

where N_0 is the fundamental frequency of a pipe of constant diameter and of the same total length, and

$$\rho = \left(1 - \frac{D_n}{D_w}\right)^{\frac{1}{2}},$$

where D_n and D_w are the diameters of the narrow and wide portions respectively. In the frequency formula the positive sign is taken if the narrow end is closed, the negative sign if one closes the wide end. The latter case is identical with that of the Bicylindron invented by Principal Aldis.

Cermak then proceeded to examine the change of pitch of pipes in which the two portions had a constant difference of diameter, when the junction was gradually moved from the narrow to the broad end, which was closed, and then for the opposite direction of movement with the narrow end closed, the total length being kept constant in both cases. He shows, as also did Principal Aldis, that the pitch in the first case falls to a minimum when the lengths of the two portions are equal, and then rises to its original value when the tube is once more uniform. Combining these results he obtains empirical formulæ giving the fundamental frequency of any closed pipe formed of any number of straight portions of any length and cross-section. His formulæ agree with his observations extremely well, but they are very complicated and most wearisome to handle.

Cermak obtains empirical formulæ for the case of the Rohrflöte, which also fit the results of experiment remarkably well, but he points out that Gerhardt's deductions differ from his observations most where his formulæ show best agreement, and vice versa.

From a brief examination of his curves, I should have expected that a formula built up from transcendental terms would be simpler, easier to handle, and give as good agreement, and, moreover, would give some insight into the physical meaning of the changes. Since Gerhardt's result admits only of graphical solution and conveys little sense of physical reality, one would welcome any equation, even though it were empirical, which might permit of the immediate solution of a problem, and if possible one which would admit of a simple physical interpretation. In the development of the compound resonator such formulæ would be invaluable.

Cermak's work is, moreover, extremely thorough. Of recent years many physicists have produced theories based on observations made with a single pipe, or at most three. Cermak used fifty-eight different pipes, and traced interesting analogies of the phenomena in the creation of longitudinal vibrations in rods of non-uniform section, in the transversal vibrations of strings having sudden changes of diameter, and in the resonance of electromagnetic oscillations in a parallel wire system in which the distance between the wires suddenly changes. To these I should like to add the effect of inserting a short length of wider tubing in a water pipe line in Constantinesco's wave-power transmission.

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The Word "Scientist" or its Substitute.

THERE is a prejudice against this word. Some profess etymological scruples; they say it is an ugly hybrid with a Latin root and a Greek termination. But surely this is not a serious objection or the one which really prevents its use. For the accusation is not true. The termination *-ist* is French, not Greek; if "scientist" had come from the French it would

have been as unexceptionable as "artist," which is an exact parallel; it did not come from French merely because French scientists, having appropriated *savant* (to which we have no close analogy), had no need of it. Even if the accusation were true, those who swallow "voltmeter" and "ionisation" would scarcely strain at such a very mild inelegance.

The real objection, I think, is different. "Scientist" was a doubtful neologism at a time when scientists were in trouble about their style. They were accused, with some truth, of being slovenly; and those who aimed at a higher standard were careful not to offer the slightest cause for offence. The word became a shibboleth. Matters have, however, now changed; we no longer need a shibboleth. Our sentences may not always be polished, but scientific journals contain no higher proportion of gross errors than the Proceedings of the Aristotelian Society or of the Classical Association. Moreover, the word has arrived; there is no chance of suppressing it entirely. Even if so far it were confined wholly to the illiterate—which it most certainly is not—we ought (as the authors of "The King's English" say) to "begin seriously to consider whether it has not been resisted as long as honour demands." Cumbrous circumlocutions, such as "man of science"—offensive to feminists and with an artificial air no artifice can conceal—are wretched substitutes. The idea is definite and important; the discovery that there is something common in the intellectual attitude of all the sciences and foreign to other branches of learning is one of the greatest advances made by the thought of the last century. For a new thing (to quote the same authors) we must have a new name.

Let me therefore plead with you, Sir, who have done so much to raise the standard of scientific literature, and with all others who have striven to show that scientific and linguistic precision are not incompatible, to give us a lead in this matter. If you will not have "scientist," at least provide us with some other single word.

NORMAN R. CAMPBELL.

[Hitherto the word "scientist" has not been used in the columns of NATURE to designate a man of science or scientific worker, and Dr. Campbell now suggests that the time has come to reconsider the exclusion of the word. Our language has grown into what it is through process of change and development, and there is no permanent standard of purity for it; so that new words and phrases are continually being incorporated while others are becoming archaic. The only criterion as to what is permissible is that afforded by refined feeling or usage in the best literature of a particular epoch. We have, therefore, invited a number of authorities on good English, including distinguished men of science, to favour us with their opinions on the desirability, or otherwise, of adopting the word "scientist" to signify generically one who has at different periods been described as a natural philosopher, naturalist, or man of science, and we propose to publish any replies received of a critical or constructive kind.]

EDITOR, NATURE.]

Cell-wall Formation.

A CHARACTERISTIC difference between the processes of cell-wall formation in plants and animals has long been recognised. In the tissues of higher plants a new cell-wall is generally laid down on the nuclear spindle and then spreads peripherally until it cuts the cell into two. The cell-wall may thus be said to be endogenous in its origin. It is also generally believed that this plate on the spindle is first formed by the coalescence of a row of granules, afterwards