me some information on the point in question which will, no doubt, interest British men of science, whose deep religious feeling I had the opportunity of admiring during the days when I studied in England some forty years ago.

According to this professor's experience, the aim of this "popularisation" of science is to replace the old religion by a new religion—Bolshevism. It is announced to the completely uneducated people that the Old and New Testaments are myths, that God, Creation, and the sublime Christian morals connected with our religion are mere prejudices of the "bourgeois," and that man is only an animal somewhat more developed than the ape, etc.

As regards education in the universities, there are still capable professors teaching who are unable to leave the country, but they have practically no rights, and there is no possibility of free scientific work. The place of the rector of the university to which my friend was attached is occupied by a former demonstrator, "whose only printed matter is his visit card," but he is a trustworthy Bolshevik, just as are the stewards ruling the university.

The only qualification for the teachers in secondary and primary schools is a Bolshevik faith—other qualification is not needed. It is, therefore, easily understood that the teaching of the old religion and morals is abolished from all types of schools.

A translation of Geikie's "Physical Geography" has been known in Russia for some years, but nowadays there are few people whose preliminary scientific education would allow them to read this or a similar work with any profit. My friend also assures me that ostensible editions of the popular scientific books quoted by Dr. Jameson are, to use a household word, "Potemkin's villages," the object of which is to acquire sympathy for Bolshevism among men of science who are far away and unable to witness the charms of this "paradise."

As regards the passage quoted in Dr. Sokoloff's article in *NATURE* of September 1, 1921, p. 20, which gave rise to the present discussion: "There is Prof. Behtereff, who declares that all Russian men of science now abroad should return to Russia"—this is fortunately impossible, since, according to the recent "ukaz" of the Soviet Government (see *Rul* of October 14), no Russian is allowed to return to Russia unless he possesses food enough for three or four months.

This challenge was also answered at the meeting of Russian men of science, mostly university professors from all parts of Europe, held last week in Prague, which is to-day the centre of Slavonic scientific culture. Resolutions were accepted at this meeting by which the Russian *savants* who were present organised themselves for permanent scientific work outside their country. Moreover, steps were taken to enable Russian students, with the aid of our Government, to study in our university and in other schools (we know Russian, and they learn Bohemian easily). Surely all this proves that Russian professors are by no means willing to accept Prof. Bechtérev's (or Behtereff's) invitation.

The President of our Republic, Dr. Masaryk, formerly professor of philosophy and sociology in this university, has just published a remarkable article, "Political Anthropomorphism," in which he states that Bolshevik Government placards in Moscow have inscriptions: "Religion is Opium for People." In his opinion the social and political ideal of an uneducated and uncultured ("negramotnyj") Russian mujik (*mužik*) is to stand on the dunghill and to crack the whip instead of working, and to use it

not only on his horses, but also on his fellow-creatures. The President concludes: "The Bolshevik experiment did not succeed, and cannot succeed, because the Bolsheviks, who are not at the level of human culture, succumbed to rude anthropomorphism."

I conclude with the question: What is left now of the *fata Morgana* of Bolshevism? I am very glad that no other Government in the world is following its example.

BOHUSLAV BRAUNER.

Chemical Laboratory, Bohemian University,
Prague, October 20.

Biological Terminology.

DR. BATHER in *NATURE* of October 27, p. 271, referred Sir Archdall Reid to Prof. Goodrich's presidential address to Section D of the British Association at its Edinburgh meeting this year for a discussion of certain questions, and characterised that address as "clear and thoughtful." It appears to me that Prof. Goodrich had adopted Sir Archdall Reid as his guide and authority in questions of evolution, and it is difficult to understand how the teacher could learn from his pupil. Prof. Goodrich's address ignores the greater part of all the new conceptions and new results obtained by recent research on heredity and genetics. The only recent work of importance which he mentions is that of Guyer on the effect of lens-destroying serum injected into rabbits.

Prof. Goodrich states that the newest characters may be inherited as constantly as the most ancient *provided they are possessed by both parents*, stating in a footnote that he sets aside complications due to Mendelian segregation, which do not bear on the questions at issue. But surely Mendelian segregation bears most fundamentally on the proviso that a character must be possessed by both parents in order to be inherited, since Mendelian researches have shown that a character may be inherited when it is apparent only in one parent or in neither. It may be asked whether "possessed" means "apparent" or not, but the context shows that Prof. Goodrich meant the two terms to be synonymous, since he states that the question, "Why are some characters inherited and others not?" is the same as the question, "Why do some characters reappear in the offspring and others not?" Characters could not reappear in the offspring if they did not appear in the parents. When a person bearing the abnormality brachydactyly marries a normal person, half the children are brachydactylous. Here the character is possessed by only one parent. In many other cases, where the one parent is homozygous for a dominant character which is absent in the other parent, all the offspring show the character. Again, there are cases in which a man with normal sight marries a woman with normal sight, and half the male children are colour-blind. According to Prof. Goodrich's definitions this would not be inheritance at all, but we know it is due to heredity, and that is more important than any arbitrary definition of inheritance. The antlers of stags are normally possessed by one parent only, but they are certainly inherited.

Prof. Goodrich states that inheritance depends on the condition that the germinal factors and the environmental conditions which co-operated in the formation of a character in the ancestor should both be present. Suppose we consider the case of an albino. What are the environmental conditions which co-operated in the formation of this character? The fact is that a new character or a change of character may be due *either* to an alteration of the germinal factors *or* of the environmental conditions. In the former

case the variation or mutation is produced without any change of environment, and often persists under a great range of difference in environment. We call such a change due to difference in germinal factors a mutation or congenital variation, a change due to environment or modification an acquired character. Therefore, to assert, as Prof. Goodrich and Sir Archdall Reid do, that all characters are acquired during the lifetime of the individual is a misuse of terms, and tends to confuse and obscure a perfectly clear distinction. Characters due to genetic factors are developed, not acquired; characters due to environmental change without change of genetic factors are acquired.

Prof. Goodrich states that in an environment which, on the whole, alters but little, evolution progresses by the cumulation, along diverging lines of adaptation, of new characters due to mutation. I regret to have to disagree fundamentally with a zoologist for whose work in his own special field I have so great a respect, but my own studies have led me to the conclusion that this statement is not in accordance with our present knowledge. What we know of mutation and adaptation seems to me to indicate very strongly that they have nothing whatever to do with each other.

J. T. CUNNINGHAM.

University of London Club, 21 Gower Street,
November 2.

Reflection "Halo" of (Semi-)Cylindrical Surfaces.

I RECENTLY noticed on the wall of a staircase in this college a clear ring of light, produced by a low sun shining through an open window. The ring was free from colour, circular so far as could be judged by eye, and complete except towards the bottom, where it was cut across by the shadow of a polished wooden handrail. A little investigation showed that the appearance was due to the reflection of sunlight falling on this rail, the upper surface of which is more or less cylindrical. Sighting along the rail showed that the axis of this cylinder passed approximately through the centre of the ring. The pheno-

FIG. 1.—AP=incident ray; PB=reflected ray. Broken lines are projections on XZ plane of these rays; broken ring shows form of "halo" on a screen parallel to the YZ plane.

menon must have been observed often enough, but I have not seen it described. It is readily treated by simple geometrical methods as follows:—

Let the reflecting segment of cylinder considered have its centre at the origin, and let its radius be r and its axis that of X (Fig. 1). Let an incident ray AP parallel to the XY plane fall, from the $-X$ direction, on the point $P(0, y_0, z_0)$ of the cylinder; the equations of the ray may then be written $y + mx = y_0$, $z = z_0$. The normal

at P is $z_0y = y_0z$, and the perpendicular plane through the origin is $y_0y + z_0z = 0$. The incident and reflected rays must cut this plane in two points, the join of which is bisected by the origin. The incident ray meets it at

$$\left(y_0 + \frac{z_0^2}{y_0}/m, -z_0^2/y, z_0\right),$$

so the point with equal and opposite co-ordinates must lie on the reflected ray; so does $P(0, y_0, z_0)$. Hence the reflected ray is given by

$$my_0x / (y_0^2 + z_0^2) = (y - y_0) / \left(y_0 - \frac{z_0^2}{y_0}\right) = (z - z_0) / 2z_0.$$

From this it follows at once that $(y - y_0)^2 + (z - z_0)^2 = m^2x^2$. Thus, considering all values of y_0 and z_0 , we see that so long as y_0 and z_0 are small compared with x, y, z , the reflected light is practically a right cone, with its axis along that of the cylinder. The distribution of brightness and other points can easily be worked out, but would make this note unduly long.

The phenomenon is shown by any reflecting cylinder; a nickelled shaving-soap tin answers admirably. The radius of the ring thrown on a screen normal to the axis is readily shown to be practically independent of the diameter of the cylinder, but proportional to the tangent of the angle between the incident rays and the axis, as the final equation shows. The ring stops at $z = \pm r$ on the $-Y$ axis—i.e. appears to be cut across by the shadow of the cylinder. Increase of length of the cylinder, of course, results in a widening of the ring.

J. H. SHAXBY.

University College of South Wales and
Monmouthshire, Cathays Park, Cardiff,
October 31.

Microscope Illumination and Fatigue.

A VERY large part of the fatigue produced by working at the microscope for long hours is due to the use of incorrectly adjusted illumination, whether too bright or too weak. In routine work of a critical nature, where daylight is out of the question for several reasons and an artificial light source must be used, the light may be regulated so as to be satisfactory for the combination of eyepiece and objective most frequently used, but any change of either materially alters the brilliancy of the field. Any alteration of the substage to correct for this will upset the critical adjustment of the optical system; the changing of light-filters is a rough-and-ready solution, but fine differences cannot easily be made without varying the quality of the light, and, in most cases, require the removal of the eye from the microscope to carry out.

When working with a 30-c.p. "Pointolite" lamp (which provides the ideal homogeneous source of light, and with a suitable condenser and monochromatic filter gives more than enough light for any combination), it was found that the excess of light was very tiring to the eyes, and the manipulation of extra filters for each change of eyepiece or objective involved a great loss of time. It seemed possible that the pyrometric lamp advertised by the same makers might produce better results, as the candle-power can be varied between very wide limits; but before trying it experiments were made with the 30-c.p. lamp.

It was found that by inserting extra resistance into the arc circuit (which in this case was some 350 ohms) the light may be varied from full to a dull red glow,