zwitterion on the one hand, and the marked disparity in these properties with the dithiocarbamate of the methyl thioether of MEA on the other, it is concluded that I is a trithiocarbonate zwitterion.

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Alkaloids of *Vinca rosea* Linn. (*Catharanthus roseus* G. Don) XVIII. Root Alkaloids

Sir:

A number of crude amorphous alkaloidal fractions from root extracts had demonstrable anti-P-1534 leukemia activity in DBA/2 mice, and it was deemed necessary to determine whether this oncolytic activity was caused by any of the four known dimeric alkaloids or by any new entities. While the roots had been examined previously by other investigators (1), they had not been looked at utilizing the method of selective extraction, followed by column chromatography and gradient pH techniques as devised in this laboratory (2, 3).

The *A* fraction yielded two new alkaloids, vinosidine and lochnerivine, as well as mitraphylline (the oxindole of ajmalicine)—first reported as being obtained from *Mitragyna macrophylla* Hiern (4)—along with varying amounts of the known alkaloids ajmalicine, leurosine, virosine, perivine, VLB (obtained as both base and sulfate), leurosidine, carosidine, sitsirikine (as sulfate), and trace amounts of leurocristine (as sulfate) (5). Two other new alkaloids, leurosivine and cavincine, were obtained only as sulfates.

The *B* fraction gave three new alkaloids, ammocalline,[1] pericalline, and ammorosine, as well as akuammicine [first reported as being obtained from *Picralima klaineana* Pierre (6)], along with lochnerivine, leurosine, perivine, virosine, and lochnerine.

Pertinent physical data of these new alkaloids are as follows:

Vinosidine crystallized from methanol, m.p. 253–257° dec.; pK'a = 6.80 (33% DMF).

Anal.—Calcd. for $C_{22}H_{26}N_2O_5$: C, 66.31; H, 6.58; N, 7.03; O, 20.08. Found: C, 66.26; H, 6.72; N, 6.75; O, 20.51.

The ultraviolet spectrum in ethanol is characterized by maxima at 226, 254, 259, and 300 mμ, with a shoulder at 330 mμ; log E (1%, 1 cm.) = 3.01, 2.46, 2.46, 2.20, and 1.90, respectively. The infrared spectrum of a $CHCl_3$ solution exhibits the following 11 characteristic bands, listed in the order of decreasing intensities (as in all following examples): 1220, 1299, 1266, 1282, 1538, 1695, 1149, 1136, 1724, 1471, and 1087 $cm.^{-1}$

Lochnerivine crystallized from methanol, m.p. 278–280°; no titratable groups were found between pH 3.0–11.0.

Anal.—Calcd. for $C_{24}H_{28}N_2O_5$: C, 67.90; H, 6.65; N, 6.60; O, 18.85. Found: C, 67.91; H, 6.48; N, 7.01.

The ultraviolet spectrum in ethanol is characterized by maxima at 296 and 329 mμ, with a shoulder at 236 mμ; log E (1%, 1 cm.) = 2.52, 2.61, and 2.39, respectively. The infrared spectrum of a Nujol mull shows the following bands: 1666, 1615, 1685, 1464, 1640, 1453, 1200, 1380, 1113, 1168, and 1369 $cm.^{-1}$

Leurosivine crystallized as the sulfate from ethanol, m.p. > 335° dec.; pK'a = 4.8, 5.8 (33% DMF).

Anal.—Calcd. for $C_{41}H_{54}N_3O_9 \cdot H_2SO_4$:[2] C, 59.26; H, 6.79; N, 5.06; S, 3.86; O, 25.03. Found: C, 59.00; H, 6.85; N, 5.09; S, 3.71; loss on drying, 4.5.

The ultraviolet spectrum in ethanol is characterized by maxima at 214 and 265 mμ, with shoulders at 286, 295, and 310 mμ; log E (1%,

[1] Small's genus *Ammocallis* is a synonym of *Vinca*, but this segregated genus is not accepted as replacing *Vinca*. The name *Ammocallis rosea* Small is a straight synonym for *Vinca rosea* Linn.

[2] Although this molecular formula agrees well with the analytical results, previous experience with the dimeric alkaloids shows a tenacious solvent retention. This formula must be considered as proximate at this time.

1 cm.) = 2.73, 2.23, 2.09, 2.03, and 1.78, respectively. The infrared spectrum of a Nujol mull shows the following bands: 1455, 1736, 1031, 1747, 1229, 1369, 1253, 1100, 1088, 1129, and 1001 cm.$^{-1}$.

The base, isolated from the sulfate, would not yield to crystallization from any of the solvents used. Its ultraviolet spectrum in ethanol is identical to that of the sulfate. The infrared spectrum of a $CHCl_3$ solution shows the following bands: 1231, 1738, 1456, 1041, 1427, 1495, 1168, 1612, 1366, 1143, and 1001 cm.$^{-1}$.

Cavincine crystallized as the sulfate from ethanol, m.p. 275–277° dec.; pK'a = 6.90 (33% DMF). The ultraviolet spectrum in ethanol is characterized by maxima at 224, 281, and 288 mμ; log E (1%, 1 cm.) = 2.86, 2.17, and 2.08, respectively. The infrared spectrum of a Nujol mull shows the following bands: 1453, 1725, 1088, 1022, 1029, 1371, 1051, 1132, 746, 1143, 1131, and 1160 cm.$^{-1}$.

The base, isolated from the sulfate, could not be crystallized. Its ultraviolet spectrum in ethanol is identical to that of the sulfate. The infrared spectrum of a Nujol mull shows the following bands: 1449, 1708, 1372, 737, 1162, 1198, 1222, 1258, 1321, 1348, and 1058 cm.$^{-1}$.

Ammocalline crystallized from acetone, m.p. > 335° dec.; pK'a = 7.30 (33% DMF).

Anal.—Calcd. for $C_{19}H_{22}N_2$: C, 81.97; H, 7.97; N, 10.06. Found: C, 81.63; H, 7.69; N, 9.93.

The ultraviolet spectrum in ethanol is characterized by maxima at 218 and 288 mμ; log E (1%, 1 cm.) = 3.09 and 2.61, respectively. The infrared spectrum of a Nujol mull shows the following bands: 1467, 748, 1435, 737, 1330, 906, 1381, 1340, 1298, 1144, and 1320 cm.$^{-1}$.

Pericalline crystallized from acetone, m.p. 196–202°; pK'a = 8.05 (33% DMF). The ultraviolet spectrum in ethanol is characterized by maxima at 207 and 304 mμ, with shoulders at 230 and 240 mμ; log E (1%, 1 cm.) = 2.98, 2.80, 2.84, and 2.75, respectively. The infrared spectrum of a $CHCl_3$ solution shows the following bands: 1322, 1458, 1120, 1441, 1420, 1230, 1601, 885, 820, 661, and 1300 cm.$^{-1}$.

Ammorosine crystallized from methanol, m.p. 221–225°; pK'a = 7.30 (33% DMF).

Anal.—Found: C, 68.73; H, 7.70; N, 7.87; O, 15.46.

The ultraviolet spectrum in ethanol is characterized by maxima at 227 and 280 mμ, with shoulders at 295 and 305 mμ; log E (1%, 1 cm.) = 2.88, 2.36, 2.26, and 2.03, respectively. The infrared spectrum of a Nujol mull shows the following bands: 1028, 1458, 1146, 1217, 790, 1119, 1166, 1327, 1438, 1489, 1103, and 835 cm.$^{-1}$. The infrared spectrum of a $CHCl_3$ solution of the acetone-recrystallized base shows the following bands: 1148, 1137, 1486, 1026, 1330, 1462, 872, 1115, 1109, 1355, and 1174 cm.$^{-1}$.

Mitraphylline and akuammicine were both obtained by crystallization from acetone. They were identified by comparison of melting points, X-ray powder diffraction patterns, and infrared and ultraviolet spectra with those of authentic samples.

Detailed methods of obtaining these alkaloids, along with their preliminary characterization, will be discussed at a later date.

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