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THE HOMOAPORPHINE ALKALOIDS

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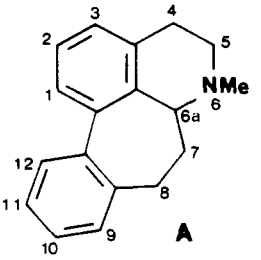
ABSTRACT.—A list of naturally occurring and synthetic homoaporphines is presented. Spectral and optical data are provided, together with botanical sources.

The homoaporphines are alkaloids derived from phenethylisoquinoline precursors by direct intramolecular oxidative coupling (1). They incorporate nucleus **A** and are always pentaoxygenated at C-1, -2, -10, -11, and -12. The nitrogen function in ring B is usually *N*-methylated, but it may also be secondary.

Seventeen naturally occurring homoaporphines are presently known. They have been obtained from seven genera of higher plants, namely *Androcymbium, Colchicum, Kreysigia, Bulbocodium, Iphigenia, Merendera*, and *Gloriosa*, all belonging to the botanical family Liliaceae (Table 1). All homoaporphines originating from the genus *Androcymbium* have so far proven to be dextrorotatory and thus incorporate the C-6a *S* configuration. On the other hand, alkaloids from *Colchicum* may be either dextrorotatory or levorotatory.

The alkaloids are here arranged in an ascending order of substitution, and some purely synthetic but relevant compounds have also been included. Because most synthetic



A

TABLE 1. Botanical Sources of Homoaporphinoid Alkaloids.

Liliaceae

Androcymbium
(+)-Androbine [**27**]
(+)-Androcimine [**34**]
(+)-Androcine [**33**]
(+)-Kreysigine [**30**]
(+)-*O*-Methylkreysigine [**38**]
(+)-Norandrobine [**26**]
(+)-Nor-*O*-methylkreysigine [**37**]
(+)-Szovitsamine [**36**]

Bulbocodium
(−)-Kreysigine [**31**]

Colchicum
(−)-1,12-Dihydroxy-2,10,11-trimethoxyhomoaporphine [**25**]
(+)-Floramultine [**20**]
(−)-Kreysigine [**31**]
(+)-*O*-Methylkreysigine [**38**]
(+)-Szovitsamine [**36**]
(+)-Szovitsine [**46**]
Szovitsinine [**28**]

Gloriosa
(−)-1,12-Dihydroxy-2,10,11-trimethoxyhomoaporphine [**25**]
(+)-Floramultine [**20**]

Iphigenia
(+)-Floramultine [**20**]
(−)-Multifloramine [**23**]

Kreysigia
(−)-Floramultine [**21**]
(±)-Kreysigine [**32**]
(−)-Multiflorine [**23**]

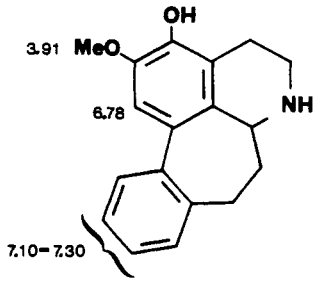
Merendera
(+)-Baytopine [**29**]
(+)-Floramultine [**20**]

homoaporphines are less highly oxygenated than the natural products, they appear at the beginning of the present listing.

^{1}H-nmr chemical shifts (δ values) are quoted for $CDCl_3$ solutions unless specified otherwise; coupling constants are in Hz. Values with identical superscripts are interchangeable. It is worth pointing out that in the nmr spectra of naturally occurring (and pentasubstituted) homoaporphines, the H-8 signal appears at higher field than H-3. This order, however, is reversed with the synthetic tetraoxygenated homoaporphines where it is the H-3 signal that is further upfield.

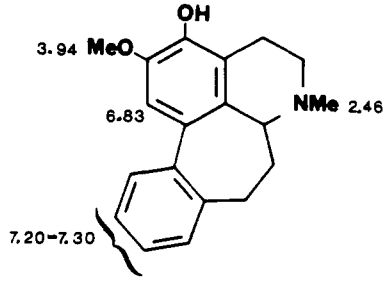
If more than one reference is cited, it is the first reference only that is actually quoted in this review. Uv wavelengths are in nm, and log ε values are given in parentheses. Only values for λ max are quoted. Ir values are in cm^{-1}. Melting points are in degrees centigrade and are uncorrected. Circular dichroism data refer to Δε values.

1. (±)-3-HYDROXY-2-METHOXY-NORHOMOAPORPHINE



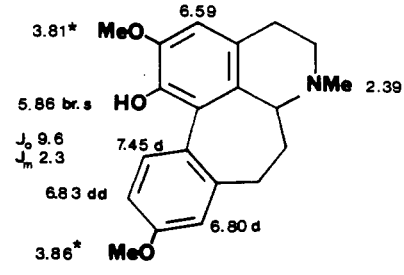
$C_{18}H_{19}O_2N$: 281.1416
MP: 198–199.5° (dec.) (2)
^{1}H NMR: ($CDCl_3/CD_3OD$; 100 MHz) (2)
SOURCES: Synthesis (2)

2. (±)-3-HYDROXY-2-METHOXY-HOMOAPORPHINE



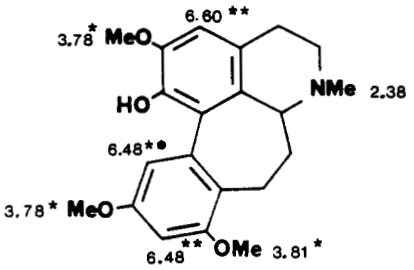
$C_{19}H_{21}O_2N$: 295.1572
MP: 200.5–201.5° (dec.) (2)
^{1}H NMR: (100 MHz) (2)
SOURCES: Synthesis (2)

3. (±)-1-HYDROXY-2,10-DIMETHOXY-HOMOAPORPHINE



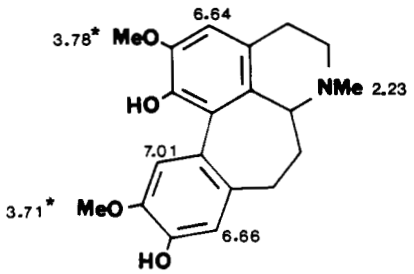
$C_{20}H_{23}O_3N$: 325.1678
MP: 72–73° (3)
UV: (MeOH) 260 (4.17), 290 (3.77) (3)
IR: ($CHCl_3$) 3505 (3)
^{1}H NMR: (60 MHz) (3)
SOURCES: Synthesis (3)

4. (±)-1-HYDROXY-2,9,11-TRIMETHOXYHOMOAPORPHINE



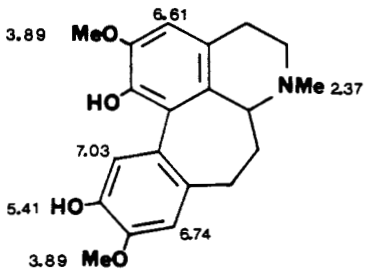
$C_{21}H_{25}O_4N$: 355.1783
MP: 190–191° (4)
UV: (MeOH) 260 (4.23), 293 (4.03) (4)
IR: ($CHCl_3$) 3500 (4)
^1H NMR: (60 MHz) (4)
MS: 355 $[M]^+$ (4)
SOURCES: Synthesis (4)

5. (±)-1,10-DIHYDROXY-2,11-DIMETHOXYHOMOAPORPHINE



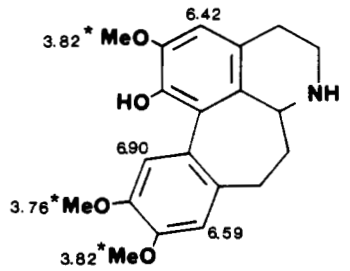
$C_{20}H_{23}O_4N$: 341.1627
MP: 241–242° (3)
UV: (MeOH) 264 (4.13), 293 (4.04) (3)
IR: ($CHCl_3$) 3475 (3)
^1H NMR: [$(CD_3)_2SO$, 100 MHz] (5)
SOURCES: Synthesis (3, 5–7)

6. (±)-1,11-DIHYDROXY-2,10-DIMETHOXYHOMOAPORPHINE



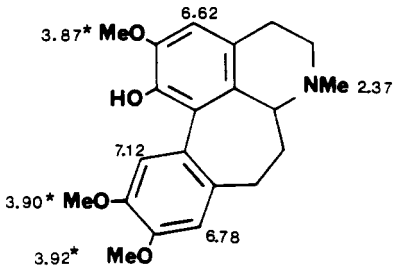
$C_{20}H_{23}O_4N$: 341.1627
MP: 185–187° (3)
UV: (MeOH) 264 (4.14), 291 (4.11) (3)
^1H NMR: (100 MHz) (8), also in $(CD_3)_2SO$ (3) and CF_3CO_2H (3)
SOURCES: Synthesis (3, 5, 8, 9)

7. (±)-1-HYDROXY-2,10,11-TRIMETHOXYNORHOMOAPORPHINE



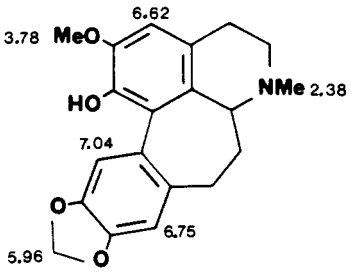
$C_{20}H_{23}O_4N$: 341.1627
^1H NMR: (60 MHz) (2)
SOURCES: Synthesis (2)

8. (±)-1-HYDROXY-2,10,11-TRIMETHOXYHOMOAPORPHINE



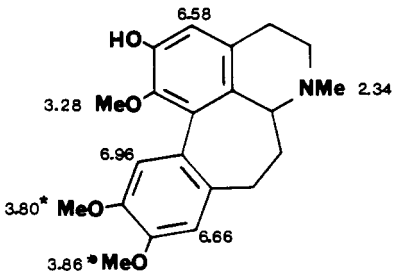
$C_{21}H_{25}O_4N$: 355.1783
MP: 195–196° (10)
IR: ($CHCl_3$) 3540 (5)
^1H NMR: (100 MHz) (5)
MS: $[M]^+$ 355 (10)
SOURCES: Synthesis (2, 5, 10, 11)

9. (±)-1-HYDROXY-2-METHOXY-10,11-METHYLENEDIOXYHOMOAPORPHINE



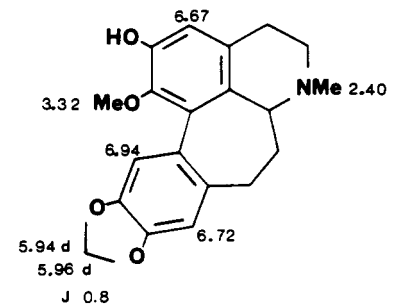
$C_{20}H_{21}O_4N$: 339.1470
MP: 139–141° (12)
IR: ($CHCl_3$) 3540 (12)
^1H NMR: (100 MHz) (12)
SOURCES: Synthesis (12, 13)

10. (±)-2-HYDROXY-1,10,11-TRIMETHOXYHOMOAPORPHINE



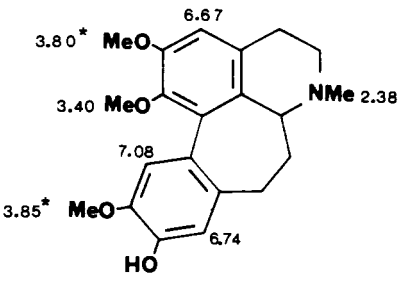
$C_{21}H_{25}O_4N$: 355.1783
MP: 170–171° (14)
IR: ($CHCl_3$) 3550 (14)
^1H NMR: (100 MHz) (14)
SOURCES: Synthesis (14)

11. (±)-2-HYDROXY-1-METHOXY-10,11-METHYLENEDIOXYHOMOAPORPHINE



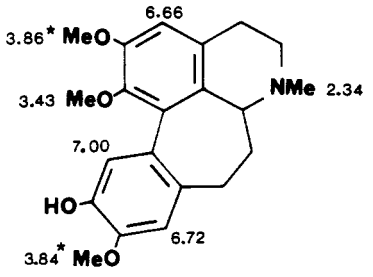
$C_{20}H_{21}O_4N$: 339.1470
MP: 178–181° (14)
IR: ($CHCl_3$) 3520 (14)
^1H NMR: (100 MHz) (14)
SOURCES: Synthesis (14)

12. (±)-10-HYDROXY-1,2,11-TRIMETHOXYHOMOAPORPHINE



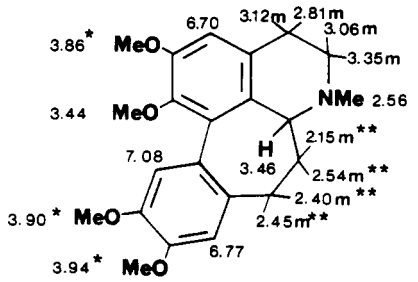
$C_{21}H_{25}O_4N$: 355.1783
IR: 3530 (5)
^{1}H NMR: (100 MHz) (5)
SOURCES: Synthesis (5)

13. (±)-11-HYDROXY-1,2,10-TRIMETHOXYHOMOAPORPHINE



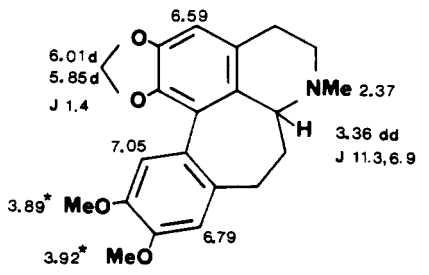
$C_{21}H_{25}O_4N$: 355.1783
IR: 3530 (5)
^{1}H NMR: (100 MHz) (5)
SOURCES: Synthesis (5)

14. (±)-HOMOGLAUCINE



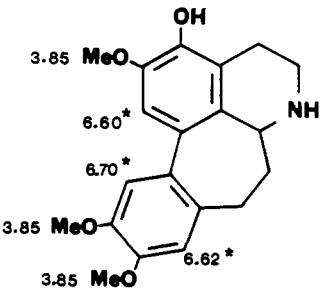
$C_{22}H_{27}O_4N$: 369.1940
MP: 234–236° (MeI) (15), 239–242° (HCl) (16)
IR: ($CHCl_3$) 1599 (16)
^{1}H NMR: (500 MHz) (16)
^{13}C NMR: (62.83 MHz) (15)
MS: $[M]^+$ 369 (28), 368 (13), 354 (18), 338 (100), 33.6 (5), 322 (10), 232 (9) (15)
SOURCES: Synthesis (8, 14–16)

15. (±)-HOMODICENTRINE



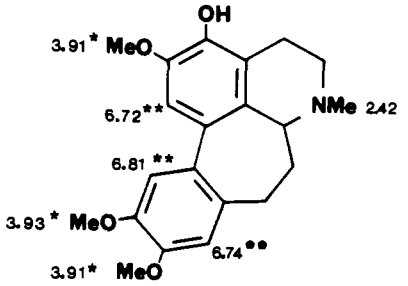
$C_{21}H_{23}O_4N$: 353.1627
MP: 257–259° (MeI) (15)
^{1}H NMR: (250 MHz) (15)
^{13}C NMR: (62.83 MHz) (15)
MS: $[M]^+$ 353 (45), 352 (26), 338 (13), 323 (61), 322 (100), 310 (24), 308 (27), 306 (11), 294 (8), 280 (10), 216 (27), 190 (37) (15)
SOURCES: Synthesis (15)

16. (±)-3-HYDROXY-2,10,11-TRIMETHOXYNORHOMOAPORPHINE



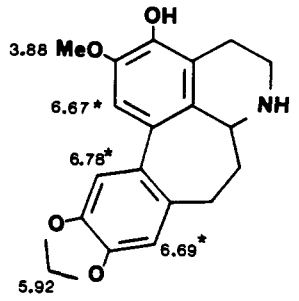
$C_{20}H_{23}O_4N$: 341.1627
MP: 215–217° (2)
^{1}H NMR: (100 MHz) (2)
SOURCES: Synthesis (2)

17. (±)-3-HYDROXY-2,10,11-TRIMETHOXYHOMOAPORPHINE



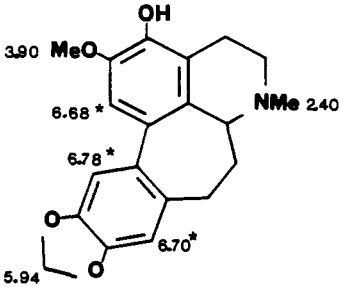
$C_{21}H_{25}O_4N$: 355.1783
MP: 199–200° (17)
^{1}H NMR: (100 MHz) (17)
SOURCES: Synthesis (2, 17)

18. (±)-3-HYDROXY-2-METHOXY-10,11-METHYLENEDIOXYNORHOMOAPORPHINE



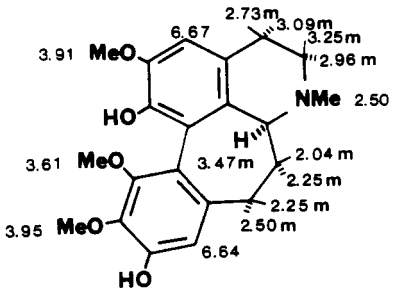
$C_{19}H_{19}O_4N$: 325.1314
MP: 216–218° (dec.) (2)
^{1}H NMR: (100 MHz) (2)
SOURCES: Synthesis (2)

19. (±)-3-HYDROXY-2-METHOXY-10,11-METHYLENEDIOXYHOMOAPORPHINE



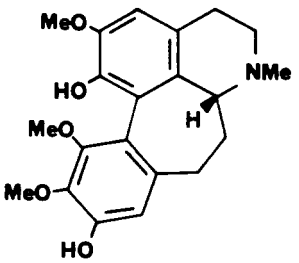
$C_{20}H_{21}O_4N$: 339.1470
MP: 181–183° (2)
^{1}H NMR: (100 MHz) (2)
SOURCES: Synthesis (2, 17)

20. (+)-FLORAMULTINE (BECHUANINE) (MERENDERINE)



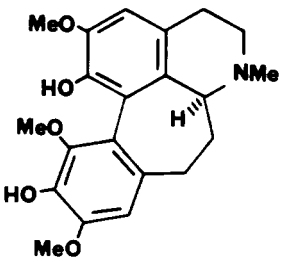
$C_{21}H_{25}O_5N$: 371.1733
MP: 232–235° (dec.) (18)
$[\alpha]_D$: +76° (c = 0.788, $CHCl_3$) (18)
UV: (EtOH) 218 (4.60), 260 (4.11), 291 (3.71) (18)
^{1}H NMR: (250 MHz)[1]
CD: (EtOH) −0.46 (294 sh), −16.50 (257), +27 (210) (18)
SOURCES: Liliaceae: *Iphigenia bechuanica, Iphigenia indica, Iphigenia pallida* (18), *Merendera raddeana* (19), *Gloriosa superba* (20), *Iphigenia stellata* (21), *Colchicum szovitsii*[1]

21. (−)-FLORAMULTINE



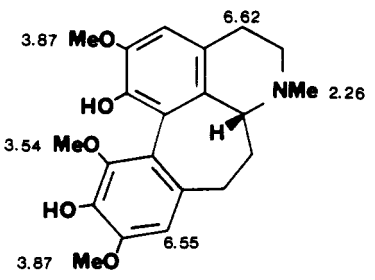
$C_{21}H_{25}O_5N$: 371.1733
MP: 230–231° (22)
$[\alpha]_D$: −77° (c = 1.19, $CHCl_3$); −97° (EtOH) (18)
UV: (EtOH) 218 (4.60), 260 (4.10), 291 (3.71) (18)
IR: ($CHCl_3$) 3550, 3400, 1600, 1120 (22)
^{1}H NMR: (22)
MS: $[M]^+$ 371 (56), 356 (33), 354 (100) (22)
SOURCES: Liliaceae: *Kreysigia multiflora* (22)

22. (+)-MULTIFLORAMINE



$C_{21}H_{25}O_5N$: 371.1733
MP: 189–190° (23)
$[\alpha]_D$: +112° (23)
CD: (23)
SOURCES: Synthesis (23)

23. (−)-MULTIFLORAMINE



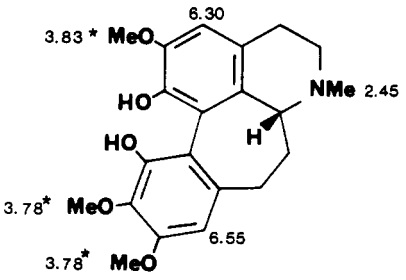
$C_{21}H_{25}O_5N$: 371.1733
MP: 209–212° (22)
$[\alpha]_D$: −108° ($CHCl_3$) (22)
UV: 221 (4.34), 261 (3.72), 295 (3.56) (22)
IR: (CCl_4) 3560, 1618, 1488, 1124 (22)
^{1}H NMR: (22)
MS: $[M]^+$ 371 (50), 354 (100) (22)
CD: (23)
SOURCES: Liliaceae: *K. multiflora* (22), *I. stellata* (21), synthesis (23)

[1]Unpublished results, E. Tojo and M. Shamma.

24. (±)-MULTIFLORAMINE

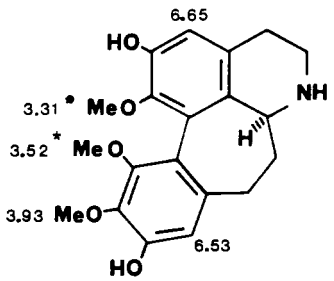
$C_{21}H_{25}O_5N$: 371.1733
MP: 190° (24)
UV: (MeOH) 261 (4.25), 291 (4.02) (24)
IR: ($CHCl_3$) 3450 (24)
^1H NMR: (24)
SOURCES: Synthesis (24–26)

25. (−)-1,12-DIHYDROXY-2,10,11-TRIMETHOXYHOMOAPORPHINE



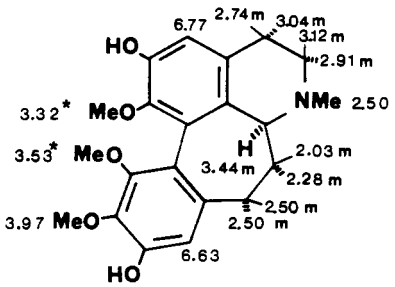
$C_{21}H_{25}O_5N$: 371.1733
$[\alpha]_D$: (−) (27)
MP: 223–225° (28)
UV: (MeOH) 221 (4.45), 258 (4.12), 289 (3.84), 298 (3.76) (28)
IR: ($CHCl_3$) 3500 (28)
^1H NMR: (60 MHz) (28)
MS: $[M]^+$ 371, 354 (100) (28)
SOURCES: Liliaceae: *Colchicum cornigerum* (27), *G. superba* (20). Specific rotation and absolute configuration for the *G. superba* alkaloid were not indicated. Synthesis of racemate (28)

26. (+)-NORANDROBINE



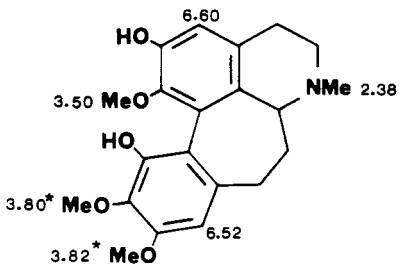
$C_{20}H_{23}O_5N$: 357.1576
$[\alpha]_D$: +20° (c = 0.10, MeOH) (29)
UV: (MeOH) 218 (3.89), 258 (3.42), 291 sh (3.10); (OH^-) 313 (3.40) (29)
IR: ($CHCl_3$) 3680, 3000, 1595, 1460 (29)
^1H NMR: (200 MHz) (29)
MS: $[M]^+$ 357 (27), 342 (26), 326 (100), 310 (23) (29)
CD: (MeOH) −1.5 (254) (29)
SOURCES: Liliaceae: *Androcymbium palaestinum* (29)

27. (+)-ANDROBINE



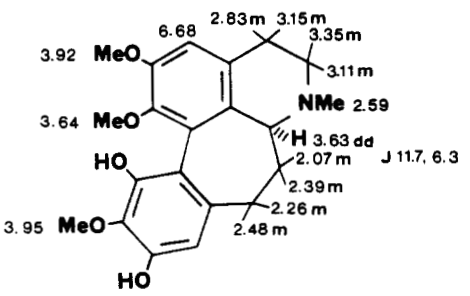
$C_{21}H_{25}O_5N$: 371.1733
$[\alpha]_D$: +39° (c = 0.12, MeOH) (29)
UV: (MeOH) 215 (4.44), 262 (3.98), 289 sh (3.65), (OH^-) 295 (3.95) (29)
IR: ($CHCl_3$) 3520, 2930, 1590, 1460 (29)
^1H NMR: (360 MHz) (29)
MS: $[M]^+$ 371 (22), 356 (13), 340 (100) (29)
CD: (MeOH) −2.5 (254) (29)
SOURCES: Liliaceae: *A. palaestinum* (29)

28. SZOVITSININE



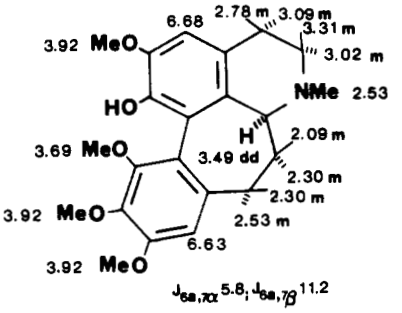
$C_{21}H_{25}O_5N$: 371.1733
^1H NMR: (30)
MS: $[M]^+$ 371, 340, 328 (30)
SOURCES: Liliaceae: *C. szovitsii* (30)

29. (+)-BAYTOPINE



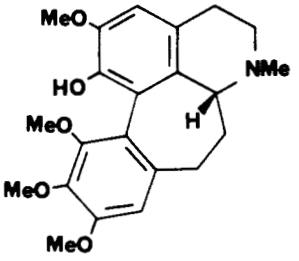
$C_{21}H_{25}O_5N$: 371.1733
$[\alpha]_D$: +74° (c = 0.28, $CHCl_3$) (31)
UV: (EtOH) 215 (4.55), 257 (4.02), 287 sh (3.67), 296 sh (3.62), (OH^-) 217 (4.39), 287 (4.00), 296 sh (3.97) (31)
IR: 3400–3500 (31)
^1H NMR: (400 MHz) (31)
^{13}C NMR: (100 MHz) (31)
MS: $[M]^+$ 371, 354 (100) (31)
CD: (EtOH) +20.09 (209), −11.20 (258) (31)
SOURCES: Liliaceae: *Merendera kurdica* (31)

30. (+)-KREYSIGINE



$C_{22}H_{27}O_5N$: 385.1889
$[\alpha]_D$: +64° (c = 0.11, MeOH) (29)
UV: (MeOH) 216 (3.94), 257 (3.49), 287 sh (3.24) (29)
IR: ($CHCl_3$) 3520, 3000, 1595, 1460 (29)
^1H NMR: (360 MHz) (29)
MS: $[M]^+$ 385 (40), 368 (100), 354 (18) (29)
CD: (MeOH) −1.95 (254) (29)
SOURCES: Liliaceae: *A. palaestinum* (29), synthesis (32)

31. (−)-KREYSIGINE

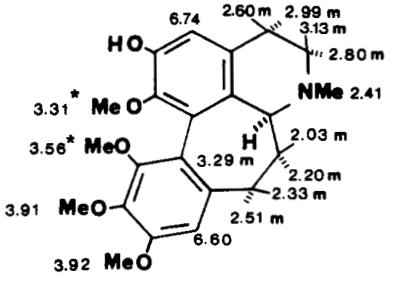


$C_{22}H_{27}O_5N$: 385.1889
MP: 122–124° (33)
$[\alpha]_D$: −65.4 (c = 0.31, $CHCl_3$) (33)
UV: (EtOH) 218 (4.62), 257 (4.10), 293 (3.67) (34)
MS: $[M]^+$ 385 (34)
CD: (EtOH) +1.77 (295), +15.59 (258), −21.1 (210) (33)
SOURCES: Liliaceae: *Bulbocodium vernum* (33), *C. cornigerum* (34), synthesis (32)

32. (±)-KREYSIGINE

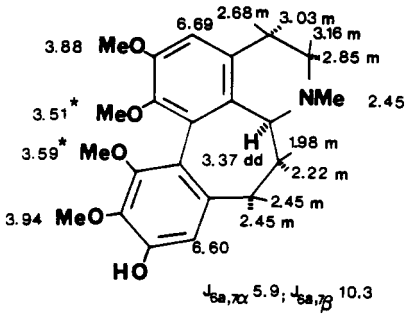
$C_{22}H_{27}O_5N$: 385.1889
MP: 188° (35)
SOURCES: Liliaceae: *K. multiflora* produces kreysigine with essentially zero specific rotation (35), synthesis (5, 10, 11, 13, 26, 36)

33. (+)-ANDROCINE



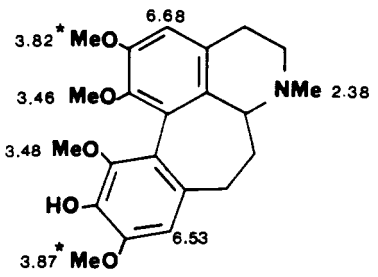
$C_{22}H_{27}O_5N$: 385.1889
$[\alpha]_D$: +39° (c = 0.10, MeOH) (29)
UV: (MeOH) 217 (4.47), 260 (3.99), 292 sh (3.93); (OH^-) 313 (3.79) (29)
IR: ($CHCl_3$) 3520, 2920, 1590, 1460 (29)
^1H NMR: (360 MHz) (29)
MS: $[M]^+$ 385 (17), 370 (12), 354 (100) (29)
CD: (MeOH) −2.9 (254) (29)
SOURCES: Liliaceae: *A. palaestinum* (29)

34. (+)-ANDROCIMINE



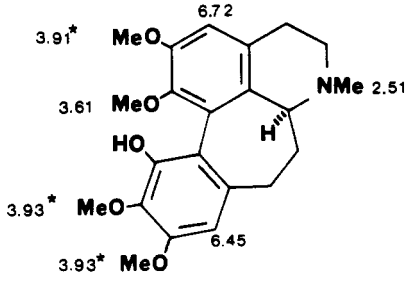
$C_{22}H_{27}O_5N$: 385.1889
$[\alpha]_D$: +51° (c = 0.11, MeOH) (29)
UV: (MeOH) 218 (4.47), 260 (3.94), 291 sh (3.60); (OH^-) 212 (4.47), 262 (3.83), 291, (3.82) (29)
IR: ($CHCl_3$) 3520, 2930, 1590, 1460 (29)
^1H NMR: (360 MHz) (29)
MS: $[M]^+$ 385 (24), 370 (18), 354 (100) (29)
CD: (MeOH) −0.79 (254) (29)
SOURCES: Liliaceae: *A. palaestinum* (29)

35. (±)-11-HYDROXY-1,2,10,12-TETRAMETHOXYHOMOAPORPHINE



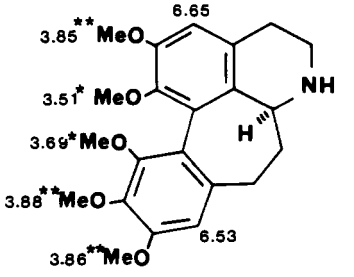
$C_{22}H_{27}O_5N$: 385.1889
MP: 168–169° (5)
IR: ($CHCl_3$) 3520 (5)
^1H NMR: (100 MHz) (5)
SOURCES: Synthesis (5)

36. (+)-SZOVITSAMINE



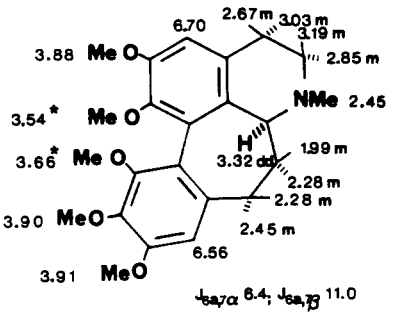
$C_{22}H_{27}O_5N$: 385.1889
$[\alpha]_D$: +55° (c = 0.10, MeOH) (29)
UV: (MeOH) 218 (4.29), 260 (3.78), 286 sh (3.50); (OH^-) 290 (3.37), 314 (3.18) (29)
IR: ($CHCl_3$) 3500, 2950, 1590, 1455 (29)
^1H NMR: (200 MHz) (29)
MS: $[M]^+$ 385 (19), 370 (17), 354 (100), 338 (21) (29)
CD: (MeOH) −1.2 (254) (29)
SOURCES: Liliaceae: *A. palaestinum* (28), *C. szovitsii* (37)

37. (+)-NOR-*O*-METHYLKREYSIGINE



$C_{22}H_{27}O_5N$: 385.1889
$[\alpha]_D$: +27° (c = 0.07, MeOH) (29)
UV: (MeOH) 218 (4.37), 259 (3.88), 292 sh (3.38) (29)
IR: ($CHCl_3$) 3000, 1590, 1410 (29)
^1H NMR: (200 MHz) (29)
MS: $[M]^+$ 385 (33), 370 (25), 354 (100), 338 (14) (29)
CD: (MeOH) −1.8 (254) (29)
SOURCES: Liliaceae: *A. palaestinum* (29)

38. (+)-*O*-METHYLKREYSIGINE

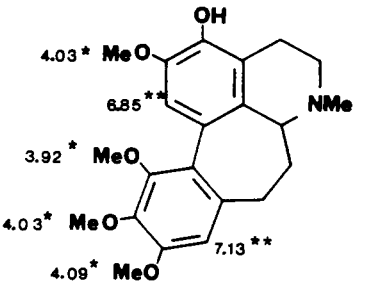


$C_{23}H_{29}O_5N$: 399.2046
$[\alpha]_D$: +68° (c = 0.10, MeOH) (29)
UV: (MeOH) 220 (4.44), 260 (3.95), 289 (3.46) (29)
IR: ($CHCl_3$) 2920, 1700, 1590, 1455 (29)
^1H NMR: (360 MHz) (29)
MS: $[M]^+$ 399 (21), 384 (18), 368 (100) (29)
CD: (MeOH) −2.2 (254) (29)
SOURCES: Liliaceae: *A. palaestinum* (29), *C. szovitsii* (38), synthesis (39)

39. (±)-*O*-METHYLKREYSIGINE

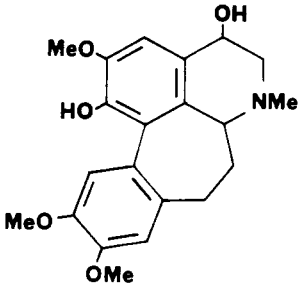
$C_{23}H_{29}O_5N$: 399.2046
MP: 152.3° (MeI) (25)
SOURCES: Synthesis (25)

40. (±)-3-DIHYDROXY-2,10,11,12-TETRAMETHOXYHOMOAPORPHINE



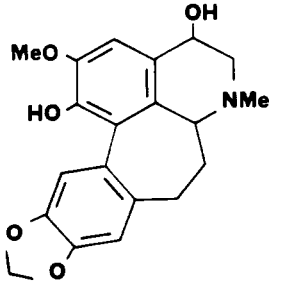
$C_{22}H_{27}O_5N$: 385.1889
MP: 240–245° (17)
^1H NMR: (CF_3CO_2D; 100 MHz) (17)
MS: $[M]^+$ 385 (17)
SOURCES: Synthesis (17)

42. (±)-1,4β-DIHYDROXY-2-METHOXY-10,11-METHYLENEDIOXYHOMOAPORPHINE



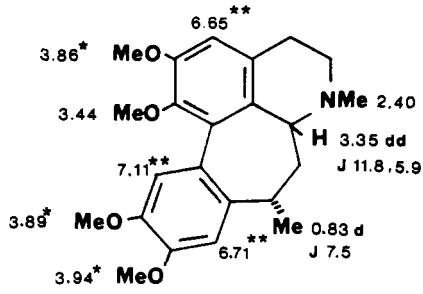
$C_{20}H_{21}O_5N$: 355.1420
MP: 199–200° (diacetate) (40)
IR: 1720, 1760 (diacetate) (40)
^1H NMR: (diacetate) (40)
SOURCES: Synthesis (40)

41. (±)-1,4β-DIHYDROXY-2,10,11-TRIMETHOXYHOMOAPORPHINE



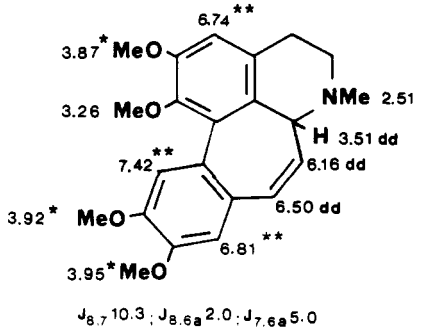
$C_{21}H_{25}O_5N$: 371.1733
MP: (methiodide of diacetate) 235–237° (40)
IR: 1720, 1755 (diacetate) (40)
^1H NMR: (diacetate) (40)
SOURCES: Synthesis (40)

43. (±)-8-METHYLHOMOGLAUCINE



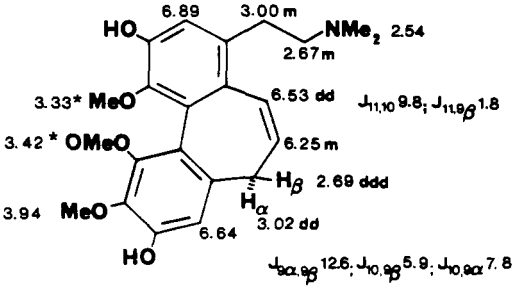
$C_{23}H_{29}O_4N$: 383.2096
MP: 196–198° (MeI) (15)
^{1}H NMR: (250 MHz) (15)
^{13}C NMR: (62.83 MHz) (15)
MS: $[M]^+$ 383 (22), 382 (12), 268 (24), 352 (100), 340 (12), 336 (8), 246 (22) (15)
SOURCES: Synthesis (15)

44. (±)-7-DEHYDROHOMOGLAUCINE
(7,8-DIDEHYDROHOMOGLAUCINE)



$C_{22}H_{25}O_4N$: 367.1783
MP: 246–248° (MeI) (15)
^{1}H NMR: (250 MHz) (15)
^{13}C NMR: (62.83 MHz) (15)
MS: $[M]^+$ 367 (100), 366 (74), 352 (33), 337 (17), 336 (26), 324 (21), 322 (11), 320 (9), 309 (36), 294 (10), 278 (10), 266 (11), 250 (9) (15)
SOURCES: Synthesis (15)

45. (+)-ANDROBINEMETHINE



$C_{22}H_{27}O_5N$: 385.1889
[α]D: +242 (c = 0.21, MeOH) (29)
UV: (MeOH) 251 (4.33), 285 sh (3.72); (OH^-) 272 (4.27), 301 sh (4.00) (29)
IR: ($CHCl_3$) 3510, 2990, 1590, 1445 (29)
^{1}H NMR: (360 MHz) (29)
MS: $[M]^+$ 385 (2), 327 (0.4), 58 (100) (29)
CD: (MeOH) +3.4 (258) (29)
SOURCES: Hemisynthesis (29)

46. (+)-SZOVITSINE[2]

$C_{42}H_{50}O_{10}N_2$: 742.3465
MP: 139–141° (41)
[α]D: +72° (c = 1.52, $CHCl_3$) (41)
UV: 260 (4.22), 290 (3.94) (41)
^{1}H NMR: (41)
MS: $[M]^+$ 742 (50), 741 (9), 727 (20), 725 (100), 723 (5), 713 (12), 711 (60), 709 (11), 699 (5), 697 (4), 695 (9), 204 (12) (30)
SOURCES: Liliaceae: *C. szovitsii* (41)

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[2]Structure assignment is doubtful.

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