experiments, using the K lines from tungsten (effective $\lambda=0.196 \text{ \AA.}$) reflected from rock-salt, and measured the absorption coefficient of the secondary radiation excited by these rays in paraffin. The absorption coefficient of these rays was found to be considerably greater, by about 52 per cent. at 90° and 22 per cent. at 30° , than that of the beam incident on the paraffin.

In order to compare my results with those of Mr. Plimpton, a molybdenum Coolidge tube was then substituted for the tungsten one, and the K_α line ($\lambda=0.708 \text{ \AA.}$) was employed. An increase in the absorption coefficient of the secondary rays excited in paraffin was again observed, though it amounted to only 29 per cent. at 90° and only 6 ± 1.2 per cent. at 20° with the primary beam.

The softening thus observed when reflected X-rays are scattered is substantially the same as that found when unreflected rays of the same hardness are employed. Mr. Plimpton's negative result is apparently due to the fact that his experiment was performed under unfavourable conditions of wave-length and scattering angle. The conclusion seems necessary, therefore, that the softening of secondary X-rays is due, not to the process of scattering, but to the excitation of a fluorescent radiation in the radiator.

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The Colour of the Sea.

THE view has been expressed that "the much-admired dark blue of the deep sea has nothing to do with the colour of water, but is simply the blue of the sky seen by reflection" (Rayleigh's *Scientific Papers*, vol. 5, p. 540, and *NATURE*, vol. 83, p. 48, 1910). Whether this is really true is shown to be questionable by a simple mode of observation used by the present writer, in which surface-reflection is eliminated, and the other factors remain the same. The method is to view the surface of the water through a Nicol's prism, which may for convenience be mounted at one end of a tube so that it can be turned about its axis and pointed in any direction. Observing a tolerably smooth patch of water with this held in front of the eye at approximately the polarising angle with the surface of the sea, the reflection of the sky may be quenched by a suitable orientation of the Nicol. Then again, the sky-light on a clear day in certain directions is itself strongly polarised, and an observer standing with his back to the sun when it is fairly high up and viewing the sea will find the light reflected at all incidences sufficiently well polarised to enable it to be weakened or nearly suppressed by the aid of a Nicol.

Observations made in this way in the deeper waters of the Mediterranean and Red Seas showed that the colour, so far from being impoverished by suppression of sky-reflection, was wonderfully improved thereby. A similar effect was noticed, though somewhat less conspicuously, in the Arabian Sea. It was abundantly clear from the observations that the blue colour of the deep sea is a distinct phenomenon in itself, and not merely an effect due to reflected sky-light. When the surface-reflections are suppressed the hue of the water is of such fullness and saturation that the bluest sky in comparison with it seems a dull grey.

By putting a slit at one end of the tube and a grating over the Nicol in front of the eye, the spectrum of the light from the water can be examined. It was found to exhibit a concentration of energy in the region of shorter wave-lengths far more marked than with the bluest sky-light.

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Even when the sky was completely overcast the blue of the water could be observed with the aid of a Nicol. It was then a deeper and fuller blue than ever, but of greatly enfeebled intensity. The altered appearance of the sea under a leaden sky must thus be attributed to the fact that the clouds screen the water from the sun's rays rather than to the incidental circumstance that they obscure the blue light of the sky.

Perhaps the most interesting effect observed was that the colour of the water (as seen with the Nicol held at the polarising angle to the surface of the water and quenching the surface-reflection) varied with the *azimuth* of observation relatively to the plane of incidence of the sun's rays on the water. When the plane of observation and the plane of incidence were the same, and the observer had his back to the sun and looked down into the water, the colour was a brilliant, but comparatively lighter, blue. As the plane of observation is swung round the colour becomes a deeper and darker blue, and at the same time decreases in intensity, until finally when the plane of observation has swung through nearly 180° the water appears very dark and of a colour approaching indigo. Both the colour and the intensity also varied with the altitude of the sun.

The dependence of the colour on the azimuth of observation cannot be explained on a simple absorption theory, and must evidently be regarded as a *diffraction* effect arising from the passage of the light through the water. Looking down into the water with a Nicol in front of the eye to cut off the surface-reflections, the track of the sun's rays could be seen entering the water and appearing by virtue of perspective to converge to a point at a considerable depth inside it. The question is: What is it that diffracts the light and makes its passage visible? An interesting possibility that should be considered in this connection is that the diffracting particles may, at least in part, be the *molecules* of the water themselves. As a rough estimate, it was thought that the tracks could be seen to a depth of 100 metres, and that the intensity of the light was about one-sixth of that of the light of the sky from the zenith. If we assume that clear water, owing to its molecular structure, is capable of scattering light eight times as strongly as dust-free air at atmospheric pressure, it is clear that the major part of the observed effect may arise in this way.

It is useful to remember that the reflecting power of water at normal incidence is quite small (only 2 per cent.), and becomes large only for very oblique reflection. It is only when the water is quite smooth and is viewed in a direction nearly parallel to the surface that the reflected sky-light overpowers the light emerging from within the water. In other cases the latter has a chance of asserting itself.

C. V. RAMAN.

S.S. Narkunda, Bombay Harbour,
September 26.

The "Proletarianisation of Science" in Russia.

DR. H. LYSTER JAMESON asks in *NATURE* of September 29, p. 147, for an account of the constructive elements of the "proletarianisation of science" in Russia, and seems to praise the effort of the Soviet Government to bring the fundamental conclusions of scientific thought within the reach of the "proletariat" by editing a whole series of elementary text-books of natural science.

A Russian university professor, whose friendship I have enjoyed for more than twenty-five years, who has just escaped from the "Bolshevik Paradise" gave

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. Behtereff'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 (muzik) 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