

I think that we are now justified in assuming that the helium, a product of radio-active change, is present in the minerals in a state of supersaturated solid solution; that the mineral substance being impermeable to the gas at ordinary temperatures, the velocity with which equilibrium is established between the helium in solution and the helium in the gaseous phase is infinitely small, but increases very rapidly with rise of temperature; that as the solubility of helium in the mineral substance is probably very small, the mineral cannot be made to re-absorb the gas. Grinding even to an impalpable powder, if unaccompanied by local heating, should result in the evolution of minute quantities of helium only.

I may point out in conclusion that the "deflagration" which takes place when "fergusonite," is heated, and was taken by Sir Wm. Ramsay and myself to indicate the presence of a chemical compound of helium, also takes place in the case of some minerals which contain no helium.

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#### The Pollination of Exotic Flowers.

IN connection with Prof. Groom's article on the pollination of exotic flowers (November 10, 1904, p. 26) the following notes may be of interest. The inflorescence of *Marcgravia Umbellata* is described in Schimper's "Plant Geography," where Belt's description is quoted from the "Naturalist in Nicaragua." The plant is common here, climbing to the summit of the forest trees, and is frequently visited by humming birds. The bird settles on the top of the flowers and inserts its long curved beak into the pitchers below to suck the sweet juice which they contain. I have not seen insects visiting the flowers, neither have I found them in the pitchers, and conclude that the birds are attracted by the sweet juice itself rather than by insects in search of it as Belt suggests.

Flowers with strong scent and brush-like stamens are very common, and one of them, the Pois Doux (*Inga laurina*), is surrounded when in blossom by a motley crowd of bees, large beetles, and insects of every description, as well as by humming birds of several species. The latter certainly visit very different plants, but are most familiar hovering round the banana flowers, sucking the drops of sweet liquid continually oozing from them.

Flowers like the Pois Doux are easily destroyed by heavy rain, and blossom only for a short period. A large number of others are provided with horned stamens, with barren anthers or anther lobes. May not this be a protection against loss of pollen by rain and wind, it being kept in a sheltered situation, and only set free when an alighting insect moves the stamens? It would be interesting to observe how far the abundance of flowers with horned stamens is correlated with heavy rainfall and constant wind.

Dominica, December 13, 1904. ELLA M. BRYANT.

#### Reversal of Charge in Induction Machines.

I HAVE tried Mr. G. W. Walker's experiment with a small Wimshurst, with 8" plates, and find that the reversal he mentions generally takes place, but not always. In my case, however, the machine is made so as to excite either way, and the reversal will not take place unless excitation has occurred while the motion is reversed.

R. LANGTON COLE.

Sutton, Surrey, January 6.

#### EVIL SPIRITS AS A CAUSE OF SICKNESS IN BABYLONIA.<sup>1</sup>

IN a former number of NATURE (vol. lxi., p. 26) the attention of our readers was directed to the appearance of the first volume of a work which Mr. Campbell Thompson, of the British Museum, was devoting to the consideration of the important function which devils and evil spirits were believed to play in the production of disease by the early inhabitants of Babylonia.

<sup>1</sup> "The Devils and Evil Spirits of Babylonia." By R. Campbell Thompson. Vol. ii. Pp. liv+179. (London: Luzac and Co., 1904.) Price 12s. 6d. net.

It was impossible at that time to state the final conclusions at which Mr. Thompson had arrived, for the publication of his work was not completed; but now that we have the second volume in our hands our readers are in a position to judge for themselves of the character and importance of the results, which have now been clothed in the dress of a modern language for the first time. The sources of such results, we need hardly say, are the terra-cotta tablets of the royal library at Nineveh, now preserved in the British Museum, and after a careful examination of Mr. Thompson's volumes we are able to say that the translator has done his best to reproduce the meaning of the documents which he places before us without unnecessary comments or theories.

It must be said at the outset that we do not regard Mr. Thompson's work as final in all particulars, for in respect of many Assyrian texts this work is the *editio princeps*; but none can fail to be pleased with the manifest honesty of the translations, which quite justifies us in overlooking the baldness and crudity of expression which sometimes characterise them. In studies of this kind we want the texts and the best rendering of them possible, but the most important point of all is that the editor should not read meanings into the words of his texts or twist them to suit preconceived notions. It goes without saying that Mr. Thompson's translations will not be accepted by other labourers in his field without reservation. Indeed, we may note in passing that M. Fossey has already animadverted upon them in the *Recueil de Travaux*, in the *Revue Critique*, and in the part of the *Journal Asiatique* just issued. It is no part of our duty here to attempt to vindicate Mr. Thompson's renderings or to belittle M. Fossey's knowledge of the science of ancient magic, but it must in common fairness be stated that the latter *savant* is not skilled in dealing with cuneiform documents except through the medium of the copies of other scholars who have been trained in making transcripts direct from the original tablets, and the mere fact that he condemns Mr. Thompson's derivations from the Syriac proves that he does not comprehend the importance of one northern Semitic dialect in helping to explain another. On the other hand, Mr. Thompson has spent some years in the task of copying the various classes of tablets which he is now editing and translating, and though some may admire M. Fossey's tempting renderings, and prefer them to those of Mr. Thompson, it should be remembered that the translations set forth in the volume before us are those of the skilled workman who is working at his trade, whilst those of M. Fossey are the product of a student of magic and religion in general.

The groups of tablets published by Mr. Thompson are five in number. The first are inscribed with exorcisms and spells which are directed against the disease of ague or fever; the second contain charms and incantations which were intended to do away with headache; the third deal with a series of diseases of an internal character, but it cannot at present be said exactly what those diseases were; the fourth are inscribed with texts written with the view of destroying the "taboo" to which, it seems, man was thought to be peculiarly liable; and the fifth supply descriptions of supernatural beings, among whom may be mentioned a creature who was half woman and half snake. Mr. Thompson identifies her with the goddess Nin-tu, who was the Babylonian equivalent of the Egyptian goddesses Hathor, Isis, Mer-sekert, &c., and the Virgin Mary among Oriental Christian peoples. Like each of those goddesses she was a form of the World-mother, or chief Mother-goddess who plays such an important part in many mythologies. By way of supplement, Mr. Thompson has added the

translation of an ancient prescription for curing the tooth-ache. The sufferer was ordered to mix some beer with oil and with another unknown ingredient, and, having rubbed it on his tooth, he recited the following words three times:—"When Anu had created the heavens, the heavens created the earth, the earth created the rivers, the rivers created the canals, the canals created the marshes, the marshes created the Worm, which came and wept before Shamash and cried out before Ea, saying:—"What wilt thou give me for my food? What wilt thou give me to eat?" To this the Sun-God replied:—"I will give thee dry bones and scented . . . wood." To this the Worm made answer:—"Of what use are dry bones and scented . . . wood to me? Let me drink between the teeth and let me be at the gums, that I may drink the blood of the teeth and sap the strength of the gums, then shall I be master of the bolt of the door." When the patient had said the above, he was ordered to address the Worm and say, "May Ea smite thee with

of water collected in pots, whereupon the vessels themselves would break. In Sumer and Accad knotted cords were much used for purposes of witchcraft, and knotted locks of hair were held to be all-powerful. The section which treats of the ban and taboo is especially suggestive, and we hope that Mr. Thompson will say more on these subjects when he has collected a larger number of examples. Finally, he directs attention to the existence of the word "*Kuppuru*," which is the equivalent in meaning to the Mosaic idea of "atonement," and the texts printed in the volume before us show conclusively that the acts which formed the atonement removed the taboo which man had incurred. The Sumerian ceremonies of atonement were certainly developed out of sympathetic magic, and the examples of atonement given in the Bible show that the ceremonies mentioned were, in more than one case, closely connected with primitive Hebrew magic. Those who are interested in the study of magic in all its forms will find Mr. Thompson's book of considerable interest and importance.



FIG. 1.—Bronze animal-headed figure of one of the Babylonian Powers of Evil. From "The Devils and Evil Spirits of Babylonia."

the strength of his fist, O Worm!" We can only hope that these potent words relieved the sufferer.

The bulk of Mr. Thompson's present volume is, of course, occupied with the transliterations and literal translations of the documents of which he treats; but, as these are manifestly intended for the expert in cuneiform only, we may briefly note the summaries of their contents, which appear in the preface. The texts which refer to words of power show that they possessed much in common with a similar class of document found in Egypt and elsewhere. The Sumerian magician having found out the name of the devil which caused the sickness he was called upon to cure, proceeded to deal with it by means of sympathetic magic. He employed ceremonies of various kinds, in which magical figures, loaves of bread, pieces of hair, water, a virgin kid, &c., played prominent parts. Sicknesses could be transferred to the dead bodies of kids and pigs, and devils could be made to disappear into masses

#### SPEECH CURVES.

AN interesting lecture<sup>1</sup> was recently delivered in the psychological institute of the University of Berlin by Prof. Scripture, of the University of Yale, whose investigations in phonetics are well known. Prof. Scripture's method is that first employed by Fleeming Jenkin and Ewing, and afterwards developed by Hermann, the writer and others, namely, to record on a moving surface, either by photography or by a direct system of levers, the curves imprinted by speech on the cylinder of a phonograph or on the disc of a gramophone. Dr. Scripture has recently improved the mechanism of his apparatus so as to obtain an amplification of the curves, about three times in the horizontal and three hundred times in the vertical direction, while the speed of the movement of his gramophone plate was reduced 126,300 times that at which it rotates during the acoustical reproduction of the sound. His curves have been submitted to analysis, and it shows the energy with which the research is being prosecuted when he is able to state that in America he has twenty persons engaged in this special bit of work.

In the discussion of his results, Prof. Scripture, in the first instance, refers to some remarks by Prof. Sievers, of Leipzig, on what may be called the "melody" of vowels and words. Prof. Sievers says that each line and verse of a poem has its own melody, and that this will be determined by the psychological condition of the individual at the time of its vocal expression. An author, too, while writing a poem, say one of a dramatic character, may give a certain "melody" to the expressions of one individual. Goethe, for example, causes Faust to drop his voice at the close of a sentence, while the voice of Mephistopheles rises and falls in a variable manner. Sievers also points out, as a curious fact, that when Goethe completed the poem, many years after he wrote the earlier portions, he had forgotten these melodic effects, and the later portions have not the same melodic characteristics. Prof. Scripture supports Prof. Sievers's view. This melodic character will thus affect the quality of a vowel sound.

Prof. Scripture holds that the movement of the vocal cords does not produce a sinuous curve, and herein he agrees with Marage, of Paris. By the movements of the cords a number of sudden and more or less violent shocks are given to the air, and each shock is communicated to the air in the resonators. In this way

<sup>1</sup> "Über das Studium der Sprach Kurven." By E. W. Scripture. *Annalen der Naturphilosophie*. (Leipzig: Veit and Co.)