the vapour-laden air inside or near the fumarole, might be the cause of a rapid and continuous condensing of the invisible vapour. I noticed that the "powdering" of the air with any kind of dust increased the cloudy column issuing from the Bocca of the Solfatara. I am therefore led to believe that the action of a paper- or faggot-flame in causing the increase of visible vapour from the Bocca of the Solfatara is due both to the production of carbon dioxide and to the increase of solid particles of soot and of light unburnt fragments made to rise and float in the air.

These experiments may help in explaining the action of explosives in causing a downfall of rain. Not only does the explosion produce a certain amount of carbon dioxide, but dust is widely scattered in the air, and carried upwards by the hot gases produced in the explosion. If the results of the experiments in Texas and Kansas by General Dyrenfurth and Prof. Curtis be confirmed, it would be interesting to see if the condensation of vapour in the atmosphere could be better insured by purposely increasing the quantity of dust produced in each explosion. The effect would perhaps be enhanced if the dust were of a markedly hygroscopical nature: the scattering in high air of very minute particles of calcium chloride should help in the making of cloud and rain. ITALO GIGLIOLI.

Laboratory of Agricultural Chemistry,
Royal Agricultural College, Portici, near Naples,
October 12.

Weather Cycles and Severe Winters.

THE following view of the relations of severe winters is one which I do not remember to have seen stated.

Consider the 79 years 1812–90 (at Greenwich), and let us take, as a measure of winter cold, the mean temperature of the three months December, January, and February. Divide the series of years at 1860; giving a first series of 48 years (1812–59), and a second of 31 years (1860–90).

Now consider the first series. The coldest winter in it is 1813 (meaning, by that, 1813–14). The coldest of the following winters is 1829; the coldest of the following, 1840; then come (reckoning similarly) 1844 and 1846 (equal), 1854, 1859. The absolute order of decreasing severity is to some extent the same, but at certain points the order of time is reversed.

Next take the second series. The coldest winter in this is 1890 (*i.e.* 1890-91); the coldest of those preceding, 1878; the coldest of those preceding, 1870; then come (similarly) 1864 and 1860.

Thus we have a succession of severe winters of decreasing severity, and another, after it, of growing severity.

We may tabulate the data:—

Severe winters with lessening severity.	Mean temperature.	Severe winters with growing severity.	Mean temperature.
	°		°
1813 ...	31·9	1860 ...	37·4
1829 ...	33·2	1864 ...	37·1
1840 ...	33·9	1870 ...	36·4
1844 ...	34·9	1878 ...	34·6
1846 ...	34·9	1890 ...	34·1
1854 ...	35·6		
1859 ...	37·4		

These data, put into the form of a graphic diagram, give a wave whose crest (mildest of the severe winters) we seem to have passed in the sixties. And it would appear judging by the past, that we have not yet reached the bottom of the hollow; but that after some years' interval we may have a winter even more severe than last, possibly we may have more than one, of growing severity.

It is right to state that, as far as 1856, the values of mean temperature used are those of Mr. Belleville, reduced to sea-level, as given in a paper by Mr. Eaton to the Royal Meteorological Society (Quarterly Journal, January 1888); after that date, those of Greenwich Observatory, published annually. The slight difference in kind does not materially affect the result.

In the *Meteorologische Zeitschrift* for September, M. Woeikof considers the question whether winters in Russia have been growing warmer, and his examination of the St. Petersburg records, from 1744 to 1890 (noting the number of cold days), leads to an affirmative answer. The number of very cold days has, on the whole, fallen off considerably in the later sixty-three years compared with the earlier, and in the second half of our century, as compared with the eighteenth and the earlier half of the nineteenth.

This, he finds, corresponds with popular opinion for Northern and Central Russia, according to which intense frosts have become more rare; but in the south, in the Crimea, the Caucasus, and Turkestan, there have been complaints of colder winters of late.

Mr. Glaisher some time ago expressed the view that our winters had been becoming milder. I have seen a criticism of this view, to the effect that the proximity of Greenwich to such a rapidly growing city as London might have to do with such a result. If the facts are as I have suggested above, a growing severity has taken the place of growing mildness, and the criticism referred to would fail to apply. A. B. M.

A Lunar Rainbow.

ON the evening of Saturday, October 17, at about 6.30 p.m., the rare and interesting phenomenon of a lunar rainbow was observed from Patterdale, Westmoreland. On the south-east, the moon, which had just risen, brightened the sky behind the mountains, while on the north-west there hung a uniformly dark and unbroken screen of haze or rain-cloud, which lightened off somewhat and was more scattered on the extreme west. With its highest point lying almost exactly north-west, a semi-circle of pale whitish light was projected against this vapoury curtain. The bow was quite complete, but much brighter and sharper on its northern arc than on that falling south. The brighter portion fell over weird and clear into Glenridding (a favourite haunt of sun-painted rainbows), and as seen striped against the dark hill-sides of that valley, appeared to emit a pale-blue phosphorescent glare. At one time a shred of the dark smoky haze scudded over, but did not completely obscure the highest reaches of the spectral light. The radius appeared smaller than in the case of an ordinary solar rainbow, and the breadth of beam was about one-half thereof, or perhaps rather less. The spectacle having lasted for about eight minutes, light rain began to fall, and then the sky in a very short time became quite clear and star-lit, and all was over.

P. Q. KEEGAN.

Patterdale, Westmoreland, October 17.

The Destruction of Mosquitoes.

THE recent mention of this subject in your pages reminds me that I was told a few years ago by an English gentleman who has a most beautiful place on the Riviera that he had freed his property from this pest.

The property in question is a peninsula, and for that reason is exceptionally open to separate treatment. On the Riviera, as many of your readers will know, fresh water is a somewhat rare commodity, and all of it that the inhabitants can lay hold of is stored for future use in tanks or small receptacles.

The larva of the mosquito lives, as I understand, only in fresh water. Consequently, on the Riviera he is found in the tanks I have named.

The carp is, I am told, passionately fond of the larva of the mosquito, and the Englishman I refer to had extirpated the insect by putting a pair of the fish in every tank.

The plan is not one that could be adopted everywhere, but it is worth bringing under the notice of those whose circumstances are like those of the Riviera. S. A. M.

Law of Tensions.

POSSIBLY many science teachers find some little difficulty in satisfactorily demonstrating to a class the "law of tensions" for vibrating strings. In practice, unless the sonometer is fixed vertically, the error introduced by friction at the pulley (especially with heavy weights) is so great that the real tension is very different from that represented by the weight attached. Even if the apparatus be thus fixed, the changing of the weights occupies time, and a comparison wire is necessary, which must first be tuned to exact unison. The following admirable and very simple method was suggested to me by one of my students, and possibly there are some teachers to whom the idea is new.

Instead of applying tension by attaching weights, the result may be effected much more readily by means of an ordinary spring suspension-balance, such as is often used for weighing

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