

denied; and he adduces the results of his own experiments to refute the deductions drawn from the sharply defined limits of the specific irritation-areas. These experiments, seven in number, were made on middle-sized dogs. In each case the position of the principal specific irritation-areas was determined. This was found to differ somewhat in the various individuals. Each area was well-defined for any given intensity of current, but an increase in this latter was accompanied by a corresponding increase in the area. The intensity of current, whether constant or induced, necessary for the production of the required results was also surprisingly great. The special experiments were all made on the irritation-area for the hind leg. The unexpectedly steady continuance of the results, even when the surface had become dry, gave Hermann the cue to his further experiments. He cauterized the area in one case with strong nitric acid, and in another with acetic acid containing potassium ferrocyanide. Even after this, which was subsequently found to have destroyed the outer third of the gray substance, the results on irritation remained unaltered. In other experiments a cylinder of brain substance was separated from its surroundings by the use of a brass cork-borer. The usual results were still always producible, but required a somewhat intensified current for their production. The cylinder was afterwards separated from its deep connections and removed. The results were then also constantly produced, whether the electrodes were placed in the pit or on the surface of its margin. In the seventh experiment the area was cauterized with pure nitric acid, and the burnt tissue subsequently removed by the knife. This double process was then repeated several times until there was an excavation of one cm. deep. The results of electrical irritation remained unaltered. Hermann concludes that the theory of these superficial areas being motor centres is untenable. Apart from the generally received opinion that a motor centre can never be recognized by direct irritation, the fact that the phenomena of motion are producible after the surface has been destroyed, requires for its explanation the admission of a conductivity to a deeply-seated centre, and therefore the necessity for believing in the motor centre on the surface vanishes. He furthermore noticed that in some cases a sulcus traversed the centre for the hind leg, while in others no such sulcus existed. The actual size of the area, independent of the sulcus, was in all cases as nearly as possible identical. This, according to Hitzig's hypothesis, offers us either horn of the dilemma, namely, either that the centre for the hind leg is enormously greater in those individuals in which the sulcus exists, or that the surface of the sulcus has nothing to do with this special function, but that we have the centre for one function divided into two distinct parts by that for another.—*Irish Hosp. Gaz.*, May 1, 1875, from *Pflüger's Archiv*, 2d Heft, 1875.

MATERIA MEDICA, GENERAL THERAPEUTICS, AND PHARMACY.

3. *Anæsthesia*.—The question of anæsthesia is one of great interest to surgeons and physiologists. Amongst recent researches on the subject, it is important to mention those of M. Budin, of Paris. The conclusions at which he has arrived are founded on a large number of clinical observations and a great many experiments conducted during several months in the laboratory of Professor Vulpian. As to the clinical observations, they were carried on in the wards of M. Léon Labbé, at La Pitié. Both experimental and clinical investigations have been lately published under the joint names of Budin and Coyne; the latter having aided M. Budin in his laboratory researches. The labours of these authors bear upon various points; but our space does not allow us to do more than notice the most important of them.¹

¹ For further information the following publications may be consulted: "De l'Etat de la Pupille dans l'Anesthésie Chirurgicale," par P. Budin. "Progrès

The object of MM. Budin and Coyne was to investigate the state of the pupil (1) during anaesthesia under chloroform and chloral; (2) during the efforts of vomiting; and (3) during asphyxia. From their clinical and physiological observations they have drawn conclusions of much practical importance, which we will endeavour to sum up briefly.

The administration of chloroform produces in the situation of the pupil various modifications connected with the state of sensibility. During the period of excitement (when it can be ascertained) the pupil is dilated. When this period is passed, the pupil contracts progressively, though it still retains its sensibility to excitement. Thus, during this period, in which anaesthesia is incomplete, the pupil is seen to dilate under the influence of various sorts of excitement exerted on the patient, who will then move about, groan, or utter cries. During the period of complete anaesthesia, on the contrary, or of profound surgical anaesthesia in other words, two constant phenomena are observed in the situation of the pupil: (1) absolute immobility; (2) a contracted state of the organ. There consequently exists a connection between the absolute insensibility of the subject and contraction with immobility of the pupil; between the return of sensibility in the patient and dilatation with mobility of the organ. The condition of the pupil may therefore, so far as regards sensibility, serve as a guide in the administration of chloroform. During protracted surgical operations, when it is necessary to keep the patient in complete insensibility, anaesthesia must be conducted in such a way as to maintain the pupils constantly contracted and immovable. It is important, however, to remark, that, although the state of the iris may serve as a guide for the management of anaesthesia, yet it does not make the surgeon aware of the imminence of danger; it is always the pulse, respiration, and general condition of the patient that he must watch over for any such intimations. Lastly, the efforts of vomiting may produce dilatation of the pupils, bring on cessation of insensibility, and awaken the patient; they partially destroy the effects of anaesthesia.

The greater part of these results had already been published in September last by M. Budin. They were sharply attacked by M. Schiff in *L'Imparziale*, of Florence. According to M. Schiff all the results were erroneous. Chloroform produced, during complete anaesthesia, dilatation and not contraction of the pupil. All the practical consequences drawn from M. Budin's investigations were therefore declared to be false, and furthermore the administration of chloroform according to the manner advocated by the French author exposed the patient to almost certain death. This was speedily answered by MM. Budin and Coyne, who repeated Schiff's experiments, and showed that the Florence professor, by administering chloroform in a bag, produced *asphyxic anaesthesia*, and not *chloroformic anaesthesia*. The importance of these experiments renders some description of them indispensable.

That of M. Schiff is as follows: He injects chloral into a dog, and obtains complete anaesthesia; the pupil is then punctiform. To the same dog he afterwards administers chloroform by means of a bag, and dilatation of the pupil is the result. When he withdraws the chloroform the pupil contracts; if he re-applies it the pupil again dilates.

The French investigators adopt a different kind of experimentation, dividing it, as it were, into two stages. First, they inject from one-fourth to one-half of a drachm of chloral into a dog; the pupil becomes punctiform. Chloroform is then applied in the open air (*i. e.*, without being contained in any recipient), and the pupil still remains punctiform during the entire period of complete anaesthesia, carried on for one hour. This result, observed in the absence of every cause of asphyxia, is totally different from that obtained by Schiff. In a second experiment, they introduce into the windpipe of a dog an open canula, provided with a cock. Three-fourths of a drachm of chloral are then injected into the femoral vein, and the punctiform pupil which attends total anaesthesia

is the result. They then close the cock, and as asphyxia comes on the pupil dilates. They open the cock, and the pupil contracts; they shut it again and the pupil dilates. Therefore *without chloroform* and with *simple asphyxia* they reproduce the results obtained by Schiff.

Other experiments of MM. Budin and Coyne show that asphyxia produces in the situation of the pupil different phenomena from those observed in chloroformic anæsthesia. In asphyxia there first exists an intermediate condition of the pupil, or one of moderate dilatation; then a most extensive dilatation when the convulsive phenomena make their appearance. Now it is very important, from a practical point of view, and as MM. Sédillot and Claude Bernard have especially shown, to avoid a state of asphyxia; not that asphyxia immediately occasions death, but because it is certain than when phenomena of asphyxia exist at the beginning of chloroformization, syncope occurs much more readily.

Such are the principal points brought to light by MM. Budin and Coyne. Some of the results announced in their publications have already been confirmed; as, for instance, those recently mentioned by Dr. Albert Bergeron in his treatise on "Chloroform in the Surgery of Children," embodying researches carried on in the laboratory of La Charité. The others are left open to the elucidation which must result from further research.—*Lancet*, April 17, 1875.

4. *Anæsthetic Action of Bromoform*.—Dr. RABUTEAU reported to the Biological Society of Paris, some cases, showing that the application of bromoform to the skin produced anæsthesia without the revulsive and painful effects of the application of chloroform.—*Gazette Hebdom. de Méd. et de Chirurg.*, May 7, 1875.

5. *Action of Subcutaneous Injections of Morphia*.—CHOUPE finds, as the result of a thousand experiments on himself, that the subcutaneous injection of morphia at the painful part produces its anæsthetic effect from two to two and a half minutes sooner than when it is made elsewhere. The pain ceases sooner than can be explained by supposing the morphia to act through the general system. A further proof of the local action of morphia is found in the use of concentrated solutions. While a weak solution of morphia in distilled water (1 in 150) produced severe pain at the point of injection, the injection of stronger solutions (1 in 50 and 1 in 30) was quite painless.—*Brit. Med. Journ.*, April 10, 1875, from *Gaz. Méd. de Paris*, No. 35, 1874.

6. *Nitrite of Amyl—its Effects, and its Action and Influences in Counteracting the Dangerous Effects of Chloroform*.—Mr. C. BADER, Ophthalmic Surgeon, Guy's Hospital, states (*Lancet*, May 8, 1875) that some years ago, when nitrite of amyl was first used at Guy's Hospital, Dr. Goodhart and himself studied its effects, when taken internally, upon the bloodvessels in the healthy optic disk and retina. The effect is as rapid as it is striking. Three or four seconds after taking three drops of the drug on sugar, the bloodvessels of the retina (arteries and veins, but especially the veins) become enormously dilated and gorged with blood, leaving no doubt as to simultaneously existing cerebral hyperæmia, with greatly accelerated circulation of blood.

Lately, after observing upon himself the effects of inhalation of the vapour of the nitrite of amyl, it occurred to him that in cases of faintness or of defective breathing or heart's action, while under the influence of an anæsthetic, nitrite of amyl might be of use. A few cases will show the encouraging effects of this agent.

CASE 1. Given a mixture of alcohol, ether, and chloroform. Young man, hydrocephalic, inherited syphilis; iridectomized on both eyes; suddenly became pale, deeply insensible, with pulse and respiration very defective. Lint, with a few (three) drops of the nitrite of amyl, was placed over nose and mouth. In two or three seconds a deep inspiration, followed by others, flushed face, quick pulse, and return of sensibility, were observed.

CASE 2. Given chloroform. A boy, pale, fat, blue lips and cheeks, became suddenly very faint (blue lips, blood turning black, breathing very imperfect).