ART. V. — Ricerche Chimiche sul Veleno della Vipera. Pel Principe Luigi-Luciano Bonaparte. (Lette in occasione della quinta unione degli Scienziati Italiani, tenuta in Lucca l'anno 1843.)

Chemical Researches on the Venom of the Viper. By Prince Louis-Lucien Bonaparte. (Read at the fifth meeting of the "Scienziati Italiani," held at Lucca in the year 1843).

In a former number we placed before our readers a brief account of Professor Weir Mitchell's investigations connected with the venom of the crotalus (rattlesnake); and, as the subject of snake poisoning has very recently excited a good deal of interest, we have pleasure in directing attention to a pamphlet, written some twenty-six years since, containing a full notice of the chemical composition of viper venom, and of the discovery by the writer—Prince Louis-Lucien Bonaparte—of its active principle, to which he gave the name of "echidnina," deriving it, he says, "dal Greco ἐχθρίνα echidna vipera, oppur quello di viperina."

The pamphlet commences with a very short, but, nevertheless, very interesting résumé of the physical and chemical qualities attributed by Fontana to the venom of vipers; and the prince then proceeds to say that, in presenting the simple facts brought forward by this authority, he feels he has only been discharging a duty towards so distinguished a physiologist; but, having done this, he must abstain from commenting on Fontana's theoretical views, inasmuch as they were founded on the chemistry of a period which would now-a-days be considered obsolete, and, of course, unsatisfactory to the present students of this "sacred science." "Dico i soli fatti, poichè non prenderò a discutere le vedute teoriche dell'Autore, che fondate in sulla chimica di quel tempo non possono più soddisfare oggigioro i cultori di questa altissima scienza."

Our author very fairly states, that he does not consider the experiments he himself has performed, are sufficient for the complete chemical study of the venomous fluid, "umore venefico," but he nevertheless is induced to hope they will not meet with an unwelcome reception, as the subject has not been treated chemically for some time, and also because most persons have an aversion to enter into any manipulative examination of these reptiles whilst alive.

We may here just remark, incidentally, that although this extremely modest estimate of his labours may have been very natural at the time Prince L. L. Bonaparte made his communication to the scientific public, it can scarcely fail to be gratifying to him to find
that his work has met with such ready recognition by those who have subsequently written upon the same subject. Professor Weir Mitchell, in his exhaustive Smithsonian essay, "Researches upon the Venom of the Rattlesnake," &c. &c., makes very repeated references to the prince's pamphlet, fully crediting him with the discovery of the active principle of the poison, and with the first and only complete analysis of serpent venom: he also admits that "echidnina" and "crotaline," the latter being the active principle of rattlesnake venom, are identically the same; but in his process for obtaining crotaline, he somewhat differs from the course pursued by the prince, and thus has succeeded in obtaining three, instead of two, distinct albuminoids.

In quoting the pamphlet before us, Professor Mitchell has fallen into an error as regards the name of the writer, styling him Prince Charles Lucien Bonaparte, who is the well known naturalist, and brother to Prince Louis Lucien Bonaparte, the author of the memoir we have under notice. The cause of this mistake is obvious enough, for Professor Mitchell states that he had not the opportunity of consulting the pamphlet itself, as it did not exist in any of the American libraries, and, consequently, he derived his information from Claude Bernard, "Lécons sur les subst. Toxiques, &c.," and also from Orfila, but principally from the former, who calls the prince Ch. Lucien Bonaparte.1

Our author, it appears, before proceeding to make any chemical examination, of his own devising, for discovering the active principle of viper venom, repeatedly tried all the experiments made by Fontana, and says that he is able to corroborate their general accuracy; that is to say, so far as they went, but this was not sufficient to effect what he desired, namely, the isolation of the active ingredient: to accomplish this he had recourse to a method which we will describe in detail.

He directs that the greatest possible quantity of venom must be obtained by offering to the bite of the deadly reptile "al rettile mordace," the edge of a watch-glass, and then pressing on the part of the head of the creature which is just above the venomous glands. The fluid, thus obtained, is then to be mixed with rectified spirit, "alcool concentrato," which has the effect of coagulating it. The liquid is next filtered, and the filter washed several times with alcohol.

These alcoholic liquors are subsequently volatilized under the receiver of an air-pump, by which process a small residue of a slightly yellow colour is obtained. By this first proceeding any substance dissolved in the alcohol, together with the yellow coloured body,

1 At page 32 of Professor Mitchell's "Smithsonian Essay," when quoting from Orfila, the Prince is called correctly, Louis Lucien Bonaparte.
which seems but little capable of being dissolved in spirit, is removed from the venom.

The filter, saturated with alcohol, and containing also the coagulated venom, is next to be dried and then put back into the funnel. Distilled water is now to be poured over the filter: this redissolves the venom, affording a colourless solution, which passes rapidly through the filter. To complete this part of the process, distilled water is repeatedly dropped upon the filter. The quantity of water used in this last proceeding must be very small, in order that the solution of venom obtained may not be too much diluted: at the conclusion of the filtering there may sometimes be found a few flakes of mucus, or albumen, which do not appear to admit of being dissolved.

The next step is to place the solution of venom in watch-glasses, and these are directed to be put under the receiver of an air-pump; when their contents have been rendered dry by exhaustion the residue is to be pulverised and treated with ether for the purpose of getting rid of fatty matter should any be present.

After having been subjected to such treatment, some of the resulting body is to be burnt on a plate of platinum, and, if pure, no residuum or ashes will be left. Should any ash remain, the other portion of the venom, or rather the body which has been obtained from it, is to be redissolved in a very little distilled water acidulated with acetic acid; it is once more to be precipitated with alcohol, and, after several alcoholic washings, it is again to be dissolved in distilled water and then rendered dry under the receiver of an air-pump. Two such treatments with acidulated water and alcohol are generally found sufficient, the Prince says, to free the "echidnina" from any salts which it may be disposed to obstinately retain; but, at any rate, these various washings must be repeated until the particular substance obtained, when burnt, leaves no residue whatever. It is only when this can be accomplished that the echidnina obtained is to be considered a pure and elementary substance, differing from all other known organic substances.

"Non è che in questo stato che considero l'echidnina come un principio immediato puro e distinto da tutte le altre sostanze organiche conosciute."

The difference between the above process and the one made use of by Professor Mitchell to obtain the active principles of rattlesnake venom (crotaline) will best be seen by placing a brief summary of each side by side.
Coagulate venom with alcohol, collect precipitate on filter; filtrate contains the extractive and colouring matter. Press filter to get rid of alcohol, and treat it, drop by drop, with cold distilled water; then dry the residue, which is "echidnina," and this may be cleaned from fats and salts by ether and acidulated water.

The method described as being employed for obtaining the venom from the viper is pretty much that first made use of by Professor Mitchell in his experiments with rattlesnake poison; the only real difference being that Mitchell stupefied the animals with chloroform before getting the fangs on the edge of a saucer (the Prince using a watch glass). Now, however, Professor Mitchell dispenses with the chloroform, and makes use of a very ingeniously contrived and effectual "lasso" for the purpose of securing the creature during the operation.

The echidnina of the viper is said to have a gummy appearance somewhat resembling uncoloured varnish; it is perfectly clear and transparent, and when removed from the watch-glass in which it has been dried, it is in the form of extremely fine, brilliant scales, somewhat resembling those of tannic acid, but much whiter. It has not any odour nor any determinate taste.

The writer next proceeds to furnish a very minute account of the various chemical tests and re-agents to which he had submitted "Echidnina," and makes a few brief allusions as to the effect this substance produces on the blood of some vertebrate animals; then points out how, and in what manner echidnina differs from a number of "azotic" substances, and, finally, comes to the conclusion that of all bodies of this class it most resembles 'Ptyaline;' he thinks this should not excite surprise if we reflect that viper venom is secreted by an organ quite analogous to our parotid gland: "né ciò debbe far maraviglia allorché si rifletta che il veleno della vipera secretato da un organo al tutto analogo alla nostra ghiandola parotide, altro non è al dire dell' illustre zoologo De Blainville che una vera saliva di questo rettile (‘Cours de Phys. Gén. et Comp.’ t. 3, p. 124.)"

The 'Memoir' concludes with the following introduced as an "Appendix:

"Having previously heard some questionable tales of hydrophobia being cured by means of viper venom, I was induced some months ago to solicit Professor Betti, in the course of some conversation I had with him on this subject, to oblige me by letting me know whenever there was any one suffering from this awful disease at the Hospital of Saint Maria Nuova, of which Professor Betti is superintendent. I thus tried to obtain the opportunity of proving the power of the antidote, rightly or wrongly so called, by subjecting
the patient to the bite of several vipers, or to inoculation with 'echidnina.' . . . . The distinguished Professor, remembering my wish, had the kindness to let me know that a youth fifteen years old, suffering from hydrophobia had been brought to the hospital. He had been bitten by a mad dog fifty-three days previously, and the vote of the majority of the physicians consulted being in favour of the employment of viper venom, 'il voto della pluralità dé medici, à quali fu proposto il mezzo terapeutico del velen viperino;' he requested me to bring the vipers with me, but not the 'echidnina,' so that I might be present at the various experiments made under the direction of Dr. Panattoni, the physician attending the sufferer; and I take this opportunity of publicly tendering my thanks to him for having permitted me to be present, although not a physician, in that worthy conclave—'in quella rispettabile adunanza.'

"As Dr. Panattoni had resolved to lay before 'Sezione di Medicina' the detailed account of this case of hydrophobia, I shall merely mention that as many as six vipers in succession were applied to the patient; that the bites of these reptiles did not in the slightest degree diminish the hydrophobic symptoms, and that they (the symptoms) became more violent after the application of the viper venom, just as would have happened if the vipers had not been applied at all, no trace of the symptoms of poisoning by viper venom appearing, neither was there any modification of the symptoms of hydrophobia.

"The unfortunate youth expired shortly afterwards in the most violent convulsions."

We refrain from making any comment on the 'Appendix,' but unhesitatingly commend the chemical portion of Prince Louis Lucien Bonaparte's brochure to the notice of all those who are specially interested in the study of serpent venom generally, and viper venom in particular.

Art. VI.—On Going to Sleep. By Chas. H. Moore, F.R.C.S.
London, 1868.

"How do we go to sleep? We know something of sleep, and something also of dreaming or incomplete sleep; but the child's old question, 'How do we go to sleep?' has never been answered."

This is the problem that Mr. Moore has set himself to solve. It will be shown, we believe, that he can help us on towards the solution of the problem, and therefore necessarily towards the solution of its converse (to some people harder still), "How do we keep awake?"

Reasoning from the known condition of the brain during sleep, shown by Mr. Durham to consist in a diminished supply of blood,