faced manner in which triangles and figures are moved about and turned about and placed upon one another.

The second chapter treats of the subject as handled in the Elementary Treatises, taking chiefly for the basis of remarks the fourth edition of the Geometry, by Messrs. Rouché and De Comberousse.

Chapters III. and IV. are occupied with Trigonometry, and Chapter V., closing the work, treats of Mechanics. The volume is too technical to allow of an extended criticism here, but we can commend it to geometrical students. No statement is made as to how it comes to pass that such a volume was issued under the auspices of the Society named above.

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 ensure the appearance even of communications containing interesting and novel facts.*]

New Methods of Moving Ordnance

In anticipation of an interesting paper and discussion at the intended meeting of the British Association at Sheffield, a complete set of working models has been prepared at the Floating Dock, North Shields, to explain several new applications of a new method of moving ordnance with ease and rapidity of motion in small space, with economy of time and labour.

The most recent of these improvements is an adaptation of the principles of the tramway and tram car, in making use of the perfectly level surface, and the retaining groove, either on the ship's deck or on the platform of a battery. But instead of flanges on the wheels, that have a tendency to clog and compress dirt into the grooves, and "gag" on the edges, a hanging longitudinal guide-plate projects below the wheels on the inside of the rails; this allows greater freedom of action to the wheel and gives greater security, and in order to attain greater power of resistance to any shock or concussion, the guide plates are strengthened by a cross connecting the plate between them. The gun carriage slide has turn-table pivots on four wheels, that can be placed anywhere; as for the real or imaginary centres of motion at the ends, or centrally or to correspond with the present A B C D pivots of the Royal Artillery, which when in line or parallel or at any angle to each other act as stationary or moving pivots or fulcra for a lever movement of the slide, to turn or move in any direction on perfectly straight lines, as the shortest route between any two points, and also as best adapted for the application of a direct action of any of the usual mechanical motive powers.

North Shields, August 1 GEORGE FAWCUS

"Law of Frequency"

The term "law of frequency" seems to be used in two distinct senses by mathematical writers. In the ordinary theory the ambiguity leads to little confusion except to beginners; but this is owing to a fortunate, though altogether special, property of the hypothesis on which the theory is based. When we come to investigate other possible theories, it becomes highly important to keep the distinction in mind. Suppose, for clearness' sake, that we have before us a large number of measurements of a single unknown quantity. On examining them we find that a considerable number agree pretty closely with each other, several are more obviously discrepant, while one or two are widely so. Conversely we are led to think of the frequency with which a given measurement occurs as a function of the magnitude of the measurement itself. Denoting this magnitude by x, we may represent the relative frequency of its occurrence by $\phi(x)$. This function is called the "law of frequency of the measurement x," and it is in this sense that statisticians often use the phrase.

But if we consider all the possible measurements that may be made of the quantity, we see that their number is practically infinite. The relative frequency of any proposed measurement becomes therefore infinitesimal, and we must seek for some other expression. This we find by inverting our ideas, as it were, and asking, not "What is the frequency of a given measurement x?" but "What is the probability that a given measurement shall lie between the two very near values x and $x + \delta x$?" Suppose that our particular theory gives us this latter probability as $\psi(x)\,\delta x$. Then mathematicians generally are wont to call $\psi(x)$ "the law of frequency of the measurement x."

A little consideration will show that on one hypothesis only are $\phi(x)$ and $\psi(x)$ necessarily of the same form. This hypothesis is that the arithmetic mean of our fallible measurements is the best value of the quantity measured which we can obtain from them. From this the ordinary law, $\phi(x) \propto e^{-h^2x^2}$, easily follows.

But if the nature of our measurements (or other discrepant magnitudes) be such as to suggest that some other mean is likely to be nearer the truth than the arithmetic mean, we shall find that the forms of $\phi(x)$ and $\psi(x)$ are not the same. It seems, therefore, desirable that a real distinction in the things signified should be marked by a corresponding distinction in the terms applied to them. If it be not too bold a suggestion, might we not "desynonymise" the terms "law of frequency" and "law of facility," keeping the former for the function I have called $\phi(x)$, and the latter for the commoner function I have represented by $\psi(x)$? DONALD MCALISTER

St. John's College, Cambridge, July 28

Carica Papaya

Thanks to Mr. Whitmee for his timely correction of my perhaps too dogmatic assertion as to the seeds of the Papau being rejected by birds, at p. 241. Had I not written off-hand I should have qualified the sentence "the birds however will not touch them," *i.e.* the fruit, by adding "as far as I have observed."

We had flocks of small birds inhabiting the casuerinas and banyans which shaded our sea-side quarters at Rivière Noire, Mauritius; they were mostly small birds such as "bengalis," (*Estrelda amandava*), "senegalis," (*Estrelda astrilda*), "calfats," (*Munia oryzivora*) "tuit-tuits," (*Oxynotus ferrugineus*), cardinals, crithagras, serins, &c., as numerous as finches and sparrows in our English gardens: but never did I see any of these birds, which were as bold and tame as possible, peck at the papaus either on the plants or on the ground; had they been in the habit of doing so I must have observed them. The "martins" or minas of the interior did not trouble us with their visits and noisy chatterings, so I cannot say whether they affect the papau seeds much. It is possible that the "pigeons marrons" and various "tourterelles" may have fed on the papau fruit but I never found any of the seeds in their crops.

The flying foxes, "collets rouges," (*Pteropus Edwarsii*), used to come down in numbers to eat the mangoes of our neighbour, Mons. Genéve; when we used to shoot them on moonlight nights and find them remarkably good eating, but I never knew or heard of their eating the papau, which perhaps they do. The conditions of the Mascarene and Navigator's islands are probably different, as the *Carica* certainly does not spring up as a weed wherever forests are cleared in Mauritius, or Bourbon. The *Carica papaya* figures as a *cultivated* and not an *intrusive* plant in Dr. Charles Pickering's table of observed localities of plants introduced throughout Polynesia; distinguishing for each plant, whether it appears to be native, or spontaneously disseminated, and whether when introduced apparently by the hand of man it has become naturalised or *intrusive*. Certainly Dr. Pickering's work is out of date (1848), and I have not yet seen his new work *Chronological History of Plants* (Trübner, 1879).

Whilst on this subject I may subjoin a paragraph I came across in a number of the *Gardener's Chronicle* about the papau, with which I conclude.

"*Utilisation of the Papaw.*—The peculiar properties of the Papaw (*Carica papaya*) in causing the separation of animal tissues, and thus rendering newly-killed meat tender, is a fact that has been frequently written about and commented upon by travellers. Our contemporary, *The Chemist and Druggist*, suggests, as a 'possible specialty,' the production of some convenient preparation from the tree which should contain the same properties as the leaves, or whether the leaves themselves might be dried and still retain their activity. 'There is no doubt,' they say, 'that a preparation which really embodied