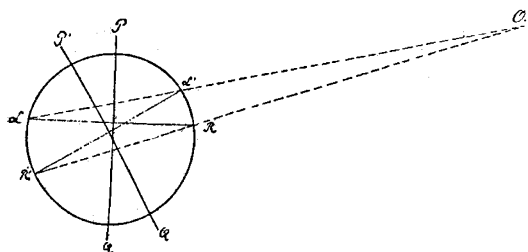


law that the observation of a motion which is being stopped is in favourable circumstances followed by the perception of that motion in reversed direction.

The accompanying figure shows the card with its plane passing through the observer *o*. *L* and *R* are the intersections of the circumference of the card with an arbitrary horizontal line. Suppose that the card turns round its axis *PQ* from north to west, the observer will see *L* removing to the left and *R* to the right, and from this he can conclude the exact direction of the rotation, provided that he makes sure of *L* being behind and *R* before *PQ*, and not otherwise. For suppose *L* before *PQ* in *L'* and *R* behind *PQ* in *R'*, the observed removal of these



points respectively to the left and to the right would lead to an apparent opposite direction of rotation—from north to east. Moreover, the axis *PQ* perpendicular to *LR* would seem to tilt away from the vertical to *P'Q'* perpendicular to *L'R'*. Hence the illusion depends upon the following condition:—if *L* and *R* are seen in the right place with respect to each other, the rotation appears in its true direction, but if, on the contrary, *L* and *R* are seen in *L'* and *R'*, so in the wrong place with respect to each other, the card will seem immediately to reverse its direction of rotation, and the axis will seem to tilt away from the vertical.

As an observer, viewing the true direction of the rotating card, will generally be unable to distinguish the right place of the two points when he shuts one of his eyes, the circumstances are favourable for the reversing of the direction of the rotating card.

Utrecht, October 5.

L. U. H. C. WERNDLY.

The Interpretation of Mendelian Phenomena.

If I have read Dr. Archdall Reid's letter in *NATURE* of October 31 aright, he draws a distinction between the study of heredity in general and the study of the problems of sexual reproduction, now defined as the problem of the function of sex (an expression with which I am perfectly contented). Among the problems of sex he includes the study of the actual transmission of characters as dealt with by Mendelians. The novelty of this classification is certainly attractive; but I find it difficult to understand what branches of knowledge remain to fall under the former head. In what does the study of heredity consist if not in the study of the transmission of characters from parents to offspring?

If by this apparent paradox it is only meant to imply that the Mendelians must confine their study to the transmission of characters by the sexual method, they may seek comfort in the reflection that this is by far the most important of all branches of heredity—it is the only one, for example, which affects the human race. Indeed, the rule that all organisms pass through a sexual cycle at some period of their existence has extremely few exceptions; but I, for one, see no reason for restricting the experimental study of heredity even to this extent. Mendel demonstrated the segregation of the germinal representatives of certain characters in the reproductive cells. What reason is there for doubting that such segregation may take place among the ova of a parthenogenetic individual? There is, in fact, evidence of the actual occurrence of such segregation. More than this, we know of segregation where reproduction is purely vegetative, as in the case of bud sports.

It is the claim of the Mendelians that they have dis-

covered in certain cases some of the fundamental characters of an organism—the units of hereditary transmission, which are represented in the reproductive cells by definite entities known as allelomorphs. Sometimes these characters are identical with those which can be defined by simple inspection previous to experimental analysis, sometimes they are not. Sometimes the apparent character depends upon the simultaneous presence of several allelomorphs, each of which may segregate from its opposite in complete independence of all the others. Mendel himself suggested that this conception, the proof of which he left to his successors, might afford the explanation of certain botanical cases which do not appear to be widely different from that of the mulatto. If Dr. Archdall Reid will produce authenticated pedigrees showing the repeated crossing of the mulatto with pure white blood and pure black blood respectively, together with a detailed account of all the offspring produced, he will make a very substantial contribution to our knowledge of heredity in the human race, and one which will be examined with very great interest by Mendelians. In the absence of such evidence the statement that there is no segregation does not seem to me to be justified, even in this particular instance.

It has been pointed out that Mendel's discovery is leading to a change in our conception of the constitution of an organism comparable with the change which the advent of the atomic theory produced in chemists' conceptions of compound substances. Whatever biological problem we may now discuss, Mendel's facts have to be reckoned with. It is true that the only method so far discovered of studying the constituent characters of organisms consists in the crossing together of individuals in which some of the characters are different. This method is so closely comparable with that by which the chemist studies his compounds that Mendelians have often found a readier appreciation of their views among students of the more precise physical sciences than among biologists. The advantage of introducing exact experiment into the study of heredity ought to be obvious to all, and I fail to see any other objection to the method except its novelty.

If Dr. Archdall Reid desires to grasp this new conception, I can only recommend him to a renewed study of the literature of the subject, beginning with Mendel's own papers. Better still, let him repeat a few of the simpler experiments. There is no royal road to this knowledge; but it is knowledge which is rapidly revolutionising our entire conception of the constitution of a living organism. Dr. Archdall Reid is so far from appreciating this at present that further discussion seems likely to be of very little profit. I will conclude my contribution to this controversy with a word of warning. If Dr. Archdall Reid discards Darwin's opinion, based as it was upon an unequalled experience, that domestic and natural varieties have arisen by essentially the same process, he may find himself landed among a crowd of unsuspected difficulties.

Cambridge, November 2.

R. H. LOCK.

Method of Observing the "Subjective Yellow."

A SIMPLE method of obtaining the sensation of yellow produced by the mixture of red and green lights is afforded by a small direct-vision spectroscopy of the ordinary kind in which the slit can be rotated to adjust its line perpendicular to the plane of refraction. If the slit is turned slowly from this normal position, the bands of different colours of course take up a sloping direction across the spectrum, like books on a half-filled shelf. As the slope increases, the upper end, for example of the red, closes down on the lower end of the green, and as the two blend the clear yellow tint is produced. Other colour mixtures can be similarly noticed.

It may be added that if the slit is turned thus until its length lies in the plane of refraction, the violet end of the impure spectrum obtained is drawn out and so more easily observed than in the normal method of use, and is still pure enough for most of the purposes for which a simple spectroscopy is of use.

JOHN H. SHAXBY.

University College, Cardiff.