Dr. E. J. Salisbury in a paper published in conjunction with the Phenological Report for 1920 (Q.J.R. Meteor. Soc., October 1921).

The average dates of leafing, flowering, etc., of a particular species is the result of *prolonged* adaptation to climate, and whilst the deviations of particular individuals from that date is controlled in part by local conditions of habitat, etc., the deviations of the same individuals in different years are governed not only by the weather of the current season but also by that of the previous season. The deviations from year to year are really kept within remarkably narrow limits, and there can be no doubt that force of habit is all-important in causing the periodic processes of vegetation to occur as near to the same dates year by year as external meteorological vicissitudes will permit. L. C. W. BONACINA.

27 Tanza Road, Hampstead, N.W.3, March 12.

The Resonance Theory of Hearing.

DR. PERRETT will, I hope, excuse me if I have seemed to impute absurdities to him (NATURE, February 9, p. 176). My reason for replying to his letter was because it seemed to me unfair to the resonance theory to leave his criticism unquestioned. But perhaps the consideration of an example will help to bridge the difference of opinion between us. Prof. Millar in his "Science of Musical Sounds" has given, on p. 201, analyses of the intensities of the harmonics of the oboe and clarionet. Whereas the clarionet note has harmonics of which the 8th, 9th, and 10th are the strongest, in the oboe note, on the other hand, the 4th and 5th harmonics have the greatest intensity If, then, the ear heard both these instruments sounding the same tone at one and the same time, it would hear one fundamental accompanied by strong 4th, 5th, 8th, 9th, and 10th harmonics.

Now no musical instrument of which Prof. Millar gives the analysis has these harmonics strongly marked, and the chances are enormously against any *one* musical instrument whatever having precisely the same intensities of the harmonics as those of the oboe and clarionet sounding the same tone together. In other words, there is something quite unique about the harmonics in the case that I have taken, which should enable the observer to say that the sound is to him not like an oboe only, or a clarionet only, but as if an oboe and a clarionet were speaking the same tone at the same moment. Now I do not say that the ear can never be deceived, for Helmholtz himself showed that vowels even, can be imitated by means of tuning-forks, but it seems to me that the characteristic intensities of harmonics do in almost all cases enable an observer to recognise the sounds of different classes of musical instruments even when any two of them are playing the same tone. Let us turn finally to the case which Dr. Perrett mentions, namely, when the voice is accompanied by the same tone produced by the chattering teeth. We know from the works of Helmholtz, Millar, and many others that the voice overtones have one maximum of intensity for the vowels "o" and "a" and two maxima for "e," "i" and "u," other overtones being very weakly represented. We also know that discontinuous sounds, such as those produced by tooth striking tooth, are very rich in overtones, and that these do not occur in maxima in any definite way. We should, therefore, expect the voice and the teeth-sound to have overtones very different in their intensity distribution. Therefore the observer should, so far as one can judge, hear overtones as characteristic on which to base his judgment, as those given out by oboe and clarionet.

I must, therefore, repeat that, in my opinion, Dr. Perrett is mistaken in his objection to the resonance theory. H. HARTRIDGE.

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Snow Furrows and Ripples.

WHILE at Gstaad recently, after a fine fall of snow (about 24 inches), the Föhn blew and rain fell for some hours. The weather then cleared, the temperature falling below freezing-point, and the snow then presented the appearance shown on the accompanying picture (Fig. 1). The peculiar "silloné" appearance of the snow on the slopes is very striking. It looks as though water had run down over the surface, but this did not happen during the rain or afterwards.

FIG. 1.

As to the origin of the "furrows" (sillons), I think they were caused by contraction of the snow, as the gentle rain wet the fine-grained snow particles and drew them together. I observed afterwards the same development of furrows during fine weather on sunny slopes. These were so shallow that I failed to photograph them, but the whole hillside was covered with them. I also noticed that they occurred on the low-lying flat meadows, although they had no particular orientation in that case and occurred in every direction. This may be discerned in the lower parts of Fig. 1. E. C. BARTON.

I WAS once out on the snow-covered prairie at Moose Jaw, Saskatchewan, when suddenly, the hot chinook wind began to blow, the counterpart of the Alpine föhn. The snow melted away with astonishing rapidity, and very soon there was the sound of trickling water, which I had not heard for months, for the season was late winter. The melting was not uniform, nor did it produce longitudinal furrows, but on the contrary a rippled structure of ridges and furrows transverse to the wind, adding yet one more variety to the many kinds of ripples which I had seen in snows of different consistency.

VAUGHAN CORNISH.