

30th December, 1955.

My dear Riddell,

Thank you among other things for a very nice Christmas card; this, however, is a business letter.

In the Annals of Human Genetics for August 1955, there is a longish paper, by H. Kalmus of the Galton Laboratory, on congenital tritanopia, in which he comes to the conclusion, which I welcome, that this rather rare ~~effect~~<sup>defect</sup> is probably inherited as an autosomal dominant, unlike the red-green confusions <sup>known as</sup> ~~with~~ protanopia and deuteranopia. He does, however, make one statement which I find puzzling, and which may be dangerously misleading. Of the Ishihara charts he says:

"The majority of tritanopes read them without mistakes excepting chart 6, which is also misread by many normal people... In daylight most normal people read this chart as '2' and a few as '8', most tritanopes and some tritanomalous people read '5' and a few tritanopes read '8', '2' or 's'."

Now looking at this chart in Ishihara everyone I have put it to so far has read '5' without hesitation or doubt, and this

would be taken vide Kalmus as confirmation of tritanopia if the chart were used for this purpose. As the gene proportion appears to be one in about 20,000, I do not suppose we are all tritanopic!

If you think this statement of Kalmus needs correction there are two points which may need attention. One, the possibility of difference between daylight and artificial light, though people here see it the same in both conditions, and the other is the possible difference between the 9th edition of Ishihara, to which Kalmus refers, and the 10th edition, which I have in this department. On this point Mrs. Fyfe, of this department, has visited the University Library and finds the 9th edition, to her eyes, very nearly the same as the 10th so far as chart '6' is concerned. Kalmus ~~thinks~~<sup>says</sup> also:

"The actual frequencies are not given because most subjects remembered having done the test before and knew what the 'correct' answer should be."

This suggests the possibility that he had mis-remembered and had interchanged the numbers '5' and '5'<sup>2</sup> in his description of what normal and tritanomalous people see in the chart. He also mentions a copy of the chart published in an article in Picture Post about which, for aught one knows, his statements may be true. The section, however, is headed "Ishihara tables".

It seems to me, especially because Kalmus's paper may be the only paper on tritanopia available to workers in various

parts of the world during the next few decades, that it may be of some importance, if a grave error has been made, that ophthalmologists should be warned, so far as is possible, about it. You will know best how this should be done. I should suggest a recorded test of ten or fifteen people supposedly of normal colour vision could be made and deliberately put on record for this purpose, but, of course, it would be of interest also to see if known tritanopes do really read this chart differently from normals, as this would make this widely available set of colour tests available also for testing tritanopia, as seems to have been Kalmus's intention. Generally speaking a clear statement does seem to be needed as to whether tritanopia cannot be diagnosed with Ishihara, or whether <sup>after</sup> ~~for~~ all it can, with some instructions different from those given by Kalmus.

Sincerely yours,