and it can be converted to O^6,5′-cyclothymidine (**4**). Based on these data and on an X-ray diffraction study of crystals of **3**,[18] the stereochemistry assigned to **3** is 5(*R*)-iodo-O^6,5′-cyclo-5,6(*S*)-dihydrothymidine. Furthermore, making the reasonable assumption that the epimerization of **2b** takes place at C-5, it then follows that the stereochemical representations of **2a** and **2b** are those shown above.

Treatment of **3** with base or silver nitrate produced **4**. Recrystallization from water afforded a good yield (>90%) of **4**: mp 219–220°; uv max 0.1 *N* HCl 269.5 nm (ε 12,550), H_2O 269.5 nm (ε 12,500), 0.1 *N* NaOH 268.5 nm (ε 9600); uv min 0.1 *N* HCl 236 nm (ε 2880), H_2O 236 nm (ε 2880), 0.1 *N* NaOH 244 nm (ε 4000); pK_a = 9.68 ± 0.05; pmr (DMSO-d_6) δ 1.72 (s, 3, 5-methyl), 3.88 and 4.63 (pair d, 2, $J_{5'a,5'b}$ = 12.5 Hz, H-5′), 6.74 (m, 1, H-1′), 11.17 (broad s, 1, N*H*); mass spectrum (70 eV) *m/e* (rel intensity) 240 (47), 222 (2), 212 (3), 194 (6), 179 (3), 168 (46), 142 (8), 140 (17), 124 (75), 98 (7), 97 (19), 96 (10), 83 (56), 81 (100), 69 (30). *Anal.* Calcd for $C_{10}H_{12}N_2O_5$: C, 50.00; H, 5.00; N, 11.62. Found: C, 50.20; H, 5.04; N, 11.55. Mild acid hydrolysis of **4** gave 6-hydroxythymidine and 5-methylbarbituric acid, its mass spectrum exhibits a fragmentation pattern characteristic of O^6,5′-cyclonucleosides,[19] and the pmr spectrum is in agreement with the assigned structure, including the fact that the H-5′ pattern is characteristic of cyclonucleosides which have an oxygen cyclonucleoside bond to C-5′,[3,20]

The conversion of **2b** through **3** to **4** is consistent with the premise that the base-catalyzed conversion of 5-halogenonucleosides to O^6,5′-cyclonucleosides involves an *addition–elimination* mechanism. It should be emphasized, however, that the 5-methyl group in **2b** and **3** precludes the possibility of a keto–enol equilibrium, in which C-5 participates, intervening in their transformation to **4**. This is in direct contrast to a conversion such as 5-iodouridine to O^6,5′-cyclouridine by means of base. In this latter case, such a keto–enol equilibrium involving a proton on C-5, rather than a methyl group, is possible in the corresponding saturated 5,6 adduct. The stereochemically most stable intermediate will be formed, therefore, regardless of the initial mode of addition in the formation of the 5,6 adduct.

Acknowledgment. One of us (J. A. R.) wishes to thank Dr. Eva G. Lovett for many helpful discussions during the course of this research.

to thymidine by catalytic hydrogenation [R. Duschinsky, *et al.*, *J. Med. Chem.*, **10**, 47 (1967)].

(18) X-Ray examination of the crystals showed that they were orthorhombic, belonging to the unique space group $P2_12_12_1$. Their density (2.026 g/ml at 25°), as determined by flotation, and their unit cell dimensions corresponded to four molecules per unit cell, with cell parameters a = 14.28, b = 12.14, and c = 6.87 Å.

The intensities of 1600 unique reflections (corresponding to the copper sphere) were measured on a Picker diffractometer with a molybdenum target and a graphite monochromator. A Patterson synthesis showed the position of the iodine and a Fourier synthesis based on the iodine indicated 18 peaks, of which the 17 highest were shown by least-squares refinement to be nonhydrogen atoms. The structure refined to an R factor of 0.11 when isotropic temperature factors were used and it refined to 0.075 anisotropically. A complete description of the X-ray determination of the structure of **3** will be presented in a forthcoming publication by Demetrius Tsernoglou and Jaime A. Rabi.

(19) The mass spectra of three cyclonucleosides (O^6,5′-cyclouridine, O^6,5′-cyclodeoxyuridine, and O^6,5′-cyclothymidine) show a number of characteristic features when compared with the corresponding parent nucleosides. Some of these characteristics are: (1) they have large parent peaks; (2) sugar residue (S) peaks are absent; (3) B + 2H peaks are very small or absent; and (4) an important peak, at *m/e* 154 for the two uracil derivatives and at *m/e* 168 for the thymine derivative, which is due to a fragment containing portions of both the base and sugar. The mass spectroscopy of nucleosides, cyclonucleosides, and derivatives of these will be treated in detail in a forthcoming publication (E. G. Lovett and D. Lipkin).

(20) I. Doerr and J. J. Fox, *J. Amer. Chem. Soc.*, **89**, 1760 (1967).

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Additions and Corrections

Photochromism of [2.2]Metacyclophan-1-enes and the Thermal Isomerization of 4,5,15,16-Tetrahydropyrenes [*J. Amer. Chem. Soc.*, **92**, 3681 (1970)]. By CHESTER E. RAMEY and V. BOEKELHEIDE, Department of Chemistry, University of Oregon, Eugene, Oregon.

At the beginning of the paragraph at the top of the second column on page 3682, the line should read: Because of the ease with which the photoisomers (**6**, **7**, and **8**) revert back....

Additionally, in the Experimental Section, the opening sentence should read: Two solutions each were prepared by dissolving **3** (5.8 and 5.9 mg, respectively), **4** (5.8 and 4.6 mg, respectively), and **5** (5.0 and 5.4 mg, respectively) in 5.5 ml of cyclohexane in each case.

Nuclear Magnetic Resonance Evidence for *cis*-Peptide Bonds in Proline Oligomers [*J. Amer. Chem. Soc.*, **92**, 6191 (1970)]. By C. M. DEBER, F. A. BOVEY, J. P. CARVER, and E. R. BLOUT, Department of Biological Chemistry, Harvard University Medical School, Boston, Massachusetts 02115, and Bell Telephone Laboratories, Inc., Murray Hill, New Jersey 07974.

On page 6192, column two, the fourth sentence of the first paragraph should read: By correlating the nmr spectra with optical rotation changes, it is apparent that the lower field peak (in $CDCl_3$) at τ 5.25 corresponds to the *trans* form.

Application of Solvent Effects to the Study of Diamagnetic and Paramagnetic Ring Currents [*J. Amer. Chem. Soc.*, **93**, 556 (1971)]. By F. A. L. ANET and G. E. SCHENCK, Department of Chemistry, University of California, Los Angeles, California 90024.

The first sentence in footnote 4 should read: Cyclohexane, 1.4% by volume (0.13 *M*); acetonitrile, 1.4% by volume (0.27 *M*); temperature, 33 ± 1.5°.

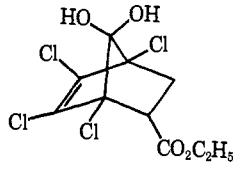
Aminoacylhydroxamates. A Case of Slow Proton Transfer between Electronegative Atoms in Solution [*J. Amer. Chem. Soc.*, **93,** 949 (1971)]. By MARIA L. BADE, Department of Biology, Boston College, Chestnut Hill, Massachusetts 02167.

In Table III, the entry in the fourth column of figures for ν_{5b} should read 307, not 207.

The Synthesis and Chemistry of Tricarbonyl(7-norbornadienone)iron [*J. Amer. Chem. Soc.*, **93,** 972 (1971)]. By J. M. LANDESBERG and J. SIECZKOWSKI, Department of Chemistry, Adelphi University, Garden City, New York 11530.

On page 976, column 1, line 12, the sentence should read: Compounds **20**,[37a] **21**,[37a] and **22**[37b] have been isolated....

Structure **22** should be



22

Footnote 37 should read: (37) (a) D. E. Applequist and J. P. Kliemann, *J. Org. Chem.*, **26,** 2178 (1961); (b) P. E. Hoch, *ibid.*, **26,** 2066 (1961).

Kinetics of Redox Reactions of Oxidized *p*-Phenylenediamine Derivatives. I [*J. Amer. Chem. Soc.*, **93,** 1347 (1971)]. By R. C. BAETZOLD and L. K. J. TONG, Research Laboratories, Eastman Kodak Company, Rochester, New York 14650.

Equation 10 should read

$$\mathrm{d}\ln\left(\frac{\beta(\mathrm{SQ})_\infty + (\mathrm{SQ})}{(\mathrm{SQ})_\infty - (\mathrm{SQ})}\right)\Big/\mathrm{d}t = k_f\left(\frac{(\bar{\mathrm{R}})}{1 + K_R(\mathrm{H}^+)} + \frac{4(\mathrm{SQ})_\infty}{K_M(\mathrm{H}^+)}\right) = k_{obsd} \quad (10)$$

Equation 15 is

$$-R\frac{\mathrm{d}\ln k_{obsd}}{\mathrm{d}\,1/T} = \Delta E = \Delta E_1 - \Delta H_R \quad (15)$$

Equation 22 is

$$\frac{\mathrm{d(SQ)}}{\mathrm{d}t} = k_1(\mathrm{H}^+)(\mathrm{T})(\mathrm{Fe(CN)_6}^{4-}) + k_4(\mathrm{R})(\mathrm{Fe(CN)_6}^{3-}) - k_2(\mathrm{Fe(CN)_6}^{3-})(\mathrm{SQ}) - k_3(\mathrm{Fe(CN)_6}^{4-})(\mathrm{SQ}) \quad (22)$$

Equation 25 is

$$\frac{-\mathrm{d}\ln((\mathrm{SQ}) - (\mathrm{SQ})_\infty)}{\mathrm{d}t} = k_{obsd} = k_3(\mathrm{Fe(CN)_6}^{4-}) + \frac{k_4(\mathrm{Fe(CN)_6}^{3-})}{1 + K_R(\mathrm{H}^+)} + \frac{k_2k_4(\mathrm{Fe(CN)_6}^{3-})^2}{k_1(\mathrm{H}^+)(\mathrm{Fe(CN)_6}^{4-})(1 + K_R(\mathrm{H}^+))} \quad (25)$$

Equation 26 is

$$-R\frac{\mathrm{d}\ln k_{obsd}}{\mathrm{d}\,1/T} = \Delta E_1 + \Delta H \quad (26)$$

Intramolecular Redox Equilibria of Cobalt–Nitrosyl Complexes [*J. Amer. Chem. Soc.*, **93,** 1788 (1971)]. By JAMES P. COLLMAN, PAUL FARNHAM, and GIULIANO DOLCETTI, Department of Chemistry, Stanford University, Stanford, California 94305.

In Table I, compound **3f** should be $CoCl_2(NO)(P(p\text{-}FC_6H_4)_3)_2$. In the right-hand column of page 1789 four lines up from the bottom of the text, Co should read CO.

Book Reviews

Chemical Mutagenesis in Mammals and Man. Edited by F. VOGEL and G. ROHRBORN (Institut fur Anthropologie und Humangenetik der Universität). Springer-Verlag, New York–Berlin–Heidelberg. 1970. xiv + 502 pp. $34.00.

Of the environmental factors which undoubtedly have mutagenic effects and which are clearly now the concern of all mankind, only ionizing radiation has received relatively thorough study. By contrast, extant information which has been derived from adequate mammalian test systems as to the cytological and genetic effects of the staggering number of agents that comprise our environment, and are administered to the human body, occasionally or chronically, is alarmingly meager. The gravity of the situation is underscored by the recognition that a change of a single codon in a gene can result in mutation with a pathological manifestation. Moreover, only a single molecule, *e.g.*, an alkylating agent or a competitive substrate, would suffice to effect such a change.

It is the editor's hope, as indicated in the preface, that the book will stimulate interest in chemical mutagenesis relative to the human being. With the development of the requisite methodology, it is no longer necessary to extrapolate conclusions from so-called simple systems to humans. Rather, the effects on mammals can be examined directly.

This work is, in essence, a collection of the various papers presented at a symposium in Mainz, Germany, held in October 1969, as part of the annual meeting of the "Gesellschaft für Antropologie und Humangenetik." The collection, augmented in scope by the inclusion of several additional chapters, consists of thirty articles by twenty-four contributors. Careful perusal of the first three chapters, which defines the problem, evoked reactions from this reviewer ranging from initial annoyance to subsequent admiration.

The translation (German to English) of Chapter 1, "Biochemical Mechanisms of Mutation," frames the contents in a clumsy rhetoric and is the source of irritation. Fortunately the authors of the other chapters have employed the services of a translator. Chapters 2 and 3, by contrast, are well written and contain a veritable wealth of information. In point of fact, the final chapter of this section,