from Boohtarminsk, on the right bank of the river, just at the entrance into the Kozlovskoe gorge, and is known among the local inhabitants under the name of Slepoy Borok (Little Blind Forest). But the illustrious travellers have made rather a blunder in defining, after only a rapid examination from the deck of an Irtyshian karbaz, the mutual relations of the rocks. A section at right angles to the stream shows that the granite lies not *on* the slates, but *in* them, and that it occurs as a main vein, with some secondary ones, all having the same strike and dip as those of the slates. The main vein is some 30 or 40 metres thick, the secondary 0.5 metre, or still less. From the river one can see only the lower limit of granite, and as the joints of this rock are nearly horizontal, whilst the bedding of slate stands almost vertical, the appearance is presented which suggested the original inference that the granite has been poured out over the ends of the slates.

My measurements gave the following results:—On the level of the current the strike of the slates varies between 9h. 45m. and 10h., dip = 82°–85° north-north-east; lower limit of granite strike, 7h. 30m., dip = 73° north-north-east; upper limit of the same, strike 8h. 45m., dip 43°–45° north-north-east. The contact of the two rocks can be observed occasionally exceedingly well. In the vicinity of the granite the slate loses all traces of fissility, and becomes a very compact rock, with abundant scales of muscovite. Generally the slates are schistose, phyllitic, and chistolitic. Both rocks are welded together. The secondary veins of granite somewhat differ in structure from the main vein, which is of a normal fine-grained variety, with little scales of biotite. The main vein is covered with young forest, consisting of pine, birch, and aspen trees, while on the slates nothing grows but rare bushes of gooseberry, honeysuckle, some species of horse-tail, and some grasses.

The conclusion of Humboldt and Rose, that some Altaic granites are younger than local schists and slates, remains indisputable. I wish to add that they are also younger than some local greenstones, as may be seen at Beshbanovskoe crags on the Irtysh, near Oostkamenogorsk, where a dioritic breccia is cemented with granitic matrix.

A. BIALOVESKI.

Oostkamenogorsk, Western Siberia, September 20.

Rankine's Investigation of Wave Velocity.

THE investigation relating to the propagation of waves contained in chapter xv. of Maxwell's "Theory of Heat," and based on that of Rankine (pp. 530–31 of "Collected Papers") presents peculiar difficulty to most readers. "The kind of waves to which the investigation applies are those in which the motion of the parts of the substance is along straight lines parallel to the direction in which the wave is propagated, and the wave is defined to be one which is propagated with constant velocity, and the type of which is not altered during its propagation."

Two cross-sections of unit area at a fixed distance apart are conceived to travel through the substance with the velocity of the wave, inclosing between them a cylindrical space within which things are always in the same condition though the matter is continually changing. The momentum of the matter which enters through the front section in the unit of time is duly expressed, and also the momentum of the matter which escapes at the rear section. The difference of these two momenta is then equated to the difference of the pressures before and behind. The puzzle is to justify this *quasi* deduction from the second law of motion; and in connection with this puzzle, the question of sign occurs. For instance, if the momentum of the entering fluid exceeds that of the issuing fluid are we to attribute the gain of momentum to the fact that the contents of the cylinder are more strongly pushed forward behind than they are pushed backward in front? Such is the impression produced on the reader's mind by Maxwell's words: "The only way in which this momentum can be produced is by the action of the external pressures"; but it is not correct.

The momentum included between the two travelling sections is changed in two distinct ways: first, by convection—that is, by gain and loss of moving matter; secondly, by pressure before and behind. *The change from pressure must be equal and opposite to the change from convection; since, by hypothesis, the momentum included between the two sections remains always the same.*

Rankine merely says, "Then in each unit of time the differ-

ence of pressure $p_2 - p_1$ impresses on the mass the acceleration $u_2 - u_1$," and gives no explanation.

I remember being puzzled by this reasoning of Maxwell's some years ago, when I was writing Note A in Part 4 of "Deschanel," and getting over the difficulty by taking the two sections very near together; but my attention has been drawn to it afresh by the receipt of a paper by Prof. MacGregor, of Nova Scotia, in which the difficulty is pointed out, and evaded in the same manner in which I evaded it. Prof. MacGregor points out that Maxwell obtains a correct result only by help of a mistake in the algebraical work—the sign of a difference being changed in obtaining equation (7) from equation (6). This is certainly true as regards the fourth and fifth editions, which are now before me. In a later edition, Prof. MacGregor remarks, the sign of the difference is changed in equation (6), thus making the algebra right, but at the expense of making equation (6) inconsistent with what goes before it. The explanation contained in the sentence printed in italics above clears up the difficulty.

J. D. EVERETT.

Belfast, November 2.

Alpine Haze.

PROF. TYNDALL'S letter in NATURE about Alpine haze induces me to say that as a non-scientific observer I have never, I think, during a residence of many years here, seen so much *local* fog or haze as this autumn.

On October 29—a perfectly clear and cloudless day here (Vevey and La Tour), with no appearance of fog, haze, or cloud, anywhere in the distance—I received a letter from Lausanne saying, "While I write (11.30) so dense a fog has suddenly come up that we fear for the boats on the lake." Other friends took a trip to Lavey les Bains. They were in perfectly clear air until a little beyond Villeneuve, when they found the whole Rhone Valley thick with fog, but on turning off at St. Maurice Station to Lavey les Bains (ten minutes' walk, and on perfectly flat ground) they again came into a quite clear atmosphere. As no fog whatever came here all day, I cannot say whether it was aqueous or not. We have both sorts here from time to time, but most commonly *dry*; this year has been rather an exception. I should say fogs had been more frequently damp than usual, and by observing the grass morning and evening I have found that there has been much more dew than is common in this locality.

Streaky hazes or "long horizontal strise," as Prof. Tyndall calls them, have certainly been unusually prevalent this year.

La Tour de Peilz, November 4.

M. C. C.

The Animals' Institute.

THE long-continued suffering of animals fatally injured in our streets, before the services of a slaughterer can be obtained, or the owner be found to give his permission, has often been referred to. Poor animals with incurable abdominal wounds, or, it may be, complete fracture of a limb, not unfrequently lie in the streets for hours before being put out of their misery. The police have no power to order their destruction until the person in charge assents, and he frequently cannot do this until his master has been communicated with. I remember one case where eight hours elapsed. I have recently found that complete absence of pain can be easily induced by subcutaneous injection of morphia, and perhaps you would allow me to publicly state that the apparatus and drug are always here at the service of the police gratuitously in cases of street accidents.

JOHN ATKINSON.

9 Kinnerton Street, Wilton Place, Knightsbridge,
November 5.

N. M. PRJEVALSKY.

A TELEGRAM from Vyernyi—one of those small Russian towns which have grown of late in the outspurs of the Tian-Shan Mountains—announces the death of Prjevalsky, the bold and indefatigable explorer of the wildernesses of Central Asia. In September last, immediately after having terminated the work which embodies the results of his fourth great journey to Central Asia, he started on a new journey, the fifth, thus prosecuting again what has been the aim of his life during the