section of the veins between the ligatures. The third stage consists of section with the bistoury of the muscles of the anterior region. The vessels compressed in the muscular interstices are only divided after previous ligature. In the fourth stage the joint is laid open. The fifth stage consists of division of the posterior muscles and of the vessels with the same precautions. The operation may be terminated in half an hour. The wound is open and shaped like a hollow cone."^a

I need hardly say that making the operation so very protracted a one, must add largely to its peril; but, in truth, it is unnecessary to criticise a procedure which no surgeon having drainage tubes, efficient antiseptic appliances, and Davy's lever, at his disposal, would at the present time be likely seriously to contemplate performing; and were it not that the proposal had such distinguished credentials, I should not on the present occasion have given an account of it.

As regards the best mode of realising economy of blood in amputation at the hip-joint, there can be little doubt that of the various methods suggested and practised with this object, that introduced by Mr. Davy is *facile princeps*. It is easy of application, does not impede rapidity of manipulation on the part of the surgeon—a matter of no small moment in this operation—leaves the patient's respiration unimpeded, and in preventing hæmorrhage is at once effectual and satisfactory.

ART. XIII.—*Addison's Disease*.^b By KENDAL FRANKS, M.D., Univ. Dubl.; F.R.C.S.I.; Surgeon to the Adelaide Hospital; Surgeon to the Dublin Throat and Ear Hospital; ex-Sch., Trin. Coll. Dubl., &c.

So short a time ago as 1855 the first treatise "On the Local and Constitutional Effects of Disease of the Suprarenal Capsules"^c was published by Addison. This treatise naturally excited a great deal of interest, and since that year a great deal of attention has been paid to these organs, both in their healthy and diseased conditions, in order to ascertain the following points:—First, what is their function in the economy of the human system? secondly,

^a British Med. Journal, April 27, 1878.

^b Read at the Meeting of the University Biological Association, Jan., 1882.

^c London, 1855.

are the train of symptoms detailed by Addison consequent on disease of these organs? thirdly, what is this disease? and fourthly, what is the connexion between the disease and the symptoms it gives rise to? Physicians, physiologists, and histologists, have all vied with each other to elucidate these points in their several departments; but though they have added much to the interest of the disease and to its history, none have succeeded as yet in placing even one of these points beyond the range of dispute.

The account of this disease, as originally given by Addison himself, is as true and graphic to-day as it was then, most of what he regarded as debatable ground is debatable ground still, and the conclusions at which he arrived are still generally regarded as correct; and when differences of opinion have arisen it has been due to the publication of many cases as cases of Addison's disease which presented "neither the clinical features nor the pathological conditions described by Addison," and were therefore not cases in point at all. I cannot do better than give the terse description which Addison wrote himself. He tells us that he had "for a long period met with a very remarkable form of anæmia, occurring without any discoverable cause whatever—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." This disease he termed *idiopathic anæmia*. Detailing the chief features presented by such a case, he says:—"The patient gradually becomes languid, weak, and indisposed either to bodily or mental exertion; appetite impaired or entirely lost; the white of the eyes becomes pearly; the pulse small and feeble, or perhaps soft and compressible; the body wastes without presenting the dry, shrivelled skin and extreme emaciation usually attendant on protracted malignant diseases; slight pain and uneasiness is from time to time referred to the region of the stomach; and there is occasional 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 extraordi-

nary change. . . . With more or less of these symptoms we discover most remarkable and, as 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 the patient's friends. The discoloration pervades the whole surface of the body, but is commonly most strongly manifested on the face, neck, superior extremities, penis, and scrotum, in the flexures of the axillæ, and around the navel. It may be said to present a dingy or smoky appearance, or various shades of deep amber or chestnut 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. . . . If I see a patient who presents this peculiar discoloration of the skin, and with this a certain train and combination of general symptoms—a pearly eye, a feeble pulse, a disposition to strongly marked anæmia, and a few other symptoms less constant—I say, this is a case in which you will find disorganisation of the suprarenal capsules.”

Thus Addison's disease presents three salient features, which may thus be enunciated:—Firstly, a marked asthenia, generally of an extreme kind and without any apparent or even discoverable cause; secondly, a remarkable bronzing of the skin, more or less intense, involving the whole cutaneous surface, though some parts, especially those exposed to the sun, show the discoloration more clearly than others; thirdly, a diseased condition of the suprarenal capsules. These three elements “present such striking and distinguishing features,” says Dr. Wilks,^a “that if the first two are found to be present the third may be safely predicated.”

On the 22nd of July last there was admitted to the Brooke Ward of the Adelaide Hospital a girl, E. M'C., aged fourteen years, who was brought to the waiting-room by her friends. She was in a very prostrate state, hardly able to sit on the form. Whilst I was talking to her friends she nearly fainted, and had to be placed lying down on her back. The pulse was almost imperceptible, her voice nearly inaudible, and she seemed scarcely able to keep her eyes open. She was at once removed to bed. The following history of her illness was obtained:—She was in good health until two months since, when she first began to notice that exertion of any kind produced invariably a feeling of great lassitude, and that in consequence she was disinclined to take any exercise. She noticed also that although naturally of a dark complexion

^a Reynolds' System of Medicine. Vol. V., p. 354. 1879.

her skin was gradually getting darker, especially that on her face, neck, and backs of her hands. She attributed this to the influence of the sun. She also suffered from pains in the loins and hypogastric region. She complained of nothing else. At this time the patient was living at Bray. Her father and mother were both stated to have died of phthisis. The mother had a dark complexion, but the father was fair. The girl had finely-cut features, dark black hair and dark eyes. The conjunctivæ were of a pearly whiteness, transparent and with a bluish tinge; eye-lashes very long and dark. She was well-formed and well-developed, and the body was well-nourished. Her skin was soft and moist. Her chief complaint was extreme weakness, with coldness and numbness of the extremities. She suffered from constant retching. For some days past she complained of mists coming over her eyes. The lungs were carefully examined; no dulness was elicited on percussion over either pulmonary region, and respiratory sounds were equal over each side; immediately beneath both clavicles there was some harshness in breathing, but the sounds were otherwise healthy; there was no cough or expectoration. The heart was normally placed; its sounds were very feeble; to the stethoscope the first sound was all but inaudible, but could just be detected by placing the ear directly over the cardia. The pulse was small, weak, and compressible—120. The temperature was normal. The appetite was bad, the tongue fairly clean, and the bowels regular. She had menstruated twice—once in October, 1880, and once in February last. The abdomen was retracted and boat-shaped; there was no marked tenderness on pressure over any part of it; it was not tumefied. The urine was normal in colour, and on examination showed nothing peculiar. The urea was not estimated. On the radial aspect of the right wrist there was a patch about the size of a shilling, deeply pigmented. The whole cutaneous surface was very sallow and bronzed, especially the face, neck, back of the hands, and knees, which were more darkly tinted. There were no other patches than the one mentioned. She was at once ordered a stimulating mixture, containing carbonate of ammonia. She was directed to keep the recumbent position, and brandy was administered.

On the 25th she seemed much weaker; pulse almost imperceptible and 130. I gave directions that she should not be raised in bed, even for feeding, as this might induce fatal syncope. The diagnosis of Addison's disease was made.

About 10 p.m. that night a street band passed in front of the hospital and stopped opposite to it, hooting and yelling, and greatly terrifying the inmates. The patient, E. M'C., had been asleep. She suddenly awoke, hearing the noise, jumped up in bed, with a shriek of terror, and immediately fell back, dead! The autopsy, which took place next morning, about thirteen hours after death, was made by the

resident student, Mr. J. H. Scott, and myself. The details of it I shall presently relate.

The diagnosis in this case was made from the two chief elements in the disease observed during life—profound asthenia and the bronzing of the skin. The first of these, which was so intense that, when I first saw her, in the waiting-room of the hospital, I thought she was in a dying condition. During the three days of her hospital life she was unable to rise in bed, or to make the slightest exertion. I could attribute this weakness to no other ascertainable cause. The skin was natural, soft, and moist; it did not present “a harsh, dry condition of the surface,” such as would be found in any other disease accompanied by the same amount of asthenia. The body was fairly nourished, affording “a striking contrast to the failure and exhaustion observable in every other respect.”^a “There is,” says Dr. Greenhow, “in uncomplicated cases, comparatively little or no real emaciation, but, on the contrary, together with some appearance of partial wasting, there is always a fair amount, and often a considerable excess, of subcutaneous fat, and the skin remains soft and smooth.”

A *post mortem* examination showed some pulmonary disease, some enlargement of the bronchial and mesenteric glands, and a remarkably diseased condition of the suprarenal capsules. All the other organs were healthy. The disease of the lungs was quite insufficient to be the cause of the condition during life. It is, however, most valuable, as helping us to an interpretation of the disease in the suprarenal bodies, and in this way corroborates what has been observed in by far the greater proportion of Addison's disease which have been hitherto recorded.

Before discussing the questions as to the nature of this pathological change in the capsules, and to the method in which the symptoms are produced, I would like to call attention to a set of cases which are sometimes included under the head of Addison's disease, but which do not seem to hold legitimately such a position. The coöption of these cases only adds to the difficulties which already beset the subject in sufficient number, and hence I shall only shortly allude to them.

These cases may be conveniently grouped in two distinct classes :

1st.—Cases in which there is discoloration of the skin, but in which no disease is found subsequently in the suprarenal capsules.

2nd.—Cases in which disease of the suprarenal capsules is found, but in which no bronzing of the skin is produced.

The first of these classes includes many cases in which there is

^a Greenhow. Croonian Lectures. 1875. P. 11.

undoubted discoloration of the surface, but in some of which the discoloration differs entirely from that observed in Addison's disease. In others there have been many similarities between the discoloration seen and that accompanied by suprarenal disease, but the change in colour can be easily referred to some ascertainable cause. There are many well-known physiological and pathological conditions accompanied by alterations in the colour of the skin. We might as well call every case of albuminous urine a case of Bright's disease, or every case of bronchocele a case of Graves' disease, as classify every case of cutaneous pigmentation as a case of Addison's disease.

In the second place, many cases of suprarenal disease occur which cannot assume the title of Addison. The exact nature of that form of disease which is entitled to this great physician's name is still a matter of controversy.

In a comparatively small number of cases cancer has been seen in the suprarenal capsules, amyloid degeneration, fatty degeneration; sarcomatous growths have been also found. But in most of these cases the typical symptoms of Addison's disease have been absent; and in the few instances in which the symptoms corresponded accurately with the disease, the pathological reports of the cases were extremely meagre, and in some cases were exact descriptions, under erroneous names, of the conditions found in the capsules in a typical case of Addison's disease.

What, then, is the nature of the lesion in the suprarenal capsules? Let me give the details of the *post mortem* on the case which I have already submitted:—

The examination was made thirteen hours after death. Rigor mortis was well marked, the body well nourished, and the skin presenting the remarkable characteristics already mentioned. On examining the contents of the thorax, both lungs showed small patches of lobular pneumonia in each apex. Round these patches, not larger than a small hen's egg, the lung was healthy. A similar piece of consolidated lung was found on the axillary surface of the upper lobe of the left lung. On section these patches showed nodules of caseation, but there was no softening or abscess. The lower lobes of both lungs were hypostatically congested, and the bronchial glands were greatly enlarged. The heart was normal, the left side quite empty; there was no valvular disease. On opening the abdomen there was no evidence of peritonitis anywhere. All the viscera, with the exception of the suprarenal

capsules, seemed perfectly healthy. There was enlargement of the mesenteric glands. The suprarenal capsules have been most kindly investigated for me by my friend, Dr. Abraham. The left suprarenal body is enlarged and entirely disorganised (see Fig. 1). It is the seat of masses of caseation, some of which are isolated, many of which have coalesced. No softening of this material has taken place. The right capsule does not present the same amount of disease (Fig. 2). On section it presents small caseous islands. The sections are stained with picrocarmine hæmatoxylin. Dr. Abraham thus reports on the microscopical appearances in each capsule:—
“*Right Suprarenal*.—The central parts have the granular, almost structureless appearance of a mass of caseation. This substance, however, is in parts more or less broken up into small and large masses, some of which seem to possess faint nuclei, and a few of the larger ones are apparently polynucleated (Fig. 3). At the periphery the tissue becomes more cellular, the cells being distinct, of different sizes, some very large, with one or more nuclei, or even of the giant cell type, and more or less granular in texture (Fig. 4). Outside this comes the capsule, much altered. The cells and connective bundles are separated by a somewhat similar cell-growth, sometimes around foci, and by large development of adipose tissue. *Left Suprarenal Capsule*.—The caseation in this case has become more extensive, and in parts of the cheesy mass cretaceous deposit has taken place. Most of the proper substance of the gland is thereby replaced. The periphery, as before, passes into a similar, irregular, scrofulous cell-growth.”

This account of the pathological condition of the suprarenal capsules in this case points strongly to the conclusion that the disease was tubercular. The same appearances to the naked eye were observed in the small patches of consolidation found in the lungs. I regret that these were not retained for microscopical examination, but I can say, from my own observation of them on section, that they showed to the eye the same condition as is found in phthisis, local patches of consolidation, containing foci of caseous degeneration; and I think we may infer that, under the microscope, they would have exhibited the same pathological structure as that found in the capsules. Moreover, the girl's parents were both stated to have died of phthisis. This agrees with what has been observed in the majority of cases of true morbus Addisonii. In these, caseous masses are found in the suprarenal bodies, of various sizes, which have their origin in the medullary

portion. As these increase in size they encroach on the cortical portion, and at last involve the capsule of these bodies themselves, exciting in them a low form of inflammation, which at first causes thickening, and at last ends in sclerosis.^a

Virchow,^b who has carefully examined these masses, gives the following description of them :—"The development of the tubercular masses begins in this case, as is the rule in others, in the medullary tissue. On making a section through the suprarenal capsule, we observe occasionally in the middle of the medullary portion the first stages of the development, in the form of small gray nodules. These gradually increase in size, become caseous, amalgamate with one another, and thereby produce the caseous masses. It not unfrequently occurs that this process is but partial, and that both internally and externally some normal tissue remains, while all in the centre has become metamorphosed. Again, the process may proceed by the development of new nodules, not only in the medullary, but also in the cortical portions, around the circumference of the original mass, with which they subsequently blend. In this way gradually every trace of proper tissue disappears, and we have nothing left but a firm caseous mass, which reaches the surface on one or both sides, or even occasionally includes every atom of the organ. As a rule, however, in such extensive disease as this, we do not meet with a single uniform mass, but the whole thing appears lobular, or nodulated, corresponding to the various original foci. These masses have, therefore, an irregular shape, proportionally thicker than the normal form of the organ; they attain occasionally a very considerable size—namely, that of a plum or small hen egg, and possess a firm or even hard consistence."

Greenhow,^c who gives a synopsis of over 330 reported cases of Addison's disease, 230 of which were *bonâ fide* cases, exhibiting the specific morbid process in the suprarenal capsules, thus writes :—"It is impossible to resist the evidence of clinical facts

^a The sections were very kindly examined by Professor Purser, who thus expresses his opinion :—"The specimens which you asked me to examine contain a good deal of granulation tissue, which in some few places is arranged in little knots, resembling those seen in tubercle—that is, a large multinucleated cell in the centre, with 'epithelioid cells' around it, the whole surrounded by lymphoid corpuscles. Whether these nodules are part of a general infection of the body by tubercle, or whether they are examples of so-called 'local tuberculosis,' I am, of course, unable to say."

^b Virchow and Ziemssen. *Krankhafte Geschwülste*. II. S. 689.

^c Greenhow. *Croonian Lectures*. 1875. P. 84.

as to the existence of some affinity between Addison's disease and the tubercular diathesis. By far the larger proportion of the diseases of other organs found in association with Addison's disease of the suprarenal capsules are diseases of tubercular or strumous character. In the typical cases, it is true, the complications are either altogether absent, or are indicated only by small tubercular concretions in the lungs, some of which are described as cheesy, some as calcareous, others as peri-bronchitic nodules, and others, again, simply as indurations in the apices of the lungs. But a very considerable proportion of the other cases are complicated with more or less active tubercular disease; and in a certain small number of cases the inflammatory lesion in the suprarenal capsules has been found coexisting with advanced phthisis or general tuberculosis."

I will quote one other authority in support of the tubercular origin of the disease in the suprarenal capsules in Addison's disease. Merkel^a thus writes:—"My own observations have shown me, in cases where the entire structure had not been broken down into a mass of detritus, that it consists in a proliferation of small cells, lying in a fine reticulum, which includes giant cells in great numbers. I have never seen any appearance which so forcibly reminded me of Schüppel's drawings as in tuberculosis of the suprarenal capsules. If we take into consideration along with this that undoubted beginnings have often been observed, as small miliary, translucent nodules, occurring in the medullary portion, and, further, that well-marked pulmonary tuberculosis and phthisis is a very frequent concomitant of this disease, we shall be justified, even without actually asserting giant cells to be characteristic of tubercle, in describing the process in question as tubercular." These giant cells, I may observe here, are seen in the sections of the suprarenal bodies, drawings of which Dr. Abraham has kindly made for me. (See Figs. 3 and 4.) They have generally been accepted, after Schüppel, to be pathognomonic of true tubercle; lately, however, they have been stated to be merely characteristic of chronic inflammatory processes in lymphatic structures.

The great opponent of the tubercular origin of Addison's disease is Dr. Wilks; and I must for a few minutes call attention to the position he takes up on this question.^b He holds, with many of the authors I have already quoted, that the disease found in the

^a Ziemssen's *Cyclopædia*. Vol. VIII., p. 651.

^b Reynolds's *System*. Vol. V., p. 355.

suprarenal capsules, associated with Addison's name, is uniformly the same; but is this scrofulous? Dr. Wilks thinks it is not. He says the pathological condition is "peculiar, uniform in character, and primary in its nature." The morbid material found in the capsules he regards, "provisionally at least, as a result of the ordinary changes which take place in inflammatory lymph." It is found in three stages. In the first, or the earliest in which the disease has been met with, "the organs have been found much increased in size, reaching to two or three times that of the natural dimensions of the capsules in a state of health. At this period it is rare to find a trace of the original structure remaining, but in its place there exists a firm, solid substance, which the older pathologists were accustomed to style lardaceous—not, however, intending to signify that peculiar matter known in more recent times as amyloid. It is an albuminoid material, of a greyish-white colour, homogeneous in appearance, firm when cut, and on section having a somewhat translucent character. It is the earliest known change which the capsule undergoes, and at this time nearly all the original structure has been destroyed, or, if any be left, it is recognised only by small dark spots which are the remnants of the cortical substance. The suprarenal organ has been thus converted into a morbid mass or lump of albuminous material, having very slight resemblance to its original form." In the second stage this "albuminoid material undergoes degenerative changes, commencing in isolated spots, so that it presents on the cut surface a number of yellow dots; these increase in size until the whole of the diseased organ is seen to have scattered through it a number of rounded yellow masses, about the size of peas, and *resembling* in outward appearance soft, yellow tubercle." In the third stage "the whole of the originally formed material may be changed into this yellow substance; and now it is that it presents the ordinary appearance of a mass of yellow tubercle. During this degenerative process the whole organ shrinks and becomes reduced to about its original dimensions. After this still further changes may ensue, as in similar deposits in the other parts of the body; and thus a drying-up process may take place and a cretaceous matter be formed. . . . In many cases a still further change ensues by a process of softening, and the solid material becomes converted into a creamy or pus-like fluid." The supposition of the disease arising from a chronic inflammation explains, according to Dr. Wilks, the occurrence of Addison's

disease associated with caries in the vertebræ, or in cases where a blow on the back or a strain has been cited as the first incentive to the disease.

But, on the other hand, when the scrofulous diathesis exists in a person, is not some local injury the determining cause as to the locality in which the diathesis will manifest itself? Do we not look always for an exciting cause in cases of hip-joint disease, even when we find it occurring in one of a decidedly scrofulous family? Is not a cold, a localised pneumonia, the origin of many cases of phthisis? And, again, I ask, is the course of the disease in the suprarenal capsules, as pictured by Dr. Wilks, in the three stages he describes, so much at variance with the course which we know scrofulous inflammatory products do take in other parts of the body, as to forbid us calling the deposit in the capsules in Addison's disease by the term "scrofulous?"

We have not yet sounded to the bottom of the difficulties which beset this interesting disease, and I will state yet another before I bring this paper to a close.

We have, as has been seen, a distinct pathological condition found in the capsules, and with this a train of very remarkable symptoms. The frequency with which these are associated together prevents us arriving at any other conclusion than that the one is a consequence of the other, and that the disease in the capsules is the cause, direct or indirect, of the symptoms. But how can we explain this cause and effect? The rôle played by the suprarenal bodies in the general harmony of the human physiological functions is so little understood—is so much a matter of uncertainty—that we can arrive at no conclusion based on this rôle. When the suprarenal capsules are destroyed by this disease, are the symptoms produced due to the loss of function of these bodies, whatever that function may be? Such an hypothesis cannot be supported by facts. Many cases are on record in which the suprarenal bodies were the seat of other morbid processes, such as cancer, and that to such an extent as to have completely deprived the organs of any function whatever, and yet none of the peculiar symptoms of Addison's disease were present. Again, in many cases of Addison's disease, the state in which the capsules were found after death pointed to a long period of total loss of function, and yet the history of the case has been as short as six months. This is remarkably exemplified in the case I have detailed. The capsules, especially the left, are extensively diseased,

and must have been devoid of function for months, if not years, and yet the first symptoms of her illness dated back for only two months.

These considerations were evident to Addison himself, and he felt that he must look elsewhere for an explanation. He, accordingly, suggested what is at present the theory most universally accepted:—

“We know,” he says, “that these organs are situated in the immediate vicinity, and in contact with the solar plexus and the semilunar ganglia, and receive from them a large supply of nerves, and who could tell what influence the contact of these diseased organs might have on these great nerve-centres, and what share that secondary effect might have on the general health, and in the production of the symptoms presented?”

In the year 1854 (that is the year before Addison published his treatise on the disease which is associated with his name) Köllicker promulgated the following views as to the structure of the suprarenal capsules:^a—“I consider the cortical and medullary portions to be physiologically distinct. The former may be considered as belonging to the category of the so-called vascular glands, and doubtless is in some way related to the process of secretion, while the latter, owing to its extraordinary richness in nerve tissue, must be described as an appendage to the nervous system, in which the cellular elements and the plexus of nerves either react, one upon the other, in a manner similar to that obtaining in grey nerve tissue, or else are actually directly connected.”

More recently still, Leydig has expanded this view of the structure of the medullary portion. He states that the cells found imbedded in its meshes are of irregular form, and exhibit processes like the multipolar ganglion cells of the brain and spinal cord. However, the extraordinary number of nerves which enter these bodies (Köllicker having counted thirty-three nerve trunks going into the right suprarenal capsule) has led Leydig to believe that the nerve fibres arise in these ganglion cells, and that the medullary portion of the suprarenal capsules is essentially a ganglionic nerve centre. The nerves of the capsules come for the most part from the semilunar ganglia and solar plexus; some are derived from the pneumogastric and phrenic nerves, as has been demonstrated by Bergmann.^b

^a Köllicker. *Handbuch der Gewebelehre*. Leipzig. 1855.

^b Köllicker's *Manual of Human Histology*. Vol. II., p. 218.

Now, when the suprarenal bodies take on the morbid process which we find in Addison's disease, it is manifest that the nervous structures, which are so intimately connected with them, must suffer in proportion. But we must recollect that not only the connective tissue forming the investing membrane of these bodies takes on the inflammatory process, but that this extends to the connective tissue in the neighbourhood through which the nerves pass to reach these organs, and involves the semilunar ganglia and solar plexus.

"In many cases," says Greenhow, "the nerves at some distance from the inflammatory tissue have been found enlarged by reason of the increased thickness of their neurilemma—a condition which could only arise from the further extension of the inflammatory process along their sheaths. . . . This undue thickening of the neurilemma must naturally tend to produce irritation, and ultimately atrophy, of the compressed medullary portions of the nerves."

The changes in the nerves, then, are of two kinds, "corresponding to two different stages of disease. In the earlier stage the nerves connected with the suprarenal capsules and the semilunar ganglia are in a state of irritation. . . . The second stage, attended by more or less impairment of function, consists in the atrophy and fatty degeneration of the nerves."

These conditions of the nerves have actually been found in recent autopsies. Thus, the whole sympathetic nervous system has been found reddened and swollen; the semilunar ganglion has been found enlarged; the ganglionic cells have been filled with granular pigment, the nucleus often being absent; the sympathetic nerve has been found atrophied, and nerve cells have been loaded with fat.

At the International Medical Congress, held in London last August, Dr. Semmola, of Naples, stated that he did not regard the nerve affection as the result of a previous disease in the capsules, but argued that the sequence of events was the reverse. The disease ought to be regarded as a primary disease of the ganglionic nerve-centres; and the anatomical alteration of the suprarenals was, not so much the origin of the disease, but that they represented (when they existed as diseased organs) the last effects of trophic change, produced by the nerves which presided over the nutrition of these organs.

Such an implication of the nervous system, involving the vagi

and the phrenic, would account to a certain extent for some of the more prominent symptoms of Addison's disease. The sighing, the yawning, the gastric disturbance, would point to the pneumogastric. The neurosis of the vasomotors of the abdominal blood-vessels might cause dilatation of these vessels, and a consequent determination of blood to this region, and a simultaneous draining of blood from the brain and heart, giving rise to the pronounced asthenia which corresponds in so many particulars to that produced by severe hæmorrhage.

This theory serves also to explain the discoloration of the skin. Attempts have often been made to offer some explanation of this phenomenon. A probable clue has been afforded by an interesting case reported by Dr. Paget, of Cambridge. It was not a case of Addison's disease, but one of diffuse pigmentation. *Post mortem* examination showed that the capsules were quite healthy, but the nerve plexuses and ganglia were imbedded in and compressed by adventitious growth. It will be important in future to make a careful examination of the nerves, plexuses, and ganglia of the sympathetic system in cases of pigmentation of the skin unaccompanied by Addison's disease.

I have only had time to suggest these explanations of the symptoms. The secondary affection of the nervous structures as the immediate cause of the symptoms is not yet an established fact, and indeed is strongly disputed. Eulenberg and Guttman, who have tabulated 19 cases in which the symptoms of morbus Addisonii were found associated with pathological conditions in the semilunar ganglia and sympathetic, have also collected 10 cases in which the sympathetic had been examined and found normal. On the other hand it must be conceded, owing to the researches of Lubinoff, who has collected 250 *post mortem* cases to prove it, that these nervous structures may undergo all the changes from irritation to fatty degeneration and atrophy, and yet give rise to none of the symptoms which are peculiar to Addison's disease.

For the present we must be content to wait till further knowledge is gained, and till the light on this subject, which is every day increasing, dissipates the mists which at present hang round this interesting yet incomprehensive disease.

Fig. 1

Fig. 2

α' Right Suprarenal Capsule.
 α'' Left Suprarenal Capsule.
 β' Section of small Tuberculous Mass.
 β'' Section of large Tuberculous Mass.

MICROSCOPICAL APPEARANCES.

Fig. 3.

Section taken from right Suprarenal Capsule.

- α Giant Cells, branching.
- γ Epithelioid Cells.
- δ Irregular Cell-growth.

Fig. 4.

Section taken from left Suprarenal Capsule.

- β Large Cell, branching.
- ε Caseous Mass.

MR. KENDAL FRANKS ON ADDISON'S DISEASE.