end of the body, while near the termination of the intestine that opens at the other extremity of the animal are seen the orifices of the ramified tubes which constitute the respiratory organs. When *Holothurians* are irritated (when they are seized, for example), they contract and suddenly expel their viscera. But what is most singular, and most inexplicable, is that after a short time the expelled organs are reproduced anew. The forms that we illustrate herewith are very interesting, first, by reason of their special habitat at great depths, and secondly, in that one of them is covered with long tentacles while the other, whose body is nearly smooth, is provided at its extremity with a nearly erect tail.

It would seem as if the life of these animals, at both slight and great depths, must pass in perfect quietude. This, however, is not at all the case, for those species that live near the surface, as well as those that exist at depths of between four and five thousand meters, are annoyed by a host of commensals and parasites. Thus, certain of them are transformed, as Van Beneden says, into a sort of *living hotel*. Some give lodging within their respiratory tubes to certain small fishes with an elongated, eel-like, but compressed body. Others, such as *Holothuria s. abra*, of the Philippine Islands, give shelter in their interior to one or several couples of those small crabs called *pinothera*, or else, as *Holothuria tubulosa*, carry in their intestines those worms that are called *Anoplodivum*. But, aside from these commensals, that do not live at the expense of their host, there are others that demand their food from them. In the engraving we show one of these parasites—a mollusk of the genus *Stylifer*—which is clamped, if we may use the expression, to the throat of an *Oncophanta*, and is sucking from the tissues that it has pierced the nutritive juices that are necessary for its existence.—*La Nature*.

CHRYSANTHEMUM ANEMONES.

MESSRS. VILMORIN'S book, entitled "Les Fleurs de Pleine Terre," consisting, as it does, of carefully drawn up descrip-

FIG. 1.—CHRYSANTHEMUM ANEMONES.

tions of garden flowers and copiously illustrated with small but characteristic woodcuts, is a book of unquestionable utility—a fact made evident, among other things, by the large use that has been made of it by subsequent compilers. The last edition of that work, we are surprised to find, dates as far back as 1870, since which time numerous additions have been made to our hardy plants. In the present supplement

FIG. 2.—POPPY ANEMONES.

the authors have extended their programme, so as to include plants which can be grown out of doors for the greater part of the year, but require the protection of a frame or heated pit during the winter in Northern France, and may be cultivated throughout the whole year in the open ground in the extreme southern and western districts. MM. Vilmorin tell us that a selection has been made so as to exclude plants of inferior merit, of delicate constitution, those which are not yet sufficiently tried, or which are otherwise unsuitable for general cultivation.

It may serve at once to illustrate the nature of the present

supplement, and the progress of horticulture, to say that begonias occupy seventeen pages. *Chionodoxa* finds a place, as also do single dahlias, the so-called double gaillardias, hybrid hellebores, *papaver umbrosum*, the newer kinds of petunias, phloxes, *Primula rosea* and other species, China asters, and many others. The descriptions have evidently been drawn up *de visu*, and are not merely paraphrased accounts taken from books, as is the case with so many garden compilations, while as to the illustrations we cannot better indicate their character than by reproducing some of

FIG. 3.—ANEMONE FULGENS.

them—for the privilege of doing which we are indebted to Messrs. Vilmorin.

Fig. 1. shows a bunch of the chrysanthemum anemones (*A. coronaria* var.), in which the outer perianth segments are relatively small, while the stamens and pistils are more or less completely replaced by narrow strap-shaped petaloid segments. The first varieties of this section were, we are told, raised some fifteen years ago by M. Bahuud Liton, nurseryman of Nantes, and now there are many named varieties of different colors. Fig. 2 represents flowers of the Caen race, called in England poppy anemones (*A. coronaria* var.), a robust strain similar to the preceding, but in which the outer perianth-segments are large. *Anemone fulgens* (Fig. 3), the *A. hortensis* of some writers, is wild in the South of France, and even in the wild state is extremely variable in color. "In addition," say MM. Vilmorin, "to the numerous lilac and reddish-flowered forms often cultivat-

ed under the name *stellata*, there are two others so distinct as by some to be considered as distinct species. One is the peacock anemone, with broad flowers of the richest color, but with a yellow eye; the other is the Pyrenean form of *A. fulgens*, in which the flower is self-colored of the most brilliant scarlet hue. This variety is rather less tender than that which grows in Provence, and requires less heat to enable it to flower. The first leaves are thrown up from the dark fleshy root-stock in the autumn, and are more or less five-lobed; those produced subsequently in spring are much more

FIG. 4.—DOUBLE-FLOWERED ANEMONE FULGENS.

divided, and reduced to linear segments. Growth ceases about the end of June, and the plant goes to rest for six or eight weeks—a period most favorable for division and transplantation. *Anemone fulgens* is easily reproduced from seed, the seedlings producing flowers of varied hues from white to blood-red, and sometimes with the stamens and pistils replaced by petaloid segments, as shown in Fig. 4.—*The Gardener's Chronicle*.

A NEW SPIRÆA.

(*S. ast illoides*.)

So seldom does a *Spiræa* occur among the multitudinous new plants that appear every year, that this one is of special interest, especially as it belongs to the *Aruncus* or Goat's head section, and is said to be hardy. It grows from 2 feet to 3 feet high and forms a dense symmetrical bush. At

FLOWER BRANCH OF SPIRÆA ASTILBOIDES, AND PLANT SHOWING HABIT OF GROWTH.

flowering time the branches are furnished with myriads of white blossoms in plummy clusters, as shown in the annexed illustration. It may be forced into flower as early as March; hence it is an invaluable plant for pot culture for conservatories. It has been introduced by Mr. Bull, of Chelsea, from whose new plant catalogue the accompanying woodcut is taken. It has been certificated both by the Royal Horticultural and Royal Botanic Societies, and whenever it has been exhibited it has been much admired. It will, doubtless, prove to be a plant of the easiest culture, both in pots and in the open ground.—*The Garden*.

REPTILES AND MUSIC.

It has been for a long time said that animals are fond of music. This fact is true, even as regards reptiles, and it is these animals that we shall speak of at present. Tradition will have it that Orpheus had the power of enchanting the most venomous reptiles, and it is said that the Argonauts conquered by power of song the terrible dragon that guarded the golden fleece. Pliny and Seneca tell us that the principal power of snake charmers resided in the attractions possessed by music.

In America, when a savage has the talent of whistling agreeably, he can without difficulty approach the iguana and capture this gigantic lizard, whose flesh is said to be so good to eat. Like all other saurians, the iguana listens to melody with such attention that it forgets to look out for its own preservation. This proves that melomania may sometimes prove fatal.

Father Labat went with a negro on one occasion, at Martinique, to hunt this lizard, his companion being armed with a pole provided with a slip noose at its extremity. One of these animals having soon been observed stretched out in the sun upon the branch of a tree, the negro began to whistle to it, whereupon the reptile thrust its head forward as if to discover whence the sound came. Then the negro, slowly approaching, and whistling all the while, began to tickle its sides and neck with the end of the rod. This gave the reptile so much pleasure that it began to roll over and over upon its back and sides, and, at a certain moment, got so far over the branch that the slip noose could be passed around its body.

its tail to the side of the basket and following, by the motions of its head and body, those of the musician who was walking and playing. The musician took the serpent from its basket, placed it around his neck, and began to play again, when the reptile remained motionless as if in an ecstasy of pleasure.

The spectacled viper, (*Naja tripudians*), one of the most dreaded species that inhabit India, is tamed by men called *Snokembus*, who, to the sound of the flute, make it go through a sort of dance. This reptile, which is still adored by the Hindoos, comes out of its retreat when it hears the noise of a flageolet or pipe, runs toward the musician, and takes food from the latter's hand.

Dr. Shaw had an opportunity of seeing a large number of serpents that performed with the dervishes in their round dances, the reptiles gliding over the head and arms of the priests, turning around when they turned, and stopping when they did.

According to Captain Percival, the cobra, even when it has just been captured, seems to listen with extreme pleasure to the notes that are rendered by any instrument whatever.

Jugglers put to profit this natural inclination of the snake; and there are some who take the trouble to tame cobras and teach them how to mark time and accompany the airs that they are playing, with a motion of the head. Reptiles that have been charmed assume attitudes that are in harmony with the feeling of the music, be it gay or sad, light or grave.

During my sojourn in the Indies, says Franklin, I saw a cobra de capello captured in my garden. The snake charmer, having a plumed turban upon his head, seated himself before a hole in a hedge of thorny pear trees, and played upon a rude musical instrument made of a gourd. The cobra soon showed his head in order to listen to the wild sounds, its eyes at the same time being attracted by the reflections from a piece of broken glass in front of the gourd instrument. Then, without taking the trouble to extract its venomous fangs, the charmer slipped the serpent into an open basket. The next day the charmer returned, and, placing his basket on the ground, crouched down behind it and began to play his wind instrument. The cover then rose and the snake made its appearance half-coiled, and began to wag

play by note. Their way is so simple that it needs illustration here only for the purpose of contrast. Suppose we have before us the following measures:

It will be the simplest thing in the world to take a child to the piano and show it where to put its finger to strike the first note. The next one is the same; the third is the nearest black key on the left, and so on, explaining that *down* on the staff means going to the left on the key-board, and up means going to the right. Very little explanation is needed to teach what key must be struck for each line and space, and how the signs ♯, ♭, and ♮ enable us to get along with fewer lines and spaces. It is only a question of time and practice to bring about the desired end, namely, that the child will put its finger mechanically upon the key that sounds the note proper to any given line or space. What is true of playing single notes is true of playing chords.

The mind learns to associate the impression upon the eye with the necessary action of the fingers.

All this is done every day without in the least training the ear, or to be more accurate, without any training that is conscious and practical.

That this is true is shown, among other ways, by the fact that so few amateur players have any definite idea of what we mean by a key, when we use the word in the sense of a group of tones having a definite relation to each other. In fact, a piano player need not care in what key he is playing. He need only observe the signature, and put his fingers on the sharp or flat keys provided by his instrument. It makes no difference, for example, in what key a piece of music is written; any given note, say

is either G, G♯, or G♭, that is to say, a certain invariable white key on the piano, or one of the adjacent black keys. The signs ♯ and ♭, which move the note up or down a whole tone, are comparatively rare.

The only mental exertion the player is *obliged* to make, is to remember which note-signs are sharpened or flattened by the signature, and to find the proper piano-keys when he sees a ♯, ♭, or ♮.

To resume, then, if you give a pianist a new piece of music to play, he looks at the signature, impresses on his mind what notes are sharps or flats, and then he puts his fingers on the keys indicated by the dots on the different lines and spaces. The difference between a *tyro* and a *master* with respect to reading at sight is only in the rapidity with which each is able to perform this simple process.

WHY A SINGER CANNOT READ NOTES LIKE A PLAYER.

Now, can a singer proceed in the same way? Can he treat his voice like an instrument? Unfortunately, he has no keyboard in his throat; neither are there any stops or ready-made notes. How then is he to sing the passage we started out with? Well, he can play it on the piano and imitate the sounds with his voice a sufficient number of times until he knows the passage by heart. That is one way, and, I may add, that is the way in which most people sing. But, when he has learned this piece by heart, that does not give him the ability to sing the next one without going through the same process.

He must learn that by heart too. He does not acquire any power or independence of an instrument. Yet this is the way in which our church choirs, oratorio societies, yes, opera singers, learn their parts. It is true that in time it becomes easier for such singers to learn a new piece. It takes them less time. But still they have to learn them by heart. They seldom reach the point where they can take up a new piece and sing it off, without first going to the piano and playing it over.

But cannot I convert my voice into an instrument by learning the notes themselves by heart, so that I can sing A when I see A, and sing Ah when I see Ah? What would such a task involve?

Let us say that the compass of my voice is two octaves. This comprises 25 semitones. Is it possible for me to learn these 25 tones so well that I can sound the pitch of each as readily as I can pronounce any one of the 25 letters of the alphabet, no matter in what order or sequence they are presented? I do not think many people can do that. I believe no one tries to teach vocal music in that way.

Well, if I cannot do this, I cannot convert my voice into a keyboard that can be played upon like a piano, and I cannot read notes as a piano player reads them.

HOW SOME PEOPLE READ MUSIC.

I have taken some pains to find out how people *do* read music; and although I have been favored by an extensive acquaintance with musical people, I have never met any one who really did it unless it was by Tonic Sol-fa principles. I do not mean that all such persons were taught by the Tonic Sol-fa method, for many good teachers follow these principles to some extent, without knowing how beautifully they have been worked out into a system of instruction. Now listen to some typical cases in which singers persuaded themselves into the belief that they were reading music.

The result of closely questioning a prominent lady-member of a notable singing society was that she had naturally an extremely fine ear, and if any instrument in the accompanying orchestra or if any of the singers near her struck her note, she would pick it up instantaneously. She knew in some mysterious way what the right note was that would fit into each place. Now, it is obvious that this sort of thing is not singing by note. A chorus composed of members all working by this method would make some very significant pauses if required to sing a piece they had never seen or heard before.

My second case is that of a member of another excellent singing society. She explained to me that she observed how many steps the notes were apart on the staff, and that her experience guided her in rising and falling to the right pitch as her eyes followed the notes. Let us investigate this

SNAKE-CHARMERS.

One of our most eminent scientists, Mr. Quatrefages, tells us that he long kept in captivity, or rather in quasi-domesticity, one of the prettiest of our French reptiles, the green lizard. "Hearing," says Mr. Quatrefages, "is highly developed in all lacertians; they can hear the noise of a leaf agitated by the wind, or the buzzing of a fly, at a distance of several feet. Further than this, their very fine ear, although provided with an arrangement for re-enforcing sounds, appears capable of distinguishing them. The facts that I know regarding the iguana caused me to make some experiments that were quite curious. When I entered a room where an instrument was being played, having my green lizard with me, the latter immediately became restless and showed its head over the edge of my cravat, and when I placed it upon the floor it ran in the direction whence the sounds came. Among different instruments, the flute and flageolet seemed especially to please it. The noise of cymbals and of the Chinese gong startled it, while it became insensible to that of the bass drum." It will be seen from this that if certain travelers have exaggerated the dilettanteism of reptiles, they have at least not invented everything. Fetis and Dr. Chomet have described the influence that melody exerts upon lizards. If any one whistles at these animals while they are endeavoring to escape, they often stop, and, provided the air is an agreeable one, listen to it with evident pleasure.

Ophidians are none the less sensible than saurians to the charms of music. The naja will rise upright at the sound of the flute, and beat measure in following the time marked by the music. Its head, which is naturally round and long, like that of an eel, then enlarges and flattens like a fan. The ears of the snake are located under the skin, and from this anatomical circumstance one might be led to think that it was a little hard of hearing. Yet in certain cases we find a musical sense developed in this class of reptiles. J. Franklin relates that a gentleman one day having met some children who were teasing a snake of the most harmless kind, took pity on it, saved it from the hands that were maltreating it, and carried it home. There he placed it in a basket suspended from the ceiling of his room by a cord. One evening, while this gentleman was walking backward and forward in his apartment and playing the violin for his own amusement, what was his surprise to see the reptile fixed by

his head at the sound of the music, just as the dilettanti do in the balcony of the Italian Opera. From time to time it displayed its hood, or hissed when the charmer held his hand toward it. A companion who stood behind the musician then seized the animal by the tail, but, held in this way, it could do no harm. Without going to India, we may also find jugglers called snake-charmers no farther off than Cairo. These men cause the famous asp of the ancients (now called baje) to move its neck rhythmically to the sound of whistles or small flutes. It is said also that by pressing this snake on the nape they throw it into a stiff and immovable condition, which they call turning it into a rod. It is certain that these jugglers could not handle this serpent with impunity without neutralizing its venom in some way or other. Finally, even the terrible rattlesnake allows itself to be captivated by music. An instance of this is related by Chateaubriand, who states that he saw one of these reptiles charmed by an Onondaga Indian, on the banks of the Genesee River in 1796, by means of a flute.—*Science et Nature*.

WHAT IT IS TO READ MUSIC.*

By Prof. CHARLES F. KROEHN, of the Stevens Institute of Technology.

It is not as a professional musician that I venture to address this convention, but as a student of educational methods. As such, I hold that education is a fine art, and that any method calculated to spread musical knowledge among the masses is worthy of serious and patient investigation. For this reason, and because I love music, I have passed through a course of the Tonic Sol-fa method, and have followed it up with earnest research, the result of which I purpose to lay before you now.

READING INSTRUMENTAL MUSIC.

It is very difficult to explain to any one totally unacquainted with the subject, what is involved in reading vocal music. It ought to be a process entirely different from that to which players of musical instruments are accustomed when they

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