

disclaim (having no title to it) the experience he assigns to me in reference to the dangerously ulcerated throat, never having made myself a martyr to science by so experimenting in *propria persona*. I have no doubt, however, as I have elsewhere stated, that this method of treating a cobra bite would not be devoid of danger to the operator.

As to venomous caterpillars. There is one much dreaded by sportsmen in the Himalayan Terai. It is said to be apt to fall from the trees on to persons passing or resting beneath their branches, and causes great irritation of the parts with which it comes in contact, amounting, I have been told, in some cases to erysipelatos inflammation. It is a moderate-sized, dark-coloured, hairy caterpillar, and known (I believe) in those parts of the Terai where I have been, as the *komla*. I have never seen it, but during my tiger-shooting expeditions into the Terai, it was always one of the probable inconveniences to be looked for in a camp in the tree jungle. I have heard many stories of the painful and irritating effects of contact with this creature, whose hairs are said to cause those results not only by breaking into but by also inoculating some irritating secretion into the skin.

London, May 4

J. FAYRE

I HAVE just read with interest your report of the paper on "Venomous Caterpillars," which appeared in your last. Towards the end of the report Mr. A. Murray refers to a hairy caterpillar which he received from Brazil, and remarks that "if the caterpillars have a special venom, then, as in the nettle, there should be a gland at the base of each hair, which should be hollow." I think I know the caterpillar to which he refers, and if I am right, its hairs are not exactly venomous, but produce a considerable amount of irritation in the skin. When in Brazil in 1859, I collected some of these caterpillars. They are very similar in appearance to the larvae of the British Arctic, but when their hairs are examined under a microscope, they are found to consist of a series of barbed points, the point of each succeeding barb fitting into the divergence of the preceding barbs; at least, that is my recollection, for I have not examined them since then, and cannot find any specimens to do so now. The caterpillar is called in Maranham, "largata de fogo," that is, "fire caterpillar." After these hairs have afforded their protection to the caterpillar during its life, it carefully removes them from its body and weaves them in its cocoon, so that the pupa is thus as safe from intruders as the larva itself was. When a child, I recollect that Maranham was occasionally visited by great numbers of a particular kind of moth, the dust of whose wings produced a very great irritation on the skin, the least touch of one being sufficient to render you miserable for the rest of the evening. I perfectly remember a drove of these putting a quick termination to a small dance at home, as you may easily conjecture that ladies in evening costume are not well protected against such visitors. When in Maranham in 1859, I heard that these moths had not been seen there for many years. I believe their visits were during the rainy season. Some of the British Bombices, *B. quercus*, for example, and some of other genera, are said to possess irritable hair. But in *B. quercus* the hairs are not barbed, and, not being an entomologist, I can give no information respecting the others.

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Anatomical School, Cambridge, May 5

#### On some Errors of Statement concerning Organ-pipes in Recent Treatises on Natural Philosophy

THAT our best teachers of science, both in their books and lectures make statements which are erroneous in fact, and inferences which are misleading whenever they touch upon the subject of wind instruments is not a little surprising, considering that intellects so highly trained hold in aversion any approach to inexactness, and the strangeness of it is that the errors arise through an ancient human custom, now supposed obsolete among philosophers, of "speaking without knowledge."

The evidence, if tendered, would fill some few pages of this paper, and if names were appended to the quotations the list would include authors most esteemed and honoured.

To cite two instances among many—and they are from works of unquestioned value and authority, and supposed to bring down sciences to the latest date—in the recently completed translation by Prof. Everett of Prof. Privat-Deschanel's "Natural Philosophy," the following passage occurs in explanation of the organ-pipe:—"The air from the bellows arrives through the conical tube at the lower end, and before entering the main body of the pipe has to pass through a narrow slit, in issuing from

which it impinges on the thin end of the wedge placed directly opposite, called the lip. This lip is itself capable of vibrating in unison with any note lying within a wide range, and the note which is actually emitted is determined by the resonance of the column of air in the pipe." In another equally valuable work, the "Physics," by Prof. Ganot, translated by Prof. Atkinson, this description is given respecting the free-reed—"the tongue which vibrates alternately before and behind the aperture, merely grazing the edges as seen in the harmonium, concertina, &c., such a reed is called a free reed." Four professors responsible for statements so perversely at variance with facts that it is not possible either writer can have even attempted to ascertain, still less to demonstrate that the facts are as asserted. Practical experience affirms that the lip of the organ-pipe does not vibrate; press it with your hand or hold it in a vice to deaden the assumed vibration, and you will not alter one iota of the pitch of the sounding note: that the free-reed does not in its vibration "merely graze the frame;" it would be fatal to its proper speech if it did, and its vibrations would be checked in a jarring rattle. The facts are too simple to need argument; all that was required was observation.

When Ganot, describing a metal free reed, affirms as a law that when the force of air is increased the pitch of the reed rises, his statement is inexact, for it depends entirely on the accident of taking up a reed more or less rigid in proportion to scale, whether the experimentalist shall prove his assertion or prove the reverse. In the harmonium, of a set of five octaves of reeds, half will go more or less sharp, and half will go more or less flat, as the force of wind is increased, a fact which, if more generally known, might induce players to mitigate some of the insufferable harshness and jangling inflicted on listeners. That "a sharp edge" is essential to the functions of the flue organ-pipe is one of the commonest errors entertained by philosophers, and it forms the groundwork for whole pages of false theory. In treatise after treatise it is stated "the air is driven against the sharp edge," "is split upon the sharp edge, and by concussion caused to proceed intermittingly," "the air strikes the sharp edge," "is divided," "is lacerated," "strikes against the upper lip, and a shock is produced which causes the air to issue in an intermittent manner." Another equally common misstatement, and important because so strongly influencing theory, is that "a closed pipe gives a note an octave in pitch lower than an open pipe of the same length; the length of a closed organ-pipe is one-fourth that of the sonorous wave it produces in the air." Proved facts give different results. At my hand this morning there stood a sounding-pipe perfect in finish, its lip quite blunt, by measurement at the edge half an inch in thickness; and whole ranks of pipes were there in various grades of conformation, showing that the sharp edge was immaterial to the functions of a speaking-pipe. Sometimes the chamfering of the lip is desirable, sometimes not, and the builder decides according to the quality and character of each stop. The art in "voicing" a pipe consists in so directing the stream of air that it shall avoid striking the lip, and shall smoothly glide past without shock or noise, or concussion; you get no tone until it does. Actual experiment will show that a closed pipe gives a note only a major seventh below the note it gives as an open pipe, not an octave below; indeed, in the higher range of pipes it will be a whole tone short of the octave, to sound which the pipe would need to be made considerably longer. As having some significance in connection with this, it may be mentioned that there is in an open pipe, whilst sounding, a centre of equilibrium of pressure; it does not occur, as supposed, at the true half of the length, but somewhat below that division; as evidence, take the Flute Harmonique, when desiring to strike the note, it will always be found below the half. Further, as to length. If the open diapason pipe beside me, giving as fine a tone (CCC) as musician can desire, measures 14 ft. 10 in. in length, and its corresponding sound-wave claims 16 ft. or nearer 17 ft., the wide divergence merits better investigation than it has hitherto received. The experiments of Regnault and Seebeck are highly important to this question, but do not reach the conditions pressing for explanation in a speaking organ-pipe. To attempt to demonstrate the laws of organ-pipes with a tuning-fork is as inconclusive as sending galvanic electricity through a dead body and calling the movement life.

There is little difficulty in understanding how it happens that errors respecting wind instruments arise and are perpetuated. Experimental philosophers are occupied with the weightier matters of science, are rarely musicians or familiar with wind instru-