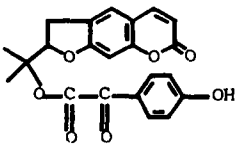
$[\alpha]_D^{25}$ –95° (dioxane).

UV: 228, 292, 348.

IR: 3550-3200, 1710-1700, 1630, 1570, 1520, 1055, 1040, 900, 880, 835, 770.

PMR: 6.10 (d, 1H, J = 9.5 Hz, H-3), 7.53 (d, 1H, J = 9.5 Hz, H-4), 7.05 (s, 2H, H-5, H-8), 3.90-4.30 (m, 6H, protons of the sugar moiety), 5.50 (d, 1H, J = 7.0 Hz, H-1′), 6.30-6.70 (5H, 5OH).

M. V. Artem'eva, G. K. Nikonov, and M. O. Karryev, Khim. Prir. Soedin., 620 (1973).



CHUIN

Seseli tschuense.

$C_{22}H_{18}O_7$.

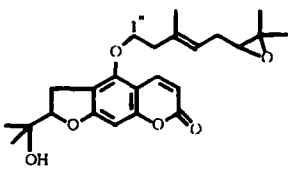
mp 212-213°. $[\alpha]_D^{26}$ –225° (alc).

UV: 227, 260, 320 (log ε 4.32; 3.94; 4.55).

IR: 3400-3320, 1720, 1690, 1636, 1620, 1580.

PMR: 6.13 (d, 1H, J = 9.5 Hz, H-3), 7.80 (d, 1H, J = 9.5 Hz, H-4), 7.32 (s, 1H, H-5), 6.62 (s, 1H, H-8), 5.05 (t, 1H, J = 8.0 Hz, H-5′), 3.10 (d, 2H, J = 8.0 Hz, H-4′), 1.54 (s, 6H, H-1′, H-3′), 6.52 (d, 2H, J = 8.5 Hz, H-3″, H-5″), 7.04 (d, 2H, J = 8.5 Hz, H-2″, H-6″).

A. M. Aminov and G. K. Nikonov, Khim. Prir. Soedin., 487 (1973).



JUMUTINOL

Seseli jomuticum.

$C_{24}H_{30}O_6$, mp 148-150°.

IR: 3500-3400, 1720, 1625, 1570, 1510.

PMR: 6.26 (d, 1H, J = 10.0 Hz, H-3), 7.58 (d, 1H, J = 10.0 Hz, H-4), 6.73 (s, 1H, H-8), 4.80 (d, 1H, J = 8.5 Hz, H-5′), 3.21 (d, 2H, J = 8.5 Hz, H-4′), 1.78 (s, 3H, H-10″), 1.36; 1.47 (s, each 3H, H-1′, H-3′), 1.25 (s, 6H, H-8″, H-9″), 5.68 (br.s, 1H, H-4″), 2.06-2.55 (m, 5H).

1. Murray.
2. Kuznetsova.
3. A. Z. Abyshev, Khim. Prir. Soedin., 250 (1980).