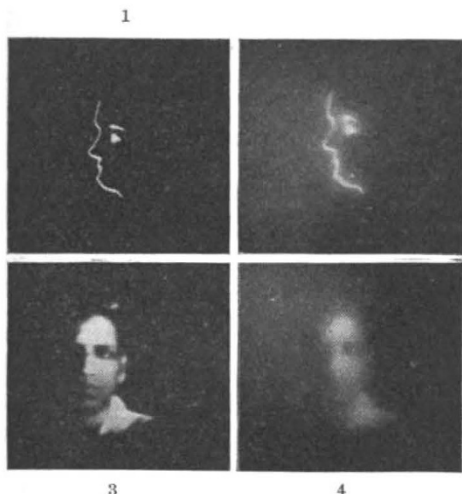


We have investigated the explanation of this effect, using a point source as the object, and find that in every case the light reaching the image-point diverges behind it in the form of a hollow cone of rays, the angle of divergence depending on the distances of the object and of the image from the



OPTICAL IMAGES FORMED BY A NAPHTHALENE CRYSTAL.

crystal faces. The image formation is thus due to a kind of generalized 'external' conical refraction which can scarcely be reconciled with the ordinary ideas of geometrical optics. Our experiences show clearly that the usual explanations of conical refraction do not go deep enough into the physical aspects of the problem.

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¹ Raman, C. V., NATURE, 107, 747 (1921); *Phil. Mag.*, 43, 510 (1922).
² Raman, C. V., *et al.*, NATURE, 147, 268 (1941).

Colour Measurement

MR. GUILD's letter¹ makes it clear that the recent conflict in views on colour measurement arises by his adopting an interpretation of the role of the C.I.E. colorimetric system which puts it outside purely physical discussion. The explanation he suggests does not, however, apply, as I have not been concerned with the public and practical aspect to which he refers. As was clearly stated², my remarks referred to the purely physical analysis of the phenomenon of colour, and measurement of the quantities following from such analysis: the C.I.E. system was therein referred to for what fundamentally, apart from all implication and interpretation, it actually is, namely, a conventional schematization of physical fact, having reference to certain conditions of observation, based, of course, upon averaged data but nevertheless representative in such conditions of a possible *real* observer (cf. the analogous purpose served by Listing's typical schematic eye in ophthalmology). In this sense the system forms in general a repre-

sentative first-order theory. Such use of the system accords with normal physical practice, for no suggestion of compromise in form, or simplification of the phenomenon has hitherto been implied in the reduction of physical data to refer to the C.I.E. normal observer.

Mr. Guild makes no reference to this aspect of the question, but he makes it clear that, in his interpretation, the C.I.E. colorimetric system is not subject to the limitations affecting the physical theory upon which it is based and that it exists absolutely and purely by virtue of definition. A physical phenomenon can, however, only be defined by relation to the conditions in which it is observed, and the existing physical knowledge of the time: the C.I.E. quantities which Guild postulates are, therefore, in general fictitious, and the C.I.E. standard observer in this extended sense, therefore, is artificial and lacking properties relating to the important physical phenomena connected with the variation of such conditions as field size. For some practical purposes this may suffice, but the theory cannot be regarded as complete while such phenomena remain demanding explanation.

Measurement on the basis of such an interpretation is clearly not measurement of physically significant quantities, and considerations involving such an interpretation are, therefore, beyond the scope of the present discussions. My statements on the subject from the point of view of the development of colour physics remain unaffected by the statements made on such other grounds in the recent correspondence.

It is, of course, possible to maintain views on interpretation, compromise and simplification for ordinary purposes, and Mr. Guild's promised statement will be awaited with interest.

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¹ NATURE, 149, 442 (1942).

² NATURE, 149, 76, 247 (1942); 148, 961 (1941).

Periodicity of Refection in the Wild Rabbit

SINCE my previous communication on this subject¹ various fresh data have thrown new light on the coprophagy or refection rhythm in wild rabbits. Taylor² reported, that of a number of wild rabbits shot and examined for the presence in the stomach of soft faecal pellets such as are re-ingested immediately, those shot in the evening contained such pellets; those shot in the morning did not. He suggested, therefore, that the rhythm in wild rabbits was the reverse of that found in domestic rabbits; the resting period of the former being during the day, naturally this would be the time when soft or 'night' pellets are produced and swallowed.

Since then I have taken careful note of the stomach contents every time a wild rabbit, which was killed at a known hour of day, came into my hands. I have also included records in which the time of death could be narrowed down to four or five hours. Recently I was able to examine fairly extensive material from a large area of woodland in Gloucestershire and this constitutes the greater part of the data upon which the accompanying table was based.