In a precisely similar way, but using equation 2 instead of 1, the value 13.937 is obtained, which can be increased to 13.948.

This being the case, the question is, How can this value arise? The experimental work upon which the figures are based seems to have been carried out with every possible precaution, and all the values agreed very closely. The only possible weakness appears to lie in equation 5; the result was deduced from only three experiments, and the agreement was not so good as usual. Assuming for the moment that this value is wrong, it is easy to calculate by how much it is so. Taking $N=14.010$, we may say

$$N = 14.010 = \frac{2422.08 + 6.62}{2779.94 - 3.57} \times 16.$$

If the values of x , w , and y are taken as before, this gives 0.028 as the *minimum* value of z , and it is hardly to be expected that such a large error could have escaped notice. Another possibility is that all the errors are about five times as large as the values given, but even if this were so it would be very improbable that they should all be of such a nature as to raise the atomic weight. Consequently, granted that the discrepancy is due to experimental error, it is almost certain that the analysis of potassium nitrate is at fault. This was carried out by heating with silica, and if the nitrate was not completely decomposed the number 87.232 would be too great. This is the only explanation which seems reasonable; and, moreover, if the ratio obtained in this experiment be changed to 100:87.203, all five equations become consistent, and yield frequently accepted values for the atomic weights, silver being 107.883.

Whether this be the true explanation or not, it is obvious that the method outlined above affords an excellent means of checking atomic weight determinations, and is also applicable to finding the absolute weights, since there is no great accumulation of errors.

H. E. WATSON.

University College, Gower Street, October 26.

The Fauna of Madagascar.

MADAGASCAR, with certain adjacent islands, has been regarded by some naturalists as forming a distinct "region," the Malagasy, equivalent to the other main regions of the world. On the other hand, Messrs. P. L. and W. L. Sclater ("The Geography of Mammals," London, 1899, p. 108) adhere to the earlier opinion of the first-named of the two authors, as well as of many subsequent writers, and place Madagascar in a subregion only of the Ethiopian region. They remark that "Madagascar appears to contain a sample of the ancient Ethiopian fauna, which has been almost exterminated on the mainland."

The archaic nature of the Madagascar fauna has lately (*Zool. Jahrb.*, 1902) received further confirmation at the hands of Miss A. Carlsson, who found that the peculiar Viverrid genus *Eupleres* showed likenesses to both the Viverrine and Herpestine sections of the Viverridae, and was therefore probably an ancient type of Viverrid. Having had lately the opportunity of making some anatomical observations upon another Madagascar genus, viz. *Galidictis*, I am able still further to support this view. This interesting Viverrid has the external scent glands of the Viverrine section, and a cæcum which is comparatively long, like that of the Herpestinae. The brain, like that of *Eupleres*, shows intermediate characters. Finally, the archaic nature of this animal is demonstrated by the completely double uterus, a feature new to the Carnivora, where a bicornuate uterus is at least the rule.

It has been pointed out that Madagascar also shows an unexpected likeness to the neotropical region in its fauna, especially in the group of reptiles. As to mammals, the late Dr. Dobson showed reasons for believing that the alleged close resemblance between the Cuban *Soleonodon* and the Mascarene *Centetes* had been exaggerated; but among the Reptilia there are genera which are common to the two regions, e.g. the snakes *Boa* and *Corallus*. I have been able lately to compare *Corallus madagascariensis* with a South American form, *C. cookii*. In the former the bronchus extends a long

way down the larger lung, the liver is prolonged by one lobe nearly to the gall bladder, the umbilical vein of the foetus does not persist, and the mode of distribution of the intercostal arteries is as in the pythons. In the latter species these characters are as in the Anaconda.

The anatomical differences may possibly seem slight to those not specially acquainted with the structure of serpents; but in the features mentioned there is, if anything, rather a greater difference between the two species of *Corallus* than between two admittedly distinct genera such as *Eryx* and *Python*. It is very desirable that the alleged close resemblance between other forms occurring both in Madagascar and in the neotropical region should be carefully scrutinised.

FRANK E. BEDDARD.

Zoological Society's Gardens.

The Interpretation of Mendelian Phenomena.

DR. ARCHDALL REID's letter in *NATURE* of October 3 contains a very positive statement in reference to the relation of Mendelian phenomena to man, which I think should be immediately answered. I delayed supplying an answer because I wished to discuss his statement on a tangible basis. I desired to analyse certain data which I have been collecting, and which throw light upon the problem of segregation in man. This analysis is as yet incomplete, but it is sufficient to show that Dr. Archdall Reid is too confident when he asserts that "there is no segregation in man," and that, "with the exception of eye-colour, and possibly one or two other traits, such as the Mongolian eyelid, human hybrids appear to blend every character as perfectly as skin-colour."

The accounts which I have collected deal with various marriages between Europeans (chiefly Scotch) and the Canadian Red Indians. It is well known that many of the early European settlers in Canada married Red Indian women. The resulting half-breeds in their turn were in some cases intermarried, and in others mated to Europeans.

The Canadian Red Indians can be marked off from Europeans by six definite characters, which concern the nature of the hair, eyes, skin, cheek-bones, nose, and beard. The Indian hair is invariably black, long, glossy, and lank, and cannot be confounded with European hair; the eyes are almost invariably black or, very seldom, dark brown; the skin is tawny brown-yellow (varying from pale olive-yellow to dark brownish yellow); the cheek-bones are high (there is no obliquity to the eyes, thus differing from the Mongol); the nose is very prominent and broad at the base, and is of the *busque* type, that is, the profile is made up of two lines, which diverge widely from the bridge towards the base; and, lastly, there is either no beard or a very scant one of straight hairs on the face of the men. These characters, when well developed, are so different from the corresponding features in Europeans that they cannot easily be confused. No one, for instance, would mistake the long, lank, black hair and black eyes of the Indian for the thick red hair and blue eyes of some of the Scotch persons concerned in the histories now under review.

We may therefore use these six characters as differentiating ones, and may tentatively regard the Indian characters as being allelomorphic to the corresponding European ones. For the sake of brevity I will use symbols, which will have the following significance:—

I=Indian, E=European, H=hair, E=eyes, S=skin, C=cheek-bones, N=nose.

First, then, with regard to the matter of dominance. We must, in this case, be quite sure that the European concerned marries a full-blood Indian. In the cases which I have so far collected, I have only one marriage of such an Indian with a European, and there were only two children of the marriage. The European was a Highland Scot. His complexion was fair, and eyes blue. I have no information of the colour of his hair, since it was white with age when observed, but it was quite thick and not lank. In all the features (with the exception of the beard, of which I have no information) which mark off the Indian from the European, the son and daughter of this marriage were quite Indian.

So far, then, as this one case will take us, these five

Indian characters appear to be dominant over the corresponding allelomorphs of the European. This conclusion, however, receives corroboration from the results of marriages between Europeans and three-quarter blood Indians, when they are traced to the F_2 generation. There is thus no blending, even of colour, but dominance.

We can now deal with the important question of segregation. If segregation occurs in man, and we regard these five characters (the beard is excluded) as allelomorph pairs, then when a half-breed Indian (that is, the child of a European and Indian marriage) is mated with a European we should expect, among others, to find the following types in the offspring:—

- (1) Wholly European, EH, EE, ES, EC, EN.
- (2) Wholly Indian, IH, IE, IS, IC, IN.
- (3) European except in the cheek-bones, EH, EE, ES, IC, EN.
- (4) European except in the eyes and cheek-bones, EH, IE, ES, IC, EN.
- (5) Indian except in the nose, IH, IE, IS, IC, EN.
- (6) Indian except in the hair, EH, IE, IS, IC, IN.
- (7) Indian except in the skin and nose, IH, IE, ES, IC, EN.

And all these predicted seven types are to be found in the records of four marriages between an E and $\frac{1}{2}$ I which have been sent to me. A total of seventeen children are considered in this description.

It is perfectly clear that segregation of these five characters is taking place. There is no blending even of the colour of the hair, eyes, or skin. The blue eyes of a Scotchman who was mated to a full-blood Indian, and whose wholly Indian-type hybrid was mated in turn to a Welshman of hazel eyes, came out blue in two members of an offspring of eight children in the F_2 generation. That is clearly enough segregation.

If segregation is really occurring, and if the Indian features are dominant over the European, then it follows that once a pure European type has separated out and is mated with a European, Indian features ought not to appear among their offspring. In the records which I have there are two marriages of this kind, *i.e.* between E and extracted E. From one of these there have resulted five daughters, and from the other a son and a daughter. All seven are European in every trait. The recessive characters have thus far bred true.

These facts, therefore, are not only opposed to Dr. Archdall Reid's statement that there is no segregation in mankind, but they supply him with that instance of an appearance of a "latent" character in a cross between two "natural varieties" as contrasted to "artificial varieties" for which he seeks. For I suppose he will regard (if I may judge from the context of his letter) a cross between an $E \times \frac{1}{2}$ I, followed by a cross of $E \times$ extracted E, as crosses between natural varieties. At any rate, they are crosses between human varieties, and he denies rather too emphatically that "latent" characters have ever been revealed in such.

Dr. Archdall Reid is apparently not aware of Farabee's observation on the mating of albino negroes with pigmented negroes. The facts are important, so perhaps I may describe them. An albino negro married a normal negress. They had three children, all pigmented sons. These sons married, and two of them had only normal (pigmented) children; but the third son married twice, and by the first wife had five normal and one albino children, and by the second six normal and three albino children. If we assume that the two negroes which the third son married were themselves carrying albinism recessive (that is, in Dr. Archdall Reid's sense of the word, "latent"), the result is accurately in accordance, as Castle has shown, with Mendelian expectation. For, in the offspring of this third son, coloured individuals and albinos are expected in the proportion of 3:1. There is actually 11:4, which is the nearest possible approximation in an offspring of fifteen.

If Dr. Archdall Reid can explain these results, *i.e.* those of the Red Indians and the negroes, on any other theory than Mendelian segregation, or can even show that it is a case of an abnormality of sexual reproduction which occurs under conditions of "artificial selection," it will be of the most entrancing interest.

It may, of course, be objected that the negro case is one of the crossing of artificial and not of natural varieties. To me such an objection presents itself as a play with words. No one, I take it, will deny that if the conditions of the Mississippi region were favourable to albinism and unfavourable to pigmentation, a variety of albino negro would arise as permanent in its characters as any other natural variety of man. Besides, the albino case must be read with that of the Canadian Red Indian, and this is a natural variety as well as the European crossed with it. Both cases lead to the same conclusion.

Dr. Archdall Reid's doubt as to whether Mendelians "are engaged in anything more than the investigation of those abnormalities of sexual reproduction which occur under conditions of artificial selection" therefore becomes an assumption with an inadequate basis.

GEO. P. MUDGE.

Biological Laboratory, London Hospital
Medical College, October 21.

I HAVE already (*NATURE*, October 31) dealt with mutations, of which albinism is one. I have no first-hand acquaintance with Red Indian half-breeds. In the case of such characters as skin-colour and shape of nose and cheek-bones, even "when well developed," "the personal equation of the observer and the precision of his categories" have sometimes to be reckoned with. Having regard to the Mendelian doctrine of the independent inheritance of characters, does it not strike Mr. Mudge as singular that in the only example he possesses of marriages between E and extracted E all the offspring should be "European in every trait"? If his correspondent is correct, the Indian half-breed of the F_1 generation is "quite" indistinguishable from the full-blooded Redskin. I venture to appeal to readers of *NATURE* who have first-hand acquaintance with the facts. The information we need is not whether exceptional half-breeds of the F_1 generation resemble pure-blooded Indians, but whether this resemblance is the rule. Personally, I have a fairly large and close acquaintance with the half-breeds of Europeans on the one side, and negroes, Maoris, Kanakas, and several Asiatic races on the other. To my eyes, except in eye-colour, they are clearly distinguishable as half-breeds, though variations occur, and the dark race is sometimes approached rather closely. The case of eye-colour is remarkable. The black persists until one or more infusions of north European blood occur, when the light-coloured eye suddenly appears. So far as I am able to judge, though here I cannot speak with any degree of certainty, the quickness of the re-appearance of the light eye bears a relation to the degree of pigmentation of the dark race; that is, fewer infusions from the light-eyed race are required when it is crossed with the black-eyed European type than when it is crossed with the Asiatic, and more especially the negro. Whatever all this indicates—and I think I know, though lack of space forbids any attempt to entrance Mr. Mudge—very obviously it does not indicate Mendelian segregation. By latent characters I meant those long-lost ancestral traits which re-appear when domesticated races of rabbits, mice, pigeons, and the like are crossed.

G. ARCHDALL REID.

Newton's Rings in Polarised Light.

IN *NATURE* of October 24 (vol. lxxvi., p. 637) Mr. Edser asks whether anyone has tried the experiment of Lloyd's single mirror fringes with polarised light to see whether a change of the character of the fringes would occur on rotating the plane of polarisation of the light. Lloyd tried the experiment himself with light polarised by transmission through tourmaline, and observed no change in the appearance of the fringes (Lloyd, "Papers," p. 156). I have made the same experiment with Lloyd's fringes by internal reflection, and found no effect on rotating a Nicol prism through which the fringes were observed (*Phil. Mag.*, October, p. 507).

The change of phase for grazing incidence is π , whatever be the plane of polarisation of the incident light. The fringes, therefore, are of the same character for light of all kinds.

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