

careful dehydration experiments which show that salts can be dehydrated completely without decomposing the anions. Techniques were similar to those utilized for other compounds.^{9,10,11} (b and c) The tetrahedral central grouping is unequivocally supported by the paramagnetic susceptibilities and absorption spectra.⁶ (d) Unlike many octahedral cobaltic complexes,¹² the 12-tungstocobaltate is reduced reversibly and practically instantaneously to the cobaltous complex. Various potentiometric titrations establish the formal oxidation potential in *N* H₂SO₄ as -1.0 volt. Extrapolated potentials of mixtures in pure water yield the same result. Thus the coordination provides relatively small stabilization for the +3 oxidation state. These observations are consequences of the tetrahedral coordination or, conversely, they support that configuration.⁶ (e) Using single crystal X-ray techniques, a detailed structure for potassium 12-tungstocobaltate has been determined in this laboratory by Klaas Eriks, Nicholas F. Yannoni, and ourselves. Every atom in the anion is unambiguously located. The anions are discrete and slightly squeezed in one direction in that salt.

These results¹³ show that the simplest relationship exists between the condition of these heteropoly electrolytes in solution and in the solid state. This point has caused concern to many investigators of heteropoly electrolytes.

(9) L. C. W. Baker and T. P. McCutcheon, *Anal. Chem.*, **27**, 1625 (1955).

(10) L. C. W. Baker, B. Loev and T. P. McCutcheon, *THIS JOURNAL*, **72**, 2374 (1950); L. C. W. Baker, G. A. Gallagher and T. P. McCutcheon, *ibid.*, **75**, 2493 (1953).

(11) L. C. W. Baker, *et al.*, *ibid.*, **77**, 2136 (1955).

(12) L. E. Orgel, *Inst. intern. Chim. Solvay*, **10^e Conseil Chim. Brussels**, 289 (1956).

(13) Detailed measurements of the magnetic susceptibilities, spectra, and x-ray crystal structure are well advanced for the two dicobalt anions mentioned in the first paragraph. These will be the subjects of other papers.

DEPARTMENT OF CHEMISTRY
BOSTON UNIVERSITY
BOSTON 15, MASSACHUSETTS

LOUIS C. W. BAKER
VIOLET E. SIMMONS

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SYNTHESIS OF AN OPTICALLY ACTIVE *myo*-INOSITOL 1-PHOSPHATE

Sir:

In a recent paper¹ the characterization of *myo*-inositol 1-phosphate resulting from the base hydrolysis of soybean phosphoinositide was reported. This natural substance showed $[\alpha]_D + 3.4^\circ$ (pH 9, water) and $[\alpha]_D - 9.8^\circ$ (pH 2, water), and, partly because of this optical activity, we concluded that the diacyl glycerol phosphate moiety in the original phosphoinositide must have been linked to the 1-position of the *myo*-inositol ring.

It can be argued that the optical activity observed was so small that it may have been due to an impurity. To check this point, we have carried out the synthesis of an *asymmetric myo*-inositol 1-phosphate. The starting material was galactinol,² which has been shown to be 1-*O*- α -D-galactopyranosyl *myo*-inositol.³ Complete benzylation

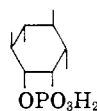
(1) F. L. Pizer and C. E. Ballou, *THIS JOURNAL*, **81**, 915 (1959).

(2) R. J. Brown and R. F. Serró, *ibid.*, **75**, 1040 (1953).

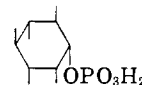
(3) E. A. Kabat, D. L. MacDonald, C. E. Ballou and H. O. L. Fischer, *ibid.*, **75**, 4507 (1953).

of this compound, and then methanolysis of the galactosidic linkage, gave 2,3,4,5,6-penta-*O*-benzyl *myo*-inositol. Phosphorylation of this product with diphenyl phosphorochloridate and hydrogenolytic removal of the benzyl and phenyl groups gave a *myo*-inositol 1-phosphate which was isolated as a crystalline cyclohexylamine salt. *Anal.* Calcd. for C₁₈H₃₉O₉N₂P: N, 6.1; P, 6.8. Found: N, 5.7; P, 6.6. The substance showed $[\alpha]_D - 3.2^\circ$ (pH 9, water) and $[\alpha]_D + 9.3^\circ$ (pH 2, water). Its infrared spectrum (KBr pellet) and chromatographic properties were identical with those of the substance isolated from soybean phosphoinositide. Thus, this synthetic compound is the enantiomorph of the soybean compound, and the good check between the rotations of the two establishes the optical purity of the latter. This result, coupled with the recent work of Brockerhoff and Hanahan,⁴ leaves little doubt that the *myo*-inositol portion of soybean phosphoinositide is substituted in one of its enantiomeric 1-positions.

The absolute configuration of the 1-position of *myo*-inositol to which the galactosyl unit is attached in galactinol is known, and was shown³ to be that one which by inversion leads to (-)-inositol. Thus, the absolute configurations in the two enantiomeric *myo*-inositol 1-phosphates also are now established, and are represented by the formulas



Synthetic compound



Soybean compound

Although there is no generally accepted convention by which one can assign configurational names to these isomers, the proposal of Lardy⁵ would lead to designating the synthetic compound as *D-my*o-inositol 1-phosphate and the one from soybean phosphoinositide as *L-my*o-inositol 1-phosphate.

(4) H. Brockerhoff and D. J. Hanahan, *ibid.*, **81**, 2591 (1959).

(5) H. A. Lardy, in "The Vitamins," Vol. II, edited by W. H. Sebrell, Jr., and R. S. Harris, Academic Press, Inc., New York, N. Y., 1954, p. 325.

DEPARTMENT OF BIOCHEMISTRY
UNIVERSITY OF CALIFORNIA
BERKELEY, CALIFORNIA

CLINTON E. BALLOU
LEWIS I. PIZER

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VINCA ALKALOIDS. I. IV. STRUCTURAL FEATURES OF LEUROSINE AND VINCALEUKOBLASTINE, REPRESENTATIVES OF A NEW TYPE OF INDOLE- INDOLINE ALKALOIDS

Sir:

In the preceding communication¹ we were able to demonstrate that the new alkaloids, leurosine and vincal leukoblastine, probably are isomeric C₄₆H₆₈O₉N₄ compounds. The spectral properties of the two compounds indicated striking similarities in their structures. We wish to present evidence that these two compounds are representatives of a new class of dimeric alkaloids containing both indole and dihydroindole moieties.

(1) Vinca Alkaloids. III. N. Neuss, M. Gorman, G. H. Svoboda, G. Maciak and C. T. Beer, *THIS JOURNAL*, **81**, 4754 (1959).