tary of our greatest Society to throw cold water on any suggestion made for the good of agriculture, especially in these sad times; but alas for the frosts of June, July, August, and September, which most of our years carry in their bosoms! Gardeners and farmers know them and dread them. Our summers are not to be relied upon, or we should grow tobacco—ay, and grapes!

JOHN WRIGHTSON

Madagascar: an Historical and Descriptive Account of the Island and its Former Dependencies. Compiled by Samuel Pasfield Oliver, late Captain R.A. Two vols. (London: Macmillan and Co., 1886.)

CAPT. OLIVER has made a useful compilation of information on Madagascar in all its aspects. The compilation consists largely of extracts from previous writers. Capt. Oliver himself visited Madagascar a good many years ago, and has naturally taken much interest in the island and its people ever since. It is evident these two volumes must have cost him much labour, which will no doubt be appreciated by those in search of information on Madagascar in a handy form. After an historical sketch, the first volume is devoted to geography, topography, climatology, geology, and natural history. These, in the second volume, are followed by chapters on natural and agricultural products, ethnology, manufactures, administration, trade and finance, bibliography and cartography, and a very long chapter, with appendixes, on the Franco-Malagasy war. The work, we should say, is exceedingly well supplied with maps and plans, of which there are nineteen altogether.

LETTERS TO THE EDITOR

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.]

[The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to insure the appearance even of communications containing interesting and novel facts.]

An Ice Period in the Altai Mountains

M. B. VON COTTA, who once visited the Altai Mountains, is decidedly of opinion that there are no traces of the Ice period on this range. But at the southern part of the Altai, where there are some large glaciers and many ridges covered with eternal snows, there are undoubted traces of a mighty spreading of ancient glaciers. At least this is the conviction I brought back in 1870 from a rapid examination of nearly the same localities as those which have been recently visited by Mr. Bialoveski.

The deposits of ancient glaciers may be observed, far more to the south, on the ranges of Tarbagatay and Saor, the southern limits of the basin of the Irtysh. There are not now any glaciers on Tarbagatay, but some sporadic snow-spots. As to the range of Saor, it attains to the height of 12,500 feet above the level of the sea, and snow always lies there in large masses. But there are no glaciers, properly so called.

Along the northern declivities of these mountains there are at many places large deposits of boulder- or cobble-stones, in great part composed of granite, which forms the crest of both ridges. The boulders are of various rocks and of different sizes, from an inch to some feet in diameter; and they are mingled together in complete confusion, the small boulders being generally well rounded, the large ones more angular, and the intervals being crammed with clay and sand without any traces of layer or assortment. The relation of these deposits to the neighbouring defiles is in most cases incomprehensible. Only at the sources of the River Kenderlik the boulders lie as if the ice which had carried them down had but lately melted. Here, instead of the sections of defiles in the form of the letter V, we find, beginning from the elevation of nearly 3000 feet above the level of the sea, a broad defile with transverse section in the form of the letter U. The walls (or cheeks, as the Russians call them) of this

defile are composed of inclined layers of sandstone and limestone (probably Tertiary deposits), replaced, nearer to the crests, at first by diorite and subsequently by granite. The bottom of the defile is filled up with a close layer of boulder-stones, many of which reach some 10 feet in diameter, the greater number being of gray granite with dark ellipsoidal inclusions. Just the same granite forms the crests of Saor. To the height of 8500 feet the defile rises steeply enough; but after this limit the inclination becomes more faint. Higher up, the defile grows broader, and at the height of 10,000 feet it is stopped up by two deep valleys crammed with close snow, and surrounded by steep snowy peaks. The full length of the layer of boulders reaches some ten English miles, with a direction from south to north.

The Saor chain is a post-Tertiary elevation, but the Altai range certainly arose at a most remote time. It must have formed dry land since the Cretaceous formation at least. Here might be found the solution of the question whether there was on the earth an ice period more ancient than that of which we have evidence in the ice-deposits of Europe and North America. Some facts observed by myself seem to me to show that the question must be answered in the affirmative. E. MICHAELIS

Oostkamenogorsk, November 3

How to make Colourless Specimens of Plants to be preserved in Alcohol

MANY plants assume a brown colour when placed in alcohol for preservation. The colouring-matter is partly soluble in the alcohol, partly not, and is the product of the oxidation of colourless substances of the cell-sap. This unpleasant change may be prevented in a very easy manner by using acid alcohol. To 100 parts of common strong alcohol add 2 parts of the ordinary concentrated solution of hydrochloric acid of the shops. Parts of plants brought into this liquid while yet living will become absolutely colourless, or nearly so, after the alcohol has been sufficiently often renewed. Such parts as already had a brown colour before, being brought into the mixture, usually retain this character.

By this method colourless specimens may be made of such plants as *Orobancha* and *Monotropa*, which, when treated in the ordinary manner, always become of a dark-brown tint. There are only some species with coriaceous leaves that cannot be treated with success with the acid alcohol; colourless specimens of these must be made by plunging them into boiling alcohol.

The acidity of the mixture here recommended is nearly 0.2 Aeq. A greater quantity of acid is neither noxious, nor does it improve the effect. A lesser quantity was in many cases found not to be sufficiently efficacious. The specimens may remain for months, perhaps for ever, in the acid alcohol without any injury.

If the alcohol, after having been used, is to be decolourised by distillation, the acid should be neutralised by a previously-determined quantity of ammonia or carbonate of soda.

Old specimens, which have become brown in consequence of being treated in the ordinary manner, cannot, as a rule, be decolourised by using the acid alcohol. This, however, may often be done by adding to the alcohol some chlorate of potassa and some sulphuric acid. HUGO DE VRIES

University of Amsterdam, December 1

Virtual Velocities

DE MORGAN in his "Differential and Integral Calculus," p. 501, says:—

"The principle of virtual velocities, like all other fundamental theorems, has had no proof given of it in the admission of which all writers agree. From its universality and simplicity it may be supposed to be rather the expression of some axiomatic truth than the proper consequence of first principles by means of a long course of regular deduction."

Would you kindly allow me to submit to your readers the following attempt to base the principle of virtual velocities and D'Alembert's principle on easily admitted axioms?

(1) The power of a force imparted to any molecule is (or is measured by) the product of the force itself, and the effective component in the line of the force, of the velocity of the molecule to which the force is imparted, and is positive or negative accordingly as the force and the effective component of the velocity are in the same or opposite directions.

(2) The power of a system of forces, whether imparted to the

same or different molecules, is the algebraical sum of the powers of the individual forces.

From the parallelogram of motions it follows that—

Prop. I. The power of the resultant of a system of forces imparted to a single molecule is equal to the power of the forces. Whence—

Cor. 1. If the forces imparted to a molecule are in equilibrium, their power for any actual or hypothetical motion of the molecule is zero.

Cor. 2. If the forces imparted to a molecule are not in equilibrium, their power for any motion in the direction of the resultant is positive.

Definition.—A system of molecules is said to be passive for a given motion when for that motion the power of its internal forces is zero.

Prop. II. The power of the external forces of a system for actual or hypothetical motions for which the system is passive is equal to the power of the resultant motions of the several molecules of the system.

For (by Prop. I.) the power of the resultant forces for each (and therefore for all) of the molecules is equal to the power of the external together with that of the internal forces, but the latter, in the case of the entire system, is zero by hypothesis.

Cor. 1. If external forces be imparted to a passive system at rest in a given position such that for any hypothetical motion through that position the power of such forces is zero, the system will remain at rest.

For if motion ensued, the resultant and therefore (Prop. I.) the external forces would have positive power for such motion, which is contrary to hypothesis.

Cor. 2. If external forces be imparted to a passive system at rest, and be in equilibrium, the power of these forces for any hypothetical motion of the system through this position of rest is zero.

For as the whole system is at rest each molecule is at rest, and the resultant forces of the molecules are all of them zero, whence their power and therefore that of the external forces (Prop. I.) is zero.

It will be seen that Prop. II. is (or is equivalent to) *D'Alembert's Principle*, and its two corollaries constitute what is called the *Principle of Virtual Velocities*.

It may be urged that this merely relegates the difficulty to determining for what motions systems are passive. This really, however, presents no difficulty, for it is obvious that a system is passive generally when its internal forces neither tend to produce or destroy kinetic energy in the system; so that (1) rigid systems are passive for all motions consistent with their rigidity; (2) all systems are passive for rigid motion; (3) inelastic and theoretically perfect funicular systems are passive; and (4) inelastic and theoretically perfect fluid systems are passive, &c.

D'Alembert's principle and the principle of virtual velocities ought to form the basis of that part of kinetics which involves the idea of the transmission of force, whether the result is motion or equilibrium. *D'Alembert's principle* is the most general. The principle of virtual velocities is to it what Maclaurin's theorem is to Taylor's. The form in which it is given in Prop. II. above is more convenient for use than that in which it is generally stated, viz. that the resultant forces reversed balance the impressed forces.

Lagrange's proof of the principle of virtual velocities and its modifications are altogether too artificial and unsatisfactory.

Cape of Good Hope

F. GUTHRIE

Recent Gales

THE gales of October 16 and December 8 varied considerably. In the former gale there were constant oscillations, from .004 to .010 of an inch, every 30 seconds between 1 a.m. and 2 a.m.; whilst in the December gale there were no oscillations, but a constant fall that was most rapid during squalls. The difference between the dry and wet bulb thermometers in the October gale was only a quarter of a degree, whilst in that of December it exceeded from $2\frac{1}{2}^{\circ}$ to $3\frac{1}{2}^{\circ}$ (or a difference of from thirteen to eighteen times as great). During the gale in October, 1.160 inches of rain fell, and in that of December 0.758 of an inch.

The lowest reading (corrected for temperature) of the barometer at 530 feet above the sea was on October 16, 28.019, and on December 8, 27.693 inches (this occurred at 8 p.m.).

The barometer reduced to sea-level was less than 28.5 inches from 11.30 a.m. of the 8th till 8.15 a.m. of the 9th (or nearly

21 hours). The October gale was W.S.W., and the December gale W.

	Hour	Barometer reduced to sea-level	Temp.	Wet bulb	Diff.
Oct. 15,	4.15 p.m.	28.880	49.7	49.5	0.2
	16, 12.15 a.m.	28.811	47.8	47.6	0.2
	2.15 "	28.699			
	7.45 "	28.591	47.2	47.0	0.2
	8.30 "	28.668	47.7	47.5	0.2
	10.0 "	28.744	47.8	47.6	0.2
	2.45 p.m.	28.941	47.8	47.6	0.2
	5.0 "	29.042	47.8	46.8	1.0
	Dec. 8, 2.20 a.m.	29.212			
	3.30 "	29.144			
Dec. 8,	8.5 "	28.596			
	10.0 "	28.561	40.3	38.7	1.6
	2.0 p.m.	28.431	40.3	37.5	2.8
	3.30 "	28.378	37.3	34.7	2.6
	6.0 "	28.287			
	7.30 "	28.278			
	8.0 "	28.273	39.7	37.0	2.7
	9.0 "	28.286			
	9, 12.30 a.m.	28.327	37.0	33.4	3.6
	2.45 "	28.297			
	5.50 "	28.342			
	10.0 "	28.642	42.0	38.7	3.3
	7.0 p.m.	28.987			
	10, 10.0 a.m.	29.339	41.6	38.6	3.0

The last gale commenced at 1 a.m. on the 8th (with constant squalls of hail and rain), and was most violent from 4.45 p.m. till 8.30 p.m.

Thunder and lightning occurred from 11 a.m. till 11.30 a.m.; and from 4 p.m. till 4.40 p.m. on the 8th, and from 1.35 a.m. till 2.45 a.m. on the 9th.

Much damage was done to house-roofs. Very few trees were blown down here, for in this exposed situation trees are better prepared to resist gales. About 11 feet of the top of a large specimen of *Picea Webbiana* was destroyed. E. J. LOWE

Shirenewton Hall, Chepstow, December 11

Note on the Manipulation of Glass containing Lead

IN reading Mr. Shenstone's very useful little treatise on glass-blowing (reviewed in *NATURE* of the 9th inst., p. 123), I have failed to notice any mention of an expedient which I have found very useful for dealing with English flint-glass containing much lead silicate; although I greatly prefer for most purposes the readily fusible "soda-glass" used probably everywhere except in England.¹

Of course, all ordinary flames, such as those of the Bunsen burner and the blow-pipe, consist, in part, of reducing gases which cause the separation of lead from glass introduced into them. This reduction can be prevented or remedied, as Mr. Shenstone says, by holding the glass a little in front of the visible flame; but there is in this region hardly enough heat to do all that is required in the manipulation of the glass.

If, however, oxygen instead of air is used in a Herapath blow-pipe, the resulting flame has so little reducing power, that lead-glass can be safely held well within it; and this is the flame that I always use in dealing with such glass.

It is true that oxygen is, at present, rather more expensive than air; but most, if not all, laboratories have a supply of the gas, either in a gas-holder or a bag, for the optical lantern and other purposes; and with it the manipulation of lead-glass becomes what shav ing is, in certain advertisements, said to be—"a luxury."

H. G. MADAN

Eton College

P.S.—The oxy-coal-gas blow-pipe is also extremely useful for difficultly-fusible "combustion-tubing." Bulbs of fair size can be blown, and side-junctions, &c., made in this glass, with almost the same facility as in ordinary "soda-glass."

¹ The best glass of this kind is that used by Geissler, Alvergriat, and others, for making their marvellous specimens of glass-work; but I doubt if glass of the same excellence, in regard to fusibility and freedom from any tendency to devitrify, is generally procurable.