Now if we write instead of the above—

$$n = \frac{k}{d\,l}\sqrt{\frac{T}{s}},$$

where k is some constant, it is evident that k will not depend on the nature of the string but solely on the system of units employed to express d, l, and T.

If C.G.S. units be employed, we have, as stated in Prof. Everett's translation of Deschanel—

$$n = \frac{1}{2\,l}\sqrt{\frac{T}{m}},$$

where m is the mass of unit length; and as we may write instead of m, $\pi r^2 s$, r being the radius of the wire, we shall have—

$$n = \frac{1}{\sqrt{\pi}} \cdot \frac{1}{2\,r\,l} \cdot \sqrt{\frac{T}{s}}, \text{ or } \frac{1}{\sqrt{\pi}} \cdot \frac{1}{d\,l} \cdot \sqrt{\frac{T}{s}},$$

so that here $k = \frac{1}{\sqrt{\pi}} = \cdot 5642$ approximately.

With any other system of units we may of course determine k from the value just given, by multiplying or dividing by the ratios of the new to the C.G.S. units; for example, if d be expressed in millimetres, l in metres, and T in kilogrammes, our new constant would be—

$$k = \frac{1}{\sqrt{\pi}} \cdot \frac{10}{1} \cdot \frac{1}{100} \cdot \sqrt{981000}$$

$$= \frac{99\cdot 04}{\sqrt{\pi}} = 55\cdot 87.$$

But we may also determine k directly for any system of units in the following manner:—If, in the formula—

$$n = \frac{k}{d\,l}\sqrt{\frac{T}{s}},$$

we make d, l, T, s, each unity, we shall have—

$$n = k.$$

Imagine then a wire of water, 1 mm. diam., 1 metre long, stretched by a weight of 1 kilo.: its weight would be $\cdot 7854$ grm., and H, the "tension length," or length which would be equal in weight to the stretching weight, would be $\frac{1000}{\cdot 7854}$ = 1273·2 metres. The velocity v of transmission of a pulse along the wire would be $\sqrt{g\,H} = \sqrt{9\cdot 81 \times 1273\cdot 2} = 111\cdot 76$ metres per second, and the number of vibrations per second—

$$n = \frac{v}{2\,l} = \frac{111\cdot 76}{2} = 55\cdot 88 = k,$$

the same figure as that obtained above.

If the units in which d, l, and T are expressed are respectively the tenth of an inch, the foot, and the pound, k becomes 48·66.

In the later editions of Ganot's "Physics" we find the formula—

$$n = 9\cdot 8257\sqrt{\frac{c}{l}}$$

given, where c is the "tension length," and l the length of the string, both expressed in inches. This formula would of course be of more easy application than those given above when we know the weight per foot of the string, but does not directly show the relation of n to the diameter and specific gravity.

W. J. GREY
Newcastle-on-Tyne J. T. DUNN

The U.S. Weather Charts

I SHOULD be much obliged if you would inform me whether the United States Monthly Charts of Meteorological Data, in continuation of the series published in NATURE, can be procured in London, and if so where. H. M.

6, Charles Street, Grosvenor Square, December 7

Climate of Vancouver Island

MR. ALFRED R. WALLACE asserts in his letter published in NATURE, vol. xxiii. p. 124, that the climate of Vancouver Island is not so mild as that of London.

For three years I commanded a gunboat on those shores; speaking from recollection, and not from recorded observations, and with great deference to so distinguished a naturalist as Mr. Wallace, I should have said that the climate of Vancouver Island was a good deal milder than that of London.

EDMUND H. VERNEY

Travellers' Club, Pall Mall, S.W., December 11

Meteors

ON the evening of November 20 at about 8 p.m. my attention was attracted by a number of meteors appearing as often as once per minute in different quarters of the heavens, but pursuing courses apparently radiating from a point near the constellation Andromeda. M. A. VEEDER

Lyons, New York, November 22

THE PROBABILITY OF PHYLLOXERA CROSSING THE TROPICS

MUCH alarm has been felt by the wine-growers of South Africa at the possibility of the phylloxera being introduced into the Cape vineyards. Very stringent regulations have been framed in consequence, prohibiting the importation of living plants or vegetables in any form; and so rigidly have these regulations been carried out that it is stated that, in accordance with them, a cargo of potatoes from New Zealand was destroyed on its reaching Capetown.

It is generally conceded by the experts who have been consulted that the importation of vines, on the tissues of which the phylloxera would be able to live in transit, must be prohibited. The phylloxera can however, it is admitted, feed on no other plant but the vine, and the important question for the South African Government to decide is whether it is really needful to exclude other plants or vegetables besides the vine. In order to obtain the best opinion upon this point, Dr. Maxime Cornu was consulted. He accordingly drew up several reports, in which he expresses the opinion that, though extremely unlikely, it is still theoretically possible that the phylloxera should be conveyed from Europe to South Africa by means of other vegetable products than the vine, and he therefore supports the prohibitive action taken by the Cape Government.

The inconvenience to the community which such a policy involves is necessarily considerable. The grounds of Dr. Maxime Cornu's decision have therefore been carefully considered by an entomologist who has studied the subject and who has drawn up the following notes The question is of great importance to all wine-growing countries in the southern hemisphere, and as these doubtless contain many readers of NATURE, I think the publication of these notes in its columns will give them the best opportunity of being fairly considered.

W. T. T. D.

Notes on Dr. Cornu's Reports on the Phylloxera, and on the Protective Measures against its Introduction.

Among the "truths" laid down in the first report, No. I. is, "The *Phylloxera vastatrix* lives only upon the vine." This is emphasised in the third report ("Memorandum on Laws of Protection, &c."), Paragraph No. IV., stating, "they (the insects) can, moreover, subsist only upon the vine."

Notwithstanding these unreserved statements of this fundamental fact in the life history of phylloxera, the same "Memorandum on Laws of Protection, &c.," proceeds (in its "General Conclusion") to recommend, "if such a course were possible," the imitation of "the example set by Algeria, and to forbid the introduction of all vegetable products whatever, with the exception of those which are absolutely required for consumption."

It may well be asked on what ground such a recommendation is based. After stating (Third Report, Paragraph IV.) that the phylloxera cannot live when dissociated from the vine for more than four or five days, and requires protection from dessication in any case, Dr.

Cornu proceeds (Paragraph V.) to sketch "the most favourable conditions for the introduction of the insect" as follows:—"A phylloxera is removed in the soil, say a pregnant mother, which survives for a period of five days; it lays an egg before dying; the egg takes fifteen days to hatch (at the mean temperature of 59 deg. Fahr.), and the young insect which is produced five days to die. This makes in all twenty-five days." That is to say, that the maternal phylloxera, when in *articulo mortis* at the end of her five days' dessication and starvation, is to lay an egg; that this egg, produced under such extraordinary conditions, is to hatch in due course, and, after undergoing total starvation from its birth, is to live out the normal term of five days allotted to the mother (presumably well fed until she started on the dolorous voyage), and after all this is to land at the Cape and propagate its species in the nearest vineyard at hand! If these are "the most favourable conditions" under which the phylloxera would be introduced, we may surely say with Dr. Cornu in another part of the same report (Paragraph VII. *a*) that "it would require a concatenation of circumstances which it is difficult to imagine to bring about the misfortune of the insect's introduction." It is as well also to note that the writer expressly states (Paragraph V.) that the egg's hatching is accelerated when the temperature exceeds 59 deg. Fahr., so that in the supposed case, if the starveling progeny ever did see the light on the voyage, it would probably emerge in a tropical temperature long before the normal fifteen days allowed, and so resign its life of total abstinence before reaching the promised land of plenty at the Cape.

Let us now turn to the "winter egg," which, as Dr. Cornu states (Paragraph VI.), "is particularly to be dreaded." This is the rarest condition of the insect, each female of the generation which includes both sexes laying only one egg (Paragraph VI.).

"It is to this egg alone that the introduction of the phylloxera in packing-cases, straw, &c., could be attributed; this would however require confirmation; in fact I am not aware of any well-authenticated instance of the introduction of the phylloxera resulting from the transmission of the winter egg" (Paragraph VII.).

This admission on the writer's part seems to reduce any apprehension about the winter egg to infinitesimal proportions, especially when it is noted that the "winter egg," as its title implies, is a state limited to cold weather, and "commences to develop at the return of the fine weather" (Paragraph VI.). If a specimen of this rare *œuf d'hiver* did by any chance (in the absence of the vine-stems or branches upon which it is laid) start on a voyage for South Africa, we may be very sure that in its passage through the whole extent of both tropics it would very speedily cease to merit its title, and become a miserable *phylloxèra d'été*, only to share the fate of its luckless relative, produced from the last dying egg of the *mere pondeuse*. It does not mend matters to find Dr. Cornu stating in italics (Paragraph VII.), "Such introduction is nevertheless possible from a scientific point of view." Impossibility can with accuracy be predicated of but very few propositions; as a rule it is safer to say of most matters apparently incredible that it is next to impossible, and this may very certainly be said in the present case; and when all known facts and conditions place every probability against a bare possibility, wise men will know how to act.

As long as vines and all parts of vines from abroad are kept out of the Cape, the requirements of the wine industry are fully met. This prohibition was put in force by the late Government, by Proclamation No. 88, of November 30, 1876, and has been in force ever since that date. As late as the 4th December last, attention was specially directed to this Proclamation, with the intimation that its provisions would be strictly enforced (in Government Notice, No. 1288, of 1879) The present superfluous and vexatious restrictions were added by Proclamation No. 14, of January, 1880, and all the facts adduced by Dr. Cornu point to their futility.

SONGS OF THE SCIENCES—I. ZOOLOGY

WE must regard it as a noteworthy sign that science has begun to percolate so through society generally that it has reached the pages of *Punch*. Almost every week we find a bit of more or less telling waggery, and last week the first of a series of "Songs of the Sciences" appeared, which we reproduce:—

Oh! merry is the Madrepore that sits beside the sea,
The cheery little Coralline hath many charms for me;
I love the fine Echinoderms of azure, green, and grey,
That handled roughly fling their arms impulsively away:
Then bring me here the microscope and let me see the cells,
Wherein the little Zoophite like garden floweret dwells.

We'll take the fair Anemone from off its rocky seat,
Since Rondeletius has said when fried 'tis good to eat;
Dyspeptics from Sea-Cucumbers a lesson well may win,
They blithely take their organs out and then put fresh ones in.
The Rotifer in whirling round may surely bear the bell,
With Oceanic Hydrozoids that Huxley knows so well.

You've heard of the Octopus, 'tis a pleasant thing to know,
He has a ganglion makes him blush not red, but white as snow:
And why the strange Cercaria, to go a long way back,
Wears ever, as some ladies do, a fashionable "sac":
And how the Prawn has parasites that on his head make holes,
Ask Dr. Cobbold and he'll say they're just like tiny soles.

Then study well zoology, and add unto your store,
The tales of Biogenesis and Protoplasmic lore:
As Paley neatly has observed, when into life they burst,
The frog and the philosopher are just the same at first.
But what's the origin of life remains a puzzle still,
Let Tyndall, Haeckel, Bastian go wrangle as they will.

THE AUGUST AURORAS

AS I had the pleasure of witnessing to great advantage at Christiania the superb aurora of August 12 last, as well as that of the 13th, it is possible that some account of these displays as seen in Norway may be useful for comparison with accounts of their appearance in England.

My attention was first drawn to the aurora on going into the open air at 11 p.m. At 10.30 p.m. a friend had remarked that the night seemed unusually dark, and that the stars were shining brightly. When first seen by me the aurora consisted of a wide arch of diffused light, the centre of which was about 30° in height. A few broad streamers were then beginning to appear. I walked as quickly as possible to a hill whence a good view could be obtained, but I had hardly got there before the aurora had already reached, about 11.10 p.m., its maximum splendour. Broad streamers had by this time covered almost the whole of the northern half of the heavens, converging to a point considerably south of the zenith, forming a grand corona. The arch was still highly luminous, and from its upper margin coruscations or waves of white light shot up every two or three seconds towards the zenith. At this time also there suddenly appeared to the east of magnetic north a splendid sheaf of rays proceeding from the horizon altogether beyond the auroral arch, and apparently in complete independence of it. These rays, through bright, attained an elevation of only some 35°, and belonged apparently to a distinct auroral discharge. At 11.15 the arch had already begun to fade, but a mass of rays shone out brightly near its eastern termination. Throughout the display I was struck by the tendency to the formation of compact bodies of streamers which seemed to flank each end of the arch. As the arch faded the pulsations of