

very much inclined to agree with Dr. West, that the operation should be almost limited to epithelial cancer of the cervix.

We have now laid before our readers a sketch of the contents of this valuable work, briefly, it is true, but sufficiently full to justify the high opinion we expressed at the commencement of this notice.

We trust to welcome contributions from the pen of Dr. West for many years to come; for when a man of such a scientific mind and careful observation and untiring diligence applies himself to any given department, the result must be a great and valuable augmentation of our information.

REVIEW X.

On the Constitutional and Local Effects of Disease of the Supra-Renal Capsules. By THOMAS ADDISON, M.D., Senior Physician to Guy's Hospital.—London, 1856. pp. 39. Plates.

DR. ADDISON, the distinguished Senior Physician of Guy's Hospital, rather more than a year ago, laid before the medical profession a monograph, in which he endeavoured to prove that a peculiar bronzed condition of the skin, accompanied by a remarkable and fatal form of cachexia, is characteristic of disease of the supra-renal capsules. He states that he stumbled upon the curious facts which form the groundwork of his interesting and suggestive essay, while seeking to throw some additional light on a form of anæmia occurring without any discoverable cause whatever, in cases "in which there had been no previous loss of blood, no exhausting diarrhœa, no chlorosis, no purpura, no renal, splenic, miasmatic, glandular, strumous, or malignant disease." That he should have *stumbled* upon them is not remarkable, inasmuch as, in the present state of our knowledge, no *à priori* reasoning could have suggested any, even the remotest, connexion between disease of the supra-renal glands and disease of the tegumentary system. Yet to have recognised the importance of facts that have come, as it were, accidentally before us, and then, by a careful investigation of them, to have acquired an insight into the laws which regulate their connexion with one another, are deserving of high praise. And to such praise Dr. Addison is fairly entitled, if the observations he has published are the result of as much well-directed labour and thought as his character as an observer would warrant us in believing them to be.

Dr. Addison, after characterizing his work as "a first and feeble attempt towards an inquiry into the functions and influence of the supra-renal capsules, as suggested by pathology," expresses the hope that—

"However unimportant or unsatisfactory his facts may at first sight appear, they may, by attracting the attention and enlisting the co-operation of the profession at large, lead to the subject being properly examined and sifted, and the inquiry so extended as to suggest at least some interesting physiological speculations, if not still more important practical indications." (p. 4.)

This hope has been to some extent realized; and chiefly through the energy of Mr. Jonathan Hutchinson,* a large amount of evidence has been collected from all sources, strongly confirmatory of the views

* Medical Times and Gazette, Nos. 297 and 299, 1856.

originally promulgated by Dr. Addison. We feel—though truly the whole subject is still involved in deep obscurity—that the time has already arrived when the facts that have accumulated may be weighed, and their value approximately estimated.

We purpose in the present article first to describe the symptoms and pathology of the disease which forms the subject of Dr. Addison's book, and then to discuss the evidence by which *it is supposed* that the dependence of the general symptoms on disease of the supra-renal bodies is established. It is only fair, however, to premise, that from a comparison of almost all the cases that have been recorded subsequently to the appearance of Dr. Addison's work, and of those which are published by Dr. Addison himself, Mr. Hutchinson has so carefully described the disease, and so fairly examined the evidence in relation to it, that there is little else left for us to do, in the almost necessary absence of anything like a good practical acquaintance with the subject, than to follow in his footsteps and to make free use of his valuable papers.

Dr. Addison's description of the disease is short, and we are therefore tempted to quote it entire. He says:—

“The leading and characteristic features of the morbid state to which I would direct attention, are, anæmia, general languor and debility, remarkable feebleness of the heart's action, irritability of the stomach, and a peculiar change of colour in the skin, occurring in connexion with a diseased condition of the supra-renal capsules.

“As has been observed in other forms of anæmic disease, this singular disorder usually commences in such a manner, that the individual has considerable difficulty in assigning the number of weeks or even months that have elapsed since he first experienced indications of failing health and strength; the rapidity, however, with which the morbid change takes place, varies in different instances. In some cases that rapidity is very great, a few weeks proving sufficient to break up the powers of the constitution, or even to destroy life; the result, I believe, being determined by the extent, and by the more or less speedy development, of the organic lesion. The patient, in most of the cases I have seen, has been observed gradually to fall off in general health; he becomes languid and weak, indisposed to either bodily or mental exertion; the appetite is impaired or entirely lost; the whites of the eyes become pearly; the pulse small and feeble, or perhaps somewhat large, but excessively soft and compressible; the body wastes, without, however, presenting the dry and shrivelled skin, and extreme emaciation, usually attendant on protracted malignant disease; slight pain or uneasiness is from time to time referred to the region of the stomach, and there is occasionally actual vomiting, which in one instance was both urgent and distressing; and it is by no means uncommon for the patient to manifest indications of disturbed cerebral circulation. Notwithstanding these unequivocal signs of feeble circulation, anæmia, and general prostration, neither the most diligent inquiry, nor the most careful physical examination, tends to throw the slightest gleam of light upon the precise nature of the patient's malady; nor do we succeed in fixing upon any special lesion as the cause of this gradual and extraordinary constitutional change. We may indeed suspect some malignant or strumous disease; we may be led to inquire into the condition of the so-called blood-making organs, but we discover no proof of organic change anywhere—no enlargement of the spleen, thyroid, thymus, or lymphatic glands—no evidence of renal disease, of purpura, of previous exhausting diarrhœa, or ague, or any long-continued exposure to miasmatic influences; but with a more or less manifestation of the symptoms already enumerated, we discover a most remarkable, and, so far as I know, characteristic discoloration taking place in the skin—sufficiently marked indeed as generally to have attracted the attention of the

patient himself, or of the patient's friends. This discoloration pervades the whole surface of the body, but is commonly most strongly manifested on the face, neck, superior extremities, penis and scrotum, and in the flexures of the axillæ and around the navel. It may be said to present a dingy or smoky appearance, or various tints or shades of deep amber or chesnut-brown; and in one instance the skin was so universally and so deeply darkened, that, but for the features, the patient might have been mistaken for a mulatto.

"In some cases this discoloration occurs in patches, or perhaps rather certain parts are so much darker than others, as to impart to the surface a mottled or somewhat checkered appearance; and in one instance there were, in the midst of this dark mottling, certain insular portions of the integument presenting a blanched or morbidly-white appearance, either in consequence of these portions having remained altogether unaffected by the disease, and thereby contrasting strongly with the surrounding skin, or, as I believe, from an actual defect of colouring matter in these parts. Indeed, as will appear in the subsequent cases, this irregular distribution of pigment-cells is by no means limited to the integument, but is occasionally also made manifest on some of the internal structures. We have seen it in the form of small black spots, beneath the peritoneum of the mesentery and omentum—a form which in one instance presented itself on the skin of the abdomen.

"This singular discoloration usually increases with the advance of the disease; the anæmia, languor, failure of appetite, and feebleness of the heart, become aggravated; a darkish streak usually appears upon the commissure of the lips; the body wastes, but without the extreme emaciation and dry harsh condition of the surface so commonly observed in ordinary malignant diseases; the pulse becomes smaller and weaker, and, without any special complaint of pain or uneasiness, the patient at length gradually sinks and expires. In one case, which may be said to have been acute in its development as well as rapid in its course, and in which both capsules were found universally diseased after death, the mottled or checkered discoloration was very manifest, the anæmic condition strongly marked, and the sickness and vomiting urgent; but the pulse, instead of being small and feeble as usual, was large, soft, extremely compressible, and jerking on the slightest exertion or emotion, and the patient speedily died.

"My experience, though necessarily limited, leads to a belief that the disease is by no means of very rare occurrence, and that were we better acquainted with its symptoms and progress, we should probably succeed in detecting many cases, which, in the present state of our knowledge, may be entirely overlooked or misunderstood; and, I think, I may with some confidence affirm, that although partial disease of the capsules may give rise to symptoms, and to a condition of the general system, extremely equivocal and inconclusive, yet that a more extensive lesion will be found to produce a state, which may not only create a suspicion, but be pronounced with some confidence to arise from the lesion in question. When the lesion is acute and rapid, I believe the anæmia, prostration, and peculiar condition of the skin will present a corresponding character, and that whether acute or chronic, provided the lesion involve the entire structure of both organs, death will inevitably be the consequence." (pp. 4—7.)

The description, derived from an analysis of about twenty-seven cases which Mr. Hutchinson gives of the disease, is strongly confirmatory of the account which we have just quoted; and in the commentary we are about to subjoin, we shall avail ourselves largely of his labours.

The change of colour of the skin would appear to be the most marked and constant symptom. If the accounts that are published are trustworthy, it would seem that this change is one of the earliest symptoms of the disease, that it frequently precedes all others, and that it becomes more and more intense up to the final issue. The tint assumed evidently

varies in different cases, for sometimes the skin is described as having a light yellowish-brown hue, while at other times it is stated to resemble that of a mulatto. In all cases, however, it would seem that the term "bronzing" conveys a good idea of the character acquired by the skin. "It strongly resembles," says Mr. Hutchinson, "the colour of a bronzed statue from which the gloss has been rubbed off." Pressure has no effect in causing its diminution. It seems, as a rule, to commence in patches with ill-defined borders on those parts exposed to the air and to friction, and on those parts where pigment naturally abounds, and to spread thence over the general surface of the body. Those parts, however, which originally present little or no pigment, as the palms of the hands, soles of the feet, unguinal matrices, &c., appear to remain unaffected to the last. The discoloration is said occasionally to invade the lips, and occasionally to extend even to other parts of the mucous membrane of the mouth. But it has not been satisfactorily observed in any other part of the body. For although Dr. Addison states that in one case there was black pigmentary deposit in the peritoneum, it must be borne in mind that there was tubercular peritonitis as well, and in such cases the appearance of black spots and patches in that situation is exceedingly common. Hence it would appear that the discoloration is, so far as is at present known, strictly limited to the skin and those portions of the mucous membrane which adjoin integument. And it is important to bear in mind that the conjunctivæ are stated in almost all cases to have remained clear and pearly. We may add that, in three instances, a peculiarly disagreeable sickening odour was exhaled from the patient's body, a circumstance which does not appear to have attracted Dr. Addison's attention, and which possibly may not have existed in any of his cases. Mr. Hutchinson observes that:

"Next to the bronzing of the integument, the extreme and peculiar feebleness manifested appears to be the most striking of the symptoms. Without any evidence of thoracic disease the patient becomes liable to faintings, loses energy, is unable to exert either body or mind, and, in short, appears to be on the point of death from sheer weakness.

"That there has generally been observed a want of correspondence between the extreme debility and the degree of emaciation coincident with it, seems evident. Several of the patients are described as having remained muscular and fat up to the very last. In almost all, however, there had been some loss of flesh, and in many it had even been considerable. Dr. Addison's observation, that flabbiness of the solids rather than actual wasting is characteristic of the condition, seems true of the majority of cases.

"In almost all cases there would seem to have been present great depravation of the coloured constituents of the blood, as manifested by the pallor of those parts not involved in the bronzing, the general flabbiness of the muscles, the pearly state of the conjunctiva, &c. In two only was the blood examined with the microscope, and in both those it was found to be loaded with white corpuscles.

"In almost all cases prior to death, and in many for protracted periods, great irritability of the stomach was present. In most there was loss of appetite, more or less persistent nausea, and occasional vomiting, with pain and sense of sinking at the epigastrium. In the majority it would seem that the bowels have been costive rather than otherwise, while in a few, attacks of diarrhœa had occurred."

(*Med. Times and Gaz.*)

Symptoms referrible to disorder of the cerebro-spinal system occurred

in several of the cases. In a few instances death was preceded by a low form of muttering delirium. In one case failure of memory was noted; in another numbness of the fingers, legs, and tip of the tongue. In two or three cases neuralgia was present. Two patients had epileptic attacks, but in one of the two this complication was clearly due to disease of the medulla oblongata.

In the generality of cases the pulse was peculiar only in its extreme softness and compressibility.

Pain in the loins was frequently complained of, but is probably to be looked upon as only a part of that general debility from which the patients were suffering.

Neither the tongue nor the urine appears to have exhibited any important deviation from the healthy condition.

Judging from the few cases in which the mode of death has been described, Mr. Hutchinson remarks, "the phenomena attending death are those of utter prostration of the vital powers, not unfrequently complicated by disturbance of the nervous functions."

From all that is above stated, we think it may be assumed that the distinctive features of the disease under consideration are the peculiar discoloration of the skin, and the general anæmic condition; for neither the dyspeptic nor the nervous symptoms are sufficiently constant or uniform in character to render it probable that they are anything more than the natural sequæ of the progressive and extreme debility. Now, the anæmic condition does not appear to us to differ, except in the fatality that attends it, from that which accompanies many other forms of disease; and hence it is clear that it is upon the peculiar changes taking place in the skin that we must mainly rely in forming our diagnosis. It is therefore highly important that we should be able to distinguish the bronzed condition of the integument, supposed to be indicative of renal-capsular disease, from other affections attended by discoloration, to which the skin is liable. Mr. Hutchinson has, we believe, correctly pointed out the distinctive marks by which a differential diagnosis between true bronzing of the skin and other cutaneous affections may be established. *Jaundice* may be discriminated, not only by the general symptoms which accompany it, but by its peculiar tint, by its uniform diffusion, and by its presence in the matrices of the nails and in the conjunctivæ. *Browning from exposure to the sun* may be recognised by its occurrence in those situations only which are habitually exposed.

"*Patches of Pityriasis versicolor* sometimes remarkably resemble those of bronzed skin. Their limitation to the abdomen and chest, their defined outline, their furfureous surface, the slight itching which attends them, their contagious character, and, above all, the microscopic examination of the cuticle, furnish, however, abundant means by which to distinguish between the two." (Med. Times and Gaz.)

Mr. Hutchinson remarks, lastly, that it is important not to confound the diffused brown muddiness of some other cachexiæ with the bronzing of supra-renal disease. With regard to the means of distinguishing by means of the microscope between pityriasis versicolor and true bronzed skin, we may remark, that although we believe Mr. Hutchinson's opinion will prove correct, we suspect that he has asserted more than our present knowledge justifies him in asserting. It is somewhat strange, yet we

believe it to be a fact, that up to the present time it is a mere assumption that the bronzed condition of the skin depends on pigmentary deposit—at least, so far as we know, no account of its microscopical examination has been published.

The morbid anatomy of the supra-renal capsules need not detain us long. The diseases which have been found in them, in connexion with bronzed skin, are various:—1. Acute and recent inflammation, ending in abscess. 2. Atrophy, with fibro-calcareous concretions. 3. The conversion of the viscus into a sort of fibroid structure, with great enlargement and induration. 4. The deposit of tubercle, or of a fibroid material resembling tubercle. 5. The growth of cancer. Occasionally the affection of the glands, especially when of a cancerous nature, appears to be secondary to disease in other parts; but it is a very interesting fact, that in many cases these bodies were the only organs in which disease was detected. It is scarcely necessary to say that the supra-renal glands are sometimes partially diseased, and that sometimes one or both are wholly destroyed; but it is very important to bear in mind, that, to judge from the cases that have been published, the degree of bronzing, and the severity of the general symptoms, appear to have been proportionate to the amount of disease in these bodies, and to have had no relation whatever to the nature of that disease.

It will, we conceive, be readily conceded, that the facts above given are very remarkable, and if the suggested connexion between them turn out to be real, exceedingly valuable and important. We will proceed, therefore, now to examine the evidence by which the dependence of the fatal cachexia, and of the concurrent change in the colour of the skin, upon disease of the supra-renal capsule, is thought to be proved. Before we enter on this subject, however, it is very essential that it should be clearly understood, that the proof of the coincidence of these phenomena by no means establishes that the one is the cause of the other; indeed, such a proof would still leave it an open question,—whether the disease in one of the organs is the cause of the morbid changes in the other, and of the general symptoms—or, whether the supra-renal disease, and the affection of the skin, like the intestinal ulceration and cutaneous rash of typhoid fever, are concurrently the efflorescence, if we may so express it, of some more deeply-seated systemic mischief.

Up to the present time, about 33 cases of bronzed skin, including the 12 originally furnished by Dr. Addison, have been published. Of this number all but one died. In 6 cases no autopsy was made, and in 2 the supra-renal glands were overlooked at the time of the post-mortem examination. But in every other case—that is, in every one of the remaining 23—these bodies were found in a more or less diseased condition. And hence it follows, that notwithstanding the close attention that has for several years past been paid to the subject in Guy's Hospital, and the general interest that has been manifested in it throughout the profession since the publication of Dr. Addison's work, upwards of a year ago, not a single case has been published, in which a bronzed condition of the skin has been proved to have existed without manifest disease of the supra-renal capsules having been present at the same time. Now we do not mean to affirm that all the 23 cases, in which the association of these

phenomena was proved by post-mortem examination, are altogether trustworthy; the details of several are very meagre and imperfect; and with regard to one or two, perhaps, a suspicion might arise that the authors had unconsciously modified or moulded the facts, to adapt them to Dr. Addison's views. Still, allowing for all these possible sources of error, we feel convinced that a critical examination of the above cases, so far from weakening, will tend materially to strengthen the evidence in favour of the close connexion between the two pathological phenomena of which we are speaking. In 7 of the cases, either one organ only, or both partially, were diseased. In 16, the healthy structure of both organs was wholly destroyed; and in 9 or 10 of these, the supra-renal bodies were the only organs in which any trace of disease was recognised. In nearly every one of the 16 cases in which both organs were found affected, the change in the colour of the skin was so marked, as to have attracted the attention of the patient and his friends; and in several of the cases that are related by Dr. Addison, and in several of those that have been subsequently described, disease of the supra-renal glands was diagnosed during life. One of the latter cases is so remarkable and conclusive, that we are tempted to give a short abstract of it. It was under the care of Drs. Ranking and Vincent, and a complete account of it was published in the 'Medical Times and Gazette' for May 24th of the current year. The patient was a lady, fifty-nine years of age. In May, 1855, she first observed that the skin of her face and hands was discoloured, and she was often annoyed when making calls, by friends offering her water to wash her hands. Her appetite failed, the stomach rejected almost everything, and emaciation became very evident. The symptoms gradually increased, and in August, and again in October, she consulted Dr. Ranking, who states, that on these occasions she complained mainly of great and increasing loss of strength, with sinking at the pit of the stomach, nausea, and complete loss of appetite. The face was dark brown, as dark, in fact, as that of a Japanese. The hands also were discoloured, especially at the knuckles. Her heart's action was feeble. The secretions of the liver, intestines, and kidneys were healthy. The case continued a complete mystery to all who were concerned in it up to December, when Dr. Vincent, happening to read a review of Dr. Addison's work, was struck by the remarkably close analogy between the case that so sorely puzzled him and those which are described by Dr. Addison. He mentioned the suspicions that naturally arose in his mind to Dr. Ranking, who, when put in possession of the circumstances on which they were founded, fully acknowledged their justice. The consequence was, that the case was published in the 'Medical Times and Gazette' for December 22nd, 1855, as one in which supra-renal disease probably existed. The symptoms continued with but little alteration up to the 25th of April, 1856, on which day the patient died, extremely emaciated, after several hours' muttering delirium. A tolerably careful post-mortem examination was made. All the abdominal and thoracic viscera were found healthy, with the single exception of the supra-renal glands. These bodies were enlarged, they were infiltrated with a putty-like deposit, and their normal structure was wholly destroyed. That they were completely disorganized is confirmed by the testimony of Drs. Addison and Wilks, to whom they were referred for examination.

There is one branch of the evidence which seems strangely to have been overlooked by Dr. Addison: it is that which is furnished by an examination of the supra-renal capsules in those cases in which no bronzing of the skin has existed. This deficiency has been supplied by Dr. Wilks, who states (Dec. 29, 1855) that, in 500 post-mortem examinations conducted in Guy's Hospital during the previous two years, in one instance only was disease in the capsules found unassociated with discoloration of the skin, and in that case only a few malignant tubercles grew from the surface of one of the organs. It is quite certain, however, that, during the last year, several examples (to say the least) have been met with, in which one or both glands have been partially diseased, and in which no discoloration of the skin has occurred. We have ourselves, within the last four months, examined four cases in which these bodies were partially diseased—three times with cancer and once with fibro-calcareous deposit—and in which we do not feel justified in admitting that there was any unusual discoloration whatever of the skin. Nevertheless, no case has yet been published in which, when both glands were wholly diseased, bronzing of the skin did not co-exist. We feel justified, therefore, in saying that the following facts are demonstrated by the evidence adduced:

Sixteen cases have been recorded in which a bronzed condition of the skin was associated with total destruction of the supra-renal capsules;

No case of bronzing of the skin has been published in which the capsules were found healthy;

In those cases in which partial disease of the capsules was detected, bronzing of the skin has been sometimes present, sometimes absent;

But, not a single case is on record in which total destruction of the capsules has existed, without manifest discoloration of the skin having existed also.

We think, with these facts before us—facts the truth of which we have no reason whatever to question—that we cannot do otherwise than admit that there is really some very close connexion between bronzing of the skin and disease of the supra-renal capsules: nay, further, that there is very strong reason for believing that bronzing of the skin may be looked upon as diagnostic of disease of the supra-renal capsules.

Assuming, then, the intimate connexion between these two pathological phenomena to be established, it remains for us to inquire what the nature of that connexion is. Is the capsular disease dependent on the skin affection?—are these two morbid conditions the coincident effects of some other cause?—or is the affection of the skin produced by disease of the supra-renal capsules?

Now, by reference to the statements which were made in the last paragraph, it will be seen that, though a bronzed condition of the skin seems always to have been attended by disease of the capsules, disease of the capsules has not always been accompanied by bronzing of the skin; and hence it is clear that the cutaneous discoloration may be dependent on the capsular affection, but that the converse of that proposition cannot be for a moment maintained. That the two morbid conditions are the coincident effects of some other cause, is a view the probability of which has most likely suggested itself, at one time or other, to the minds of all who have bestowed any thought on the subject; but we believe a little con-

sideration will prove it to be altogether untenable: for had the morbid condition of the supra-renal glands been produced by some agency which was at the same time working its ill effects on the integument, we should have expected to find the same unity of type in the disease of the glands as appears to have been found in that of the skin. The diseases in the glands, however, which have been found associated with bronzed skin, present the most varied characters; and indeed, all the evidence goes strongly to show that bronzing of the skin, and the cachectic symptoms which accompany it, are found to be associated with every form of disease that has yet been recognised in these bodies, provided that disease be sufficiently extensive to have effected their entire destruction. The third alternative is thus irresistibly forced upon our attention; and that it furnishes a correct explanation, so far as it goes, of the disease in question, is rendered nearly certain by the fact, that those considerations which militate so powerfully against the first two alternatives, are strong positive arguments in favour of this. We believe, therefore, that the evidence before the profession with regard to supra-renal capsular disease, proves not only that such a condition of the skin as has been described at a previous page is diagnostic of disease of the supra-renal capsules, but that disease of the supra-renal capsules is the cause of that discoloration of the skin, and we may add, of the symptoms that co-exist therewith.

There are yet two or three points which deserve to be alluded to before we bring the present article to a conclusion:—1. Dr. Addison speaks in very gloomy terms of the prognosis of the disease. It is possible that his fears may be well founded. Indeed, it is certain that the published cases confirm them. We must recollect, however, that most of these cases, and certainly the more conclusive ones, were cases in which the glands were structurally and irremediably disorganized; and since we have no reason to suppose that the supra-renal bodies do not resemble all other organs in being subject to transient and remediable forms of disease as well as to progressive and incurable ones, we cannot help suspecting that, as our knowledge of the disease in question becomes more extensive, we shall find that bronzing of the skin, with the attendant symptoms, is not so invariably fatal as it is at present believed to be. 2. With regard to treatment, little can be said. The symptoms usually manifested appear to indicate the desirability of the exhibition of tonics: that is the treatment that seems usually to have been resorted to, and probably with advantage; but with what ultimate benefit, may be in some measure estimated by the invariably fatal result which has attended the cases. 3. Dr. Addison has—wisely, as we think—refrained from speculating upon the functions which the renal-capsules subserve, although he has certainly shown that their importance is much greater than has generally been suspected. We are not more disposed to speculate on the subject than Dr. Addison, and shall therefore refrain from discussing the possibility of their function being a nervous one, which is a view that Mr. Hutchinson, partly on anatomical grounds, seems inclined to adopt.

Finally, we beg to reiterate our belief, that the connexion between disease of the supra-renal capsules and a bronzed condition of the skin, which Dr. Addison sought to establish, has been proved to exist; and we have to thank him, therefore, for a most valuable and interesting contri-

bution to pathology—for a work which, we believe, contains important truths, and the germs of truths probably still more important. It would be ungracious if we refused to acknowledge, also, the services which in this inquiry have been rendered by Mr. Hutchinson, and those other gentlemen who have made Mr. Hutchinson the medium by which valuable cases have been laid before the profession. We venture to hope that their good example will be followed by numerous pathologists, and that ere long the supra-renal capsules may be entitled to hold as definite position on the map of pathology as is at present occupied by other organs which have been successfully investigated by the light of modern science and by the industry of modern observers.

 REVIEW XI.

1. *Ueber das Absorptionsvermögen des Bluts für Sauerstoff.* Von G. MAGNUS. ('Annalen der Physik und Chemie,' Band lxvi. 1846.)
On the Capacity of the Blood for the Absorption of Oxygen. By G. MAGNUS.
2. *The Effects of Respiration on the Inspired Air: Gases Absorbed and Given Out by the Blood.* (Chap. xxv. in 'Letters on Chemistry in its Relation to Physiology, Dietetics,' &c. By JUSTUS VON LIEBIG. 1851.)
3. *Respiration.* ('Lehrbuch der Physiologischen Chemie.' Von Prof. Dr. C. G. LEHMANN. Band iii. p. 284. Zweite Auflage.—Leipzig, 1853.)
On Respiration. ('Handbook of Physiological Chemistry.' By Professor LEHMANN. Second Edition.)

PHYSIOLOGY may now be said to have reached that point where an accurate knowledge of the changes produced by the respired air upon the animal economy becomes indispensably necessary not only to the just appreciation of the normal functions, but also to the comprehension of the assimilation of food and the action of medicines upon the body, not a single function of which is independent of respiration. Nervous action, muscular contraction, secretion and excretion, are alike under its sway. No change can take place in either the living or dead animal organism without an interchange of gases. Shut out the atmospheric supply, and development ceases; prevent the action of air, and decay is instantly arrested. No new cell can be formed, no old one destroyed, without the influence of this all-important agent. From the moment when the animal or vegetable germ springs into existence, throughout its development into tissues, during its whole life as an organized being, to the time of its death, and even throughout its decay, until the last cell has been resolved into its primary elements, oxygen has been uninterruptedly employed; and according to the supply of this indispensable agent have these changes been accelerated or retarded. Is it, then, surprising that a complete knowledge of the chemistry of respiration should be considered one of the principal indicators towards the understanding and treatment of disease, and that it should rank as a most important pillar in the structure of rational medicine?