Short Communications

A chromatographic artefact involving iodide-131

CRITCHLOW AND GOLDFINCH[1] described a radioactive component which was present in extracts of plasma, obtained from a thyrotoxic patient who had been treated with 7 mC of iodine-131. The R_F value of this material on chromatography in butanol–dioxane–ammonia was 0.22 in the presence of potassium iodide carrier, and 0.33 in the absence of carrier. The R_F of potassium iodide in carrier quantities was found to be 0.22, in contrast to the value given by GROSS[2] for this solvent system (0.4). We have also observed R_F values of about 0.4. CRITCHLOW AND GOLDFINCH did not report having carried out radioautography of their chromatograms, and their results were obtained by direct counting of the paper strips. It seemed possible that interference with the chromatography of iodide by traces of metal impurities, such as is known to occur in the case of phosphate esters[3], could have accounted for their findings.

A solution of carrier-free iodide-131 was applied to untreated Whatman No. 1 paper, and to Whatman No. 1 paper previously treated with ethylenediaminetetraacetic acid (EDTA) as described by EGGLESTON AND HEMS[3]. Five portions of solution each containing 0.5 μC of carrier-free sodium iodide-131, were successively dried onto any one spot. Carrier potassium iodide (50 μg) was subsequently added to half the spots. Each chromatogram was developed for 16 h by the descending method in *n*-butanol–dioxane–2 *N* NH_4OH (4:1:5 by vol.), allowing the solvent to drip off the end of the paper in order to obtain a longer run. The chromatogram was then dried and placed in contact with "Ilfex" double-coated X-ray film for 24 h.

Fig. 1a shows that the point of maximum density of the carrier iodide spot on untreated paper has a smaller R_F than that of the carrier-free iodide spot. Fig. 1b shows that, on paper treated with EDTA the region of maximum spot density has the same R_F value whether carrier iodide is present or not. The different shape of the spots in the presence of iodide carrier can be explained by saturation of the stationary phase with iodide. Treatment of the paper with EDTA would be expected to remove traces of metal impurities[3]. Part of the iodide might combine with heavy metal ions, present in trace amounts in the paper, to form poorly soluble salts, thereby lowering its R_F value. However, a portion of iodide, corresponding to the solubility product of the least soluble salt, would remain free, and this portion would presumably run in the leading part of the spot, whose R_F on untreated paper corresponds to that of the greater part of the carrier-free iodide-131. When iodide is present as carrier-free iodide-131, the solubility product is probably not reached, and the iodide spot remains homogeneous even on untreated paper. The use of an alkaline solvent system might be expected to favour the formation of insoluble iodides. There is a small amount of

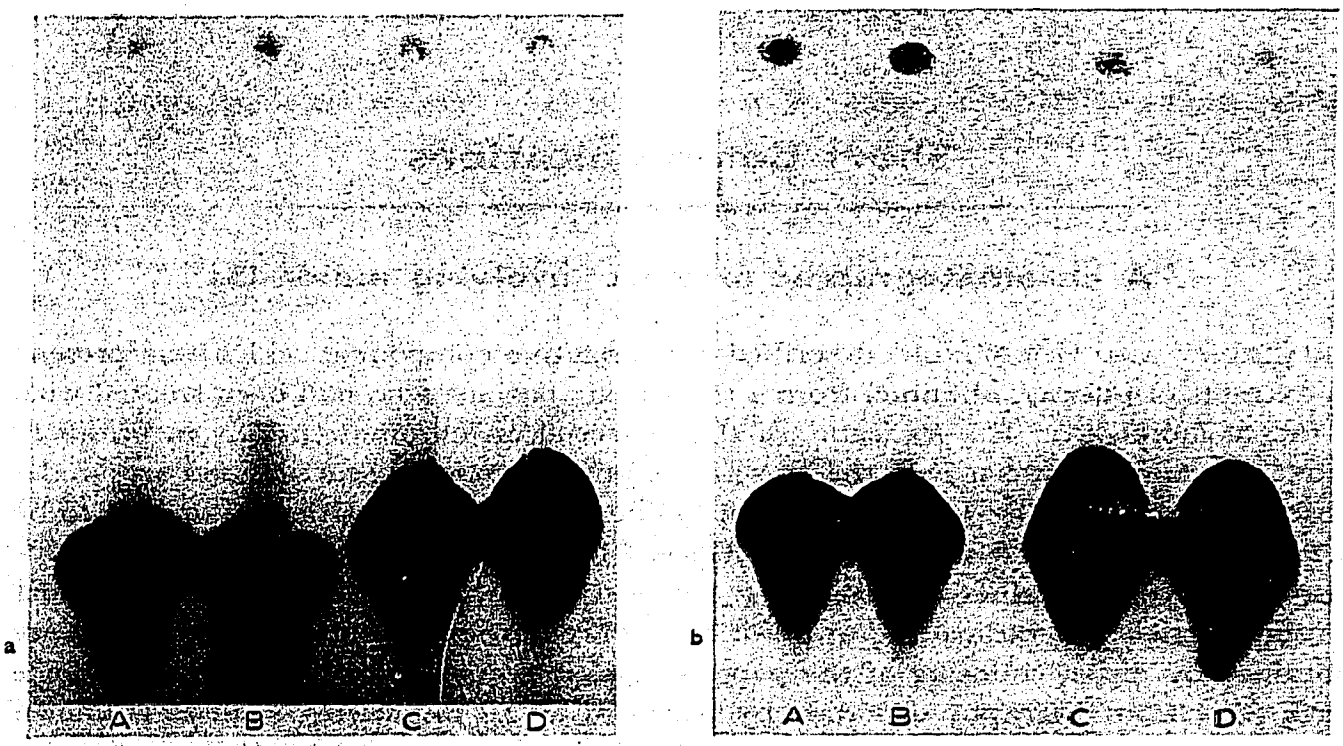

Fig. 1. Radiochromatograms of iodide-131 on untreated (a) and EDTA-treated (b) Whatman No. 1 paper. In each case, spots A and B contained iodide-131 only, while potassium iodide carrier (50 μg) was added to spots C and D.

"tailing" extending on both sides of the iodide spot, more marked in the untreated than in the treated paper. It might be attributable to an iodination reaction catalysed by trace quantities of metals.

It seems, therefore, that trace amounts of metal impurities in the chromatography paper may cause changes in the R_F of iodide. Tissue extracts would also contain metals which might be expected to cause a similar interference. This effect might account for the observations of CRITCHLOW AND GOLDFINCH[1].

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