		Frequency of: Correct readings	Double readings	Errors
Extreme C.B.	Prot. (3 ♂, 0 ♀)	1–2	0–1	23–24
	Deut. (3 ♂, 1 ♀)	1–2	0–2	22–24
Moderate C.B.	Prot. (3 ♂, 2 ♀)	1–2	1–5	18–22
	Deut. (5 ♂, 1 ♀)	1–2	3–6	17–21
Green anomalous. (2 ♂)		2	2–8	15–21
R-G- Weak (13 ♂, 18 ♀)	Mode	22	0	0
	Scatter	14–25	0–7	0–8
Normals (9 ♂, 27 ♀)	Mode	21	0	0
	Scatter	14–25	0–8	0–9

On a level of failure of nineteen or less correct in twenty-four plates, the Ishihara Test would have failed 9 of the 31 red-green weak subjects, but not consistently the weakest, and 9 of the 36 normals. Proportions of correct, alternative and 'blank' readings gave no accurate information about degree of weakness, though the test was used in a very strict manner.

Some red-green weak subjects might be dangerous and ought to be failed. The Ishihara Test is not capable of picking them out accurately. A warning to almost the same effect is given in the introduction to Stilling's Tables (17th edition, 1926).

The Ishihara Test is unsatisfactory as a scientific instrument[5]. It also errs on the side of severity, a good fault, but in an undiscriminating way, which is unfortunate, and Vernon and Straker's percentages may be unduly high

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[1] NATURE, **152**, 690 (1944).
[2] NATURE, **153**, 409 (1944).
[3] Edridge Green, F. W., "The Physiology of Vision", chapter 24.
[4] Houstoun, R. A., "Vision and Colour Vision", 194–199.
[5] Cf. Thomas, G. J., *Amer. J. Psych.*, **56**, 583.

Incidence of Colour-Vision Weakness

Vernon and Straker[1] reported that the incidence of colour-vision defect among recruits for the Royal Navy was least in the north-eastern part of Britain and greatest in the south-western part. They deduced that colour-vision defect may be racially connected with pigmentation.

The colour-vision of the first-year medical students at the University of Glasgow, who represent an educated cross-section of nearly all of the mixture of races in the west of Scotland, was examined with a set of Ishihara cards. Ten men were found colour-defective, out of 138 tested, an incidence of about 7 per cent. The colours of hair and eyes, and the general build, were noted. Five had hair of shades of brown; all five had blue or blue-grey eyes; one was very tall, three were stocky, and one was small and thin. One with black hair had brown eyes and was fairly tall; one with dark hair had hazel eyes and was small and thin. Three with fair hair had blue eyes and were of short stature.

The number is small, but the absence of any association of pigmentation or of physical type with colour-vision defect suggests that other possible causes of Vernon and Straker's interesting results should also be considered. For example, there may be some selection made by the men themselves, especially in the more educated groups, in which the individual who knows that his colour-vision is defective will tend to avoid presenting himself for the Royal Navy. Tests on army cadets at Glasgow have shown an incidence of colour-vision weakness higher than normal; this was found to be caused by the presence of several men who, but for their known colour-vision weakness, would have volunteered for the Royal Navy or the Royal Air Force.

The statistical surveys by Waaler[2] and von Planta[3] cannot be ignored. Waaler at Oslo examined 9,049 boys and 9,072 girls; von Planta at Basel examined 2,000 boys and 3,000 girls. The races are very different, yet the results are in agreement not merely in overall incidence but also in the incidence of each of the two defects, deuteranomaly (including deuteranopy) and protanomaly (including protanopy):

INCIDENCE OF COLOUR-VISION WEAKNESS.

	MALES			FEMALES		
	Deuter-anomaly	Prot-anomaly	Total	Deuter-anomaly	Prot-anomaly	Total
Waaler	6·10%	1·91%	8·01%	0·41%	0·03%	0·44%
v. Planta	5·75	2·20	7·95	0·33	0·10	0·43

These results indicate that the incidence of colour-vision weakness in Europe is probably independent of race, and that deuteranomaly and protanomaly are different colour-vision defects, inherited independently. That these two independent defects exist may be the reason[4] why the incidence of colour-vision weakness in females is 0·44 per cent, instead of 0·64 per cent as required by a simple theory of the inheritance of one sex-linked factor; the missing 0·20 per cent represents women of pseudonormal colour-vision, who have inherited both defects.

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[1] Vernon, P. E., and Straker, A., NATURE, **152**, 690 (1943).
[2] Waaler, G. H. M., *Z. indukt. Abstammungs- und Vererbungsl.*, **45**, 279 (1927).
[3] von Planta, P., *Arch. f. Ophthalmologie*, **120**, 253 (1928).
[4] Gray, R. C., *Arch. Ophthalmology*, **29**, 446 (1943).

Road Safety and Road Structure

IN his comments on my article "Road Safety and Road Structure" in NATURE of May 20, p. 623, Lieut. Colonel O'Gorman refers to the use I made of statistics in discussing the road accident problem.

Lest the reader is inclined to place undue emphasis on the secondary effects to which Colonel O'Gorman quite rightly refers, it should be pointed out that the sole purpose of the reference to statistics in the early part of the article was to support the conclusion that, "unless novel methods of prevention were introduced", there would probably be a serious increase in road accidents when traffic took to the highway again after the War.

As this is largely the foundation of Colonel O'Gorman's own praiseworthy efforts to get road accidents studied scientifically, I have felt it desirable to clarify the point.

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