whereas deoxycytidylic acid bound in its molecule is inactive. This phenomenon may be perhaps interpreted in the following manner: one part of the guanine purine ring, which is of great importance for the formation of the anodic indentation (apparently an amino-group in position 2 is involved²), is found in the molecule near the surface, whereas the analogous part of the pyrimidine ring of cytosine (apparently the 6-amino-group³) is hidden inside the molecule where it participates in the formation of the hydrogen bond. In apurinic acid, where the double-helical structure is completely destroyed, deoxycytidylic acid is not blocked sterically in any way so that its oscillo-polarographic activity may manifest itself. Free deoxyadenylic acid and deoxythymidylic acid do not show the characteristic indentation in ammonium formate as medium, and consequently no indentations due to these nucleotides can be expected if they are bound in the molecule of deoxyribonucleic acid.

I have also studied deoxyribonucleic acid and apurinic acid in 2 M sodium chloride as medium; both substances yield oscillograms that differ only slightly. In 1 M sodium hydroxide, the oscillograms of deoxyribonucleic acid differ considerably from those of apurinic acid.

In cobalt and nickel solutions⁷, proteins give an indentation even at a very low concentration⁸. Since the deoxyribonucleic acid indentation is produced in this medium at a different potential, I was able to use the oscillopolarographic reaction for detecting deoxyribonucleic acid and proteins in the presence of each other. In this manner, proteins can be detected even in the presence of an abundance of deoxyribonucleic acid (Fig. 4).

EMIL PALEČEK

Institute of Biophysics,
Czechoslovak Academy of Sciences,
Královopolská 135,
Brno 12,
Czechoslovakia.

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Fluorescence of Organic Traces in Inorganic Substances

In previous publications¹ I have directed attention to the fluorescence due to traces of organic substances in commercial inorganic chemicals and in minerals. What was not clear was the relation of my experiments to the somewhat similar ones of Ewles². Recent investigations have now convinced me that we were observing two quite different phenomena. This is best shown by the following experiments:

(1) Exciting alumina (Merek, for chromatography) with 254 mμ, I obtain fluorescence that is not enhanced by weak annealing and not destroyed by 1 min. at red heat, and also phosphorescence, in perfect agreement with Ewles, who had to heat his samples for hours at high temperatures to get rid of

the fluorescence. I find, however, that the phosphorescence no longer appears after 1 min. at red heat and is not regenerated by adding traces of organic substances.

(2) On the other hand, on exciting alumina which has been exposed to atmospheric dust with 365 mμ, there is no noticeable phosphorescence, and the fluorescence is enhanced by weak annealing, destroyed by 1 min. at red heat and regenerated by weak annealing after adding traces of organic substances.

Under condition (1) we have the Ewles effect: luminescence of adsorbed water or other substances containing the OH-group; under condition (2) fluorescence of organic traces occurs.

The latter, frequent in minerals, has now also been found in certain meteorites: Hvittis (Finland), Stannern (Moravia); it remains to be seen if these have acquired traces of organic substances after their arrival on the Earth or already in outer space.

K. PRZIBRAM

Institut für Radiumforschung,
Vienna.

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Triphosphitochromic Acid

TRIVALENT chromium forms, with dibasic anions of oxygen-containing acids, complex ions of the type $[\text{Cr}(\text{AA})_3]^{3-}$, in which the ligands are bound to the central atom through oxygen atoms. The best-known representatives of this group of compounds are trisulphatochromates(III)^{1,2} and complex anions with organic acids³, for example, with oxalic^{4,5} and lactic⁶ acid. The complex with lactic acid is the stable and relatively strong trilactatochromic acid $\text{H}_3[\text{Cr}(\text{lact})_3]$. The phosphite anion, which may also act as a bidentate oxoligand⁷, forms a similar triphosphitochromic acid $\text{H}_3[\text{Cr}(\text{HPO}_3)_3]$.

Free triphosphitochromic acid can be prepared in crystalline form by dissolving freshly precipitated chromic hydroxide (precipitated by ammonia at pH ~ 8) in a boiling aqueous solution of phosphorous acid, followed by crystallization. The decahydrate of triphosphitochromic acid is obtained, forming green crystals soluble in water and methyl alcohol, practically insoluble in ethyl alcohol and ether, of density 2.03 at 20° C. The complex is paramagnetic, having a molar magnetic susceptibility of 7.8×10^{-3} at 20° C. The compound liberates its ten water molecules at 40° C. The conductometric and pH metric titration of triphosphitochromic acid solutions by sodium hydroxide show that the compound prepared is a tri-basic acid ($K_1 \sim 2 \times 10^{-3}$, $K_2 \sim 4 \times 10^{-6}$, $K_3 \sim 4 \times 10^{-7}$) and forms sodium and ammonium salts easily soluble in water, and salts of alkaline earths, transition and heavy metals which are only slightly soluble. The ammonium salt $(\text{NH}_4)_3[\text{Cr}(\text{HPO}_3)_3] \cdot 6\text{H}_2\text{O}$, sodium salt $\text{Na}_3[\text{Cr}(\text{HPO}_3)_3] \cdot 4\text{H}_2\text{O}$ and barium salt $\text{Ba}_3[\text{Cr}(\text{HPO}_3)_3] \cdot 8\text{H}_2\text{O}$, have been prepared in the crystalline state. Aqueous solutions of the acid and its salts show, as may have been expected, reducing properties, and reduce, for example, after standing for some time, silver salts to metallic silver. The reduction, however, takes place much more slowly than with the free, non-complex phosphite anion.