variety, and when such interference takes place the tone is always meagre, as described by Dr. Huggins.

But it will naturally occur that there must be *one* note in the scale of the instrument which will coincide in its vibrations with those of the belly when in this unsupported condition, and that this note ought to be exceptionally loud. It is so in fact, but not to the extent that might at first be supposed. This is because in reality, as I shall try to explain, the injurious effect of interference does not include the whole question. When a tuning-fork is struck and held out of contact with a resonant body, it gives out a very feeble sound. The cause of this, as is well known, is that each half-wave is compensated and partly annulled by the succeeding half taking place in the opposite direction. A string stretched between two non-resonant supports does the same when plucked or bowed in the middle. In like manner, the belly of a fiddle, when unsupported by a sound-post, is under conditions which are very similar to those of the string. The most yielding part is immediately beneath the bridge, under the impulses of which every point of every longitudinal fibre moves up and down in the *same phase*, and every half-vibration cancels the effect of the half immediately preceding. The sound is correspondingly feeble. The wave, in fact, is not a true one. It is a to-and-fro, self-compensating motion all along the line. If the bridge were placed near one end of the instrument, the case would be different. Its nearness to a support or fulcrum on one side would cause the free part on the other side to break into a wave of progression, which is the true dynamic sound-giving wave. The office of the sound-post is precisely this. It forms a node at a particular part under the influence of which the wave is converted into one of *contrary phases* all over the surface. Such a wave travels in wood at amazing rapidity, and the consequence is that every half vibration reaches its limit and strikes the air almost before the other half has commenced its career, and therefore before it has had time to interfere with its dynamic effect. The best position of the node is found to be just behind the E string, because the higher the note the greater is the firmness required. The G string is further removed from the support, because the lower notes require greater freedom of motion, but it still partakes of its advantages.

I have never met with a satisfactory explanation of the cause of resonance in sound-boards. It cannot be due to extended surface in the sense that there are more extended vibrations or more numerous ones, because the greater the quantity of matter put in motion the more is the motion diluted. The investigation is practically a difficult one, owing to the extreme minuteness of the oscillations which have to be traced, but so far as the experiments indicate which I have been able to devise, the true cause does seem to be what I have been endeavouring to explain. A resonant wave is a *travelling wave*—the crest is always in advance of the depression, and expends itself dynamically before the latter has time to neutralise it. On the other hand, the depression succeeds in due order and produces a similar effect. It is in this sense only that an extended surface is useful and necessary.

If we need confirmation of the principle thus advanced, we have it in every wind instrument without exception. The type of all such instruments is the reed, the only difference being that in some it is aerial, and in others substantial. Take therefore an ordinary harmonium reed, and vibrate it with the finger. However elastic it may be, the sound is of the feeblest character. The double vibration is a compensated one—but let a current of air traverse the point of disturbance, the reed then speaks, or rather the current of air speaks. The half vibration has proceeded so far from its origin that it expends its dynamic force before the succeeding half is able to reach and neutralise it—the crest of the wave, as it were, has smitten the shore, before the depression has had time to overtake it. The depression then succeeds and does its own work.

R. HOWSON

Middlesbrough

Waking Impressions

THE accompanying experience may be of interest to some of your readers; and that it may be the more genuine in the recounting of it, I copy the little entry I made in my notebook some few hours only after the occurrence, as it was so distinctly impressed on my mind that I could not but be struck by it as being worth taking note of.

I have not unfrequently been on the point of noting down

similar visual impressions between sleeping and waking time, but have hitherto always found that they were really of so fugitive a nature, or the mind so little sensitive as not to be retentive, that the mere effort to recall them and put them into uttered words (whether audibly or only mentally uttered) was quite sufficient to dispel the impression totally; though by a long directing of the memory I could sometimes *nearly* recover it, not perfectly enough, however, to feel confident that imagination had not added somewhat to the picture. But the present case has been so vividly impressed on my mind that it has been fairly caught, to my own satisfaction at any rate, and I hope that it may be not unworthy of a corner in your valuable paper.

“Reigate, July 13

“This morning I woke up suddenly with the end of a dream and found myself reading, as if from a printed book, only there was no book, merely printed words, thus: ‘*So while he was enjoying himself at . . . she was in deep depression at Kaj-ro.*’ The ‘Kaj-ro’ looked quite right, and I quite naturally pronounced it Cairo, and knew I meant that town. I was so struck by the clearness of the visual impression that, for fear of losing it, as one generally does, I instantly recounted the thing to my husband; but in the uttering of it when wide awake I could not at the moment, *even so soon* after the dream, recollect the name of the other locality (marked here by ‘. . .’), though I knew that it had been printed and read by myself in the dream. But about four minutes later, as we were talking it over, I said, ‘It is so strange, for I’m sure I’ve not been talking or thinking either of *Beloochistan* or *Cairo*!’ and at once it flashed upon me that *Beloochistan* had been the other name, and I had then and there reseen the impression after an interval of total oblivion of it.

“There had been no idea of book or sheet to carry the printing, nor, I fancy, even *solidity* of any kind in the letters; but that the whole phrase was conveyed to my mind through a printed form and by a process of reading I am quite certain. We were on a visit, and the night before had been greatly entertained by the conversation of our host, who had been a great traveller, and we had certainly talked much of India, Cashmere, and Assam; but as far as I can now, or could then, recollect, we had most certainly *not* mentioned either *Beloochistan* or *Cairo*, nor had I been reading a novel before going to sleep or during the previous day.”

Collingwood, Hawkhurst, July 14

J. MACLEAR

Tertiary Corals

I SHALL be obliged if you or any of your readers would kindly inform me the best authority to consult on the tertiary corals of Piedmont and Liguria; also the age of the beds in the lower part of Val d’Andona.

W. E. BALSTON

Bearsted House, Maidstone, July 15

Wild Fowl and Railways—Instinct and Intelligence

I AM happy to find that my experience of “ducks and railways” is confirmed by so high an authority as Mr. Goodsir from observations made on the other side of the world. Agreeing so far, we differ as to the cause by which the birds are influenced, Mr. Goodsir attributing it to “quick and unerring instinct,” whilst I credit the ducks with “quick intelligence” or reasoning powers. If caused by the “teaching” of instinct, the ducks should show no alarm on the sudden and first appearance of a smoking, roaring train in their midst. They certainly do at first show alarm, but as they receive no injury, their intelligence teaches them, after a brief experience, that there is no danger.

I may perhaps be permitted to give one of many instances known to me of the quickness of birds in acquiring a knowledge of danger. Golden plover, when coming from their breeding-places in high latitudes, visit the islands north of Scotland in large numbers, and keep together in great packs. At first they are easily approached, but after a very few shots being fired at them, they become not only much more shy, but seem to measure with great accuracy the distance at which they are safe from harm; the sportsman, however, not unfrequently takes an unfair advantage of them by loading with a wire cartridge, which adds twenty yards or so to the distance at which the gun will kill when charged in the ordinary way.

It would be easy to adduce many cases of what may be considered pure and true instinct, of which the following is perhaps not a bad example, and not unworthy of mention, if it has not already appeared in the columns of NATURE or elsewhere:—

If the eggs of a wild duck are placed with those of a tame one under a hen¹ to be hatched, the ducklings from the former, on the very day they leave the egg, will immediately endeavour to hide themselves, or take to the water if there is any near, should any person approach, whilst the young from the tame duck's eggs will show little or no alarm, indicating in both cases a clear instance of instinct or "inherited memory."

4, Addison Gardens, July 16

JOHN RAE

Clouds

THE following notes of a cloud action, which, so far as I am aware, is not common, may be considered worthy of record.

The occurrence took place at Chatham at about 1 p.m. on Sunday the 1st inst., and attracted attention more particularly from its following a week of strong electrical disturbance in the neighbourhood, accompanied by two fatal results.

At the hour named above, and apparently at a considerable height, certain semi-transparent clouds arranged themselves in thin columns at right angles to each other, some of the columns giving off shoots throughout their length, in shape somewhat resembling blades of grass. Whenever fleecy clouds passed between the foregoing formation and the earth, they were quickly

broken up into small, attenuated components which gradually reunited on getting out of the influence; but on one occasion a very small cloud thus acted upon set itself in the form of a right angle also and remained so.

R. Y. ARMSTRONG

July 7

Extraordinary Flight of Dragon-Flies

AN English gentleman writing from Malmö, in Sweden, on July 3, says:—

"On Sunday, June 24, we had an extraordinary flight of the *Trollslända* (*Libellula quadrimaculata*, Linn.), . . . a brown dragon-fly an inch and five-eighths long and three inches from tip to tip of the wings. . . . They passed over or through the town and neighbourhood for about half an hour in the afternoon. The next day about 1 o'clock they reappeared for more than an hour, but on Tuesday the 26th, at 7.30 a.m., they again began in millions, and notwithstanding the wind had shifted to the south during the night, they held the same course from north-west by west, heading south-east by east. The streets, shipping, and every place were full of them. They did not fly very high, and seemed to avoid going into open doors and windows. Some hundred or so alighted on the gooseberry bushes, apple and pear trees in this garden, but never touched the fruit. I observed one sitting on the dead tip of an apple-twig, and I pushed it off with my stick thirteen times, the insect returning each time after flying away about five or six yards. . . . The flight ended that night about 8 p.m., having been incessant for more than twelve hours. On the 27th they appeared again about noon, flying the same course, but in much reduced forces. Each day since I have seen a few, but very few. . . . The papers say they were observed in all southern and Central Sweden, and in many places in Denmark, and they

¹ I mention a hen as foster-mother because the ducklings have no instinctive knowledge of any note of alarm or warning she may give.

swarmed about the ships in the Sound. With their disappearance came the hot weather."

The foregoing extracts seem to me worthy of record in the pages of NATURE, and I accordingly forward them with that view.

ALFRED NEWTON

Magdalene College, Cambridge, July 11

Sheet Lightning

WE had here last night a violent rain and lightning storm without thunder. The lightning was very vivid and incessant, and seemed nearly overhead, but there was no sound but that of rain. We are near the crest of the Apennines, and the storm seemed to have gathered along that crest, having been preceded by a furious sirocco suddenly supervening on a north-west wind.

I have twice before witnessed the same phenomenon of electrical storms with vivid lightning overhead and no thunder. Both instances occurred on the abrupt edge of the Montenegrin highlands, where they fall off into the low, wide plains of the Scutari district, and where thunderstorms are more common than in any other country I have ever visited. On these nights we were encamped on the edge of the hill country, on broken rocky land, with much low scrubby vegetation, but the lightning was so incessant and vivid that we were able to walk about, choosing our way amongst the stones and shrubs as readily as by daylight, the intervals between the flashes being, I should judge, never more than a minute, while much of the time they seemed absolutely continuous, the landscape being visible in all details under a diffused violet light. Looking overhead the movements of the lightning were easily discernible, the locality of the discharges varying from one part of the vault to another in a manner which it was impossible to confound with the reflection of lightning from a distance. Like the storm of last night those were followed by copious rain, but not a single peal of thunder was heard during the whole night.

W. G. STILLMAN

Cutigliano, Pistoiese Apennines, July 11

ALGÆ

DR. BERTHOLD tells us in his preface that he was induced by his discovery of the processes of fructification in *Erythrotrichia obscura* to study the small but interesting group of the Bangiaceæ, in the knowledge of which so many gaps still existed. The Zoological Station at Naples afforded him every facility for carrying on his researches on these algæ, not only in what may be called their wild state, but also under cultivation. To these advantages may be added, although in an inferior degree, that of the use of a great number of dried specimens. The results of his two years' study are embodied in the work mentioned at the head of this notice.

The small group of algæ, now included by Dr. Berthold under the general name of Bangiaceæ, consists of the three genera, *Bangia*, *Porphyra*, and *Erythrotrichia*; under the last genus are included *Bangia ciliaris*, and *B. ceramicola* of Harvey ("Phyc. Brit.," Pls. cccxxii. and cccxvii.). To these genera may probably be added *Goniotrichum*.

The exact systematic position of these algæ has, from the fact that little was known of their fructification, been hitherto uncertain. While their red colour induced Cohn, Thuret, and Bornet to place them with the Floridææ; other algologists, among whom may be mentioned J. Agardh, Kützinger, Harvey, and Zanardini, grounding their opinion on the structure of the vegetative thallus, have classed them with the Chlorosperms.

For the first information relative to the fructification of the Bangiaceæ, we are indebted to Derbès and Solier, who had discovered in *Bangia fusco-purpurea* and *B. lutea* two different kinds of fructification, namely, the "common spores" and antheridia. Then followed the researches of Nägeli, Thuret, and Janczewski on *Porphyra*. Janczewski had actually discovered and described the carpospores of *Porphyra*, to which he gave the name of

¹ "Die Bangiaceen des Golfes von Neapel." Eine Monographie von Dr. G. Berthold. Fauna und Flora des Golfes von Neapel. (Leipzig: Wilhelm Engelmann, 1882.)