

On the pathology and treatment of scrofula : being the Fothergillian prize essay, for 1846 / by Robert Mortimer Glover.

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PRIZE ESSAY

ON

SCROFULA.

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Scrofula

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Glover

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ON THE
PATHOLOGY AND TREATMENT
OF
SCROFULA;

BEING THE
FOTHERGILLIAN PRIZE ESSAY,
FOR 1846.

BY ROBERT MORTIMER GLOVER, M.D.,
CORRESPONDING MEMBER OF THE MEDICAL SOCIETY OF LONDON,
LECTURER ON MATERIA MEDICA IN THE NEWCASTLE
MEDICAL SCHOOL.

"Hypotheses non fingo."
Newtoni Principia.



London :
JOHN CHURCHILL, PRINCES STREET, SOHO.
—
1846.

ON THE
PATHOLOGY AND TREATMENT
OF
SCROFULA;

POTTERGILLIAN LECTURE ESSAY,

FOR 1848.

BY ROBERT KORTNER GUYER, M.D.

LECTURE DELIVERED AT THE MEDICAL SOCIETY OF LONDON,
ON WEDNESDAY EVENING 14TH NOVEMBER 1848.
PUBLISHED BY THE SOCIETY.



NEWCASTLE-UPON-TYNE :
Printed by M. A. Richardson, 44, Grey Street.

TO
HENRY GLASFORD POTTER, ESQ.,

F.L.S., F.G.S.,

CORRESPONDING MEMBER OF THE ROYAL ACADEMY OF

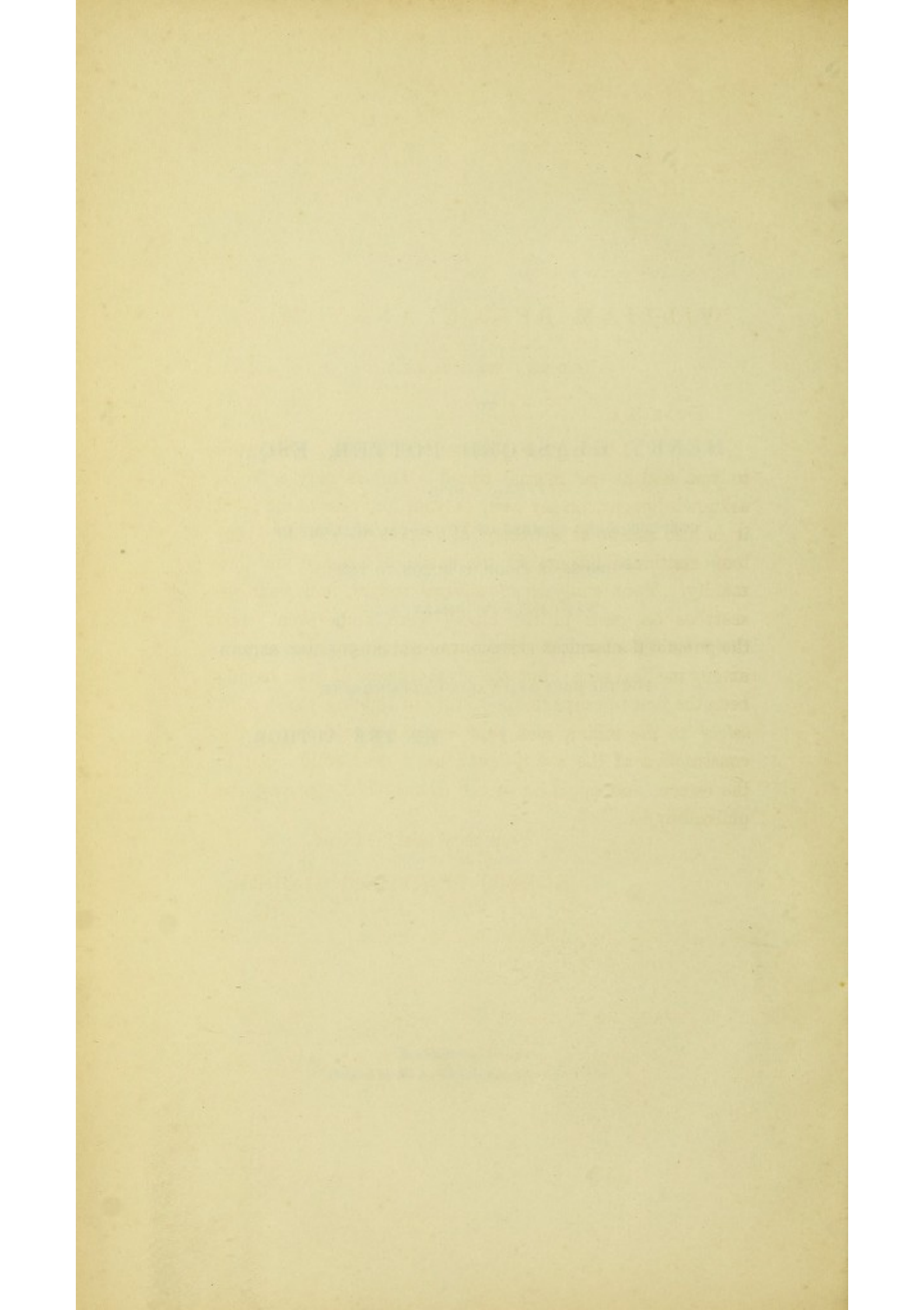
SCIENCES OF TURIN, SURGEON TO THE

NEWCASTLE INFIRMARY, &c.,

THIS WORK IS INSCRIBED, IN TESTIMONY OF FRIENDSHIP, AND ESTEEM

FOR HIS HIGH AND VARIED ATTAINMENTS,

BY THE AUTHOR.



TO
WILLIAM REID CLANNY, M.D.,

F.R.S.E., HON. M.R.I.A.

DEAR SIR,

I have great pleasure in dedicating this work to you, and to our mutual friend. This is only a feeble acknowledgment, on my part, of your kindness to me; but it is also meant as a tribute of respect to you for your long continued labours in the cause of science and humanity. Your analyses of mineral waters, and your researches on gases in the blood, were undertaken when the pursuit of chemical science was not so popular as now among medical men; but the circumstance of your having been the first to prove the possibility of lighting mines with safety to the miner, and your exertions to improve the construction of the safety-lamp, must ever entitle you to the esteem and applause of the friend of science and the philanthropist.

Your most faithful friend,

ROBERT MORTIMER GLOVER.

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PREFACE.

SOME explanation of the circumstances which have led to the publication of this work may be considered requisite. Much attention had been given, by the Author, to the treatment of Scrofula, for several years. In the year 1842, the Harveian Society of Edinburgh awarded him their medal for an essay on the physiological and medicinal properties of bromine, and on the analogies of the chlorine, bromine, and iodine group. In the spring of 1844, a dispensary was established in Newcastle, by Mr. Potter and him with the assistance of some friends, for the treatment of scrofula, phthisis, and cutaneous affections and diseases of the joints, with the view of making an extensive trial of the therapeutical properties of some of the new remedies which have been proposed

of late years in these affections, and especially with the view of trying the efficacy of the compounds of iodine. When the Medical Society of London announced their intention of awarding the Fothergillian gold medal for 1846, for the best Essay on the Pathology and Treatment of Scrofula, the Author was induced to compete, and encouraged by the result, to publish. His work was in the hands of the printer and engraver, when Mr. Phillips's book appeared; and as the arrangement which that writer adopts, and the views which he entertains, are both different from those here given, the publication has been proceeded with.

The thanks of the Author are due to Mr. A. Hancock, of this town, for his assistance in the microscopical part of the inquiry; and to Dr. Richardson for co-operation in some of the analyses.

Newcastle-on-Tyne, Sept. 20th, 1846.

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INTRODUCTION.

I. According to a learned writer, the term *struma* is correctly applied to goitre, somewhat incorrectly to the disease generally called scrofula.* The word scrofula is derived from the Latin *scrofa* or *scrophæ*.

The Greek *χοιρας* has a similar meaning to the Latin *scrofa*, and it is singular that in Russia similar terms are used: thus *swinucha* means

* Tractatus de Glandulâ Thyreoideâ tam sanâ quam morbosâ, imprimis de strumâ ejusque causis atque medelâ. Auctore Augusto Gulielmo Hedeno Saxone. Lips. 1822.

Other attempts have been made to form distinctions between struma and scrofula. According to Bredow, Th. Watson (Lond. 1656.) was the first to draw a line of separation between the applications of the terms. Felix Plater called a glandular swelling of a large size struma, a smaller one scrofula. Sennert (Prax. med. p. 1. cap. 33.) describes strumæ as "Tumores ex carne ortos,"—scrofulæ, on the other hand, as "Tumores membranulæ in glandulis inclusos atque induratos." Other authors might be cited who have made even less significant distinctions. Ludwig, at least, draws a distinction sufficiently obvious when he gives the

swelling of the parotid, the mumps, &c., *swinja* being the Russian for swine.*

But with regard to the etymology of the terms employed to designate the disease of which we are about to treat, perhaps the best plan which we can adopt is to quote the learned writer to whom we have already referred. "*Vocabulum strumae* pure latinum est, et a *ruma* dictum existimatur, quasi nempe sit struens rumam, seu propendentem v. g. de collo mammam. Rumam enim veteres vocabant mammam." And again; "Jam vero sequitur, ut loca nonnulla, in quibus vocabulum strumae occurrit, ex *veteribus* adducamus; nam a multis hoc videmus praetermissum. Sic *Celsus* 5, 28, 7. idem 1, 9. idem 2. 1 et 5, 18. n. 23. sequu. *Scribonius Largus* 79, 214. etc. *Marcellus Empiricus* de medicamin. lib. cap. XV. p. 305. ex ed. Henr. Steph. *Plinius* sub fine libr. XXV. idemque in infinitis adhuc aliis locis, quorum taediosa esset enumeratio; *Coelius Aurelianus* 30, 26. *Columella* 7, 11. et *Vitruvius* 8, 3. tumores, qui maxime in cervice nascuntur, strumam appellant, sed non perpetuo vocabulum illud eo sensu usurpant,

name of strumæ to all glandular swellings of the neck, and calls tumours of other parts scrofulæ, although all of the same nature. (Bredow ueber die Srofelsucht. Berlin, 1843.)

* In Portuguese, *al porcos*. (Phillips.)

saepenumero enim et quidem in iisdem quoque locis, quos enumeravi, significat tantum id, quod *Latinis* scrophula vocatur, et vel in anteriore colli parte, et ab altera ipsius parte et ab utraque, vel in alis et inguinibus et in lateribus oritur. Ex his igitur liquido constat, veteres minus exacte de tumoribus hisce diversis egisse; excusationem tamen aliquam vel eo nomine merentur, quod a *Graecis* ex parte in hos errores fuerint inducti. Hi enim late extendunt τῶν χοιρᾶδων vocabulum, illudque cum quibusvis tumoribus imprimis glandulosis in quacunque corporis parte apparentibus confundunt, et non tantum bronchocelen, sed et atheromata, steatomata, melicerides, atque herniam carnosam inter tumores strumosos referunt, atque per illos quarumcunque partium tumores etiam sub alis et inguinibus interdum intelligunt, de quo *Senner-tus* in instit. 1. 5. sect. 2. c. 15. p. 1054. consulatur. Sed de his abunde: Plura inferius.—Quod autem struma affectus sit antiquis et nostris temporibus valde existimatus turpis et molestus, non solum ex eo apparet, quod *Hippocrates* istum ad pessimum colli morborum genus referat, libro de glandulis cap. VI. p. 417. ex edit. *van der Linden*, sed etiam quod *Cicero* ad turpitudinem et perniciositatem alicujus rei uberius exprimendam vocabulo strumae eleganter utatur: “Hi,” ait

pro Sext. 135, c. 65, "medentur reipublicae, qui exsecant pestem aliquam, tanquam strumam civitatis."*

II. It could be remarked with some degree of correctness twenty years ago by a writer in the *Encyclopédie Methodique*, that the general pathology of scrofula had made little real advancement since the time of Hippocrates;† but this observation has ceased to be applicable. In more recent times a prodigious improvement has taken place in our knowledge of the real nature of disease; and this is in great part due to a more minute analysis, and especially to the use of the means which chemistry and the microscope place in our hands. The force of the efficient resources thus afforded has been especially felt in the study of the disease (or class

* Hedenus, op. cit. pp. 57, 59, 60.

† "Cette maladie paroît avoir été observée de tous temps; du moins Hippocrate, Galien, Celse, et la plupart des médecins de l'antiquité en avoient déjà fait le sujet de leurs méditations, et sans vouloir méconnoître les travaux de nos contemporains, on peut dire qu'ils n'ont que très-peu ajouté à ce que les anciens nous ont transmis sur la nature et le traitement de l'affection dont il s'agit." (*Encyclopédie Methodique. Art. Scrofule.*)

This of course can only be considered to hold good when we are speaking of attempts to arrive at a knowledge of the essential nature of the disease.

of diseases) forming the subject of the present investigation ; and the exposition of what has been thus gained, with the further prosecution of the inquiry in the same direction, constitute the more especial objects to be held in view throughout this treatise.

A philosopher long ago observed of physical science in general, that it arises from the imperfection of our senses ; such a maxim is well calculated to exalt the importance of means which extend the power of the senses a hundred or a thousand times.

Many have drawn conclusions from the errors committed in the premature application of the resources and modes of research which we have alluded to ; but it should be remembered that everything great and important must be bought at a price proportionate to its value. The failures which have taken place occurred in the infancy of chemical science, and before the existence of microscopic analysis as an art. Dr. Graves of Dublin has recently objected the paucity of real results obtained by chemical analysis in the investigation of disease ; but medicine has been two thousand years, according to the system of mere observation, in arriving at its present imperfect state, and the resources of chemistry have just begun to be applied, while

every application made of them points at a vital part of our science, and tends to the solution of problems of the first magnitude. Henceforth morbid anatomy must not be confined to the department of the picture maker ; but chemical and microscopical analyses should form the more important elements of this branch of pathology.

The great difficulty to be contended with in medicine is the obscurity in which the connection of observed facts is veiled. Hence the great value of anything approaching to experiment. The function of experiment must be distinguished from that of mere observation : experiment has in view the nature of the connection between ascertained or observed facts, in order to test the constancy and essentiality of their relation ; in other words, it is the bringing out of what Bacon terms prerogative facts.—For instance, iodine is a remedy supposed capable of producing the absorption of scrofulous tumours. But a mere case in which a scrofulous person recovers under the use of iodine is of most moderate value : for patients have got rid of scrofula while submitted to every form of treatment as proposed by generation after generation of so called *practical men*, and remedy after remedy, thus used with apparent success, has fallen into oblivion. Suppose we were

able to shew that the use of iodine promotes not merely the flow of the urine, but also an increase of the solid contents in this fluid, and especially of the amount of urea? In other words, iodine excites the secondary digestion of the tissues; and as urea is the product of the albuminous tissues thus converted,* and tubercle is composed chiefly of albumen, we learn that the connection between the giving of the remedy and the absorption of a scrofulous tumour, is not accidental, and thus may we derive a confidence which the blind empiricism so absurdly denominated *practical*, could never properly give. The sequel will prove that there is no wish here to undervalue observation of any kind; it is only intended to put prominently forward the great value of rationalism in medicine; and the reflections just written have been dictated by a review of the numerous failures in generalization presented by the history of the medical literature of

* Dr. Prout attributes the urea of the urine to the transformation of the gelatinous tissues, and the uric acid to the metamorphosis of the albuminous constituents of the body; but this is manifestly erroneous, on account of the small proportion which uric acid bears to urea in the urine, while the albuminous tissues far exceed the gelatinous. It is also opposed to the views of Liebig, who considers urea to be the ultimate stage of the transformation, and itself arising from a change produced upon the uric acid.

scrofula ;—failures which have chiefly arisen from too hastily grasping at the sequence and relationship of facts, without a sufficient consideration whether the connection observed was essential and constant, or merely accidental. A glance at the different views which have prevailed or been brought forward concerning scrofula, (independently of those theories requiring more serious discussion either from their value or their recent origin,) may not improperly precede the closer discussion of the subject.

III. It is not our intention to give an historical sketch of the literature of the subject :—we may refer more particularly for information on this head to the work of Bredow already quoted, as also to Sir James Clark, Lepelletier, Deygallières, Baron, and others ; but the view to be here exposed differs somewhat from that of preceding writers.

We find in the Hippocratic writings a kind of humoral pathology of scrofula. In the treatise *περί αδεύων*, it is stated that when the glands are affected by their proper disease, (for they have little affection in common with the body), they give origin to tubercles and strumæ ; and subsequently the swelling and degeneration are ascribed to a flowing of pituitous humour to the

glands from the rest of the body overstocked with it. This attribution of scrofula to a lymphatic temperament and to an exudation from the blood of the prevailing and morbid humour, does not seem very consistent with the other notion of the isolated character of the disease. The views of the Hippocratic school were generally adopted by succeeding ancient writers, by Galen, and probably by Celsus, whose mention of scrofula is very brief. Sprengel gives references to writers who flourished in ancient times and before the revival of letters, who have noticed the affection, and proposed various methods of treatment.* We find an extension of the Hippocratic pathology of scrofula by Ambrose Paré, who ascribed the disease to an alteration of the lymph, which becomes fatty and glary, and takes the form of deposit whenever the melancholic humour comes to be mixed with it.† At a more advanced period the tendency was to improve the humoral pathology of the disease by the introduction of obscurely conceived notions of the chemistry of the fluids. Thus Wiseman defines struma—"I shall endeavour to fix

* Histoire de la Médecine, traduit par Jourdan, t. 2. pp. 51. 177. 417.

† Sat. Deygallières, Théorie nouvelle de la maladie scrofuluse, p. 73.

upon a peculiar acidity in the *serum sanguinis* for my specific Difference ; and shall describe the *King's Evil* to be a *tumour* arising from a peculiar *Acidity of the Bloud, which, whensoever it lights upon Glandule, Muscle, or Membrane, it coagulates and hardens ; when it mixes with marrow alway dissolves it, and rotteth the Bone.*"* The notion of a peculiar acidity of the fluids in scrofula has found several supporters, and indeed in a modified form has been continued to our own time. Bordeu adopted the same idea as Wiseman. Peyrilhe also leans to an acid principle capable of coagulating the lymph. Charmeton thinks that the scrofulous virus consists in a salt more or less fixed or volatile, and charged with earthy particles, acid or bitter, which thicken the juices, and especially the lymphatic fluids. M. Baumes, of Montpellier, went even further into particulars ; according to him scrofulous disease is due to the presence and aberration of an acid principle of a phosphorous or phosphoric nature, which, reacting on the albuminous

* Wiseman's Chirurgical Treatises.—"Of the cure of the King's Evil." Wiseman, after comparing the contents of scrofulous tumours and abscesses to the curd of milk, reasons upon the resemblance which the serum of the blood and milk bear to each other, and refers struma to an acid coagulation of the serum.

fluids, tends to concrete them, while it softens and dissolves the bones, taking possession of the lime which they ought to contain, in order to carry it into the torrent of the circulation, while at the same time it diminishes and weakens the relation which heat and light have with the solid and humid parts of the living system.* The frequent thinness of the blood in scrofula began to be remarked, and the disproportion which the blood globules bear to the solids of the serum, was loosely conjectured. After the discoveries of Priestley and Lavoisier, attempts were made in the usual hypothetical manner to frame an oxygen theory which should explain the humoral pathology of the disease.† An idea of this kind was part of the hypothesis of Baumes; but the whole dependence of Weber, a German, who wrote in 1793, is on such a supposition. The following sentence, of portentous involution, gives his definition of scrofula—"A

* Deygallières pp. 73. 83. Le Pelletier, *Traité complet de la maladie scrofuleuse*, pp. 22. 29.

† Sprengel speaks of a Frenchman who, in 1796, published anonymously a theory of scrofula behindhand by thirty years. He makes the disease proceed from a peculiar virus, and a viscous state of the blood; and speaks also of the developement of an aeriform fluid in the body, which enables him to explain scrofula. (*Histoire de la Médecine*, traduit par Jourdan, t. 6. p. 367.)

degeneration effected in the animal body by a preternatural quantity (excess) of oxygen, and of that portion of the blood-serum, which is coagulated by fire, (a change) which depends on a miasma, and conceals itself at the beginning behind ordinary changes proceeding from excess of acid, and in the course of time makes itself known by gradually advancing swelling, obstruction, and hardening of the whole glandular system, and finally passing into an acute stage, which undermines and destroys the whole machinery of the animal body, is the object of this essay.* It is curious that while this writer, in the most purely hypothetical manner, explains the disease by his excess of oxygen, our countryman, Dr. Beddoes, applied the new chemistry in an equally hasty manner, but in the opposite sense, and made out that scrofulous tumours arose from a deficiency of oxygen in the system; and, says one of his followers, who publishes a list of cures effected (of course) by the inhalation of oxygen, "when we remark the sallow appearance of the countenance, the slowness of the pulse, and the torpor of the tumours

* Von den Scropheln einer endemischen Krankheit vieler Provinzen Europens. Salzberg, 1793. Erst. Theil, Erst. Cap. § 1.

in such patients, we shall readily assent to this doctrine."*

A few writers may be found in the last century who contented themselves with simply repeating the opinion of the Hippocratic school with regard to the general pathology of struma. Thus Russel—"Morbos igitur glandularum morbidarum censeo ferè oriri á quibusdam obstructionibus, quæ proveniunt á fluxione aliquâ copiosius in glandulas influente, quàm ut per earum tubulos transmitti possit. Proinde intumescunt glandulæ, earum capsulæ distenduntur, atque increscenti tumori paulatim cedunt, donec rumpuntur vascula, movetur pus; aut è tunica-tis tumoribus vel steatoma, vel atheroma, vel meliceris, vel aliquid ejusmodi oritur."†

White, in 1794, says—"My opinion, therefore, is, that the struma, or King's evil, arises immediately from obstructions in the lymphatic system, most frequently occasioned by a viscosity of lymph."‡ Cullen, on the other hand, supposes an acrimony of the fluids in scrofula, a doctrine which is partly that of Hufeland, and has continued to be held in Germany until

* A treatise on scrophulous diseases shewing the good effects of factitious airs. By Charles Brown. 1798. p. 19.

† De Tabæ Glandulari. 1750. p. 22.

‡ A Treatise on the Struma. p. 61.

nearly the present day. But Hufeland did not content himself with speculating on the state of the humours ; we find him attributing the disease to a profound atony of the lymphatic system, accompanied with a specific irritation of the same system, and a particular alteration of the lymph.*

Of more eccentric notions regarding the pathological cause of struma,—we have the disease ascribed to the vitiation of the nervous fluid, to the consequences of syphilis ; and more especially the theory of De Haen, who conceived scrofula to be dependent on an alteration of the fluids consequent on the small-pox :—a notion strangely opposed to the recent researches of M M. Barthez and Rilliet, who, as shall afterwards be shown at greater length, endeavour to prove small-pox to be in some degree a preservative against tubercular affections, while vaccination tends to increase the prevalence of these diseases. Nevertheless, the views of De Haen were entertained very generally during the last century ; and we are informed by our venerable friend Dr. Clanny, that after the promulgation of the discovery of Jenner, the late well-known Dr. Fearon, of Sunderland, remarked to him how much

* Hufeland, par Bousquet, p. 47.

the new practice of vaccination was likely to diminish the frequency of scrofula.

We have also theories of the nature of the disease, in which the solids are chiefly or alone concerned. Thus Soemmering thinks the affection due to a relaxation and dilatation of the absorbing vessels, whence stagnation and alteration of the fluids. Cabanis attributes the strumous affection to an atony of the lacteals and of the ganglions, and an exaggeration of the lymphatic temperament. Girtanner lays the chief stress on a remarkable irritation of the lymphatic system; and this is pretty much the opinion of Broussais.* Brown, true to the generalities of his system, considered scrofula as a local debility, and treated it by stimulants.

IV. An important part of the history of the progress of medical discovery in regard to scrofula, is that which relates to the connexion between this disease and phthisis. Sir J. Clark considers Sylvius de la Boe, whose works were published in 1679, to be the first author who gave "a good account of tubercles, pointing them out as a cause of phthisis, and showing

* Consult the works of Le Pelletier and Deygallières, already referred to.

their connexion with scrofula. He attributed their origin to the scrofulous degeneration of certain invisible glands in the lungs, similar to those in the neck and mesentery." But our own countryman Wiseman, who published in 1676, that is to say, three years before Sylvius de la Boe, was fully aware of the relation between tubercular phthisis and struma. For instance, "A lady brought her only son to town, who was about seven years of age, of a sickly weak constitution, obstructed internally with the King's evil in his mysentery and lungs. He had externally many strumae under his jaws." "A gentleman sent two of his sons out of Ireland to Westminster school; they seemed both healthful youths, but soon after the elder of them grew indisposed with a cough, and died tabid; the body being opened by his physician, his lungs were discovered full of strumae." Clark states also, that after Sylvius nothing was known concerning tubercles till the publication of the essay of Dessault in 1733. Nevertheless, a very general notion must have been entertained of the connexion between scrofula and phthisis. We find Hoffman, in an account of a post-mortem investigation, clearly aware of the pathological connection between external and internal scrofulous affections. "*Cujus corpore aperto adpa-*

ruit tumorem submaxillarem multis continuationibus sub musculo pectorali ad sternum usque protractum fuisse, et induratas glandulas incisas caseosam reddidisse materiem. Neque minus in secato pectore glandula thymus intumefacta, indurata eademque caseosa substantia referta in conspectione veniebat, pulmones pariter caseosis tuberculis obsessi rigidi duri non collapsi et multis locis cum pleura observabantur concreti
 * * * * * abdomine aperto glandulae mesenterii haud discedebant a statu naturali, ubi autem illud lumborum vertebri adhaerebat, tumor tunicaceus, caseosa saburra repletus pugni magnitudine conspiciebatur. Hepar naturali majus, nec tuberculis nec tumoribus fartum videbatur.”* Bonetus gives cases and quotations which afford evidence of the enquiries made about his time into the real nature of the tuberculous affections of the lungs. Thus we find the Malpighian bodies, which the observer from whom they are called detected in the kidney, perhaps in the liver, and which he supposes to exist in all organs, made to play an important part as the seat of phthisical or tuberculous disease of the lungs. “Exempta pulmonis compage, observavimus fere ubivis istam naturali

* Hoffman, vol. 1, s. 2 cas. 75, p. 470. Amstelaedami 1736.

sua textura, spongiosa nempe et rara, orbatam fuisse : Etenim tota illius superficies innumeris ulcusculis, instar acinorum, quos pro Marcelli Malpighii vesiculis orbicularibus dilatatis agnovimus, obsessa fuit, intermedia saltem sinistra parte Pulmonis sana.* A case is quoted in which it is observed "Pulmonum parenchyma, quod alias flaccidum et spongiosum esse solet, duriusculum erat, et multis quasi granulis instar steatomatum, quæ aliquid sebacei continebant, refertum."† Then follows a commentary on this case, in which the views of Sylvius de la Boe on the scrofulous nature of phthisis are stated. In the numerous elaborate researches of Morgagni, sufficient acquaintance with the condition of the lungs in phthisical affections will be found ; but no very distinct recognition, so far as we have been able to discover, of the connexion between scrofula and phthisis.‡ The great advance which the pathological anatomy of phthisis has made in more recent times, throws much light on the general pathology of scrofula ; and the views entertained by modern writers on the nature of

* Anatom. Pract. Lib. 2. Sect. 7 p. 681. Genevæ 1700 (Sepulchratum.)

† Ibid. p. 698.

‡ Epist. 50, art. 27, 28, 29.

the connexion between these diseased conditions will come under our discussion in a subsequent part of this treatise.

PATHOLOGY AND TREATMENT OF SCROFULA.

PART I.

PATHOLOGY OF SCROFULA.

THE word *scrofula* has a two-fold meaning ; it is used to signify a diathesis and a disease. To introduce such a subject as this before us, as if it had never been treated before, is of course uncalled for. It is not therefore requisite to explain the reasons which induce us to divide this part of the essay as follows :—

I. We shall commence by a description of scrofulous matter or tubercle, avoiding as much as possible all deductions from the facts stated.

II. Then shall follow the humoral pathology of the disease, similarly treated.

III. The description of the scrofulous diathesis.

IV. The comparative pathology of scrofula.

V. The identity of scrofula and internal tuberculosis.

VI. The essential nature of the disease.

VII. The etiology of scrofula.

VIII. The localization, modifications and complications of the disease.

In the fifth chapter an attempt shall be made to prove the various forms of scrofula and phthisis to be identical ; and in the sixth chapter in like manner, that scrofula is a modification of inflammation, that is to say, regarding the actual disease-process. It is necessary to premise this much ; we shall of course not enter into the details of pulmonary tuberculosis, but it may be necessary to touch on this disease in order to draw from it illustrations in regard to what must be looked upon as forms of the same affection belonging on the whole to similar pathological conditions.

CHAPTER I.

DESCRIPTION OF SCROFULOUS OR TUBERCULOUS MATTER*.

By scrofulous or tuberculous matter should be understood a peculiar morbid formation, the product, as it is here considered, of a particular modification of the inflammatory process. This product is to be distinguished, 1stly, from structures produced by ordinary (or what may with some liberty of speech be termed normal) inflammation; 2ndly, from various morbid growths inclining more or less to a parasitic character, and also from malignant structures; and 3rdly, from various heterogeneous bodies of a totally different character, but which have sometimes been regarded as partaking more or less of the nature of the scrofulous deposit.† The micro-

* Scrofulous pus and scrofulous and tuberculous concretions are included under this head.

† Schönlein speaks of tubercular deposits to which he gives the name of menstrual and arthritic tubercles; the former containing cruorine, the latter the urates. (*Allgemeine und specielle Pathologie und Therapie*. St. Gallen, 1841. t. 3. s. 71.) Now we should doubt the propriety of classing substances of this character with ordinary tubercle. "Not every such like formation which has the form of knots deserves the name of tubercle, according to what we understand by it. For want of a strict examination many faults have been committed

scope and chemical analysis together are capable of materially assisting these distinctions; or if there be cases in which scrofulous formations pass gradually into structures having characters different from those by which true scrofulous deposits are to be here described, this is only what we everywhere find in nature where absolute limits are unknown. For instance, we should not, with some chemists, extend the meaning of the term *metal* widely enough to contain all elementary substances, because we cannot absolutely, by any definition of a metal, determine the precise limit of separation between bodies more or less metallic. To do this, is simply to throw away a very useful word. To use the language of Bacon, the subtilty of nature exceeds the subtilty of art. But for the distinctions which are about to be set up, broad fair lines of demarcation shall be assigned, sufficient to enable us to separate the various classes of morbid structures already referred to, with the exception of the particular cases that may occur,

They speak of cancerous tubercles, they reckon independent parasites, which, provided with their own cellular system, have nothing in common with the true tubercular matter, but a chance form, for instance, many neoplasms of the outer skin, certain excrescences of the serous membranes, &c.)” Canstatt, *specielle Pathologie und Therapie*. Erlangen, 1843. Bd. 1. s. 222.

and some of which shall afterwards be explained.*

Tubercle, in the sense in which the term is here used, includes all scrofulous formations, whether in the lungs or in the lymphatic or lacteal glands, in the heart, the liver, the kidneys, the spleen, the brain, or spinal cord, the free surfaces of the mucous or serous membranes, the interstitial cellular membranes, the cellular tissue under the skin, the bones and periosteum, and, in short, in every conceivable tissue or organ; and we distinguish the scrofulous matter by its microscopic characters, with a certain not very definite chemical constitution, and a physical structure apparent to the eye, and which is well known. These characters, taken altogether, after the manner of the method of natural families in classifications of natural history, appear sufficient, as they can be described, to separate as accurately as can be done in any natural study, the scrofulous formations from all others.

I. We adopt, in its fullest extent, the statement of Lugol, which makes scrofula, i. e. the

* For example, compound new formations occur, in which lymph of the usual structure, organized, is found to be intermingled with scrofulous matter presenting the characters of this formation when examined by the microscope.

actual process of disease, to be always revealed by the development of tubercles.* According to Barthez and Rilliet, who have given as yet the most elegant and complete description of tubercle (excepting its microscopic anatomy and chemical analysis,) and who condemn the distinction between scrofula and tubercle as useless,†—the various forms under which tubercle is found are the following;—the miliary tubercle or grey, and yellow or crude tubercle, the grey and yellow forms of infiltration, the gelatiniform infiltration, and tuberculous dust or *poussière tuberculeuse*.

There is no reason for ascribing these forms of tuberculous matter solely to tubercle of the lung. M. Valleix observes: “As to the absence of these granulations,” (he is speaking of the grey granulation of Laennec,) “in the other organs, I shall recall, that incontestable proofs have been found of the contrary, and that as researches of pathological anatomy have been

* “Qu’elle est toujours révélée par le développement de tubercules: cette production est, en effet, la scrofule elle-même, son signe anatomique, pathognomonique, celui-là seul qui la caractérise et qui donne de la valeur à tous les autres symptômes.”

† “Et nous pourrions dire que la scrofule et la tuberculisation sont la même maladie.” (Des Maladies des Enfants, t. 3. p. 3.)

better performed, these examples have been multiplied. M. Papavoine, in his interesting memoir "*On tubercle considered particularly in children*," expresses himself thus—"We cannot admit the seat of the grey granulations to be only in the pulmonary vesicles: there are to be met with in the lymphatic glands, in the liver, the spleen, on the serous membranes, forms of alteration exactly similar, especially in certain cases of general and acute tuberculization." (*Journal des Progrès*, t. 2. 1830. p. 89). The following words, borrowed from the excellent thesis of M. Nelaton, leave no doubt of the development of grey semi-transparent granulations in the osseous tissue. "I have been able several times to determine that the tubercles of the bones, like those of the lungs, recognize for points of departure the grey semi-transparent granulations described by Laennec, M. Louis, &c." *Recherches sur l'affection tuberculeuse des os*. Dissert. inaug. (Paris, 1836, p. 16.)* We have observed, in granular meningitis, the forms of grey granulation and yellow particles answering very well to the yellow points which appear in the grey granulation of the lungs. The

* "Considerations sur les Lésions Anatomiques et sur la Curabilité de la Phthisie Pulmonaire. Par M. Valleix." *Archives de Médecine*. Fev. 1841, p. 136.

miliary tubercle may exist in all the organs, and it is in the form of a grey infiltrated matter, granular to the microscope, more or less diffused through the substance of a gland that we detect the first appearance of mesenteric tubercle; afterwards we find a more crude or yellow appearance of the tubercle-matter, as in the lungs. The appearance of infiltrated grey matter is especially marked in effusions organized between the tunics of the intestinal canal. Some of the illustrations which are appended shew the tubercular effusion in a mesenteric gland; 1stly, in a diffused form throughout the hypertrophied tissue of the organ; 2ndly, forming striæ and patches varying in hue from grey to yellow; 3rdly, incysts filled either with a tuberculous powder or with a curdy matter; 4thly, in masses of lardaceous consistence implicating either the whole gland, or more or less of its structure. We have specimens of bronchial glands and bronchi sprinkled over, as it were, with a tuberculous powder, and studded with cretaceous fragments.

High authorities, notwithstanding, have spoken of the grey granulation as a form of tubercle peculiar to the lungs, but we repeat as Barthéz and Rilliet observe, "it exists in all the organs, not only in the intestines, peritoneum,

and pleura, but in the spleen, the liver, the kidneys, the lymphatic glands and the meninges."* In fact all the forms of tubercle which occur in the different organs are brought about chiefly by mechanical causes, and differ very slightly in a physiological sense, never in their more minute anatomy. Thus for example, the liver is an organ, in which tumours generally are of large size, and of various and irregular shapes ; in the lungs the air cells and the membranous character of the tissue tend much, if the effusion be not rapid, to surround it, while progressing and stiffening, with envelopes of a membranous nature. The brain from its structure must oppose pressure in every direction in which the progress of a deposit in its interior can take place ; and thus we find tubercles of the brain generally of small size and regularly circumscribed. Between layers of membrane we find the deposit stretched out in flakes. In the sub-cutaneous cellular tissue it forms irregular masses. On the free surfaces of mucous or serous membranes its figure is irregular, or it occurs in superficial layers. In the bones in general it is in little round granules or in very circumscribed masses. In short, to trace everywhere the forms of tuber-

* *Traité des Maladies des Enfants* t. 3. p 23.

cular deposits to the mechanical properties of the organs in which they occur, might lead to some fantastic assumptions, but there are grounds sufficient to enable us to decide, that it is much more philosophical to ascribe the differences of form to peculiarities of this kind, than to infer (the ultimate anatomy of tubercle being everywhere the same) the external differences to be due to any essential distinction between scrofula and tubercle.

It is exceedingly probable that the grey and gelatiniform infiltrations of Laennec are merely early stages of the tubercular effusion. According to this author, the gelatiniform effusion similar to an œdema, formed of a viscous lymph, passes into the grey infiltration, as it is probable that this latter, like the grey granulation, passes into the yellow tubercle.

The various forms of tubercle, according to their external appearance, may be perhaps as well described in the words of Canstatt, "the form of the consolidated tubercle is different; the most frequent is the round, granular, knotty. We distinguish the scattered, isolated tubercular mass (from its size named miliary, but also from the bigness of a hemp seed to that of a pea), heaped together, united, granular masses, knotty, ragged, grape-like, knoll-like forms, and at

length the tubercular infiltration of the tissues. Carswell also distinguishes the transformation of an organ into a tuberculous mass; this will especially ensue as a consequence of infiltration. The difference of tissue in the diseased organ has an influence on the diversity of form of tubercle (drop formed on the serous membranes, cylindrical and ragged in the bronchial cells, root-like shaped in the liver) an influence exercised through the pressure of the surrounding tissues upon the deposited tubercle matter (round form for the most part on account of the on-all-sides equable pressure) and by means of the processes preceding the deposit, the quicker or slower solidification (infiltration when the tuberculous matter remains for a longer period fluid). The tubercular grains appear scattered most at the beginning of the deposit, they begin to be confluent at a later period. Also the tubercular infiltration is oftenest the commencement. The volume of the commencing tubercle is in general very little, but different in different organs, in the lungs never bigger than a pea, in the liver often as big as an olive, in the neck often still larger; the colour is in general yellowish white, other hues are accidental as yellow, green, black.*

* *Specielle Pathologie und Therapie* (Canstatt) Bd. I. s. 223, (843.)

The most important questions concerning the anatomical characters of tubercle are those connected with its more minute and microscopic anatomy. Hitherto we have had infinitely more time bestowed on the mere relations of external form, than on matters capable of throwing light on the real pathological nature of the product. And in the first place on the vascularity or non-vascularity of tubercle and the degree of its organization. We know that the vascular is not an ultimate structure, that the more minute tissues beyond the vessels are cells. A controversy has been carried on as to the vascularity or non-vascularity of tubercle. We believe that tubercles and scrofulous matter are not essentially vascular in their ultimate stage of conversion; that when the last degree of tuberculization has arrived we find no vessels; although often tuberculated structures and glands apparently fully degenerated can be injected by a very fine injection to a considerable extent. There are illustrations appended to this essay which will explain our meaning: we have a representation of two lymphatic glands belonging to a group of which several appearing to the eye and to the strongest Stanhope-lens, wholly degenerated, were yet injected. One of them is represented which is pretty fully injected, and some of the

vessels are even of considerable size. Beside it, is another gland of the group, which was not injected. Now it is a fair assumption, that the size was unable to pass into this gland, because the vessels were obliterated, since we find other glands of the group to have been injected. Many illustrations of this kind might have been added. We may assume, then, the true explanation of the deposit of tuberculous matter in a gland, as far as the vascularity is concerned, to be this: in the first place the gland becomes hypertrophied and swollen, a state in which we have often found the lymphatic glands.* After

* " If we examine a scrofulous gland in an early stage of the disease, we find that it is simply enlarged, and the enlargement seems to be owing to thickening of its cellular structure, as its vessels are completely pervious, quicksilver passing readily through them, as through one that is not diseased, as was ascertained by Soemmering. As it increases in size, the same change goes on; the gland, however, appears to have more nutrient vessels, and is redder than is natural. If the disease is not put a stop to, the whole structure of the gland becomes altered and destroyed, and new matter is gradually deposited, which sometimes is firm in texture, and very much resembles cheese, and when divided, shews an even surface, of a mottled yellowish white colour. At other times, the gland is converted into a much softer matter, less uniform in texture, and, when cut into, appears to be composed of two kinds of matter, the one resembling curd, while the other is softer, less opaque, and of a yellow colour; it

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this, the tubercular infiltration takes place, not uniformly over the whole surface of the gland, but in rings and patches, answering probably somewhat to the bundles of vessels of which the ultimate tissue of lymphatic glands consists. Some of the illustrations in Plate 8 will explain this state of the deposits. The deposits increase, and as they extend, the normal vascular structure of the gland is gradually obliterated. Nevertheless the glands may, and frequently do, remain in the apparently complete granular yellow stage of the tuberculization, with their vessels permeable to a very considerable extent. Bredow states, very properly, that "the vessels recognized in scrofulous glands in the beginning of the deposit" (and, we add, sometimes in its advanced stage) "belong to the tissue of the gland itself, not to the scrofulous matter deposited therein."* And Canstatt, more fully, "If many, as latterly Kingston and A. Thompson, think that they have recognized blood vessels in tubercles, Sebastian explains this rightly as

sometimes appears, too, as if small quantities of pus were deposited about the centre of the gland; and sometimes there are small abscesses, containing a scrofulous matter, in the body of the enlarged gland."—Lloyd on Scrofula. London, 1821, p. 52.

* Bredow ueber die Scrofelsucht. Berlin, 1843—s. 33.

a mistake, and remarks that the tuberculous matter may be deposited, sometimes, on a little blood vessel which passes through the tubercle," (Schönlein speaks of determinate organs of nutrition, either as an envelope which affords nourishment to the tubercle, or even as a proper vascular system—a middle branch with ramifications in two directions*) "without giving off a branch to it. Also, lymph vessels do not go to the tuberculous mass. On this point agree Abercrombie, Andral, Carswell, Rochoux, and others to boot, (consult Cerutti, l. c, p. 9). But Lugol on the other hand maintains the presence of vessels as well on the outer portion of the envelope of the tubercles, as in the interior of the tuberculous substance. He speaks even of hemorrhages in the interior of the tubercle. This, however, does not affect the

* "Endlich findet sich bei manchen Tuberkeln, und dieses scheinen die höchst entwickelten zu sein, ein eigenes Gefäßsystem: so bei Gehirntuberkeln (Schrent) und bei Lebertuberkeln (Meckell) erinnert die Gefäßbildung an die niedersten der Thiere. So findet sich bei Lebertuberkeln ein Gefäßring, ein Blutstrom, der in sich selbst zurückkehrt; bei andern tuberkeln zeigt sich in dem Pfortadersystem ein ähnliches Gefäßsystem, in der Mitte ein kurzer Stamm mit Ramificationen nach der einen oder andern Seite. Diese Gefäßbildungen stehen isolirt, ausser Zusammenhang mit den naheliegenden Theilen." Op. cit. t. 3. s. 71.

opinion that these vessels are not of new formation*." Not exactly in accordance with the opinions of Dr. Canstatt, thus critically expressed, are the observations of M. Guillot. According to this observer, the tubercle itself is always non-vascular, but around the tuberculous mass, or around the cavity left by it, exists an infiltrated layer of grey matter, which obliterates the vessels in the space that it occupies.† Beyond this circle a new circulation is connected with the bronchial and intercostal vessels on the one hand, and the pulmonary veins on the other; so that from each of these ramifications, a venous blood is poured directly into the left side of the heart. The observations of Schröder Van der Kolk confirm those of M. Guillot: from the earliest periods of the formation of tubercle, he has observed this obliteration of the vessels. Messieurs Barthez and Rilliet do not exactly accord with Guillot and Van der Kolk. From their observations

* Canstatt, *Op. cit.*, Bd. 1. s. 225. (Note).

† In the representation of tubercle of the spleen, appended, there may be observed a blue line of separation between the tubercle and the tissue of the organ. This line is formed by an albuminous infiltration, and is non-vascular, similar, in fact, to the layer which, according to M. Guillot, surrounds the pulmonary tubercle.

it would result, "1stly, that when the lung contains grey granulations, isolated from one another, an injection penetrates easily by the bronchi and by the pulmonary arteries and veins; 2ndly, that the vascular net work which surrounds the granulations communicates very evidently with the pulmonary artery, and probably not with the vein; 3rdly, That the bronchial injection surrounds, on all sides, the grey granulation, and conceals it in part only; it is not disposed in very fine ramifications similar to a vascular lacework, but in little grains united one to another; 4thly, that perhaps the bronchial injection can penetrate the granulations." Again, they conclude with regard to the demi-transparent grey infiltration, that there "the veins and pulmonary arteries are very penetrable, whilst on the other hand the small bronchi are obliterated, which latter fact is similar to what is observed in pneumonia."*

These facts and observations, taken together, lead to the conclusion of the vascularity of tubercle being a non-essential phenomenon. The obliteration of the vessels of the tissue into which the scrofulous or tubercular matter is effused, may be carried to a greater or less extent; the

* Op. cit. t. 3, pp. 19, 20.

inflammatory action produced by the presence of the tubercle on the surrounding tissues may, in some instances, cause obstruction of the vessels, or, in an earlier stage, increased vascularity; the envelopes which are formed around the tubercular mass may be more or less vascular, or totally devoid of vessels; but tubercle matter itself is *beyond the normal influence of the circulation*; and this fact is confirmed by the results of microscopic examination.

MICROSCOPIC STRUCTURE OF TUBERCLE.

II. As of the degree of organization which tubercle possesses in point of vascularity, so have we a similar question to decide in regard to its structure when examined under the microscope, viz., whether this substance should be ranked among the cell formations, or whether it should be considered beneath this ultimate and essential degree of organization. It is to be inferred, in the present state of our knowledge, that the existence of nucleated cells is an essential element of organization; and thus, most microscopic observers of late years, with some exceptions, having detected cells in tubercles, have concluded this formation to be organized.

Perhaps the best representation of the present state of the question, as to the amount of organization of tubercle, will be derived from the words of Dr. Canstatt, whose work has already been quoted; and, indeed, this writer has given perhaps the most learned and copious digest existing of our knowledge of the subject of scrofula generally. He precedes these observations, by repeating his opinions of the non-vascularity of tubercle: "Every trace of organized structure is wanting to tubercle matter; vessels which have been observed in it either belonged to false membranes developed in its bounds, or were the remains of tissues accidentally destroyed."* Tubercle, he says, should not be considered a tissue. "Microscopically observed, the peculiar fine tissue of organized bodies growing by intussusception, composed of cellular cytoblasts, is wanting to tubercle matter. We distinguish only a mass, composed, in great part, of imperfect cells, which are easily broken down. As the deposited tubercular substance gathers gradually more and more tubercle matter from without, tubercle grows by apposition from without, and, in this wise, increases from tubercle molecules, larger and larger, to tubercle masses,

* Op. cit. Bd. 1, s. 225.

formed of layers laid concentrically together. The outer layers of younger growth are formed of a clearer, more transparent matter. This mode of growth forms an essential separation of tubercle from the idioplastic parasitical new formations which increase, like organic beings, by intus-susception, while tubercle, in this respect, grows more like inorganic bodies." But in a note, (s. 222,) he says, "Contrary to my earlier view, of cell formations being wanting to tubercles, I have since convinced myself of the existence of cells, as J. Vogel describes them in his introduction to the use of the microscope, and recall, therefore, what I said in the first edition, about the amorphous condition of tubercle." And again, in a note on the passage in the text quoted above, in page 226, he goes on, "Scharlau describes them (the tubercle grains) as an accumulation of little corpuscles, about the $\frac{1}{2000}$ th of a line in size, which, in many situations, form a dark blackish grey granulated mass, (l. c. s. 36,) similarly Gluge and Cerutti. The observations of Kuhn, according to which tubercle, under the microscope, has a papillary appearance, and seems to resemble a knotty tissue, rest, certainly, on an illusion. The peculiar bodies which Gruby has found in tubercular sputa, and which are described by him as

consisting of whitish yellow lenticular, round, or oval corpuscles, one to ten times larger than pus corpuscles, of a darker yellow, and of concentric onion-like, one on another superimposed layers, so that one observes dark concentric streaks on the upper surface, (consult Gruby's *Observ. Microscop. ad Morpholog. Pathol. Vindob.* 1840. p. 27 et s. 99,) are not confirmed according to others, and appear to have sprung from a misconception. According to Julius Vogel, tubercle consists in the beginning, of an amorphous mass, which, through acetic acid, and also ammonia, almost entirely disappears, (compound of protein), and in which we usually already find the rudiments of cell formations; this mass gradually passes wholly into tubercle cells; these are of very different sizes, from 1-80th to 1-400th of a line, are differently formed round-like, oval, long, drawn out, tail or string-like, irregular, with very pale walls, with nuclei, which are larger in the smaller cells, smaller in the larger; the cells often contain fat granules or granules of dark pigment. By means of acetic acid, the walls of these cells become clearer and transparent, or wholly disappear, whilst their nuclei remain unchanged; by ammonia, not only are the cells destroyed, but also the nuclei. Sometimes we see fat corpuscles. (Consult J. Vogel

Anleitung Z. Gebrauche des Mikrosk. Lpz. 1841, s. 457.) I must espouse the view of Vetter, (Schmidt's Encyclop. Bd. 6. s. 248), that although the presence of cellular bodies is proved in tubercles, these may be distinguished from the usual formative cytoblasts. "The organic elements in them must, as Vetter thinks, be reckoned rather as the rudimentary portions, or altered remains of other tissues, than as independent bodies."

According to Bredow, (s. 26), Ruete found the individual corpuscles of tubercle composed of an integument and a nucleus; they are, he says, rather larger than blood globules; and he thought himself able to see some burst and fallen to pieces. This was with a magnifying power of 400 diameters. Bredow himself could find no integument to the corpuscles.

Scherer says of a tuberculous mass taken from the abdomen of a scrofulous child, "Under the microscope, the firmer outer portion shewed itself composed of a multitude of little granules and nuclei, mixed with a few irregular larger cell-granules. Fibres, or a fibrous structure, nowhere visible; likewise no free fat corpuscles. The softened middle point appeared very irregularly shaped under the microscope, with the nuclei visible of granular corpuscles which were

as large as the round nuclei of the more solid substance."*

Of the five kinds of formation, described by Gerber as modifications of tubercle, one only can come under the definition of this product as given by us. This is what Gerber terms the albuminous or unorganized tubercle. This, he says, can only be produced by exudations abounding in albumen, poor in fibrin: "they (the tubercles) consist almost entirely of granules, from the 1-2000th to the 1-200th of a Paris line in diameter; but, with the granular matter, nucleoli, nuclei, or cells are mingled in a quantity bearing relation to the amount of fibrin which the exuded fluid contained."†

In this country, the microscopic structure of tubercle has been more particularly examined by Mr. Gulliver, Mr. Addison, and our friend Dr. Bennett of Edinburgh.

Mr. Gulliver, in his observations appended to Gerber, gives several descriptions of tubercular matter, illustrated by plates. His figures shew a structure composed "chiefly of irregular cor-

* *Chemische und mikroskopische Untersuchungen zur Pathologie.* von Dr. Joh. Jos. Scherer, Heidelberg, 1843. s. 199. Scherer gives a representation of long cells intermixed with granules, (taken from tubercle).

† Gulliver's edition of Gerber, p. 305.

puscles and cells with oblong and circular nuclei."* He also finds tubercular matter "void of regular structure, being composed of shapeless fragments, and a granular matter formed of minute spherules very variable in size."† Also in tubercular matter taken from the pancreas of the patas, vesicular corpuscles of a large size.

Mr. Addison says, "Tubercles of the lungs are generally described as devoid of organization; but this description of them must be understood in a qualified sense; for, in the first place, a tubercle involves or includes in its substance the vesicular structure of the lungs: minute blood vessels, lobular passages and air cells are all capable of demonstration on the dissection of a tubercle under a Coddington lens; the blood vessels are no longer permeable, but their presence may be demonstrated. Secondly, I shall endeavour to shew that tubercles are composed of *abnormal epithelial cells*."

"If a tubercle, or even the tissue of the lung near it, be slightly compressed between two slips of glass with a drop of water, it will crumble down and break to pieces, the fluid at the same time being rendered quite white or milky. This

* Op. cit. Explanation of the plates, p. 61.

† Ibid. p. 65.

white appearance is attributable to a great number of minute objects, the assemblage of which constitutes the substance of the tubercle. They consist for the most part of molecules, granules, and granulated corpuscles, of various sizes, of aggregated granules without any tunic, and of collapsed tunics without any granules. These objects are mingled with a great many shapeless flakes, and filaments, which are no doubt fragments of the membrane of the air cells, and of the minute blood vessels which, when involved in a tubercle, become so extremely brittle that they must necessarily form a considerable proportion of the objects occupying the field of the microscope. The granulated corpuscles of a tubercle are sometimes very large (1-800th in. or 1-1000th in.); and the molecules and granules, which are very conspicuous, may frequently be seen on the point of escaping from them.”*

Dr. Bennett observes, “As regards the structure of tubercle, it is certainly not malignant. Gulliver and Vogel, indeed, have described it under certain circumstances to be composed of nucleated cells. On the other hand, notwithstanding I have carefully examined tubercle in

* Trans. of the Pr. Med. and Surg. Association, vol. 11. pp. 287, 288.

numerous cases, in all its forms I have never been able to discover such a formation. On this point the observations of Lebert more nearly agree with my own, which have always shewn me that tubercle was composed of numerous granules, and of corpuscles of an irregular shape, difficult perhaps to be described, but in the aggregate readily recognized by an experienced eye."*

As we agree with Dr. Bennett in having obtained results from the examination of tubercle by the microscope closely approaching those of Dr. Lebert as communicated to Louis, we shall quote the account of Dr. Lebert's observations.† According to him, "tubercles present microscopical elements proper to themselves, and distinguishing them from all other morbid products; in this respect they obey the general law, that all existences which are really different pathologically, differ also in respect of molecular composition.

"Tubercles contain a great quantity of molecular globules, varying in diameter from 1-1600th to 1-800th of a line [1-800th to 1-400th of a

* Ed. Med. and Surg. Journal, No. 163.

† And see also Dublin Journal, July. 1845, pp. 437-8, for some observations on the microscopic structure of infiltrated tubercle.

millimeter], a hyaline substance which unites their elements, and a species of corpuscle which gives them a peculiar character. These corpuscles are of irregular angular form, vary in diameter from 1-200th to 1-300th of a line [1-100th to 1-150th of a millimeter] and generally speaking, present a well-defined edge. Their interior is yellowish coloured, slightly opaline, and often contains molecular granules distributed through its substance; they never contain true nuclei, which are so common in cancerous globules and so constant in those of pus. Acetic acid, which renders the latter transparent, and displays nuclei within them in a very distinct manner, renders the tuberculous corpuscle also more transparent, without disclosing true nuclei in it. If enough water be added to the tuberculous corpuscles to make them float, their form is discovered to approach that of an irregularly polyhedral sphere, instead of being flattened, like the globules of pus or cancer. They are so numerous, generally speaking, and present so many super-imposed layers in the best microscopical preparations, that it is necessary to have observed them repeatedly, and with a clearly defining magnifying power of from four to five hundred diameters, in order to acquire an accurate notion of their characters,

and enable the observer to detect them in all tubercles."*

He then goes on to point out the differences between tubercles, cancerous matter, and pus. The observations contained in Lebert's work, "*Physiologie Pathologique*," on this subject do not extend essentially beyond those given in his note to the work of M. Louis. On viewing M. Lebert's plates, we believe that the author has committed an error in taking the minute granules which are scattered both between the spaces occupied by the larger corpuscles and over the larger corpuscles, as component parts of the latter. For an illustration of his idea of the essential character of tuberculous deposits under the microscope, see fig. 11 of the microscopic drawings appended to this work.

Our own observations have been made with powers of four hundred, and six hundred and ten diameters, and on tubercles from the lungs, heart, spleen, renal capsules, kidneys and bladder, and on tuberculated mesenteric, bronchial, and cervical glands. The ordinary element of tubercle present in all the forms which we have examined, and scarcely different in one situation

* Louis on Phthisis Ed. Sydenham Society, Author's advertisement to the second edition.

from what it is in another, is the granular corpuscle described by several writers. Many tubercular masses are composed almost wholly of this matter, which varies in size from about the bulk of a blood globule to about, perhaps, the 1-10,000th of an inch in diameter. These corpuscles are generally of a somewhat yellowish colour, and when magnified by the highest power which we have used (610 diameters) shew occasionally spots in their substance which may possibly in some cases be nuclei. Mixed with these, which we believe to be in some instances altered cells, in other cases new formations, we have the following elements.

1st. Epithelial scales, variously altered, observed in lung tubercle, and which are shewn in one of the drawings taken from a specimen of miliary tubercle.*

2nd. Fat globules.

3rd. Crystals of salts, of which some specimens are particularly exhibited in fig. 8 of the microscopic drawings.

4th. Portions of the destroyed tissues which sometimes assume singular shapes.

5th. Cells which also appear to belong to the old tissues, of these there is a specimen taken

* Fig. 3 of the microscopic drawings.

from tubercles of the heart in fig. 7, and the fig. 12 of Scherer's plate, probably represents similar cells.

6th. Large granular and corpuscular masses of the most irregular forms.

The corpuscular granules which constitute the essential elements are shewn in fig. 5 magnified 400 diameters, and again in fig. 6 magnified 610 diameters, and still larger than they appear under the microscope, so as to elucidate our view that in some instances these granules may arise from an error of nutrition, whereby nucleated cells become converted into thickened and semi-opaque bodies. Besides the various kinds of corpuscles we find in tubercles a countless number of granules of very small size.

In tubercles from various seats then, we can discover no essential difference in constitution; and a marked discrepancy exists between cellular and fibrous growths arising from normal inflammation on the one hand, and tubercle, and again between this formation and the various parasitic growths on the other hand. In fig. 1 there is a representation of normal organized lymph from the pleura. We see the globules composing the mass of such effusions in an early stage on one side, and the nuclei appearing in some of them, and on the other

side the development of beautifully curved fibres. In fig. 2 we have a slice taken from an effusion organized between the peritoneum of the intestines and that lining the abdominal walls: the structure which was half an inch thick, exhibited on section, a fibrous mass with portions of yellow granular matter in the interior. A slice of this examined by a power of 400 diameters after being flattened in the compressor, appeared composed of a mixture of fibres, lymph-globules, irregular nucleated cells, with tubercular corpuscles, granules, and some of the other constituents of tubercle. The microscopic structure of an atheromatous mass which was found in the centre of a fibrous tumour removed by Mr. Potter from the left shoulder, shewed well the means of diagnosis which we possess between structures apparently to the naked eye tubercular and scrofulous, and those really so. This atheromatous substance, to the naked eye, closely resembled tubercle, but examined by the microscope, it's structure was totally different from that of the latter formation, shewing a combination of large irregular cells of corpuscles, exhibiting a species of exaggeration of the exudation corpuscle, and of crystalline forms, not easily describable in a few words, but sufficiently apparent to the microscope. The diagnosis between the

various forms of encephaloid or cancerous matter and tubercle, is in general extremely easy.*

Under the microscope, undoubtedly, tubercular masses exhibit evidences of a deficiency of formative power, when compared with the organized deposits of ordinary inflammation on the one hand, and those of a parasitic character on the other. In these latter the formative power is not sufficiently controlled by the laws of the general system, nor directed, as in ordinary inflammation, to a reparative function, but the new formed product takes on itself an independent vitality. In scrofulous and tubercular formations the formative power is deficient, and the cells which are formed, either remain abortive, or instead of cells, we find the granular corpuscles already described. The cells which many have found, belong most frequently, in our opinion, to original structures mixed up with the tubercle-masses: thus in fig. 4 there is a microscopic representation of lung tubercle, shewing the remains of vascular and cellular tissue, mixed with the usual tubercular granules; the cells in fig. 7, from tubercle of the heart, are probably of the same character, and similar to those figured by Scherer, as already stated. We have

* M. Lebert states (op. cit. t. 1, p. 493,) that he has found tuberculous and cancerous matter in contact

not been able to discover any essential difference between the microscopic structure of infiltrated tubercle and that of the ordinary tubercle already described. The structure of infiltrated tubercle consists of irregular corpuscles and granules, some epithelial scales mixed with a few exudation corpuscles, and a great number of minute molecules.*

* According to Mr. Dalrymple, reported by Mr. Phillips, exudation globules can be discovered in enlarged lymphatic glands before scrofulous corpuscles can be detected. (A treatise on scrofula by B. Phillips, 1846, p. 46.) The following observations of Lebert on the early stage of lung tubercle, appear important—"The commencing tubercle may be detected under two different forms, the first is that of very little yellow points, yellow miliary tubercles, in which the microscope shews at the commencement some fibres, but in smaller quantity than the grey granulations; their principal elements are the corpuscles of tubercle." (Physiologie Pathologique t. I. pp. 304. 5. Paris, 1845.) We believe that as soon as the various scrofulous and tubercular deposits assume any recognizable form under the microscope, they will present those marks of deficiency of organization, which constitute their characteristic features. They may be more or less mixed with deposits of a different character. Lebert again observes, (p. 387) "the use of the microscope never detects the least passage between the elements of inflammation and the elements of tubercle, although the two are often mixed;" but this opinion is a *little* too decided. M. Lebert recognizes the same elements of tubercle in the various organs. (See his remarks on tubercles of the liver, nervous centres, internal organs, &c.) And he concludes his observations on tubercles

CHEMICAL EXAMINATION OF SCROFULOUS PRODUCTS.

III. It seems generally understood in pathological works, that the chemical analyses of tubercle are very imperfect:* nevertheless a very great amount of labour has been bestowed on this subject by chemists, some of whom are of eminence. Of late, in particular, the excellent researches of Scherer have furnished us with minute information of the composition of several different kinds of scrofulous and tuberculous matter.

Here, as in other instances, we shall give an account of the present state of our knowledge of the subject before detailing our own researches. The following account of previous investigations is quoted from Canstatt:—

“Lombard found in the unsoftened tubercle:—animal matter 98·05, chloride of sodium, phosphate of lime, carbonate of lime, 1·85, traces of

of the lymphatic glands (internal and external) as follows—
“We see then that glandular tuberculization in general offers the same characters and the same phases of developement as the tubercles of the other organs, and that the peculiarities which we find here, are only due to their structure and physiological function.” (Op cit. p. 483.)

* See the meagre account given by Barthez and Rilliet, t. 3. p. 6,—Bredow. s 28.

oxide of iron.† Hecht found in 6 grammes of tuberculous matter, albumen 1 gramme 4 decigr., fibrin 2 gr. 8 decigr., gelatin 1 gr. 2 decigrs. Preuss found in the tuberculous mass 19.5 per cent. of solid constituents, and 80.5 of water; the solid constituents comprised an animal matter which conducted itself with acetic acid, and on being heated and evaporated, like casein, besides a fat containing cholesterin and a small quantity of salts. The particular tubercle-mass contains cholesterin 4.94, fat salts of soda 13.50, phymatin, muriate of soda, lactate of soda, sulphate of soda, together 8.46. Casein with chloride of sodium, sulphate and phosphate of soda united 7.90. Casein destroyed by heat with albumen, oxide of iron, phosphate and carbonate of lime, magnesia and sulphur united 65.11. In softened tubercles the same elements, with the exception of cholesterin. Preuss concludes the organic matter to be casein, because an extract of the tuberculous mass rubbed up with water, was not coagulated by heat, but became covered with a pellicle like milk, (which pellicle was insoluble in water) and gave a strong precipitate in the watery extract, especially when the acid was put into the warmed fluid. The

† Dr. Canstatt is wrong in attributing this analysis to our friend M. Lombard, it is the work of Thenard.

portion insoluble in water was composed of a fibrous substance with fat, and was partly changed by boiling into a jelly. Güterbock found in tubercle-matter from the bronchial and jugular glands, albumen, pyin (instead of what Preuss erroneously denominated casein.) (Simon found no pyin in lung-tubercles), phymatin and fat. According to Scharlau 100 parts of fresh tubercle-mass consist of 23.32 albumen, 20.00 gelatin, 30.35 fibrin, 25.62 water, and loss 1.01, fat. It is certain that the calcareous tubercle has a similar composition as the bones in their usual constitution; and that on the other hand the bones of those affected with tubercular diseases are of unusual lightness and fragility. Larcher has upon this started the hypothesis that tubercle is nothing but the bone matter led astray from its natural course of deposition; and especially that this is the case with the concretions. This opinion does not agree with the results of the above stated analyses: in the crude, not indurated tubercle, it appears that the animal matter preponderates in the composition, even when the salts are abundant. Lombard* found in crude tubercles 98 parts of animal matter and only 1.85 of salts; on the con-

* Thenard.

trary, in those which had undergone the cretaceous change, 3 parts of animal matter and 96 of salts. F. Simon found in the tubercle of the horse 84.27 of water, fat containing cholesterin, 1.40, spirituous extract with salts, 1.52, casein-like substance with watery extract, 1.14, watery extract with salts, 3.80, insoluble constituents, 4.44, (3.43 loss). According to Schönlein menstrual tubercles, contain chiefly cruorine; arthritic tubercles, uric and phosphoric acid salts; brain tubercles, cholesterin.*

One of the opinions of the nature of tubercle, viz., that supported by Lallemand and Cruveilhier, is partly founded on chemical experiments tending to shew tubercles to be nothing but concrete pus.† The anatomical and physiological details with which we are already acquainted render this doctrine impossible. It is not requisite therefore to recount the alleged resemblances between two very different morbid products, from which the hypothesis was framed.

Prout regards tubercles as deposits of albumen incompletely developed. Gendrin as a mixture of albumen with excess of salts. L'Héritier says "I have analysed the softened tuber-

* Canstatt, Op. Cit. Bd. 1. s. 227. (Note)

† L' Hérítier, Chimie Pathologique, pp. 677-9.

culous matter. It was coagulable by heat, by acids and by alcohol; it reacted after the manner of alkalies. I obtained from it albumen, very soft fibrin, fatty matter, and carbonate of lime. Several cretaceous tubercles furnished me:—

Animal matter from 5 to 9

Saline matter $\left\{ \begin{array}{l} \text{Phosphate and} \\ \text{carb. lime from} \end{array} \right\}$ 95 to 91"*

M. Boudet, whose name is well known to chemists from his researches on the fats of the blood, appears to have made some very elaborate researches on the composition of tubercle. According to him tubercles contain, 1st. albumen, 2nd. casein, 3rd. a substance presenting the characters of fibrin, 4th. a substance soluble in boiling alcohol (cerebric acid), 5th. oleic and margaric acids, 6th. saponified fat, 7th. lactic acid, 8th. lactate of soda, 9th. cholesterin = 0.045 or 1-20th of the weight of the dried tubercles. The ashes, like those of the lungs, contain soluble salts,—chloride of sodium and sulphate of soda; insoluble salts,—phosphate and carbonate of lime, silex and oxide of iron. But the most important part of M. Boudet's researches is that in which he endeavours to confirm the argument of Preuss, already given, in

* Op. Cit. p. 688.

favour of the existence of a large quantity of casein in tubercle. After the separation, he asserts, of the albumen, there remains a liquid which is precipitated by acetic acid like milk, and which evaporated at a mild heat, gives rise to the formation of pellicles similar to those which form on milk. In order more fully to ascertain the identity of this substance with the casein of milk, M. Boudet precipitated comparatively by acetic acid, a certain quantity of cows milk and of the liquid obtained from tubercle. The two precipitates, placed in contact with carbonate of barytes, in order to saturate the excess of acid, and subsequently with water, gave two liquids perfectly similar in all their properties.

According to M. Boudet calcareous tubercles present a composition very similar to the residue of the combustion of tubercles themselves. They contain, however, according to him, but a small proportion of carbonate of lime, and no less than 70 per cent. of soluble salts, viz., chloride of sodium, phosphate and sulphate of soda. It is singular, according to this result, how such a mass of soluble salts should remain undissolved in an organ abundantly supplied with fluids.*

* Lancet, Nov. 16. 1844.

We now proceed to give an account of the very important researches of Scherer, of which, beyond a translation of one analysis in the Medical Gazette, no notice has yet been taken in this country.*

The first analysis which we shall describe is that of a mass of scrofulous glands from the belly of a child which had been affected with general tuberculosis.† Having rubbed up the mass with water, he obtained a turbid milky fluid, which, after standing, deposited a flocculent precipitate. The fluid above this was filtered with difficulty. In the filtered liquid, nitric acid produced a precipitate, and the formation of flakes. Acetic acid produced no result in the cold, neither did alum; the former reagent gave a precipitate, however, in the heated fluid. He infers the existence of albuminate of soda, and the want of casein and pyin. The flakes described above, as formed on the standing of the mixture rubbed up with water, were freed of soluble albumen by digestion in a solution of saltpetre, and boiled repeatedly with water, spirit of wine, alcohol, and ether. "The watery decoction exhibited

* Since the period at which this was written, these researches have been given by our friend Dr. Day in his edition of Simon's work.

† Untersuchungen, s. 199. et seq.

traces of pyin as indicated by acetic acid and alum. The spirit of wine decoction contained some yellowish extractive matter, and the alcoholic and etherial solutions much fat, and in particular very much elain." * * * * *

A thousand parts of the mass, fresh taken from the body, gave, on drying by the water bath :—

Water.....	776.78
Solid constituents....	223.22
	<hr/>
	1000.00

On burning 1,000 parts, he obtained 5.26ths of ash, consisting of a little chloride of sodium, much carbonate of soda, with phosphate and sulphate of the alkali, and very little phosphate of lime.

The mass, after the removal of all its extractive substances, gave, on organic analysis, results which make the composition in 100 parts to be :—

Carbon,	54.125
Hydrogen,	7.281
Azote,	15.892—16.086
Oxygen,	22.702

Scherer then proceeds to formularize these results, and to institute a comparison with protein formulas. In the present state of our know-

ledge, these formulas can scarcely be deemed of much importance. Our own analysis give results considerably different from those of Scherer; nor shall we amuse ourselves, by putting them into formulas.

In a scrofulous mass, which Scherer obtained from the brain of a young man, whose case, as detailed, is very interesting, we have the following result. After a pretty similar treatment of the tuberculous mass, as in the case just recorded, he submitted a portion, freed of its extractive matters, to ultimate analysis, the results would give:—

Carbon,	54.410
Hydrogen,	7.147
Azote,.....	16.366
Oxygen,	22.077
<hr/>	
	100.000

Adopting a permanent azote constitution of protein, and of the substance under examination, he makes the following formula:—brain-tubercle, $C_{46}, H_{74}, N_{12}, O_{14}$; that is to say, 2 atoms of carbon less, and 2 atoms of hydrogen more, than in protein.

In another tuberculous mass from the abdomen; separated masses from which, of broken fatty consistence, shewed, under the microscope,

after having been first mixed with water, "a great mass of little granules, also partly destroyed cells, and dispersed between the same, in great quantity, ramificated, thread-like, or nerve-tubed looking formations."* * * * "The mass developed free ammonia, and digested with water gave a darkish white fluid, with broken grey sediment. The filtered fluid, by boiling, gave a precipitate, which, by the addition of a drop of acetic acid, passed into flakes; and the addition of saltpetre produced coagulation of flakes, while the fluid became of a reddish hue.† Acetic acid, in the cold, produced a slight precipitate in the fluid, and this was not fully dissolved in an excess of the acid. The substance, boiled with muriatic acid, gave no violet fluid."* * * "After the albumen was removed, by digestion, with solution of saltpetre, the mass was boiled with spirit of wine and alcohol, and finally with ether. These fluids took up much fat, and yellowish extractive matter which separated in the evaporation. The fat consisted of margarin, with a little elain—no trace of cholesterin. The spirit of wine extract gave no reaction

* This structure is shewn in the microscopic drawing copied from Scherer Fig. 13. No. 3.

† He appears to consider this reddish hue indicative of the presence of casein.

with chloride of mercury nor with ferrocyanide of potassium. With neutral and basic acetate of lead, there were obtained precipitates of a white colour, which consisted of chloride of lead. The watery extract of the mass contained much albuminate of soda, also casein and pyin. The fluid, on being evaporated, covered itself with a little skin, and acetic acid produced a strong cloud in the cold, which did not dissolve itself completely in an excess of the acid, but left a flaky coagulation behind, even on the warming of the fluid.

A thousand parts of the fresh mass gave :—

Water, 893.82

Solid residue, 106.18

The ultimate analyses gave :—

	1	2	3
Carbon	55.299	55.069	55.137
Hydrogen....	7.098	7.004	6.944
Azote.....	16.698	16.534	16.476
Oxygen.....	20.905	21.393	21.443
	<hr/>	<hr/>	<hr/>
	100.000	100.000	100.000

In a tubercular-like mass from the liver he found :—

Water..... 826.04

Solids..... 173.96

1000.00

The solids were, 1st, a fat extracted by ether,	
consisting of elain and margarin	18.63
Matters extracted by alcohol.....	21.75
Watery extract, with very slight	
traces of pyin	8.34
Insoluble residue.....	120.34
Inorganic salts.....	4.90
	<hr/>
	173.96

The organic analysis of the residual protein compound, gave

Carbon	54.554
Hydrogen	7.121
Azote	16.928
Oxygen	21.397
	<hr/>

100.000

In the organic analysis of the protein basis of a mass of crude tubercle from the lung, after the usual removal of the extractive matters he obtained

Carbon	53.884
Hydrogen	7.112
Azote	17.237
Oxygen	21.767
	<hr/>

100.000

The same author, in an analysis of scrofulous

pus, found in that first removed from the abscess, no pyin. A thousand parts of the whole gave:

Water,.....	872
Solids,	128

1000 And 1·08

of inorganic salts. In that obtained from the abscess, after it had been opened for some time, and phlebitis had set in, the fluid was strongly alkaline, and contained ammonia. There were, water 959·98, and only 40·02 of solids; alcohol extracted much fat, and the inorganic salts were 5·72 in 1,000 parts.

In another case, he found pyin in tuberculous pus.* His analysis of the contents of a strumous cyst gives:—

Water,	920·96
Solids,.....	79·24

1000·00 The so-

lids consisted of:—

Albumen, with some me-	
tamorphosed blood,.....	61·23
Extractive matters,	8·71
Fat, with cholesterin,.....	1·80
Salts,	7·72
	<hr/>
	79·46

* Untersuchungen, s. 103.

An analysis of a calcareous tubercle found in the bronchial tube of a person who had died of pulmonary phthisis, presents some interesting points.* He infers, from the behaviour of the concretion with muriatic acid, that it was not merely enveloped by a membrane; but that a membranous substance also pervaded the interior of the concretion. The composition of the concretion was—

Organic substances,....	20·10
Phosphate of lime,	69·92
Carbonate of lime.....	9·09
Chloride of sodium, phosphate and sul- phate of soda,	0·89
	—————
	100·00

In another chalky concretion from the pleura he obtained—

Organic substance†.....	36·967
Phosphate of lime.....	55·924
Carbonate of ditto.....	7·109
	—————
	100·000

In Simon's Beiträge we have the analysis of a bony concretion of the size of a hazel nut,

* Op. cit. s. 196.

† Op. cit. s. 197.

found in a person whose lungs contained many of the calcareous concretions.*

Organic matters..... 38·89

Incinerated salts..... 61·11

Earthy phosphates.... 53·33

Carbonate of lime... 7·04

Soluble salts..... 0·37

In 100 parts of the salts we thus have

Earthy phosphates..... 87·2

Carbonate of lime..... 11·5

Soluble salts..... 0·65

A composition which closely assimilates this body to an osteoid tumour, of whose analysis by J. Muller we have also the account.

Several analyses of tubercle have been published by Dr. S. Wright, of Birmingham, in the Medical Times.

The first original analysis which we shall recount was of mesenteric tubercle, the specimen was taken from an adult who died of pulmonary phthisis; the glands varied in size from that of a walnut downward; those were selected in which the degeneration was most complete, and the tubercular matter in the crude form. The glands were carefully freed from their envelopes,

* Beiträge, s. 234.

and as much as possible from everything of a membranous structure, or which might represent a portion of the old tissue.*

A thousand grains of the matter thus obtained gave, on being dried:—

Water..... 803

Residual solids..... 197

1000

The solids pounded, were then subjected in succession to the action of water, spirit of wine, alcohol, and ether, (cold and boiling); the result was as follows:—the watery extract, dried, weighed 16 grains; it had a somewhat gummy, semi-gelatinous aspect, but did not gelatinize with boiling water. One portion dissolved readily in boiling water, another not so easily: these were separated by filtration, the portion on the filter, dried, weighed 2·83 grs. and seemed mucous matter; the filtered solution was divided into two portions, one of them gave a tolerably copious precipitate when treated by acetic acid, and solution of alum, and which remained insoluble in excess of the reagents; this precipitate was collected on the filter and weighed; the

* The microscope shewed only granules; and in short the structure was an excellent specimen of the complete tubercular mass.

other portion of the solution, on being evaporated, shewed a substance not dissimilar in appearance to the extractive matter of the urine, and to that which is obtained by a similar process to that followed here (as we have ascertained) in saliva formed in abnormal quantity during partial suppression of urine. The watery extract was composed of:—

Pyin	1·27
Muco-extractive	2·83
Peculiar extract and loss....	11·90
	<hr/>
	16·00

The extractive matters presented a mass, consisting, apparently, almost entirely of fats, and weighing 44·9 grs. These we, not being much experienced in the analysis of fatty bodies, forwarded to Giessen; but have not yet received any account of them. The spirituous extract gave 4·0 grs., which, on being burnt, furnished 0·35 of salts. The residual substances weighed 130·1 grs., so that there was a loss of 2 grs.

8·30 grs. of the residual protein compound, fresh pounded and dried, were burnt for ash, and gave 0·11 or 1·37 per cent. The composition of the solids would thus be;—extractive matters, as thus described, 64·9; residual protein, with its salts and loss, 132·1 = 197·0.

Ultimate analysis of the residual protein compound.

A. Estimation of carbon and hydrogen.

1. Material, 7.00 grains

2. Potass app. after combⁿ., 362.02

———— as before, &c. 348.29

Increase in CO_2 13.73 196.1 per cent.

By Rose's tables = 54.22 per cent. of carbon.

3. Chl. calc, tube after combⁿ. 439.12

———— before, &c. 435.00

Increase in H_2 0 grs. = 4.12 = 58.85 p.c.

And by Rose's tables = 6.536 per cent. hydrogen.

B. Estimation of Azote.

6.8. grs. of the substance, burnt in Varrentrapp and Will's apparatus, furnished 13.1 grs. of platinum salt = 192.7 per cent. = 12.15 per cent. of azote.

And as the ash, as already stated, was 1.37 per cent., we have :—

Carbon..... 54.97

Hydrogen..... 6.63

Azote 12.31

Oxygen..... 26.09

————
100.00

The small quantity of azote thus obtained is worthy of remark, as compared with the results of Scherer.

Analysis 2.

200 grs. of crude mesenteric tubercle, likewise from a patient who had died of phthisis, were carefully selected, some of the masses were as large as nuts, after they had been freed of everything which had the appearance of ordinary tissue.

The substance dried, furnished..... 37.5 grs.

It was therefore composed of— Water 812.5

Solids 187.5

1000.0

The fats extracted by alcohol and ether, amounted to 7.2 grs., which burnt, gave 0.45 of saline residue; after the exhaustion by spirit of wine and water, there remained a residuum of 22.30 grs., and the half of the extractive matter removed in this manner, burnt, gave 0.25 of salts. 5 grs. of the protein residue, burnt for salts, gave 0.125 or 2.5 per cent. of ash.* No traces of

* 3 grs. were tested for casein with acids: it dissolved readily by the aid of heat in acetic, muriatic, and strong sulphuric acids.

casein or pyin were discovered. The proximate composition would then be:—

	Fats	6.75
	Extractive matter sol. in spirit of wine and water and loss.....	7.50
Salts {	Chlorides.....	0.45
	Earthy salts (phosphates).....	0.58
	Alkaline salts.....	0.50
	Protein residue.....	21.72
		<hr/>
		37.50

The portion of the protein residue which remained, was now subjected to organic analysis.

A. Estimate of carbon and hydrogen.

Material..... 2.94

1. Hydrogen lost.

2. Carbon.

Potash app. after combⁿ. 371.50

Before process 365.65

grs. $5.85 = 198.9$ per cent.

Co₂

as by Rose's tables = equal 54.99 per cent. carbon

B. Estimation of azote.

Method of Varrentrapp and Will:—

Material..... 3.53 grs.

Platinum salt $8.60 = 240.8$ per cent.

viz. 15.18 per cent. azote : calculating for ash we have:—

Carbon	56.40
Hydrogen.....	* * *
Azote,.....	15.56
Oxygen.....	* * *

Analysis 3.

A portion of crude lung tubercle was dried in a water bath ; the residuum, which weighed 25.45 grs., after having had the extractive matters and fats removed by alcohol and ether, was treated with cold, and then with hot water, the watery solutions were mixed and filtered ; the filtered liquid gave precipitates with acetic acid and solution of alum, which remained insoluble in excess of the reagents. To a portion, filtered after the addition of the acetic acid, solution of ferrocyanate of potass was added without effect. The protein compound, which remained after the extractive matters were removed, was readily soluble with the aid of moderate heat in acetic, muriatic, and sulphuric acids. It was concluded that this tubercle matter contained pyin and albumen, but no casein.

Analysis 4.

A mass of crude lung tubercles, which weigh-

ed 500 grs., from a woman who died of phthisis, was selected on account of the completeness of the tuberculization. On being dried, the weight was 106·8, giving thus :—

Water 786·4

Solids 213·6

1000·0

The fats and substances, soluble in ether and alcohol, were removed, and weighed, with their salts, 18·25 grains ; they were examined, qualitatively, and consisted chiefly of elain, with some cholesterin. The watery extract=6·55, contained neither casein nor pyin ; the spirituous extract and loss amounted to 4·00 : the insoluble protein residue was 78·0 grs. 20 grs. of this, burnt, gave 0·4 of ash, or 2 per cent. : this residue consisted chiefly of insoluble salts.

The proximate analysis, therefore, gave

Fats and extractive substances by

alcohol and ether, with salts..... 18·25

Spirituous extract and loss..... 4·00

Watery extract and salts..... 6·55

Protein residue and salts..... 78·00

106·80

The ultimate analysis was then proceeded with.

1. Estimation of C. and H.

Material..... 5.38 grs.

Weight of Cl_2 Ca. tube after combⁿ. 154.94

do. do. as before 151.78

grs. 3.16 = per

Rose's tables .349 H. or 6.51 per cent.

Potass app. after combⁿ. 363.91

do. do. before, &c. 353.72

grs. 10.19 = per

Rose's tables, 2.817 C. or 52.36 per cent.

2. Estimation of azote.

7.6 grs. of material yielded 16.56 grs. of platinum salt = 217.89 per cent. = 13.74 per cent. of azote. Hence,

With ash,		Without ash,
Carbon....	= 52.36	= 53.43
Hydrogen	6.51	6.64
Oxygen....	25.39	25.91
Azote.... ..	13.74	14.02
Ashes	2.00	
	<hr/>	
	100.00	

Analysis 5.

This was the analysis of 100 grs. of fresh tuberculated bronchial glands. The mass was taken from a man whose lungs were tuberculated, and which exhibited on the lower part, on the right side, some melanotic masses. The tuberculization of the glands, although complete, was not in the most advanced stage. The results were :—

Water.....	74·20
Solids	25·80
	<hr/>
	100·00
Fat acids.....	2·70
Fatty body non saponifiable: cholesterol (?).....	1·00
Extractive matter sol. in alcohol.....	1·30
Extractive by spirit of wine and hot water	4·10
Insoluble protein residue and loss ...	15·00
Salts.....	1·70
	<hr/>
	25·80

Analysis 6.

A tuberculated cervical gland of an ox, containing some cretaceous fragments on being

dried, weighed 25 grs., which, burnt, yielded 3·85 of salts, chiefly phosphates.

Analysis 7.

This was the analysis of some tubercular matter from the upper part of a phthisical lung, exhibiting what appeared to be a partial change to the cretaceous substance. For this specimen we are indebted to Dr. G. H. Bennett. The whole quantity, dried, weighed 33·8. This, burnt, gave 9 grs. of ash : these were carefully pounded, and treated with anhydrous alcohol ; the solution, evaporated, gave 1·22 of residuum ; the residuum, after the alcoholic solution was removed, treated by boiling distilled water, gave 1·9 of soluble matter, consisting chiefly of phosphates, with a trace of muriates ; what remained was then dissolved in muriatic acid, and precipitated by ammonia ; afterwards solution of oxalic acid was added to the filtered liquid, which furnished only a trace of precipitate.

The following then were the results :—

Animal matter.....	24·80
Salts.....	9·00

33·80

Chlorides with a trace of alkaline salts....	1.22
Salts soluble in water, as above described	1.90
Phosphate of lime.... ..	5.40
Carbonate of lime, a trace, and loss... ..	0.48
	<hr/>
	9.00

Analysis 8.

Of the tubercular' concretions represented in the plate, and others of the same kind, from different lungs. The concretions, dried, weighed 30.1 grs. The following were the results:—

Animal matter.....	07.7
Incinerated salts.....	22.4
	<hr/>
	30.1
	<hr/>
Phosphate of lime... ..	16.45
Carbonate of lime.....	5.10
Sol. salts and loss	0.85
	<hr/>
	22.40

Analysis 9.

The subjects of this analysis were portions of scrofulous bones: the astragalus and a portion of the calcis represented in the illustration pl. 4, were selected; tubercular matter was deposited

in spots, between a bony shell next the periosteum, in the astragalus and the more cellular interior portion of the bone, which was very spongy, easily cut, and on section presented a greyish mottled aspect:—

1000 grs. of the bone, dried, became 388·0; thus the constitution was:—

Water..... 612·0

Solids..... 388·0

1000·0

100 grains of the dried bony tissue were burnt, and gave 25·15 of ash, thus we had:—

Animal matter..... 74·85

Earthy do. 25·15

100·00

Of the ashes 22·50 were phosphate of lime, and 2·0 carbonate of the same base; a result which does not justify an opinion, somewhere expressed, of the proportion of phosphate and carbonate of lime being much altered in scrofulous bones, the carbonate being supposed to be increased.

A portion of a supposed healthy astragalus was now taken, in order to compare its density and the amount of earthy matter which it contained, with the scrofulous bones; for the bones

of different parts differ greatly in composition, and we are not aware of any analysis of the bone in question having been made.

250 grs. of the healthy astragalus, dried, gave 182·4 residue; thus there were:—

Water.....	270·4
Solids.....	729·6

1000·0

The residuum of 100 grs., burned, was 41·4; thus, in every respect, was afforded a strong contrast with the scrofulous bone, nevertheless the analyses would have been more satisfactory, had they been made on *whole bones*.

Analysis 10.—Of scrofulous pus.

The specimen was taken from an abscess above the manubrium of the sternum, in the case described as No. 15, of the reported cases.

This pus was uniformly fluid, and contained no large masses of albuminous matter, although small molecules were diffused throughout. It was alkaline; and had a sp. gr. of 1033·48.

In 100 parts were found:—

Water.....	85·900
Solids.....	14·100

(N.B. The analysis was made on 200 grs.) 100·000

Fats	1.575
Extractive matters sol. in water, pyin	2.450
Alkaline and earthy salts, traces of iron..	1.125
Albumen and loss..	8.950
	<hr/>
	14.100

Analysis 11.

Of pus from an abscess in the leg of the case, No 10. The fluid was mixed with curdy albuminous matter, granular under the microscope. 300 grs., evaporated to dryness, gave 32.2 grs.: these were composed of

Extractive and fats by alcohol	4.80
Do. do. by ether (cholesterin ?).....	1.55
Extractive, &c. by water	4.50
Albuminous matter and loss	18.45
Earthy and alkaline salts	2.90
	<hr/>
	32.20

Analysis 12.

Pus from a scrofulous abscess of the back ;—thin, mixed with curdy matter. 200 grs., evaporated to dryness, gave 18.4 grs.; this residuum, burnt, gave 1.6 of salts, which were alkaline: alkaline salts and loss, 1.0 chlorides 0.4,

earthy salts—phosphates 0.2. On comparing these analyses with those hitherto published of pus from other sources, it is difficult to draw any inference with regard to the difference between scrofulous and non-scrofulous pus ; it will probably be found however on the whole, that the proportion of albumen is greater in the former.

Analysis 13.

We were very anxious to compare the analyses of tubercle, proximate and ultimate, with those of organized lymph on the one hand, and of cancer on the other.

A portion of organized lymph, which was found between the pleuræ in a phthisical subject, where it formed a layer of about 2 lines in thickness, in some parts, and from which the microscopic drawing, fig. 1, was taken, was submitted to analysis. A carefully selected specimen, dried, weighed 44.55 grs. This, pounded, was subjected successively to the action of alcohol and ether ; the solutions obtained were mixed, and, on being evaporated, gave crystals of cholesterin ; the watery extract contained no pyin ; the spirituous extract was very small, but it was lost ; from the weight of the protein residue, this extract could not have exceeded

1.95 of a grain ; the alcoholic and etherial residue, burnt, gave 0.5 of ash ; the watery extract gave 0.7 ; 10 grs. of the dried insoluble protein basis yielded 2 per cent. of ash. The following, therefore, was the proximate composition of the lymph.

Alcoholic and etherial extract, fats, and	
cholesterin	6.50
Water extract.....	5.90
Spirituous do. and loss.....	1.95
Protein residue.....	28.40
Salts	1.80
<hr/>	
	44.55

Organic analysis.

A. Estimation of carbon and hydrogen.

1. Material, 5.2 grs.
2. Potash. app. after combⁿ. 379.24
as before, &c.. 368.70

Increase in Co_2 grs. $10.54 = 202.7$
per cent. = 56.04 per cent. carbon.

3. The oxide of copper mixture had not been sufficiently dried, as the hydrogen was much too high.

B. Estimation of azote.

8.72 grs., burnt in Varrentrapp and Will's apparatus, furnished 20.4 grs. of double plati-

num salt = 233.94 per cent. = 14.75 per cent. azote.

C. Estimation of ash, 2 per cent.

Result without ash.

Carbon.....	57.18
Hydrogen....	* *
Azote	15.05
Oxygen.....	* *

Scherer obtained in the analysis of a plastic exudation from the peritoneal covering of the liver, where the person died of tubercular affection of the abdominal glands and lungs, and in which he analysed the abdominal tubercular deposit,—results differing from those which we have obtained, and the quantity upon which he operated, was much larger: the following are his results:—

Proximate :

In 1000 parts—

Water.....	731.62
Solid residue	268.38

1000.00

The solid residue contained—

Fat	15.47
Water extract, and pyin with casein	4.32
Spirituuous extract.....	6.23
Salts.....	5.40
Insol. Residue.....	237.96

Ultimate analysis of the mass freed from its extractive matter :—

Carbon	55·190
Hydrogen	7·186
Azote	16·602
Oxygen.....	21·022

Comparing his former analysis of the tubercular matter with that of the lymph—from the same person, just given, he says, in the former, “ We find more watery parts, more fat, and extractive matter.”

The analyses of cancer, which Scherer gives, scarcely admit of any useful comparison, in the present state of our knowledge with those of tubercle. In one of them the azote was high = 17.720 per cent.

GENERAL CONCLUSIONS.

1st. The results of the chemical analysis of tubercle, and its after-products, of scrofulous bones, &c., although they may not as yet warrant very decisive conclusions, yet furnish some useful information, which will be found to bear upon the pathological propositions advanced concerning the essential nature of scrofulous and tubercular affections.

Thus the large quantity of fat and extractive matters in tubercle, has a direct bearing upon

the theory supported by many of the advocates of the use of cod-liver oil in the treatment of these diseases. The existence of pyin is important, and could we be sure of that of casein in quantity, we might to a certain extent explain the unorganizability of tubercle. But we have never been able to satisfy ourselves that the protein constituent of tubercle, as examined by us, approaches much nearer to casein, than to albumen. Nevertheless, the researches of Preuss, Boudet, Scherer, and others, must be held decisive of the existence, at least in some cases, of casein ; although the last-named observer is far from confirming former writers in the statement of a large proportion of tubercle matter being composed of this substance. We have made other examinations for casein than those recorded, and have never been able to detect its presence. Whoever considers the very doubtful power of the tests which we possess, for distinguishing these different substances in the animal body, will be very doubtful of the precise nature of the protein basis of tubercle. Nevertheless, we may perhaps conclude that there is great probability of this protein compound having a certain approach to casein, or at least of a portion of it,

exhibiting a tendency to take on the characters of this latter substance.*

2nd. The ultimate analyses which have been made can lead to no very definite conclusion, although Scherer infers from a comparison of his formulas of lung and liver tubercle, that the difference which exists between them, may arise from the substance in the latter situation being less exposed to the air.† Thus he says—making the azote the fixed quantity, we have:—

The lung-tubercle..... $C_{43} H_{70} N_{12} O_{13}$

The liver-tubercle..... $C_{45} H_{72} N_{12} O_{13}$

shewing an excess of carbon and hydrogen.

Our analyses would give to the protein compound of tubercle a much smaller per-centage of azote in general, than those of Scherer; only 12.31 in the first analysis of mesenteric tubercle, while the proportions of carbon and hydrogen shew that the substance had been completely freed from fat. But when we find analyses of normal protein differing almost as much from the ordinary standard, what inference can we draw? Since we wrote as above, Liebig has called in question the protein theory, but the use

* From the reviews of the recent work of Mr. Simon, we learn that this writer regards the protein basis of the thymus gland as intermediate between protein (albumen?) and casein.

† Op. Cit s. 228.

of the word protein, in this essay, is not hypothetical; it is used to signify a basis of an albuminous, or, perhaps, partly caseous nature, which undoubtedly is at the bottom of the constitution of the greater portion of tubercle.

It does not, however, follow that these ultimate analyses are useless, because we cannot at present draw many inferences from them. We see at least the close approximation which they enable us to make between the basis of these morbid formations and protein compounds.

3rd. The analysis of the concretions which we have made, does not bear out in the least the statement of M. Boudet, which makes these bodies contain 70 per cent. of soluble salts. On the contrary, even in the tubercle, which may be supposed to form a transition-stage on the way towards the conversion into the calcareous substance, we find only about one-third of the ash composed of soluble salts; and in the perfect concretion there was merely a fraction of these substances. In this respect our results agree with those of Scherer and Mulder.

A doubt has arisen, whether these concretions should be regarded as the remains of absorbed tubercle; and this doubt is supported by Rayer, who maintains them to be oftener the residue of

pus.* The presence of these concretions may not improbably serve to attract towards them, once formed, more osseous matter.

4th. The analysis of scrofulous bones requires no comment.

5th. Scrofulous pus appears to differ from ordinary pus, chiefly in the fluid part being thinner and mixed with albuminous granules proceeding from a decomposition of scrofulous or tuberculous matter. The pus globules appear also, as stated by Mr. Gulliver, to be fewer and less distinct than those of healthy pus.* We have found them also more irregular in their form.

* Archives de Médecine Comparée, Nos. 4 and 5, p. 203. 1843.

* Op. Cit. Explanation of plates, p. 62.

NOTE.—The analysis of a tubercle by means of the microscope and chemistry, is but an extension of its dissection by the scalpel. The chemical elements of such a formation belong as much to its anatomy as the cellular tissue, &c., of which it is composed.

CHAPTER II.

HUMORAL PATHOLOGY OF SCROFULA.

No apology is necessary in the present day for attaching great importance to this department of our subject. Indeed, there has always existed a sort of humoral pathology of this disease, from the time of Hippocrates downwards. Almost every one seems naturally to have looked to the state of the fluids for an explanation of the principal phenomena of the affection. Hufeland has forcibly pointed out the importance of a pathology of the fluids. "I cannot sufficiently repeat, that, to judge adequately the state of a system of organs, we must take into consideration the system itself, and the fluids which it holds in circulation—for the influence is reciprocal." He proceeds to remark. "The fluids are the natural stimulus of the vessels; or in other terms, the vessels only enter into action by the irritation exercised on them by the fluids. This is a law of nature. Nevertheless, we hear but of the irritability of these vessels as the cause of their movements." Again—"The humours are the natural stimulus of the solids, the mov-

ing force of their functions; which proves, let us state in passing, that the fluids should be considered in a pathological system."

STATE OF THE BLOOD IN SCROFULA.

1. A change in the composition of the blood in scrofulous persons, from the normal standard, has been long suspected; and of late years this depraved condition of the blood has been assumed to exist in almost every work on scrofula; but, as far as we are aware, the assumption has been chiefly hypothetical, at least to a very recent period.*

Reference is made to the subject by Simon in words which we quote from the recent translation, published by the Sydenham society:—"In scrofulous affections the blood is deficient in solid constituents, especially in fibrin and in corpuscles. The primary causes are probably due to a deficient formation of chyle, and to the influence of a moist unhealthy atmosphere.

Dubois has analysed the blood of scrofulous persons; "the blood coagulates slowly, the clot is small, soft, and diffuent; the serum is

* According to Bredow, Bandelocque was the first to deliver a rational pathology of the blood in scrofula.

thin, and often of a red colour. When examined under the microscope, some of the corpuscles appeared devoid of colour at the edges only ; some entirely colourless ; their size was not materially changed, but they appeared flattened, spherical, or cylindrical. Hence we may also infer that there is a deficiency in the quantity of salts in the blood of scrofulous persons." Several analyses of scrofulous blood have been published lately by Mr. Nicholson, of Hexham, in the Northern Journal of Medicine. Mr. Philips says—" I have examined the blood in sixty-seven instances of scrofula, and although I have almost always observed a considerable deviation from the condition of healthy blood, the changes have not presented sufficient uniformity to induce me to regard any particular condition as specially characteristic of scrofula ; the changes are such as seem to belong to a tolerably extensive group of affections, all, it is true, being connected with disordered nutrition and debility. In almost every case, the coagulum was relatively small, the serous menstruum large ; the clot was usually very soft, almost diffuent ; in a few instances only it was tolerably firm. In almost all cases, the proportion of globules was considerably under the healthy standard. The fibrin had not usually undergone

much change ; in a few cases it exceeded, in many more it was below the healthy standard. In most instances there was a considerable increase in the proportions of albumen ; in almost every instance the proportion of salts was found to exceed the healthy standard ; in some instances it was nearly double." Andral and Gavarret have given an account of the analyses of the blood in 22 cases of pulmonary phthisis. The mean of the 22 gives, as compared with their mean of healthy blood, the following result :

	Water.	Solids.	Fibrin.	Corpuscles.	Solids of serum.
Mean.....	809.7	190.3	4.6	100.5	85.3
Healthy blood*	890.0	210.0	3.0	127.0	80.0

Becquerel and Rodier have examined the blood of persons with pulmonary phthisis, namely, five men and four women ; and the result, according to their standard of the healthy mean in both sexes, shews in phthisis a diminution of blood globules and a slight diminution of albumen, with no great alteration in other respects. We have examined the blood of eleven males and seven females in scrofula, one of the females, of a strumous aspect, was affected with goitre.

The two modes of analysis in more common

* It will be observed that the standard composition of healthy blood, according to Andral and Gavarret, differs considerably from that established by Becquerel and Rodier.

use for ascertaining the leading constituents, depend, as is well known, on different modes of procedure with the blood soon after it has been drawn; we may either receive the blood into a vessel, and allow it to coagulate, determining the fibrin by washing a portion of the clot; or we may divide the blood, according to the method of Andral and Gavarret, into four portions, mix together the 1st and 4th portions, and the 2nd and 3rd, and whip one of the quantities thus formed for fibrin, leaving the other to coagulate.

Both these modes are liable to objections. When we cut the clot in order to weigh a portion for washing, however homogeneous and uniform the substance of the coagulum might previously appear, we shall invariably find that we have the greatest difficulty in separating a portion without destroying the uniformity of the structure, a red coloured serum flows as soon as the knife is applied, and all certainty of ensuring the separation of a weight of the same consistence for washing, with that which we leave behind, is at an end. When we performed the analysis in this way we took the precaution of allowing the clot to drain as completely as possible after the separation of a portion for washing, the drainings were then weighed along with

the vessel, and evaporated separately from the remainder of the clot, and the quantity of matter belonging to the globules in the portion thus drained, was afterwards estimated from the comparison between the clear serum and the dried residue of the clot: this difficulty is not all that attends this mode of analysis. As M. Mandl has well shewn, the washing of the clot, so as to obtain an exact result for the fibrin, is a matter of the most extreme difficulty.* If we wash in a coarse linen cloth, and especially if we employ pressure, portions of the fibrin are apt to be carried through the cloth. If we wash on a fine cloth, and endeavour to complete the process on a weighed filter, the matter will sometimes begin to putrefy before all the colouring matter be washed away. Again, M. Mandl has proved by experiments, which appear decisive, that we cannot always obtain, by stirring, the same quantity of fibrin from equal portions of blood containing the same.† The objections of M. Mandl have been too little noticed. Nevertheless, if by different methods, we obtain nearly uniform results from a good number of

* See his papers in the Archives Générales for October and March, 1840, and February, 1841—for this see first paper, pp. 179, 80.

† 1st paper, pp. 181, 182; paper 2nd, p. 297.

analyses ; or at least results, which lead to one broad general conclusion in regard to the state of the blood in a particular disease, we may confide, undoubtedly, so far in these results, notwithstanding the comparative imperfection of our modes of analysis. Changes in the blood, more subtle than any which can be detected by our analyses, may play a most important part in the phenomena of disease ; and as Bredow well remarks, “ if a peculiar condition of the scrofulous blood could not be proved by chemical or microscopical researches, still it would not necessarily follow that such a state does not exist, but only that the necessary reagents were not known, and the microscopes employed not sufficiently powerful.”*

Another objection to one of the methods of analysis referred to, which made us sometimes have recourse to the other method, is not unworthy of notice. In this country we have not that power over our patients which is exercised in the foreign charitable institutions, and when patients bled, have seen the precautions which it was requisite to take, and the methods employed in receiving the blood, and stirring a portion of it according to the mode of Andral and Gavarret, they have conceived a notion that

* Ueber die Scrofelsucht, s. 30.

they were being made subjects of experiment. Occasionally, patients affected with scrofula, may be bled without injury ; and even where there is some local congestion with possible benefit ; but in general the drawing of blood in these cases, even in small quantity, can only be excused by the great importance of the study of the composition of the blood in this disease. And as the patients easily conceive the idea that blood-letting is not likely to be beneficial to them, it is, of course, highly proper to avoid rousing their suspicions.

We have employed the mode of analysis of Andral and Gavarret, not because we believe it entirely correct ; and, indeed, as Simon remarks, the fundamental assumption on which it proceeds, of the globules swimming as dry bodies in a fluid, is probably quite gratuitous. But the object of the analysis of scrofulous blood, which is here in view, is the comparison of it with healthy blood, and the only mode of making such a comparison, is by the mode of Andral and Gavarret, in order to compare our results with those which have been obtained by their method in their analyses, and in those of Becquerel and Rodier. Thus, although the results may not be absolutely correct in themselves, they serve the purpose of comparison. Had

Simon, or some other observer, given us tables of the composition of healthy blood sufficient to serve our purpose, another method than that referred to, might have been, and with advantage adopted; but we cannot compare results obtained in another way, with the results of the method of the French observers.* The blood, after being drawn, and one portion stirred, was always covered in our experiments until coagulation was effected; the serum was separated as long as it continued clear; and the coloured serum was always dried with the clot; moreover, such care was taken in drying the clot and serum, that we have no doubt of the exactness of the estimate of the solids of the serum and clot: again, it is considerably doubtful whether the nuclei and envelopes of the corpuscles should be represented as albumen, as by the method of Simon. Although the idea of water of the clot, as made by the French method, to correspond to a quantity of solids of the serum, and the solids to be wholly globulin, may not be perfectly correct, yet it must approximate considerably to the truth; for the serum is very abundant in the clot, and the fluid with which the sub-

* The precautions taken in our analyses obviate, in great measure, the objections offered by Simon to the mode of Andral and Gavarret.

stance of the globules is permeated, is most probably the serum.

MALES.

CASE 1.—A boy of fair-complexion, aged 15, tolerably stout, but of scrofulous aspect; affected with swellings of the glands of the neck, with considerable enlargement for four years; several of the glands have suppurated, and some of the ulcers are now open. Four ounces of blood were drawn, and treated according to the method of Andral and Gavarret. The results were :—

Water.....	816.40
Solids	183.60
	————
	1000.00
	————
Fibrin	04.30
Solids of the Serum....	79.30
of which the organic	
ingredients =	73.90
And the Salts, by inci-	
neration =	5.40
Globules	100.00
	————

In the blood of a healthy boy of fourteen,
Denis found,—

Water	750·4
Solids	249·6

1000·0

Fibrin	4·0
Blood corpuscles	162·2
Albumen	58·0

CASE 2.—A boy, aged fourteen, of fair-complexion. Has had scrofulous swellings of the neck for two years, and for a year and a half a scrofulous affection of the tarsal bones has been manifest in him. He has the cicatrix of an abcess in the abdominal parietes, and several cicatrices in the neck. Abdomen tumid. As in the other case, the blood (of which 4 oz. also were drawn) was treated after the method of Andral and Gavarret.

Water.... ..	803·44
Solids	196·56

1000·00

Fibrin	4·00
Solids of the Serum...	90·19
{ Organic	84·43 }
{ Incinerated salts....	5·76 }
Blood globules	102·37

CASE 3.—A boy, aged thirteen, has been affected with lupus vorax for four years; there is complete destruction of the end of the nose. Complexion fair; stout; appearance strumous. Analysis, by the same method, gave—

Water.....	790·00
Solids	210·00
	<hr/>
	1000·00

Fibrin	3 50
Solids of serum	87·00
{ Organic	80·40 }
{ Salts of incineration	6·60 }
Globules.....	119·50

CASE 4.—A youth from the Gateshead poor-house, of dark complexion, aged sixteen; stout, and rather plethoric in appearance; has been affected with scrofula for four years and a half—very large tumours of the cervical glands, ulcers, and cicatrices: previously under our care, but

has taken no medicine for several months back. Six ounces of blood were drawn and allowed to coagulate, the clot was separated from the serum, and the analysis performed according to the mode already described, as adopted in those cases where the fibrin was obtained by washing a portion of the clot. The results were :—

Water	798·00
Solids	202·00
	—————
	1000·00
	—————
Fibrin	3·00
Solids of serum	99·70
{ Organic	94·70 }
{ Salts of incineration	5·00 }
Globules	99·30
	—————

CASE 5.—A man, aged thirty-three, in the Newcastle poor-house ; tall, stout, and of plethoric aspect ; has been a soldier ; has several scrofulous swellings of the glands of the neck, with extensive ulcers. His blood was examined by the same method as the foregoing. Eight ounces were drawn :—

Water	804·86
Solids	195·14
	—————
	1000·000

Fibrin	1.30
Solids of serum	90.20
{ Organic	83.20 }
{ Salts.....	7.00 }
Globules.....	103.64

CASE 6.—A youth, aged sixteen; fair—affected with scrofulous swellings of the neck for six years; these have successively burst and left several cicatrices. He has kept working at his business, which is that of a brass-finisher.

Analysis, by the method of Andral and Gavarret, gave :—

Water.....	776.13
Solids	223.87
	1000.00

Fibrin	1.44
Solids of serum	89.41
{ Organic	83.32 }
{ Salts of incineration	6.09 }
{ Fats of serum & fibr ⁿ .	3.51 }
Globules.....	133.02

CASE 7.—A man, thirty years of age, affected with strumous enlargement of the glands of the neck, going on to suppuration. Analysis, by the method of Andral and Gavarret :—

Water	784·590
Solids	215·410
	<hr/>
	1000·000
	<hr/>

Fibrin.....	3·720
Solids of serum	79·690
{ Organic.....	73·190
{ Salts of incinerat ⁿ .	6·500
{ Fats of serum &	
fibrin.....	4· 900
Globules... ..	132·100
	<hr/>

CASE 8.—A man, aged thirty-four, of sanguine complexion and with red hair; pretty stout; a farm-labourer; scrofulous swellings of the neck, with obscure symptoms of a chest affection. The blood was simply allowed to coagulate, and then examined in the mode already described in that case. Results:—

Water.....	794·9
Solids	205·1
	<hr/>
	1000·0
	<hr/>
Fibrin	4·5
Solids of serum.....	79·6

With the extracted salts.	{ Organic.....	73.1
	{ Inorganic	6.5
	{ Fats of serum & fibr ⁿ .	0.8
	{ Extractive matter by } spirit of wine.....}	0.2
	{ Ditto by water.....	7.8
Blood Globules.....		121.0

CASE 9.—A man, aged twenty, about five feet nine; of lymphatic temperament; affected with a large scrofulous swelling on the right side of the neck, and a smaller one on the other side; a forge-man. Bled to four ounces, which he bore very badly; and the analysis, conducted as in the preceding case, gave:—

Water 806.0

Solids 194.0

1000.0

Fibrin..... 2.1

Solids of serum..... 89.8

{ Organic 83.5 }

{ Inorganic salts..... 6.3 }

Globules..... 102.1

Case 10.—A man, aged twenty-five; fair complexion; brown hair; a cinder-burner—

height, five feet eleven; weighed, three months ago, eleven stones, and is able to blow 260 cubic inches of air by a forcible expiration. For two years, has had swellings of the glands of the neck. There are several tumours and cicatrices down the neck—on the left side. Analysis, by the method of Andral and Gavarret, gave:—

Water	773·1
Solids.....	226·9
	<hr/>
	1000·0
	<hr/>

Fibrin	2·60
Solids of serum.....	87·30
{ Organic	80·75
{ Salts of incineration	6·55
{ Fats of serum, with	4·30
{ extracted salts...	
{ Spirituous extract..	2·00
{ Watery extract(un-	6·10
{ burnt)	
Blood globules.....	137·00
	<hr/>

CASE 11.—Blood of a stout labourer, affected with scrofula of the glands of the neck; the blood was drawn into one vessel and allowed to coagulate, the serum was drawn off, and the

analysis proceeded with in the usual way in such cases :—

Water	764·01
Solids	235·99
	————
	1000·00
	————
Fibrin	4·00
Solids of serum	91·50
{ Organic	84·70 }
{ Inorganic	6·80 }
Blood globules	140·49
	————

According to the researches of Becquerel and Rodier, the standard of male healthy blood gives —water 779; solids 221; fibrin 2·2; solids of the serum 77·7, of which 6·50 are salts: the fats are 1·60; and the blood globules 141·1: they give extractive matters with salts 6·80. In boys, there is reason to believe that the blood globules should be still more numerous. Thus the analyses which we have made would lead us to conclude, as a general rule, that in males affected with scrofula, the blood globules are diminished in quantity; and in some cases remarkably so, while the solids of the serum are increased, and this increase appears to bear chiefly on the albumen of the serum, the extractive matters be-

ing not increased to a great extent; although it would appear that the fats are in increased quantity. In one case, No. 8, the fats were much diminished. This result can be further commented on, when the analyses of the blood of scrofulous females have been given.

The means resulting from these analyses of the blood of males would be—Solids 208·05, Fibrin 3·132, Solids of serum 87·60, Globules 117·32, (rejecting a few decimals in the calculation).

FEMALES.

CASE 12.—A woman, aged twenty-nine, of fair complexion; for seven years has been affected with a scrofulous impetigo of the face, extending into the interior of the mouth. She has been under our care for two years, during which time a finger has been amputated for scrofulous disease of the bone. She previously had another finger removed.

Analysis, by the method of Andral and Garvarret, gave :—

Water	785·4
Solids.....	214·6
	<hr/>
	1000·0
	<hr/>

Fibrin.....	3.30
Solids of serum.....	101.30
{ Organic	94.06 }
{ Incinerated salts.....	7.24 }
Blood globules.....	110.00

CASE 13.—A woman, aged twenty-nine, in the Newcastle Infirmary ; affected with a degenerated scrofulous tumour of the breast, of long standing. Analysis, by the method of Andral and Gavarret :—

Water	824.2
Solids	175.8

1000.0

Fibrin	4.7
Solids of serum.....	68.6
{ Organic.....	62.1 }
{ Salts of incineration..	6.5 }
Blood globules	102.5

CASE 14.—A woman, aged twenty-one, in the Newcastle Infirmary ; affected with a scrofulous disease of the bones of the leg. When a girl, she had disease of the hip-joint. Analysis, by the method of Andral and Gavarret, gave :—

Water	781.94
Solids	218.06

1000.00

Fibrin	3.51
Solids of serum	93.60
{ Organic	86.12 }
{ Salts of incineration	7.48 }
Blood globules	120.95

CASE 15.--A widow, aged thirty-seven ; fair and stout; scrofulous swellings of the neck. Has been thus affected for six years. She has the marks of several cicatrices. There are also scrofulous tumours in the axilla and on one side of the body. Analysis, by the method of washing the clot of the simply coagulated whole blood, gave :—

Water	794.20
Solids	205.80

1000.00

Fibrin	4.50
Solids of serum	91.78
{ Organic	85.18 }
{ Salts of incinerati ⁿ	6.60 }

Fats of serum & fibrin	1.48
Blood globules	109.52

CASE 16.—A woman, twenty-four ; fair complexion ; married, and mother of a family ; was under our care about eight months ago for scrofulous swellings and ulcers of the neck ; the ulcers were then healed, but have broken out again. Analysis by the same method as in the last case :—

Water	807.49
Solids	192.51
	<hr/>
	100.00
Fibrin	03.30
Solids of serum	69.42
{ Organic	63.20 }
{ Salts of incineration	5.82 }
Blood globules	119.79

CASE 17.—A maiden, aged nineteen ; fair complexion ; tolerably stout ; four years ago she had a scrofulous swelling of the neck, which we then treated with the iodide of barium ; she got well ; she has now, just above a cicatrix on the right side of the neck, at the angle of the jaw—a commencing scrofulous swelling. The analysis, by the method of Andral and Gavarret, gave :—

Water	783.7	} 1000.0
Solids	216.3	
<hr/>		
Fibrin	2.2	
Solids of serum	87.6	
{ Organic	81.2	}
{ Salts of incineration	6.4	
Blood globules	126.5	

CASE 18.—A maid, aged eighteen ; dark complexion ; affected with goitre for four years. The analysis by the method of Andral and Garvarret, gave :—

Water.....	819.34
Solids	180.66
	<hr/>
	1000.00
	<hr/>
Fibrin.....	2.73
Solids of serum	89.30
{ Organic	82.43
{ Salts of incineration	6.87
Blood globules	88.63

According to Becquerel and Rodier, the proportion of water in the blood of females is 791.1, that of blood globules 127.2 ; the fibrin is the same as in the blood of males ; the solids of the

serum are 79·5, of which 7·695 are salts; the fats are 1·620; and the extractive matters, with their salts, 7·4. In the analyses above given, in only one instance do the blood globules approach very near the normal standard; *i. e.*, in case 18. This was a case, however, in which the scrofulous affection was slight; and if we make abstraction of the old disease, of recent appearance. Perhaps a more decided illustration of genuine struma, than case 12, could scarcely be found; and, accordingly, we find considerable diminution of the blood globules, with a greatly increased quantity of solids of the serum. The salts are throughout nearly normal, oftener below the standard than above it. The fats were only examined in No. 15, and there were found rather below the standard. The fibrin was generally above the standard given by Becquerel and Rodier. The great diminution of the blood globules, in the case of goitre, was remarkable, not being accompanied by any very apparent emaciation. The solids of the serum, above the healthy standard in five of the cases, were below it in the remaining number.

In women, the means will be, excluding the goitre case—solids 203·845; fibrin 3·585; solids of serum 85·28; globules 114·88.

On the whole, therefore, it may be stated, as the result of these analyses, that in scrofula we have an increase in the solids of the serum, and a diminution of blood globules, which is very nearly the alteration that has been long suspected to exist. As far as the analyses go, the fats are not deficient in the blood, and however opposed this may be to certain hypothetical notions, with regard to the supposed *modus operandi* of cod liver oil, it is altogether in harmony with the results of the analyses of tubercle which we have made. The experiments of Ascherson have been supposed to prove the capability of fats introduced into the blood, to work up mechanically the excess of serous matter into blood globules, and so counteract the tendency to the expulsion of this serous matter, and its excretion into the tissues under the form of tubercle. But we find a large portion of fats in tubercles; in one analysis, conducted on a sufficient scale, almost one-fourth of the tubercular matter was found composed of fats! And this result is not much in discordance with other analyses, and with analyses by other persons. If then the diseased matter be expelled by a supposed effort of the vis medicatrix, it would appear as if the sanative materials were also expelled. But this theory depending upon the tendency of an albu-

minous liquid to form spherical globules in contact with oil, is altogether too mechanical, and vitiates itself by giving a too easy explanation of great difficulties. Again, we by no means find a uniform deficiency of fat in scrofulous persons. We have two females, (sisters), now under our care thoroughly scrofulous. One sister was treated by us a year ago for scrofula of the neck ; symptoms of phthisis came on ; the scrofulous glands disappeared, but the phthisical symptoms continued : the other sister has now scrofula of the neck, and is the case referred to in No. 18 of the analyses just given. Both sisters were plump, and the latter, aged nineteen, weighs a pound less than nine stones, being five feet four and a half inches high : this is a good weight for a female of her age. We remember examining the leg of the person referred to in analysis 14 of the preceding with our friend Mr Potter who had removed the limb, and we were both struck with the large quantity of firm fat beneath the skin. This person had been almost constantly confined to bed for nine months, and the leg was removed in consequence of the discharge of blood which daily took place from a diseased surface ; yet there was no deficiency of fat. Some have asserted that the fat in scrofula is different from ordinary healthy fat, but this is probably

the most pure conjecture. When the disease has continued long, we must, of course, in general, expect deficiency of fat; but this characteristic of chronic diseases seems rather absent than present in scrofula.*

Analyses of the blood in phthisis are obviously much less instructive of the real character of the alteration which takes place in this fluid, than are those which can be made in scrofula, or mere external tubercle, on account of the great debility and cachexia arising from obstruction of the more important functions present in the internal scrofulous diseases. Nevertheless, the alterations which Andral and Gavarret found in the blood of phthisical patients correspond, as far as they have investigated the matter, with those which we have determined in scrofula. According to three analyses given by Simon, (p. 280), the resemblance between the state of the blood in phthisis and that which we have obtained as characterizing scrofula, would be still more complete.

It is probable that the state of the blood in the scrofulous diathesis may approach to that

* That is to say, when the scrofulous disease does not seriously implicate the essential organs of nutrition, or when it does not proceed to such an extent as to cause emaciation by long continued exhaustion of the system.

which exists in the actual disease. The analyses of Lecanu shew the blood of lymphatic persons to be poorer in solid constituents, and especially in blood corpuscles, than that of persons of sanguineous temperament.*

BILE, LYMPH, AND CHYLE IN SCROFULA.

II. The theory of the origin of scrofula which has recently come into much favour on the Continent, especially with those favourable to the use of cod-liver oil, makes the pathology of the disease turn upon a deficient secretion of bile. The chylous digestion is supposed to be defective, from the absence of the fatty principles of the bile. In support of this fact, we have the frequent occurrence of fatty liver in persons who die of scrofulous disease. Andral finds a fatty liver in one-third of the autopsies of phthisical

* Klencke finds, that in the fresh and healthy blood, there ought to be 14 and 16 per cent. of the colourless corpuscles of Muller, while in the blood of cachectic individuals only 3 to 4 per cent will be found. (*Memoire sur Ol. Jecoris Aselli, &c., par le Dr. H. Klencke traduit par Bercham. Annales de la Societie de Médecine d'Anvers, 1843, p. 85*). We have found the blood globules altered in form in some cases of scrofula, viz., irregular in their outline, star-shaped, and sometimes studded with little granules. This appearance however is not necessarily abnormal.

patients.* Louis also found a fatty state of the organ in the same proportion in phthisical cases.† He observes that M. Reynaud, in his essay on phthisis in the quadrumana, never found the liver fatty in this disease in these animals. Rayet, however, finds this state of the liver occasionally in animals.‡ But he observes on the frequency of fatty liver in poultry, either naturally or artificially produced, with sound lungs. Klencke draws an inference from the state of the liver and bile in cats affected with a disease which he considers analogous to scrofula, with regard to the conditions of the organs and the secretions in this latter disease, in human beings. He found the bile of the animal indicated, greatly deficient in fat, while the viscus was loaded with fatty substances. || Hence the inference, that as in individuals affected with scrofulous diseases, the liver is frequently fatty, the fats are not properly separated from the organ by means of its secretion. Le Pelletier observes, that in the autopsy of scrofulous persons he almost invariably found the bile more pale and less consistent, and less charged with resin and colouring mat-

* Clinique Médicale, translated by Spillan, part 3, p. 537.

† Sydenham Ed., p. 98.

‡ Archives de Médecine comparée, t. 1. p. 211.

|| pp. 78, 79.

ter, than in the ordinary state.* This fact was also observed by Bordeu, and we have also made the same observation, but were withheld from drawing any inference, for in the state of marasmus which exists in such subjects as those referred to, where every secretion is in a deranged state, what conclusion do such facts enable us to form? Clearly they afford no evidence as to the state of the biliary secretion in tuberculosis, or with regard to the share which a deranged state of the bile may have in producing this disease. Moreover, the fatty state of the liver is not constant in tuberculosis; nor does, as Rayer remarks, a fatty state of the liver always produce this disease in animals, while in man this fact is also notorious. Nevertheless, although we cannot recognize a merely deficient secretion of the fatty principles of the bile as the cause of scrofula, it is not very improbable that these states of the liver and bile are closely connected with the pathology of the disease. The fatty state of the liver being only occasionally found in scrofula, and having been particularly observed in tuberculosis of the lung, (for Le Pelletier and Bordeu, in their accounts of autopsies of scrofulous persons, do not speak

* Lepelletier, pp. 65, 66.

See, also, Deygallières, p. 92.

of a fatty state of the liver, but of a watery condition of the bile), may arise from obstructed respiration, which, even where the physical obstruction to the passage of air into the lung is not considerable, may yet result from the deficiency of blood globules, which analysis shews to exist alike in internal and in external tuberculosis ; the blood globules being the portion through which aeration of the blood is effected.

Notwithstanding some attempts to shew an alteration in the nature of the chyle and lymph in scrofula, we believe that these alterations are to us completely unknown. In some cases of tubercle, a tuberculous matter has been found in the lymphatics (Andral). The same observation was made lately by our friend, Dr. Bulman, in a case of mesenteric disease, to which we shall probably afterwards refer. The notions of a peculiar acidity of the lymph, entertained by Baumes, Hufeland, and others, are, of course, purely hypothetical. We shall translate the following sentences from L'Héritier.* “ In reflecting, as Collard de Martigny says, upon the unusual languor of the general absorption, and especially on that of the cellular tissue in the individuals reputed lymphatic ; on the imper-

* *Chimie Pathologique*, p. 23, 1842.

fection of the assimilation, whence results necessarily the predominance of the serous part of the blood, the softness of the clot, the flaccidity of the muscles, the delicate tint of the skin, the want of energy of the innervation, the feebleness of the circulatory movements, &c., &c., one is authorized to suppose that the particular state of the lymph taken from lymphatic subjects depends upon a defect—upon an imperfection of animalization of this product. Can it be only because it is too poor in fibrin or albumen, that it cannot circulate through the lymphatic ganglions, and that it determines their engorgement? This cause is powerful without doubt, but I do not believe it to be the only one. In the lymphatic temperament, the tissues are diseased as well as the fluids; they want tone; wherefore, it may be supposed, that the lymphatic vessels, on account of their atony in scrofulous children, are not in a state to transport the too abundant serosity with which they are charged. A similar thing may be seen, often enough, at the inspection of the bodies of those who die of dropsy, where we find these vessels gorged with liquid.”

STATE OF THE SECRETIONS OF THE
STOMACH IN SCROFULA.

III. Great stress has been laid upon the state of these secretions, especially by German writers. An excessive formation of acid is the principal derangement. Thus Disse—"Scrofulous persons suffer from acidity of the primæ viæ, from which follow gastralgia, sour belching, sour breath, vomiting of sour matters, &c."* Most German writers are agreed upon this point. For our part, we believe that these symptoms are not so universal. To the depraved digestion, produced by this excess of acidity, a prominent part in the pathology of scrofula has been ascribed. "In order to understand the application of the above views (with regard to the use of cod-liver oil) to the pathology of scrofula, it is necessary to remember that the symptoms and course of this disease indicate that it is caused and kept up by some fault in the process of digestion. The healthy performance of this function consists in the maintenance of the equilibrium between the digestive process in the stomach and that in the small intestines, or, in

* Die Skrofelkrankheit nach ihrem Wesen; Joh. Andr. Disse, Berlin, 1840, s. 19. See, also, Fischer, Ueber Ursache, Wesen und Heilart der Scropheln, &c., Leipz., 1832, s. 33.

other words, so long as the stomach pours out only so much acidulous and albuminous fluid as is necessary to neutralize the bile and pancreatic juice, the digestion remains undisturbed. In scrofula, this equilibrium is destroyed, there is a diminished activity in the small intestines, and the whole digestion is almost exclusively performed by the stomach. The predominance of the last, in the digestive process, at length becomes so great, that the contents of the whole intestinal canal are found to be acid, and the albuminous fluid runs into hard masses, which lose their property of becoming organized. This, then, is the material which is received into the lymphatics, instead of the normal emulsion formerly alluded to; and on joining the blood necessarily tends to deteriorate that fluid. At length the blood itself contains albumen in excess, on account of its non-mixture with the other element, oil, which enables it to become adapted to the organism; and, after a time, it is effused into the cellular tissue of the external or internal membranes, or into the parenchyma of the organs, constituting the different kinds of tuberculous disease. Very often, also, a mechanical stagnation of the abnormal lymph takes place in the lymphatic vessels, causing obstruction and swelling in the lymphatic glands. From the faulty

preparation of lymph, so occasioned, the healthy formation of the blood ceases; and, lastly, by the repeated effusion of useless matter, or from the irritation and disorganization thus produced in important organs, exhaustion appears, and the vital powers sink."*

STATE OF THE URINE.

IV. We possess very little information about the state of the urine in scrofula. Becquerel gives some observations, but no analyses. He has, however, observed this fluid in seventy-two young girls affected with scrofulous diseases. In scrofulous diseases, without fever, he found the urines of these patients of two kinds. In those cases where there was much debility, he found the urine anemic, i. e., of low specific gravity—about 1010, while the mean density in the whole number of cases was 1015.540. He has sometimes found the urine in such cases decompose more rapidly than usual, and become speedily alkaline. Where there was no debility, nor cause of exhaustion, he found the urinary excretion in general normal. A mucous cloud was sometimes present. Unless there was fever,

* Bennett on cod-liver oil, pp. 57, 58.

uric acid did not deposit itself from these urines, either spontaneously, or on the addition of a little nitric acid. Twice, he found a little albumen. This does not refer to the disease of Bright, which often is found as a complication of scrofulous affections. When fever complicates the scrofulous affection, we have the usual effects of a general febrile state manifested in the urine; namely, increase of density, diminution of quantity, deeper colour, stronger acidity, and uric acid sediments.*

According to Canstatt, the urine of those affected with scrofula contains oxalic and urobenzoic acids;† but it is not stated upon what grounds this assertion is made. Disse says, "The urine is generally natural; frequently there is a flaky sediment; sometimes it contains grains of sand, resembling crystals; according to chemical analyses, phosphoric acid predominates."‡

We have examined the urine in the following cases of scrofula:—1st, the case first referred to in the analyses of blood. He was bled on the 21st Nov., 1844, and the urine first examined, was passed between eight a.m. on the 22nd and

* Becquerel; *Séméiotique des Urines*, pp. 302-5.

† *Op. Cit.* Bd. 1, s. 245.

‡ Disse; *Scrophelkrankheit*, &c., s. 30.

the same hour on the 23rd. The treatment was not commenced till the 26th. The fluid was in quantity, 44 fl. oz., slightly acid, pale, of sp. gr. 1022, with mucous deposit. It contained, in 1000 grains,

Water.....	954·40
Solids	45·60
	<hr/>
	1000·00
	<hr/>
Uric acid	00·70
Urea.....	10·50
Incinerated salts.....	10·35
Remaining solids.....	24·05
	<hr/>

In twenty-four hours, whole quantity of urine = 19673·55 grains; solids, 897·11; uric acid 13·77; urea, 206·57; incinerated salts, 203·620; remaining solids, 473·150.

The patient commenced taking the syrup of the iodide of iron, on the 30th, in the dose of a drachm thrice daily; having, at the same time, frictions of the hydriodate of potass ointment to the tumours; and on the 14th of Dec., the urine was again examined. It was now, in quantity, 45½ fl. oz., and of specific gravity 1023·5; more sedimentous. On the 25th December, the quantity was decreased again to 39 oz., and

the specific gravity was 1025. On the 16th of January, the quantity was 31 oz., and the specific gravity was 1025. The urine, strongly acid, furnished 5 grains of sediment, composed chiefly of vesical mucus and ~~urea~~ *urates*. Iodine was present in large quantity : iron was detected by evaporating a pint of the urine to dryness, treating the ash with sulphuric acid, and then with distilled water, filtering, and applying the tests for iron ; but the iron was only present in a minute proportion. The analysis gave :—

Water.....	944·0
Solids.....	56·0
	<hr/>
	1000·0
	<hr/>
Uric acid	0·6
Urea.....	17·7
Salts of incineration....	11·2
Remaining solids.....	26·5
	<hr/>

Urine of twenty-four hours, whole quantity, = 13901·5 grains ; solids, 778·48 ; uric acid, 8·34 ; urea, 246·057 ; salts of incineration, 155·697 ; remaining solids, 368·386.*

* The different estimates which have been made of the amount of solids in urines of the same specific gravity arise, no doubt, in great part, from the extreme difficulty in drying the urine without decompo-

On the 18th of January, the patient commenced taking the hydriodate of potass instead of the iodide of iron. Of the former remedy he now took three grains thrice a-day; and this was exchanged on the 1st March for the compound tincture of iodine; of this he took, at first, twenty drops thrice a-day. On the 15th the dose was increased to thirty drops. All this time the frictions of hydriodate of potass ointment had been continued. On the 23rd of March another analysis was made. There were now 30 ounces in the twenty-four hours, of specific gravity 1024—non-sedimentous. Iodine was again easily detected. The results were, in 1000 grains:—

Water.....	953·00
Solids	47·00
	————
	1000·00
	— — —
Uric acid.....	0·53
Urea.....	15·50
Salts of incineration..	13·95
Residual salts	17·02
	————

sition. In the specific gravities of the urines, we have not taken into account the temperatures, and the hydrometer only was used. The figures of the quantities in the twenty-four hours are not *absolutely* correct, a few decimals being omitted in the calculation of the first five quantities, and as the last quantity is obtained by subtracting the three

In urine of twenty-four hours, whole quantity, = 13440·00 ; solids, 631·68 ; uric acid, 7·12 ; urea, 208·32 ; salts of incineration, 187·48 ; residual salts, 128·74.

On the 26th, the quantity was 36 ounces, of specific gravity 1020 ; clear ; acid. The solids were 41·20. On the 16th April, the quantity was 38½ ounces—urine of the same character, specific gravity 1020. On the 25th March, the iodine treatment had been discontinued ; the patient afterwards fell into a cachectic and febrile state from the effect of the original scrofulous affection of the neck superadded to the irritation of a new affection, viz. scrofulous ulcers connected with disease of the bones of the foot. On the 17th of June, he commenced taking the oleum jecoris aselli, which was increased to the dose of a table-spoonful eight times a-day. On the 30th of June, he made 70½ ounces of perfectly clear acid urine, having a specific gravity

above it from the whole solids, it also is not correct within a few fractions. The measuring of the urine also was not carried further than to drachms. The decimal figures of the quantities in the twenty-four hours are merely left for the purpose of making the residual quantities found by subtraction more accurate. This observation is made on account of a recent criticism in the *Lancet* on a work on the potato disease. The critic expressed his doubt of the accuracy of all analyses in which an attempt is made to carry the result to many places of decimals ! As if the decimals denoted the extent to which the weighings were carried ! Of course our readers know that the decimals in most analyses are obtained by calculation and may come when the weighings have been made only to grains.

of 1015.* And on the 14th of August, the same treatment being continued, the quantity was only 37 ounces, of specific gravity 1017.

These latter urines smelt strongly of the oil, and yielded an oily substance on being agitated with ether.

CASE 2.—The patient was a youth, aged seventeen, of miserable and squalid appearance, affected with mesenteric disease in an advanced stage; also with a sinus in the back, connected with a diseased vertebra.

The urine was passed in twenty-four hours, on the 15th and 16th of February, 1845.

It was in quantity, 63 fluid oz. and 2 drachms, of specific gravity 1012, feebly acid, contained no sediment, and no albumen. In 1000 grains, there were :—

Water..... 981·15

Solids..... 18·85

1000·00

Uric acid..... 0·70

Urea..... 4·50

Salts of incineration.. 8·00

Residual solids 5·65

* On the 17th of July the quantity was 56 oz. of sp. gr. 1017.

Whole quantity of urine in twenty-four hours, = 28003.90; solids, 527.87; uric acid, 19.62; urea, 126.00; salts of incineration, 224.03; residual solids, 158.22.

CASE 3.—This was the urine of the case referred to in No. 4 of the analyses of the blood. It was the secretion of the third day after he was bled. The quantity was $27\frac{1}{2}$ fluid oz.; acid, with a slight mucous cloud. The specific gravity 1025. The analysis gave:—

Water..... 945.80

Solids..... 54.20

1000.00

Uric acid..... 0.50

Urea 12.40

Incinerated salts..... 15.15

Residual solids..... 26.15

Whole quantity in 24 hours, = 12332.03; solids, 668.39; uric acid, 6.16; urea, 152.91; incinerated salts, 186.83; residual solids, 322.49.

CASE 4.—The urine of No. 6 in the analyses of blood. The blood was drawn on the 18th of March, 1845, and the urine examined on the 25th. In the interval, he took nothing but a little opening medicine.

The whole of the urine of the twenty-four hours was not brought, a *small quantity** was omitted; that brought, was of specific gravity 1023; in quantity 27 fluid oz.; acid and clear. The analysis gave:—

Water.....	950·50
Solids.....	49·50
	<hr/>
	1000·00
	<hr/>
Uric acid.....	0·70
Urea	17·00
Salts	10·70
Residual solids	21·10
	<hr/>

Whole quantity, in 24 hours, = 12084·18; solids, 598·16; uric acid, 8·45; urea, 205·43; salts, 129·30; residual solids, 254·98.

After he had taken twenty-five drops of the compound tincture of iodine, thrice a day for a week, the urine was 25 fluid oz., in the 24 hours; of specific gravity 1029; largely charged with iodine, sedimentous, and containing 59 grains of solids to the 1000 grains. On the 16th of the succeeding month the urine was 55½ oz., and of specific gravity 1019.

* A table-spoonful or two.

CASE 5.—A girl, aged seven, affected with scrofula of the neck. She had taken the syrup of the iodide of iron for some time. Urine, of the twenty-four hours, 19½ fluid oz., slightly acid; specific gravity 1024·5. The whole quantity gave 10 grains of sediment composed of mucus and urates.

Water.....	955·40
Solids	44·60
	<hr/>
	1000·00
	<hr/>
Uric acid.....	0·22
Urea	18·00
Salts.....	11·40
Residual solids	14·98
	<hr/>

Whole quantity, in 24 hours, = 8628·210 ; solids, 384·818 ; uric acid, 1·898 ; urea, 155·287 ; salts, 98·361 ; residual solids, 129·272.

CASE 6.—A boy, aged ten and a half, affected with scrofula of the submaxillary gland, and a scrofulous swelling of the cellular tissue below the left knee. The urine was examined on the 20th of March, being that passed before any treatment was applied. Urine of twenty-four hours, of the 19th and 20th March. The

quantity was $59\frac{1}{2}$ fluid oz.; acid, without sediment; of specific gravity 1016.

Water	968.00
Solids	32.00

1000.00

Uric acid.....	0.55
Urea	6.90
Incinerated salts	8.00
Residual solids	16.55

Whole quantity, in 24 hours, = 26447.750 ; solids, 846.328 ; uric acid, 14.540 ; urea, 182.389 ; incinerated salts, 211.582 ; residual solids, 438.717.

On the 22nd, he commenced to take half a drachm of the syrup of the iodide of iron thrice a day ; and on the 29th the urine, of twenty-four hours, was again collected and examined. It was now $66\frac{3}{4}$ oz., strongly impregnated with iodine ; of specific gravity 1017 ; acid, and non-sedimentous. The analysis gave :—

Water.....	969.90
Solids.....	30.10

1000.00

Uric acid	0.35
Urea	14.00
Salts.....	10.00
Residual bodies	5.75

Whole quantity, in 24 hours, = 29699.578 ; solids, 893.957 ; uric acid, 10.394 ; urea, 415.794 ; salts, 296.995 ; residual bodies, 170.774.

The quantity was, in another fortnight, 64 oz. in the twenty-four hours, and the specific gravity 1015. After another fortnight, it was 68½ oz. ; specific gravity 1012.

CASE 7.—Urine of the case described in No. 15 of the analyses of the blood. The specimen was taken two days after she was bled, and two days after the commencement of the iodine treatment. The quantity was 30½ fluid oz. ; specific gravity 1019 ; slightly acid ; non-sedimentous.

Water.....	962.30
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Solids	37.70
--------------	-------

	1000.00
--	---------

Uric acid.....	0.15
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Urea	11.90
------------	-------

Salts.....	7.50
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Residual bodies	18.15
-----------------------	-------

Whole quantity, in 24 hours, = 13430·09 ; solids, 506·314 ; uric acid, 2·014 ; urea, 159·818 ; salts, 100·725 ; residual bodies, 243·757.

The urine examined on the 16th of April, a week after she began to take twenty-five drops, thrice a day, of the compound tincture of iodine, was in quantity $34\frac{1}{8}$ fluid oz. ; specific gravity 1021 ; acid and sedimentous ; highly charged with iodine. She kept a rough account of the quantity of her urine for a week, from the 22nd of April, she being then taking thirty drops of the compound tincture thrice a-day, and rubbing on the iodine ointment. The quantity varied, she said, from two to three pints daily ; but was never less than two pints during this time.

CASE 8.—This specimen was the urine of a youth, aged $18\frac{1}{2}$, sinking under the exhaustion produced by a large scrofulous abscess in the cellular tissue of the thigh, and tumours and abscesses of the neck. The urine was that of the 20th and 21st of March, and he died on the 21st of May. No treatment had preceded the examination for several months ; the urine of the twenty-four hours was 55 fluid oz. ; acid ; slightly albuminous ; non-sedimentous ; specific gravity 1010.

Water.....	981·91
Solids.....	18·10
	<hr/>
	1000·00
	<hr/>
Uric acid	0·50
Urea	3·50
Salts of incineration..	2·10
Residual solids	12·00
	<hr/>

Whole quantity, in 24 hours, = 24303·125 ; solids, 439·886 ; uric acid, 12·150 ; urea, 85·050 ; salts of incineration, 51·036 ; residual solids, 291·650.

CASE 9.—The urine of a boy, aged six, affected with scrofula of the glands of the neck for four months. The quantity, in twenty-four hours, before any treatment was employed, amounted to 17½ fluid oz. ; specific gravity 1020 ; slightly acid ; clear. The analysis gave :—

Water.....	956·5
Solids.....	43·5
	<hr/>
	1000·0
	<hr/>
Uric acid	0·3
Urea	11·5
Salts.....	6·6
Residual solids.....	25·1

Whole quantity, in 24 hours, = 8980.78 ; solids, 339.707 ; uric acid, 2.342 ; urea, 89.980 ; salts, 51.541 ; residual solids, 195.844.

From the cases of phthisis in which M. Becquerel examined the urine, he infers the excretion in this disease to be under the influence of two regulating causes ; first, the degree of marasmus which generally prevails, and second, the fever which occasionally occurs. The former determining circumstance causes the urine in general to be diminished in quantity, and to hold in solution a much smaller amount of solids than in health ; the latter frequently renders it high coloured, with deposits of uric acid.

Our analyses do not show any particular affection of the urine in scrofula, unless when, as in case 8, there is a long continued exhaustion.

In concluding this account of the pathology of the fluids in scrofula it should be remarked that authorities and observation alike concur in indicating a deranged state of the functions of the skin as a constant concomitant of the affection.

The skin is generally harsh and dry, but occasionally there is profuse sweating.*

* The influence of pregnancy and lactation in suspending the progress of tuberculosis has been supposed to be owing to a derivation

of the excess of albuminous principles in the blood for the additional process of nutrition. The analysis of the blood of tuberculous persons during pregnancy or lactation would probably furnish some valuable results.

CHAPTER III.

ON THE SCROFULOUS DIATHESIS.

A careful distinction should be made between the scrofulous diathesis, or predisposing constitution, and the actual processes of the disease; between the *Ens in potentia* and the *Ens in actu*.

The scrofulous diathesis may, by the debility which accompanies it, and perhaps by other still more characteristic qualities, predispose to other diseases besides scrofula; and a distinction should again be drawn between those diseased states and that to which the name scrofula ought to be restricted. The matter may be stated thus:—Is it not worth while to separate, from all other diseases, a class characterized by the formation of a peculiar product, whose existence imparts a peculiar character to all the after-processes? Is it not of importance to place a distinct line between those affections in scrofulous persons, which give rise to the formation of tubercle, and other morbid conditions in the same class of people, which merely occasion processes of disease that may take place in any individual?

M. Lugol, who considers tubercle as a distinctive mark of scrofula, is not sufficiently careful in attending to this other side of the question. He regards intestinal worms, febrile affections of the mucous membranes, rachitis, with other diseases, too many for enumeration, as scrofulous, being forgetful, apparently, of his own statement, already quoted, with regard to the *exclusive* value of tubercle as a sign of the development of scrofula. For our own part, we consider those diseases to be scrofulous in which, instead of normal blood plasma, an exudation is poured out, (as a modification of the process of inflammation), which is incapable of passing into the forms of organization characteristic of lymph, but which remains in a semi-organized condition, a source of irritation in the tissue in which it is deposited. The correctness of this definition comes to be a matter of more particular consideration in the 6th chapter. Here the question to be decided in the first instance is, as has been already stated, simply whether the formation of tubercle constitutes an element of such importance in the pathology of these diseases, as to require the existence or non-existence of this structure to be taken for a distinctive sign? And here a due consideration of the subject must lead to an answer in the

affirmative. No matter, then, how nearly an affection may approach the strumous character, unless there be tubercular or scrofulous matter formed, or an evident tendency to its formation, checked, perhaps, by treatment, the disease is not scrofula. Strumous constitutions appear to be favourable to the generation of worms and other parasites; but such creatures may likewise form in other habits; we may mention, then, this fact as well worthy to be borne in mind; but we have clearly no right to set down, like M. Lugol and others, a vast number of affections as scrofulous on a plea like this.

In the description of the constitution, or *habitus* and *facies*, most favourable to the production of scrofula, an accordant exist among medical writers, which is really very extraordinary. Not but that some writers entertain doubts with regard to matters which appear perfectly clear and decided in the eyes of others. Lugol, while he admits the constitutional peculiarities, seems to doubt the constancy of those said to characterize the facies.*

But his exception is probably only apparent; for, throughout, he professes himself able to di-

* Recherches et observations sur les causes des Maladies scrofuleuses. par J. G. A. Lugol. Paris, 1844.

agnose the disease by a kind of intuitive perception of this facies; although he does not find himself so capable as others of putting his conceptions into words. There exists, also, some controversy, as to whether the disease is more common in persons of light or dark hair and complexion. Most writers in England and Germany, and many in France, maintain, that light complexions are more liable; but according to Lugol, more than half of his patients have dark hair and dull brown complexions;* while Mr. Lloyd thinks that complexion is altogether a matter of indifference.†

It might have been more satisfactory, if those who have made assertions on this head, as Dr. Alison in Edinburgh, Hufeland in Berlin, Lloyd in London, and Lugol in Paris, had informed us, first—what proportion persons of light complexion bear to those who are dark, in the inhabitants of these places, respectively; and second—whether the relation among people in general holds good in those affected with scrofula, or to what extent it is altered. This is clearly the only mode by which to arrive at a conclusion. If in Edinburgh and Berlin light hair and complexions are more common, and

* Op. cit. p. 33.

† Lloyd on Scrofula, pp. 8 and 9.

dark people predominate in Paris, it may well happen that the disease is more frequent in persons of one complexion in the two former places, and in those of a different complexion at the other, and yet the opinion of Mr. Loyd may be correct. The agreement which exists between modern authors on the subject of the external signs of the scrofulous diathesis, has probably arisen from most of them having copied one description. Thus Messieurs Le Pelletier and Deygallières, Fisher, Disse, and Bredow, from whom we are about to compile the description of these signs, have evidently copied from Hufeland. M. Lugol professes some originality on this head, but it would be hard to tell, with the exceptions already given, in what his account really differs from that of others.

The characters by which the scrofulous diathesis may be distinguished, then, according to Hufeland and his followers, may be summed up thus :—

1st.—A want of due bodily symmetry, manifested in particular, by a tendency to the disunion of various parts of the body at the mesial line ; hence, hare-lip is more common in scrofulous persons. (Bredow says, that since he began to pay attention to the matter, he has never seen hare-lip but in a scrofulous habitus.

We have now a man of forty under our treatment, who has been operated on for hare-lip, but who never had a symptom of scrofula or tubercle). The want of harmony in the external configuration of the body is also shewn in the presence of various deformities :—e. g., a gibbous chest, weak limbs (often crooked), hypertrophy of the pubis, the sacrum and the ischia (Lugol); the jaws are said to be broad, the forehead low and angular, and the neck short and thick.

2nd.—A peculiar facies, characterized by the form of the jaw and forehead already mentioned, a head larger than natural (especially posteriorly), a puffed-up visage, a fine transparent-white skin, often with a rosy tint. (Bredow says—“the face is pale and inflated; the principal colour with those of a dark tint, dull or dirty; with those of a fair complexion, often unnaturally white, frequently with an agreeable redness in the cheeks; in other cases like yellow wax, with a dirty paleness round the mouth.”) Blueish rings under the eyes have also been remarked; the eyes are mostly large, oftener blue than dark; the hair light (?); the pupils are said to be large; the tunica albuginea, of a pearly whiteness, (which, according to Hufeland, betrays the existence of mesenteric disease,) tra-

versed by streaks of injected blood vessels.* The eyelids are generally œdematous; the meibomian secretion in excess; the eyelashes long. The general expression of the countenance is indicative of amiability and want of energy. The nose is generally swollen, red, and shining. The upper lip, especially, is thick and projecting, and the furrow between it and the nose particularly deep. The first teeth are said to be small, and easily affected with caries. The second set are broad, and covered with a glairy secretion.

3rd.—An important series of symptoms are said to be connected with the digestive organs and mucous membranes in persons predisposed to scrofula. The appetite is irregular—sometimes feeble, at other times voracious; there is frequent nausea and vomiting; the tongue is foul; the breath fetid and sour; acid eructations are common. The bowels, also, are irregular, sometimes confined; while at other times there is diarrhœa. All the German writers whom we have consulted, lay great stress upon the presence of acidity in the *primæ viæ* in the scrofulous diathesis. In our experience, we do not find this to be so uniformly the case; but in those persons affected with scrofula, who

* Bredow, *Op. cit.* s. 38.

have presented themselves to our notice, we have found, almost invariably, the tongue furred, and frequently covered with little maculæ. A swollen belly is one of the outward (ascribed) signs of the diathesis: the frequency of tumefaction of the mesenteric glands in such persons, doubtless, renders this often so far true; but, then, it is not an evidence of the diathesis merely, but of the development of the disease itself.

Discharges from the nose, (which are presumed to account for the state of the upper lip), frequent colds, muco-purulent secretions from the vagina, are supposed to be more frequent in scrofulous children. Most authorities agree with regard to the state of the skin: this important organ is, in general, dry; but although the healthy perspiration be diminished, profuse sweating may, occasionally, occur. Here, as in other instances, the observation of the French reviewer of M. Lugol holds good, with respect to the indications of the scrofulous diathesis. "It is a strange thing, that of all M. Lugol's characters of the scrofulous diathesis, there is not one which cannot, with equal value, be replaced by a phenomenon diametrically opposed to it."*

* This observation of the Reviewer (see Archives Générales de Médecine Fev. 1845) is of course used in ridicule.

4th.—Although scrofulous persons have often an appearance of *enbonpoint* ; yet their muscles are flabby, and their fat, as already noticed, has been said to be wanting in the constituents of healthy fat ; but this statement must be considered, for reasons already given, to be of very doubtful character.

5th.—General languor, lassitude, and debility. The intellectual powers are, for the most part, feeble—sometimes precocious. According to Hufeland,* Fischer,† and others, the generative functions are early and powerfully manifested ; while Lugol, with more appearance of truth, maintains these functions to be much below the average in scrofulous subjects. In very few of the patients, whom we have examined, have we found the bodily or intellectual powers fairly developed in a degree proportionate to the age and circumstances of the patient. A general

The work of M. Lugol, so much praised in this country, has been very differently treated in France. “A prophet,” and so forth ; the proverb is stale ; but no great acuteness is requisite to enable us to perceive the extreme looseness and even absurdity of the reasoning which M. Lugol frequently employs, and to penetrate through the veil of *jactance* which covers the assumed originality of his very much over-rated work.

* Hufeland par Bousquet, p. 89.

† Fischer, Op. cit. s. 22.

retardation of development seems one of the most constant features of this peculiarity of constitution. Masturbation has been laid down as a character ; but it remains to be seen, whether it is not rather a cause of scrofula ; and, on the other hand, whether it is at all essentially connected with the subject. Several things, which might be mentioned here, are to be discussed under the head of Etiology.

One inquiry, which would tend to give much real information concerning the scrofulous diathesis, has, hitherto, been neglected, namely, *the statistical investigation of the dimensions and weights of scrofulous subjects*. Investigations of this kind are well calculated to put a stop to the reign of mere conjecture. Under the separate cases detailed, it will be found that we have taken the heights and weights of a few patients, and also the capacity of their lungs, as indicated by Mr. Hutchinson's spirometer. This has been done simply by way of making a beginning ; for the importance, both to the pathology and therapeutics, of knowing the heights and weights, occurred to us at too late a period of the inquiry, to enable us to derive information available to any extent at present.

With regard to the temperament and complexion, colour of the hair, &c., of scrofulous

subjects, Mr. Phillips has examined no less than 9000 scrofulous children, of whom 32 per cent. had light hair and eyes. Barthez and Rilliet found that of 314 tuberculous children, the hair was blond in 150, red in 4, chesnut in 71, black or dark in 40, while in 49 the colour was not marked. On the other hand, in 211 non-tuberculous children, 108 had blond hair, 1 red, 35 chesnut, 17 black hair, and in 50 the colour was not observed.* In 126 cases of scrofula, which we have very carefully examined, with two or three exceptions of the age of puberty or below it, the light hair and complexion, taking especially the colour of the eyes into account, predominated in 86 of the number, of whom 3 had red hair, while the remaining 40 were of dark complexion. Again, the complexions of the inmates of three workhouses, (taking those persons below the age of puberty), were noted in the course of another inquiry to be afterwards related. These workhouses belonged to the districts which furnished almost the whole of the scrofulous patients examined. Of these inmates then below the age of puberty, and of both sexes, 97 had the characters of light complexion predominating, while 47 were decidedly dark.

* Op. cit. p. 125.

The results of this comparatively limited investigation would tend to shew that the disease has no essential connection with the colour of the complexion. In fact, as far as our observations entitle us to judge, the lymphatic temperament occurs indifferently in persons of dark or light complexion. The reports of Dr. Rozas and Mr. Kaye, published in Mr. Phillips's work, would also tend to shew that scrofula has no particular relation to complexion. Scrofulous patients, in general, certainly present an absence of those signs which are said to denote high breeding; they have thick ancles and wrists, ill-formed feet and hands. It must be noted, as Barthez and Rilliet observe, that the fact of the lymphatic temperament predominating during life, would lead us to expect the disease to be more common in lymphatic persons. Glanders, which, according to some, is a scrofulous disease, is much less common in horses of blood and breeding, and in those bred on high and dry pastures, than in heavy and clumsy animals bred in flat and rank pasturages.*

We agree entirely with Mr. Phillips in as-

* The following description of the scrofulous diathesis or *scrofule simple* by M. Heusinger is worthy of translation. "Simple scrofula manifests itself by a torpid state of the

signing the "strumous dyspepsia" of Dr. Todd, when present, rather to the actual disease than to the diathesis. Neither are these symptoms of dyspepsia confined to cases of tubercular deposit. The transition from the diathesis to the disease, is frequently indicated by a general febrile excitement corresponding to the peculiar form of inflammation which, in our opinion, constitutes scrofula.

nervous system; the blood whose state is yet little known, appears to be from the commencement poor in globulin and in hæmatin, rich in albumen which, at a later period only, diminishes also; there is abundance of the lymph, extension of the lymphatic vessels; predominance of the cellular system, not only under the skin but in all the organs, where it commences to replace the specific tissues, which is especially apparent in the muscles, the bones, &c.; all the mucous secretions are augmented and they become often albuminous." *Recherches de Pathologie Comparée, par Ch. F. Heusinger. Cahier 2. pp. 131-2. Cassel, 1844.*

CHAPTER IV.

COMPARATIVE PATHOLOGY OF SCROFULA.

The comparative pathology of scrofula is sufficiently advanced to furnish some useful inferences which bear, especially, upon the etiology of the disease in man. More pains, however, have been taken to trace the relations of phthisis in the animal kingdom, than those of merely external tuberculosis. Attempts have been made to shew that, even beyond the bounds of the animal kingdom, in vegetables, an affection of a tuberculous character exists.* The most general summary with which we are acquainted, of what is known with regard to the scrofulous affections of the inferior animals, is contained in the admirable and learned work of M. Heusinger. Scrofula, he says, "is frequent in all animals, not only in quadrupeds, but also in birds as well as in men; it is met with under the same conditions and influences as in man, which ren-

* M. Dupuy considers that certain concretions found in fruits, to which the name of *carrière* is given, partake somewhat of the tuberculous character. Dupuy, de l'affection tuberculeuse, &c. p. 256.

ders it very interesting for the observing physician: it is most frequently enzootic—very often hereditary; nevertheless, it is much more frequent in herbivorous, than in carnivorous animals. The simple scrofula” (i. e. the diathesis) “exists as well in animals as in man, but most frequently it escapes the observation of the physician. An observation which is very instructive upon the transition of the different forms of the scrofulous affection has been communicated by M. Erdt (Gurlt und Hertwig, Magazin 6, p. 292). A flock of 350 lambs was kept in a hot stable without renewing the air, and beyond the influence of the atmosphere, while the nourishment was too rich and too succulent, (thus all the influences which so often produce scrofula in our children were present), and soon the lambs were covered with scrofulous eruptions!

“As soon as the faults committed were perceived, another error occurred, viz., that of changing too rapidly the regimen: they were exposed to the cold air and received a weaker nourishment; the eruption disappeared, but pituitous secretions from the mouth were established, mesenteric atrophy declared itself, rachitis began to appear, and the lambs died.

“In every species of animal, we observe more disposition for one kind of scrofula than for an-

other ; in the horse, for scrofula of the pituitary membrane ; in the sheep, for rachitis ; in the calf, for scrofula of the skin ; in the pig, almost solely for glandular scrofula. As the physicians, so the veterinaries, are not agreed with regard to the contagious or non-contagious nature and on the degree of transmissibility of the different forms of scrofula ; nevertheless, all the forms are more contagious than in man."*

The disposition to swelling of the lymphatic glands is, according to the same writer, exceedingly common in our domestic animals. Rachitis is frequent in quadrupeds and birds. Scrofulous blennorrhœas, similar to those which exist in man, are very common in young animals. He seems disposed, with Dupuy, to regard the glanders as a scrofulous disease ; and insists, particularly, on its being developed under the influence of similar causes to those which generate scrofula, or accelerate its development.

Phthisis in animals has been made the subject of investigation by Dupuy, by Reynaud, and more recently by M. Rayer ; and as the paper of this last writer includes a view of all that has been done by his predecessors, with much new matter, we shall give a summary of those of his

* *Recherches de Pathologie comp.* pp. 130-2.

results which bear more particularly upon etiological questions concerning tubercular diseases.

1st.—He has never found tubercles in wild animals, slain while yet in the enjoyment of their liberty. He connects with this observation, the freedom of North American Indians from tuberculous affections of the lung, according to the statement of Dr. Rush.

2nd.—Of the two first classes of vertebrated animals, there is none which, if reduced to captivity, may not have the disease; but the frequency of it is far from being the same in all animals.

3rd.—Phthisis is more frequent in the Quadrumana transported into our climates and living in captivity, than in any other animals. It is comparatively rare in carnivorous animals, even in those transferred from hot to temperate climates.

4th.—Pneumonia is common, and phthisis rare, in the domestic dog.

5th.—It is rare in the greater number of the Rodentia, with some exceptions, as rabbits, squirrels, and Guinea pigs. In 130 rats, from Mont-Faucon, he neither found tubercles in the lungs nor in other organs.

6th.—It is much more common in ruminating than in carnivorous animals; and, in particular,

is very often met with in the cows about Paris. Goats are least exposed to it, of all the Ruminantia.

7th.—The Solipedes rarely suffer from tubercles. The opinion to the contrary has arisen from a fact in every respect interesting: “In horses chronic glanders determines the inflammatory swelling of the lymphatic glands of the neck and of the interbronchial ganglions and little miliary swellings or even more considerable tumours in the lungs. In consequence of these swellings, which commence by a sanguinous injection, there form little grains of a white-yellowish matter, fluid *pus* in fine, with all its characters both to the eye and microscope. But if the animal is not killed, until seven months after the commencement of the disease, the *pus* becomes more solid, of a greyish-yellow, mixes less completely with water, and only presents, on being inspected by the microscope, some few globules and a crowd of granules. At a later period this same matter, this *pus*, whether it be obtained from the lymphatic glands of the neck or from the lungs, is so transformed, by a long residence in these organs, that in its place we find a yellow matter, friable, without globules, only shewing granules on a microscopic examination, staining paper like substances which

contain fatty matters, and sometimes including little deposits of salts or a matter called cretaceous." These deposits, mistaken for tubercles, have given rise to a false impression of the frequency of the disease in these animals.

8th.—He believes the disease to be rare in the Pachydermata.

9th.—He has often observed tubercles in pigs affected with glandular scrofula.

10th.—According to the observations of Mr. Harrison, the Cetacea are not exempt from this disease.

11th.—Tubercles have been observed in the Marsupial animals.

12th.—The chief circumstance, which appears to determine phthisis in animals, is transference from a warm or cold climate to a temperate one.

13th.—In birds, there is a difficulty attending the study of tuberculosis. "If in man tubercles have been often confounded with deposits of pus, and if not long ago little deposits of pus, which follow certain purulent re-absorptions, were regarded as tubercles, the microscopic inspection of these matters in the present day prevents error: the pus of mammiferous animals containing always at the moment of its formation, and for a longer or shorter time afterwards, the particular granulated globules, and tubercles

not shewing in their proper state any kind of globules. But in birds, the pus, or at least the matter which is formed either around the threads of a seton, or in the lungs around needles pushed into these organs, and left there for some time, is greyish-yellow, friable, and without purulent globules. The distinction of the tubercle is no longer possible, even by the aid of microscopic inspection. To discover phthisis in birds, other characters must be added to those which are given by the inspection of the matters deposited in the lungs: these characters are the existence of a chronic disease with progressive emaciation, and the presence in the lungs of grains, or greyish or yellowish little masses, which can be enucleated, and almost always the coincidence of similar grains in the liver and other organs." He finds, making allowance for this difficulty, phthisis in all the orders, except the rapacious birds, in which class tubercles are very rarely found in any part.

14th.—According to Mr. Harrison, tuberculous matter has been found in reptiles and fishes.*

* Archives de Médecine Comparée, Nos. 4 and 5. Fragment d'une étude comparative de la phthisie pulmonaire chez l'homme et chez les animaux, par P. Rayer.

In insects, a supposed tuberculous matter has been found by Mr. Newport.*

The analyses of Andral and De-la-Fond, as far as they go, would lead us to suppose that the same change in the healthy proportion of the blood globules and solids of the serum which takes place in tuberculous affections in man, occurs in the lower animals. On taking the mean in the largest number of healthy ovine beasts, whose blood was examined, we would have globules 111.1—solids of the serum 82.4; while in a ram, in one case of softened tubercle, the former constituents were 88.8, and the latter 101.8.

Moreover, in the acute inflammatory affections, in which they examined the blood in these animals, this disproportion between the leading constituents did not exist.

But the number of analyses made by these enquirers in tuberculosis of the lower animals, is too few to enable us to draw any very decisive inference.†

* Clark, on Pulmonary Consumption, pp. 214 et seq. 1835.

† Annales de Chimie et de Physique, t. 5, p. 337. 1842.

CHAPTER V.

IDENTITY OF SCROFULOUS AND TUBERCULAR
DISEASES.

This proposition has been often maintained and disputed: in the present day most writers have taken the affirmative side of the question; still several have supported the negative; and among these may be mentioned Scharlau, (Berlin, 1842.) Schönlein, and, quite recently, Dr. Evans, of Dublin, and Dr. Chapman.*

The great argument which we should be disposed to urge in favour of the view here adopted is derived from the similarity of the diseased products in the two classes of affection: in fact so great is this similarity, that, as shall appear, those who advocate a contrary doctrine cannot point out any difference between tubercle and scrofulous matter, which may not be accounted for by the diversity in structure of the tissues in which the deposit may be placed. But, as an author frequently quoted here, observes, dropsy is not the less dropsy,

* And now Mr. Phillips.

because at one time the accumulation is found in one cavity, at another time in a different one.* The only difference which we have been able to detect by the microscope between tubercular matter and the degenerated substance of scrofulous glands, is in the existence of a greater number of bodies presenting the appearance of thickened and translucent or opaque cells in the latter case. But the microscopic elements are in both instances the same. The results of chemical analysis likewise fail in establishing any essential difference: on the contrary, so far as they allow inferences to be drawn, they would tend to point out the identity of the two kinds of formation. A similar state of the blood and other fluids of the body, of the secretions and excretions, similar causes, and diatheses, as we believe, characterize scrofula and tubercle:—these diseases are frequently united in the same person, or in the same family, pass through phases strikingly analogous, and are relieved generally by the same methods of treatment. Nevertheless, some of these assertions have been disputed. On this head, Canstatt observes, “We have delayed till now, to take the argument about the difference between tu-

* Canstatt, *Specielle Pathologie und Therapie*, Bd. 1. s. 241.

berculosis and scrofula into closer consideration, although previously we expressed our conviction of the essential resemblance of both diseased processes. In this view, we are supported by the authority of an Abercrombie, a Bayle, a Meckel, a Carswell—Vetter, Sebastian, and others. When we also find that even the physiological and material causes of scrofula and tubercle, their progress, the causes of these cachexiæ, scarcely leave a doubt of their identity, still we feel so high a respect for those opposed to our views, that although we are convinced of their almost total inability to advance a proof of an essential difference between the two processes of disease, we are willing to afford them an opportunity of bringing forward their arguments: let them speak.* Many of the objections to the identity of scrofula and tubercle may be summed up as follows:—

1st.—The difference of form between scrofulous formations and tubercle, the former being indeterminate and indistinctive, the latter more or less rounded, and provided with an envelope. But all this merely depends upon the structure of the tissue in which the deposit occurs. In some of the illustrations of diseased

* Op. cit. Bd. I. s. 240.

lymphatic glands appended, we have, in the interior of the gland, cysts filled with scrofulous or tubercular matter, comparable to isolated tubercles.

2nd.—It has been asserted that while scrofulous glands can be injected, tubercles shew no vessels in their structure. But besides that some, as has already been shewn, have distrusted the latter observation, it appears clear that neither scrofulous matter, nor tubercle is *essentially* vascular. “All these assertions,” says Canstatt, “are groundless; vessels are wanting to all tubercles, except what remain of the tissue in which the deposit has taken place.”

3rd.—The same author observes that tubercles may heal as well as all the forms ascribed to scrofula, that both are curable in the same manner, and that scrofulous masses, like tubercle, are subject to pass into chalky masses, and degenerate.* The resemblance between the representation which we have given of a cicatrix in the lung formed by the healing of a tuberculous abscess (as was proved by the remains of tubercular matter imbedded in the false membrane of the cicatrix, as demonstrated by the microscope) and the appearance of a scrofulous

* The asserted incurability of phthisis having been made another ground of distinction.

scar of an external part, is particularly striking.

4th.—It has been said that tubercular masses soften more easily than scrofulous tumours ; but the greater sluggishness of the latter depends simply upon the slighter susceptibility of the tissue in which they are situated, to irritation, while the pulmonary substance is especially liable to undergo inflammation.

5th.—Again, we have it advanced, that persons below puberty are more liable to scrofula, those of a more advanced age to phthisis ; and that those who may have the latter disease later in life, have in their youth rarely suffered from the former (Scharlau). But we have scrofula at all ages, and pulmonary tubercles have been found in the foetus, while a very large proportion of the deaths from phthisis occurs below the age of puberty ; but all this could only shew how at one period of life the morbid deposit was directed toward the external, at another upon the internal parts, according to the prevalence of the *schema externum* or *schema internum*, in the language of Hufeland ; or with regard to the latter part of the argument, it might be inferred, of people in the circumstances described, that at an early period “no occasional causes existed by which the possibly inherited scrofulous diathesis might be brought to a further develop-

ment; the childhood and boyhood passed happily over without the symptoms appearing; but at a later period, when the determination of blood to the lungs gives liability to pulmonary affections, pulmonary consumption appeared" (Bredow).

6th.—The assertion, made by Scharlau, of the lymph and chyle glands being mostly sound in tuberculous affections, while in scrofula they are the chief seats of the evil, is in total contradiction to well known results. Indeed, one of the most powerful arguments in favour of the identity of scrofulous and tubercular affections, is the association of tuberculous glandular diseases with phthisis; for surely no one can contend for a distinction between those pathological conditions which respectively give rise to tuberculization of the cervical, bronchial or mesenteric glands. According to Barthez and Rilliet, the scrofulous affection of glands is always a tuberculization: "but it will be said, all scrofulous patients do not present tubercles, and we see children succumb with caries, without the bones containing this accidental product, with the ganglions enlarged and not tuberculous. For our part after having opened the corpses of a great number of scrofulous subjects at the hospital of St Louis, and at the

children's hospital, we may affirm that we never missed finding the tuberculous deposit. We know very well that Dr. Baudelocque has cited two examples, in which two scrofulous patients died, and their autopsies shewed no signs of tubercle; but we would remark that in one of them, who had been ill for a year, there existed 'around the neck several fistulas which went to ganglions, suppurated and partly destroyed;' nothing proves that tubercles had not previously existed in these organs, and been eliminated."*

Every one is acquainted with the well known law of Louis, that, above the age of puberty, tubercles never exist in any organ without at the same time occurring in the lungs. Admitting a few exceptions to this law, of which one occurred recently to our friend Dr. Bulman,* still it must be admitted to be very nearly correct. Below the age of puberty, indeed, the lungs are more frequently exempt. Thus out of 312 children who died of various tubercular affections, the lungs were in 47 exempt from

* Barthez and Rilliet, *Op. cit.* t. 3. p. 5.

* This was in a case of mesenteric disease in an adult, from which was taken the specimen of lymph and tuberculous matter mixed, which we have elsewhere described; the lungs were quite free of tubercles.

tubercle. According to Lugol, scrofulous children have always tubercles of the lung. "The natural death," he says, "of scrofulous patients takes place by the chest; one may even assert that it does not take place otherwise."* This assertion is one of the grand generalities in which M. Lugol so frequently indulges; nevertheless we may extract from it a certain value.

Louis, after relating a remarkable case of tuberculization of several organs at once, says, "The development of tubercles in the brain and cerebellum is doubtless a less striking feature in this case than the simultaneous existence of these bodies in a great number of various parts, the lungs, the neck, the right axilla, the mesenteric glands, the spleen, and more especially the fact of the tuberculous matter being in the same stage of development in all these places except the lungs. I really do not understand how this fact can be accounted for, unless by admitting the agency of one and the same cause acting at one and the same time upon all these parts. * * * And above all, what explanation can be advanced of the circumstance that the tuberculous matter was in the same stage, that of crudity, in every place

* Lugol, Op. cit. p. 94.

where it existed, if the cause leading to its evolution be not admitted to be uniform, and and to have produced its effects simultaneously?" *

7th.--Scharlau, whose objections have been so often referred to, has also contended for another distinction: scrofulous diseases, according to him, are found in the venous and lymphatic temperaments, while phthisis is an affection of sanguine people. There is more in this objection than in those previously considered, although it does not amount to much, for we find scrofula in all temperaments, and likewise phthisis. But, admitting a lymphatic temperament to be more necessary to the production of scrofula than of phthisis, the explanation is to be found in the fact of the lungs having, of all organs, the greatest tendency to tuberculization, although this tendency may be obviated, to a certain extent, by other circumstances, as in the period of life below puberty; so that we may have a less amount of the lymphatic temperament requisite as a predisposing cause in phthisis than in scrofula.

8th.—A different state of the secretions and excretions has been assumed to exist in the two diseased states under consideration. Thus, while

* Ed. Sydenham Soc. p. 144.

the urine of those affected with scrofula contains urobenzoic and oxalic acids, in phthisical patients the same fluid contains an excess of uric acid. This, of course, is all hypothetical. The formation of an acid in the stomach in scrofula has been laid down as a distinction: but children are more disposed to acidity than grown-up persons.

9th.—Schönlein says, "The family of tubercular diseases is united with that of scrofula, but by no means the same, as later writers assert."* His chief ground for making a separation appears to be the notion of tubercles partaking of a parasitic nature. But this opinion is, as shall be afterwards shewn, totally without foundation.

10th.—Dr. Evans argues for the complete separation of the strumous and tubercular diatheses, chiefly on the following grounds:—

"1st. I see every day, numerous examples of phlyctenulæ, ophthalmia, prurigo, rickets, &c.,—diseases confessedly peculiar to scrofulous children. I am frequently called upon to prescribe for lymphatic looking infants with tumid upper lips, dilated pupils, swollen bellies, and enlarged cervical glands: but upon enquiry as to the diseases to which the parents and other re-

* Allgemeine und Specielle Pathologie und Therapie, t. 3., s. 69.

lations have been liable, I do not find that consumption or decline is mentioned more frequently than among any other class of men. I have known many large families, the members of which have been all more or less subject to scrofula in one form or another, and none of them had ever got phthisis. 2nd. Upon inquiry into the early history of numerous phthisical patients, I have remarkably seldom met with persons who at any time presented the characteristics of struma. Nay in one remarkable instance, where, out of a family of eighteen members, fourteen died of phthisis, not one ever presented symptoms of scrofula, unless acute hydrocephalus in one child could be considered such."

In replying to Dr. Evans, we must first point out the extreme looseness of his premises:—"Phlyctenulæ, ophthalmia, prurigo, rickets, &c., diseases confessedly *peculiar* to scrofulous children!" We should doubt whether *one* of these affections be peculiar to scrofulous children. Only those diseases are truly scrofulous in which, according to our definition, the inflammatory process is so modified as that a scrofulous deposit is formed from the effusion, instead of the normal formation. Certain affections may approach more or less near to the

strumous type; but they cannot be used in a question like this about the degree of connection between true scrofula and phthisis. To the other arguments of Dr. Evans, we may reply—1st.,—families may be hereditarily liable to one or more forms of scrofula; thus, not to multiply examples, we had recently under our care a child, who, at the age of sixteen months, was attacked with symptoms of tabes mesenterica. At the same period of life, or within a week or two of it, according to the statement of the mother, three brothers of our patient had been formerly affected in the same way; and subsequently the disease had proved fatal to all of them; and we admit a less amount of the constitutional predisposition requisite for the production of phthisis than of ordinary scrofula. 2ndly,—The *observations* of Dr Evans are contradicted by those of so many observers, that we should only weary by citing them. Lugol may be more particularly mentioned. Moreover, it is so exceedingly difficult to trace the history of disease in families, and patients are so unwilling to admit the existence of either phthisis or scrofula in their ancestors or relations, that little dependence can be placed upon inquiries of this kind. Among the cases of scrofula which we have observed under our

own care, and that of our colleague Mr. Potter, during the last two years, we have been able to trace the family history with some certainty in eighty cases. A connection between scrofula and phthisis could be observed, either in the same individuals or in members of the same family, in thirty-eight of these cases. But so many persons die of phthisis, that very extensive inquiries indeed, made with precautions which are very difficult to practise, would be requisite, in order to enable us to arrive at a result worthy of confidence in this way. We rest our opinion of the identity of scrofula and phthisis on the perfect identity of the greater number of anatomical and pathological details common to these affections.

The occurrence of scrofula in the glands of the neck, or generally in an external form, may also prevent the existence of the internal disease becoming manifest, according to the popular belief, and according also to the opinion of Sydenham, who says, speaking of persons recovered from phthisis, "*Quibusdam eorum qui ex hac methodo convaluere, tumor in collo exortus est, non multum a scrophulis abludens.*"*

In fine, the conviction here expressed would be best marked by terming the diseased con-

* Op. Sydenham. p. 610. Ed. Sydenham Soc.

ditions whose relation is discussed, respectively, Internal, and External Tuberculosis.

NOTE 1.—Portal, who considers phthisis and scrofula to be identical, shews also that the different forms of scrofula are transmitted hereditarily in different families. “D’autres familles (cela est moins commun) sont ravagées par la phthisie mésentérique, hépatique, splénique; et ces maladies souvent héréditaires, si on veut bien y réfléchir, sont les effets d’un vice stéatomateux que les ouvertures des corps font évidemment reconnaître.” (*Considérations sur la nature et le traitement des Maladies de famille et des maladies héréditaires*, p. 33.)—Dr. Holland expresses himself thus, “In the scrofulous temperament, even more than that of gout, we have a remarkable diversity in the forms the disease takes, and the organs it attacks. But it is worthy of note that there appears a general tendency to the same form in the same branch of a family thus affected, still more in children of the same parents. I may mention as a striking example the number of cases of blindness, partial or complete, in some families where this temperament exists. In others the disposition is as strongly marked to affections of the joints—in others again to pulmonary consumption in its more common form. These are instances of the tendency to specialities before noticed extending to morbid structure or functions, as well as to those of a healthy kind.” (*Medical Notes and Reflections*, p. 32.)

NOTE 2.—Since this chapter was written we have to encounter the arguments of Mr. Phillips, who takes the opposite view of the question to that here adopted. Most of his arguments are of the same nature as those already referred to and answered in this chapter. He lays great stress upon the different periods of life in which deaths occur from phthisis and scrofula. We have already shewn that this argument is of no weight in the sense in which it is attempted to use it. Besides, the number of deaths from scrofula in the Registrar General’s report, to which Mr. Phillips trusts, is no evidence of the extent to which the disease prevails. Mr. Phillips, while noticing this objection, remarks, strangely enough, that a similar objection might be made to the inference from the number of deaths from phthisis. But the deaths from

phthisis unfortunately *are* good evidence of the extent to which the disease prevails. Another of Mr. Phillips's arguments is derived from the fact that according to the same report, phthisis destroys an excess of females; scrofula an excess of males. There is evidence to prove that, in some situations and countries at least, scrofulous affections are common and phthisis rare: upon this also Mr. Phillips lays great stress. The conclusion at which an inquirer may arrive upon the question just discussed, must depend upon the view he takes of the relative importance of the arguments and facts brought forward on the different sides. We consider that on the one side all is clear, *pathological*, and decided, founded on facts of essential relation; while on the other side we have doubtful assumptions, and at best, non-essential relations.

CHAPTER VI.

ESSENTIAL NATURE OF SCROFULA.

Such of the older theories respecting the nature of the disease, as appeared most worthy of notice from their antiquity, their merit, or the mode in which they represent the progress of science, have already found their place in the introduction to this treatise. A full account of more recent views would take up much space. We may, generally, object to most of the general laws framed to include, as in a definition, the most abstract idea of scrofula, either because they err by fixing upon one or two symptoms or characters of the diseased condition only, as the subjects of the definition, or because they are either absolutely false in their terms, or founded on pure hypotheses ; whilst some again are true in their details, but not so far advanced as the state of medical generalization demands.

All generalizations which make the disease consist essentially in a deranged state of the digestive organs, are faulty both on account of the reason first assigned, and from their vagueness.

“ A profound alteration of nutrition,”* says one writer ; but nutrition may be thoroughly deranged, and no scrofula result. “ A diseased state manifesting itself as the result of a long process of morbid assimilation,” and distinguished by “ the disorganization which it operates in the lymphatic system ;”† but scrofula does not manifest itself only in the lymphatic system. “ An irritation or inflammation of the lymphatics in a scrofulous subject ;”‡ liable to the same objection which has been applied to its predecessor. Of more complicated definitions, we may take that of Fischer :—“ We understand, under the name of scrofula, a great derangement of the lymphatics (ein tiefes Leiden des Saugadersystems), a diseased condition of the vessels and glands which belong to the preparation of the lymph and the assimilation of the chyle, the unavoidable consequence being imperfect assimilation and nutrition ; it is, therefore, a disease of the reproductive system, an affection which, through obstruction and a preponderance of albumen in the lymphatics becomes manifest, and

* Deygallières ; *Théorie Nouvelle*, &c. 1829, p. 99.

† Vering ; *Manière de guérir la Maladie Scrofuleuse*. Vienne, 1832, s. 1.

‡ Lepelletier ; *Traité Complet sur la Maladie scrofuleuse*, p. 101.

which gradually goes on to a separation of the juices and cachexia. This malady has its foundation in a great weakness and abnormal tone of the nerves of the body, by means of which, the processes of assimilation and animalization are rendered imperfect.* This definition is faulty, because it limits scrofula to the lymphatics, while, according to the observations in the preceding chapters, every such generalization must be more extensive; and because the assumption of the disease commencing with a derangement of the nervous system is hypothetical, as comparing this to other diseased states. Perhaps every morbid process has its commencement in the nervous system; but can it be proved that the affection under our consideration has peculiar right to this distinction? Such definitions as that of Hufeland, given in the introduction, sin doubly. Not only is the diseased process independent of the lymphatics in many instances, but it even develops itself in organs where there is no proof of their existence.† And the hypothesis of a specific irritation—of a peculiar virus, is purely gratuitous. Dr. Tyler Smith says, “Müller has suggested an interesting hypothesis, that struma is produced by the

* Fischer, *Op. cit.* 1832, ss. 29, 30.

† Ueber die Scrofelsucht, s. 29.

presence of an acrid or irritant principle in the liquor sanguinis." We know too well how free of all originality such a figment would be ; and that the act of framing similar hypotheses is as destitute of merit, as it is of novelty. The definition of Scharlau, not to multiply examples, appears to us one of the most correct, although not sufficiently elevated in the present state of our knowledge. According to Bredow, he defines the disease as "the result of a debilitated state of the vital functions," founded on a diseased respiration, digestion, and perspiration, the result of which again is a deranged condition of the blood, which manifests itself in an excess of albumen, and a deficiency of fibrin and blood globules, by which again deranged nutrition is produced.*

Almost every thing in the statement, just given, is true ; but the definition of the disease, which we should propose, is the following :—Scrofula is (speaking of the actual diseased process, not of the diathesis, which has been elsewhere described), a peculiar modification of inflammation, whereby the usual, or, as they may be termed, the normal products of this process are not evolved, but instead of them

* Bredow, Op. cit. s. 12.

other materials, incapable of passing into the regular cell forms, and which constitute the substance already described under the name of scrofulous or tuberculous matter. The peculiarity of this formation, and the continuance of the scrofulous diathesis are the causes of the characters assumed by the various after-processes which result from the existence of tubercle.

Doubtless, this definition adopts one view of a disputed question, but this view shall be supported by argument. It rests, also, for an independent existence upon the description of the diseased product already given. It includes the consideration of the diathesis as a subject of separate discussion, not more involved in the definition than are the various predisposing and occasional causes which may give origin to tubercle. It is clear, according to the opinions already adopted, that no general definition of scrofula can be correct, which does not include tubercle. We cannot separate the external and internal forms of the disease, in questions which relate to the general pathology of the same diseased condition, although we may distinguish them in the details, which refer to matters of convenience and practice.

The author, whose views approximate nearest to those which we entertain on the subject of

the general pathology of tubercle, is Dr. Alison : "The marks," says he, "by which we distinguish the form of inflammation, denominated scrofulous, are less peculiar and characteristic, than those which distinguish the erythematic or other specific inflammations ; but where the whole course of the affection is observed, the distinction from simple or healthy inflammation becomes obvious. The common affection of external lymphatic glands, is, perhaps, the most simple and obvious. The pain and heat are not great, the colour is often nearly unchanged for a long time, and then is somewhat livid or blueish ; the progress is remarkably slow, and is little influenced by remedies. But besides those, which may be said to denote the chronic inflammation, there is a more decided peculiarity in the suppuration which generally follows such inflammation, lasting longer than in ordinary cases ; in the discharge being more serous, but usually mixed with fragments of curdy matter ; in ulceration very generally succeeding, and in the ulcers being indolent and shewing little disposition to heal, and often degenerating into fistulæ."*

* Outlines of Pathology and Practice of Physic, Vol. 1st, p. 187.

The most eminent writers have differed on the question in the discussion of which we are engaged, and it would be most difficult to decide on which side there is the greatest weight of authority. It is necessary that we should have a correct notion of that about which we are striving, and that we should understand clearly what should entitle a process of disease to be considered inflammatory. "A moment's consideration," says Dr. Bennett, treating the same subject, "will shew that the whole discussion depends upon what is meant by inflammation. If by that term be understood pain, heat, redness, and swelling; or, the presence of lymph or of pus, then certainly tubercle is not inflammatory. But if, on the other hand, we consider that the essential phenomenon of inflammation is an increased exudation of blood-plasma, then tubercle must be regarded as an inflammatory product."* Dr. Bennett, in a former paper, has well justified the views which he entertains of the nature of inflammation. Nevertheless, we should not be disposed to define inflammation, as consisting solely in increased exudation of blood-plasma. On the other hand, congestion is not the more essential part of the inflam-

* Edin. Med. and Surg. Journ. April, 1845.

matory process. Congestion, upon the greater or less rapidity and extent of which, (along with affections dependent on the structure of the part in which it may take place), depend the other more or less accidental symptoms which have been usually included in the definition of inflammation, may occur and disappear without the occurrence of effusion, and consequently without the morbid nutrition arising from changes taking place in the exuded blood-plasma. These latter phenomena are the more essential characteristics of inflammation. It must be recollected that the discussion is not as to whether scrofula and inflammation are one and the same; but whether the process which terminates in the deposition of scrofulous or tuberculous matter, is so far allied to inflammation, that we may include it with propriety as a modification of the latter process under the same generic title. For want of a due consideration of the real question at issue, many of the arguments against the inflammatory nature of tubercle have been wrongly directed. The argument is not, as to whether scrofula be normal inflammation, we repeat; but, whether the two processes be essentially allied, however much one of them may be modified.

It is probable, that if the effusions in scrofulous and in ordinary inflammation were ex-

amined in their primitive state, no difference in anatomical character would be detected. The opinion maintained by Mr. Addison, regarding the actual passage of corpuscles from the blood in the process of inflammatory exudation, seems not in accordance with analogy. The probability is in favour of such exudations being composed, in the beginning, of a plastic fluid, in which the different corpuscles characteristic of ordinary inflammatory organization are afterwards developed. A scrofulous effusion, then, from some deficiency of organic power, of innate susceptibility, does not pass into the higher organized forms. We have, as a result, either a granular mass, destitute altogether of cell forms, or only abortive attempts at cell formation. True, as has been already stated, nucleated cells are found in tubercle, but they appear to arise from altered original structures, the remains of the tissues in which the effusion has been deposited; and in scrofulous glands we find structures which appear to be composed of the original cells of the gland become thickened, and opaque, or more or less translucent, and in which, sometimes, an appearance of nuclei exists. The microscope does not, as yet, explain the *cause* of the deficiency of scrofulous effusions in organizable power. Neither, as yet,

is chemical analysis capable of affording a satisfactory solution of the difficulty. It is true, that in some of our analyses of the protein basis of tubercle, a deficiency of azote was found; but this does not accord with the results of Scherer; and Jones has obtained almost as low an estimate of azote, as in the lowest of ours, in the analyses of the protein of yolks of eggs. The existence of casein in large quantity in tubercle, or the passage of the protein element in the direction, as it were, of casein, would, to some extent, afford a solution of the problem. The state of our knowledge, on this point, has been already exposed. Tubercles contain pyin, which has been made to play an important part in the regeneration of the tissues.* In connection with what has been said of the deficiency of scrofulous effusions in organizable power, we find a statement of Mr. Dalrymple, recorded by Gulliver in his translation of Gerber: "The organizable material of the blood, when effused without direct rupture of the vessels, is more rapidly organized in those conditions of the system denominated cachectic, than in the more vigorous and robust." It is not here pretended to reconcile this with the preceding observations.

The great objections brought against that

* Chemical Gazette, July 1st, 1845.

view of the nature of scrofula, which is here adopted, may be summed up under two heads: first—the absence of the more marked symptoms of congestion, in a part, in the stage before effusion; secondly—the different circumstances under which inflammatory and scrofulous exudations respectively take place, and the different laws of genesis which seem to attend them.

It cannot, now, be doubted, we presume, that the occurrence of effusion of blood-plasma with preceding congestion, must be accounted inflammation. Now, a very slight amount of congestion may reasonably be deemed sufficient to produce exudation in a strumous constitution. We have the blood overloaded with the solids of the serum, while there is a general absence of tone in the system. Thus, there will both exist a tendency to effusion from the blood, and a disposition of the vessels to yield to this tendency. This exudation may, in some cases, where the blood is much diseased, take place with so much facility, as almost to resemble an excretion. Canstatt observes, “The greater number of authorities, and those of the weightiest, recognize in tuberculosis a diseased condition of the fluids, which again supposes a morbid state of the solid organization (*habitus tuberculosus*). The accuracy of the definition

leaves us as soon as we are to determine wherein that alteration of the juices consists.* Only it might, perhaps, be said, approximatively, that the elements of the general formative juice, or plasma, destined to nourish the solid essence, and particularly its protein compounds, remain in a lower formative step, (that of casein), and do not raise themselves to the perfect animal production of normal plasma, (fibrin), so that, thereby, the albumen in the formative juice becomes overpowering, till at last its vehicle, the blood serum, is no more able to maintain it suspended, and excretes it under the form of tubercle. It can easily be seen, that this diathesis of the juices is capable of different gradations. In an inferior degree, such an albuminated blood serves still for nourishment, without exactly depositing isolated tubercle matter. We see this in childhood. The described quality of the juices is, in this period of life, almost in a normal state; that habitus which is called lymphplethora, represents it in a higher degree. All tissues and organs swell then through such a badly eliminated albuminous plasma, without the superfluous elements yet depositing them-

* This observation of Dr. Canstatt shews how much of conjecture there was in the notions hitherto entertained of the state of the blood in scrofula.

selves as pathological products beyond the natural boundary of nutrition ; the tissues are still in a state to assimilate to themselves the formative matter although depraved. This practically defective nutrition appears most visibly in the glands, because these form the first stations of passage for the defective juices. At a later period of life, the defectively animalized albumen, or casein, holds itself in a more diverse and heterogeneous manner in relation to the blood, and to the now higher formed textures. It is now far less possible than in infant age for this matter to be suspended in the blood ; and the assimilating attraction between the same and the tissues is diminished. It is precipitated, therefore, most frequently, into the organs from the blood-mass, where this reaches its highest degree of formation, viz., in the lungs. And, thereby, that (is precipitated) which is most hostile to every assimilating element in it. The local separation of the tubercle matter from the blood on the free surfaces of the mucous membranes, of the serous membranes, or in the interstitial texture of the organs, happens exactly by the same process ; like plasma destined for normal nutrition and secretion, it penetrates the walls of the vessels, and then appears as secretion from without, or is solidified in closed

spaces like nutrition-molecules. Yes, we ourselves believe that this deposition takes place contemporaneously with the process of the normal nutrition and secretion; for the plasma used in this process contains also the tubercle-matter; whilst the elements applied for nutrition penetrate by intus-susception into the formative cells of the parenchyma, the tubercle-matter, not susceptible of any idio-plastic attraction, remains lying without the formative cells, and petrifies, or mixes, if it is fluid enough, with the secretion flowing out."*

It must thus be evident, that tuberculization may take place with very little preceding congestion, and that the process of nutrition may pass, as it were, in scrofulous subjects into disease; but this does not disprove our definition. Nowhere, in nature, can we draw absolute lines: we cannot, by any definition of an animal or a vegetable, include, absolutely, in one or other of our more or less artificial kingdoms every organized being. But in the greater number of cases of tuberculization the antecedence of more or less distinct signs of congestion places the affinity of the process to inflammation in a more certain light.

* Canstatt, Op. cit. Bd. 1. s. 243.

There seems little doubt, that in scrofulous subjects, inflammation assumes a peculiar character, whatever may be the cause occasioning it.*

We, sometimes, find no want of all the usual phenomena of the first stage of inflammation in external scrofulous diseases ; there is often sufficient heat, pain, redness, and swelling. Indeed it is admitted by most of those who take the opposite side of the question, that inflammation can *sometimes* produce scrofulous formations. Thus, Canstatt says, " In tuberculous patients, every accidental inflammation may produce a deposit of tubercular matter, instead of other plastic exudation." It is requisite now, to consider how far the more obvious phenomena of inflammation precede the formation of internal tubercle.

On this point, we shall translate the following from Andral—" But, in order that this modification" (i. e. tubercle) " may take place, is it necessary before it be produced, that there should be, where it is about to take place, exaltation of vitality, augmentation of the organic action of the part, stimulation, irritation, and, in

* Bredow says that inflammations in scrofulous subjects are characterized by their diffusion, their chronic course, and their tendency to become asthenic. Op. cit. s. 48.

consequence, hyperæmia? To this question, facts reply, that in a great number of cases, there has been, by the symptoms, manifestation of sanguineous congestion, where at an after period, a tuberculous secretion has been established. But the facts reply also that in other cases, there is no proof of this sanguineous congestion—product of an irritation—having ever existed, so that it can only be admitted through analogy. We enter then into the field of reasoning, and, according to the sense given to the word irritation, and as we attach to its existence this or that series of functional disorders, it will become free to every one to admit or deny that there has been irritation in those cases where, after death, tubercles are found at once in the greater number of organs, without any sign having ever revealed their presence during life. All that can be established on this head, is contained in the three following propositions.

“1st.—In many cases, neither the study of the symptoms, nor the examination of the cadaveric lesions, reveals any evidence of irritation, past or actual, in the point where tuberculous matter is formed. This is the case, not only in organs of slightly marked sensibility, and which occasion symptoms but little active, as the lymphatic glands, liver, or spleen; but it equally takes

place with the brain. 2nd.—For the formation of tubercles, as for every other morbid production, theory only shews irritation to be an energetic cause, and one which ought to be a very frequent, but not necessary cause. 3rd.—The irritation alone, without the concurrence of other causes, can no more constitute a reason for the formation of tubercles, than it can render account of the speciality of numerous alterations of nutrition and secretion, which it precedes so often, and which develop themselves, not through it, but along with it.

“Thus, tubercles are not necessarily formed by the sole presence of irritation, whatever may be its intensity and duration. On the contrary, they may be produced without appreciable irritation. In fine, it seems to me, that in the actual state of science, tubercle should be considered as the result of a modification or perversion of nutrition, preceded or accompanied often by a sanguineous congestion.”*

The admission of the existence of congestion as a frequent antecedent of the abnormal effusion of blood-plasma which precedes the formation of tubercle, is sufficient, according to our views, to assimilate this product with the results

* *Anatom. Path.* t. 1., pp. 437-8.

of inflammation. Andral contends for something more than congestion and effusion of blood-plasma to characterize inflammation. The congestion must be the result of *an irritation*. M. Dubois also, who exposes the views of Andral, contends for a distinction between congestion and inflammation.* According to the opinion which we adopt, congestion is not so essential a phenomenon of inflammation as effusion of blood-plasma; this effusion may take place with more or less rapidity, and to a greater or less extent, according to the degree of quickness with which the blood has been poured into a part, the greater or less power of the vessels affected to maintain their tone, and other modifying circumstances of a similar kind, while, in a disease like scrofula, from the state of the solids and fluids, effusion may occur with very little previous congestion, or even without any phenomenon of the kind. Some expressions of Henle bear upon the question: "Congestion and inflammation are not essentially different from one another; it depends upon the degree of the irritation, and the locality of the affected seat, whether the pathological event may approach nearer to the one or to the other. From

* Pathologie Expérimentale, p. 146.

a slight irritation is the relaxation of the vessels slight and of shorter duration ; in consequence, also, the exudation which exists in similar proportion with the extension of the vessels, is slight ; the more violent and continued the irritation, so in proportion is the dilatation of the vessels, and so much more abundant the exudation. Naturally, also, it depends on the vascularity of the irritated part. The more the vessels preponderate over the solid substance, the more easily exudation follows ; and hence, in the glands especially, very slight congestion is followed by excessive exudation.* There is an objection to the restriction of the causation of inflammation immediately to external or internal irritation ; for the experiments of Dr. Robinson shew, that mechanical causes of congestion are adequate to produce the essential phenomena of inflammation.

Among the arguments usually advanced in favour of the production of tubercles by inflammation is the formation of them by artificial means. We have produced them in this way in the rabbit and dog, chiefly in order to examine them by the microscope. The mode of experimenting adopted was by incising the

* Henle, *Pathologische Untersuchungen*, s. 153. Berlin, 1840.

trachea, and injecting a quantity of mercury downward into the lungs. The appearance of the bodies which resulted, the animal being killed at a period of from one to two months after the operation, was not externally unlike that of tubercle; little round whitish masses, more or less agglomerated; and each nodule with a globule of mercury in its centre, around which the exuded matter was formed. Pus existed in some parts around the artificial tubercles; but on examining the broken up bodies by the microscope, although the structure of portions did not appear very different from that of the irregular granules and corpuscles of tubercle, yet the exudation corpuscles were tolerably numerous and those toward the edges of the exudation fully formed. Numerous nucleated cells also were found mixed with the mass; in short the formation more nearly resembled an ordinary inflammatory product, such as we find in pulmonary hepätization.

Another argument may be drawn from the gradual passage of scrofulous and inflammatory effusions into each other. A specimen of an organization of this kind has been already described, and is represented in the illustrations. To the same head may be referred the recent observations of Dr. Addison on pneumonic

tubercle,* which appear also to modify considerably the force of the general conclusion of Louis with regard to the rarity of phthisis as a consequence of pneumonia and tubercle; the former commencing at the lower and the latter at the upper part of the lung. It is clear now that we may have an albuminous effusion, truly the result of inflammation in the lung, closely assimilated to tubercle. And moreover the more scrofulous and cachectic the subject, the more tendency does pneumonia exhibit to terminate in such albuminous exudations. Pneumonia also is not so rarely a cause of phthisis as Louis has asserted.† Moreover, Barthez and Rilliet describe, under the name of chronic pneumonia, an alteration which they regard as the intermediate stage between “acute pneumonia and the grey infiltration or yellow tubercle.” This, like tubercle, is found chiefly in the upper part of the lung and in tuberculous subjects.‡ What, then, is the tendency of these observations, but to destroy the inferences which have led some to draw a line of separation between inflammation and scrofula?

* Guy's Hospital Reports, April, 1845.

† See the obs. of Barthez and Rilliet, t. 3, p. 106 et seq.

‡ *Maladies des Enfants*, t. 3, p. 223.

That some considerable difference should exist between the products of ordinary inflammation, and scrofulous products, and their laws of formation, is in accordance with what is here contended for.

Considerable resemblance has been shewn to exist between the supposed occasional or exciting causes of scrofula and such as are known to produce inflammation in healthy subjects.*

The parasitic theory of tubercle is now hardly maintained. This doctrine, which made these morbid formations to be merely transformed hydatids, appears to have originated with Jenner,† and was chiefly supported by Baron. Since then, our acquired knowledge, both of the nature of hydatids and of tubercle, has shewn the falsity of such a theory. It is true, in some animals, we find hydatids to undergo a gradual transformation into bodies very similar to tubercle. Thus, in the rabbit, we have seen these tubercle-like forms in the lungs, brain, mesen-

* See Alison's Outlines, pp. 197-9.

† Cum a. 1803 Londini fueram, Jennerum, joci gratia, interrogavi, num forte adhuc germen alterius, vaccinae æmuli, inventi, foveret? Cur non? vir amicus respondit. Puto me causam phthiseos scrophulosæ detexisse. Et quænam illa est? *Vermis*. Frank, Praxis, Taurini, 1824. p. 2, vol. 7. p. 120.

tery, kidneys, interior of the heart, and between the peritoneal and muscular tunics of the intestines: the omentum was loaded with them: the lungs contained them, along with true tubercles. They were to be found in every stage of change from the original hydatid: some exhibited one extremity of the sack opaque: in others this opacity extended further, and some were wholly opaque, converted into a granular substance not very unlike tubercle matter, even when examined by the microscope.

NOTE.—An experiment of our friend Dr. Robinson, would appear singularly to strengthen the opinion of the inflammatory origin of tubercle. The theory which he has maintained with so much talent, of the nature of the first stage of inflammation, is well known. Now, in one of his experiments, performed on a tuberculous rabbit, he believes that he observed the effusion, from the blood, of scrofulous matter mixed with lymph. The following is the account with which he has favoured us:—"In one of my experiments, after the renal vein had been partially obstructed, some distinctly scrofulous matter was found in the pelvis of the same kidney, embedded in a quantity of pellucid lymph. This fact was, at the time, witnessed by two or three gentlemen, then pupils of the Newcastle Infirmary, and was mentioned in the detailed account of those experiments prepared for insertion in the *Medico-Chirurgical Transactions*. But on submitting the manuscript to the inspection of a distinguished physician, this passage was, in accordance with his suggestion, expunged on the ground of the improbability of much faith being attached to an isolated observation. The experiment is the fifth of the second series on venous obstruction, and is related at page 69 of the 26th volume of the *Transactions*.

"The recent observations of Messrs. Rainey and Quekett (mentioned in the 28th volume of the same publication, page 596), by shewing the occasional existence of scrofulous matter in the blood, may perhaps now render the fact more credible."

CHAPTER VII.

ETIOLOGY OF SCROFULA. *

Δεί δὲ δήπου ταῦτα αἷτια ἐκάστου ἡγέεσθαι, ὧν παρεόντων μὲν τοιοῦτον τρόπον ἀνάγκη γίνεσθαι, μεταβαλλόντων δὲ ἐς ἄλλην κρῆσιν παύεσθαι.—Hippocrates, περὶ ἀρχαῖης ἰητρικῆς, 19.

The hereditary nature of scrofula might be supposed to be established; but scarcely anything in medicine can be considered to be beyond the reach of controversy; and we find Louis unable, from his own experience, to derive any satisfactory proof of the hereditary transmission of phthisis. Many writers at different times have denied the hereditary transmission of scrofula. Louis, a French surgeon, who towards the close of the last century supported the negative side of the question, may be especially instanced. A specimen may be given of the reasoning of Mr. White, already quoted, who maintained a similar opinion. He finds the disease to be non-heredi-

* Since this chapter was originally written, Mr. Phillips has published by far the best account of the Etiology of Scrofula yet given to the world.

tary, as he believes, in two instances, and boldly draws a conclusion. One of the cases which he relates is that of a family of nine children, who all died below the age of eighteen months, and apparently from scrofulous disease, as far as could be learned, (for he never saw any of them,) the father and mother being healthy looking people. The other is an instance of a woman (healthy?) who had scrofulous children by three different husbands. Here also "and by her account there could be no doubt of their" (the children) "having been strumous." No attempt seems to have been made to ascertain whether struma was hereditary or not in the family of the mother. If such instances were well established, they would merely prove that the disease was not in these cases transmitted directly from parent to child, they could not prove anything with regard to other cases, and even in these very instances, a further investigation might lead us to conclude that an *influence* had been transmitted from the parent to the offspring, which circumstances might have developed in the offspring although it had lain dormant in the parent.

Negative instances there are of two kinds; either they may prove that, in particular cases, the disease is not transmitted directly from pa-

rent to offspring ; or they *may* prove (however difficult the proof) that the disease is not in every instance transmitted by inheritance in a family either as regards the disposition or the actual disease. But so difficult is it to prove an absolute negative in the latter case, that we hold this almost impossible.

The leading questions with regard to the hereditary nature of scrofula are these ; 1st. is the disease hereditary ? 2nd. To what extent is it hereditary ? (supposing the preceding question resolved in the affirmative) ; and 3rd. What is the mode or law of the hereditary transmission : i.e. is it more likely to be transmitted from a father or mother ? Is the actual disease transmitted, or the diathesis ? Does the disease appear in uncles, or aunts, and not in parents whose children suffer ?

The first question is independent of the others : scrofula may be proved to be hereditary by a certain number of remarkable instances, in which the influence of occasional causes is precluded. From a few such instances, we might infer the hereditary transmission of the disease in the cases in question, and the possibility (or probability, if our investigations were more extensive) of its transmission in this way in other cases. Statistical inquirers are sometimes apt

to overlook the relative importance of the facts, each of which in their tables may count *one*; when one particular instance may be worth a hundred others. Thus we regard the hereditary transmission of scrofula as a fact which is abundantly proved by the many remarkable histories of families, detailed in various works, and particularly in that of Lugol—cases in which the agency of external causes is excluded. Surely the *fact* that in many instances scrofula is hereditarily transmitted does not now depend upon the researches or opinions of any one individual! It has the assent of the great body of the profession now and in former times; and the cases which may be readily observed by any one, where great mortality is found in families from the class of scrofulous and tuberculous disease, must render the mass of the profession indifferent to the discussion of such a question as the hereditary or non-hereditary transmissibility of scrofula.

That family peculiarities may pass over one generation and appear in another, is a fact too well established to be denied. Now as the transmission of the actual disease is admitted to be a very rare event; and as in the various questions connected with this part of the subject, the *real question* is about the diathesis or

predisposition, we cannot limit the investigation merely to the parents and offspring. The existence of tuberculous affections also in several of the children where no adequate occasional causes can be discovered, is, even where the parents are free, a suspicious circumstance. To limit the investigation, also, to external tubercle would be unphilosophical on the view, advocated here, of the ultimate nature of the pathological connexion between the various forms of tubercle. How, upon this principle, could we pronounce that the disease was not hereditary, where we found that the parent of a scrofulous child had died of phthisis?

Several cases are recounted in the appendix in which the family-history of patients is given with perhaps as great a degree of exactitude as can very well be obtained, and others may be related here with the view of illustrating the views entertained, and shewing the kind of facts from which conclusions are drawn. The hereditary transmission is not made out in all of them; they are examples merely of the facts.

CASE 1.—M. W. aged four, affected with a scrofulous swelling under the jaw on the right side. The tumour supplicated and was opened. His sister, two years old, has now ophthalmia tarsi. Two sisters older than himself, and one

brother, are said to be healthy. He had another brother who died of convulsions, aged two or three days. His father is subject to ulcers of the legs, (which would ordinarily be termed scrofulous) and had a sister who died of white swelling. Others of his father's family have died of phthisis. The mother's family appear to be healthy.

CASE 2.—R. S. aged seven, affected with extensive mesenteric disease in a very advanced stage. He has had eight brothers and sisters. Two of them, younger than this one, are living; two were dead born; and the mother had twins, twice, who only lived a few hours. The mother (44) never had any scrofulous symptoms. She had two sisters who died both about a year ago, of phthisis. She has one brother at home, healthy, another a soldier, a third killed. The father is thirty-one, healthy. He has two brothers living, who are married and have families, said to be healthy. He had a sister who died of phthisis.

CASE 3.—A. N. aged seven, extensive mesenteric disease:—four brothers and sisters living; one, aged twelve, affected with glandular swellings. The mother had two children who died of small pox, one apparently of *tabes mesenterica*, at the age of eight months. The

mother and her family, whose history need not be given minutely, are, and were, healthy; The father and his family exceedingly subject to eruptions; and one of his sisters, epileptic.

CASE 4.—H. W. aged six, a scrofulous swelling of the cellular tissue of the thigh. He has had twelve brothers and sisters; one died of phthisis, aged nineteen; five were still-born; the others are healthy. Father forty-seven, mother forty-three, both healthy. The further history of the family shews no other signs of phthisis or scrofula; but the deaths of so many children still-born, is a circumstance which M. Lugol might connect with the deaths of four brothers and sisters of the mother, at a very early period.

CASE 5.—J. T. aged one year and seven months: scrofulous swellings of the cervical glands, and mesenteric disease. He has had twelve brothers and sisters, of whom six died; two of hydrocephalus; two of inflammation of the chest; one of phthisis, after hooping cough, and another of mesenteric disease. The parents are healthy. The mother's father is living, aged sixty-eight, and her mother also living, seventy-two; both healthy. Her four sisters and brothers are living, all healthy. The boy's paternal grandfathers and grand-

mothers died not of phthisis or scrofula. His two uncles and an aunt, on the same side, are living, healthy, one uncle killed.

CASE 6.—T. E. aged nineteen, a keelman, (the keelmen are in general a remarkably strong and healthy race,) scrofulous swellings of the neck for four or five years. He had seven brothers and sisters. One died of mesenteric disease. The oldest surviving son is twenty-one; he had a tumour like the present when about the same age, but got well. A sister, of fifteen, has scrofula now. Father and mother healthy. The father has one sister, healthy. His brother and a half sister died young, the latter of phthisis. One of his mother's brothers had scrofula when fourteen or fifteen. Her other brothers and sisters healthy.

CASE 7.—R. H. aged seventeen, scrofulous disease of the right thumb, and a scrofulous tumour of the face. Seven brothers and sisters, all living. The present is the fifth. The eldest is twenty-nine, a carter, married, and with three children, two of whom died soon after birth, and the other is very weak and unable to walk, an idiot: the man himself never had scrofula. The second is twenty-seven, a policeman; the third, twenty-five, a labourer; both unmarried, always healthy. The fourth,

twenty-three, a joiner, had once a tumour on the arm, which was opened, and which the surgeon who attended him regarded as scrofulous; the sixth, a sister, is now healthy, but appears to have had scrofulous ophthalmia, when young. The seventh, a sister, fourteen, healthy and well. The father and mother both healthy. The father had a brother who died of phthisis, and a sister who died in childhood. The mother had three brothers and two sisters; all the brothers are dead, one of the gravel, another suddenly, and a third of phthisis; the sisters are living; the families of such of the brothers and sisters as had any, are healthy.

CASE 8.—H. F. aged nine, several scrofulous tumours of the neck and left axilla. She has five brothers and sisters living, five still-born, or died in infancy; those living are healthy. The father and mother are healthy, never had any symptoms of scrofula. The mother had seven sisters and two brothers. One died of cancer of the throat, another from an unknown cause. The others are living and healthy; some of them have families, reported as healthy. The father has a brother and sister living; there was a large family, but the others died young of water of the head. The history of the mother's ancestors shews no sign of scrofula.

CASE 9.—P. U. a currier, widower, aged forty-five; a large congeries of scrofulous swellings on the left side of the neck. He has a son married, and a grown-up daughter, both healthy. He has three brothers and three sisters all living and all healthy. He had one brother who died on the day of his birth. His father is living, seventy-six. The mother died at sixty-three. His uncles and aunts as far as he knows were healthy.

CASE 10.—M. T. aged forty-nine, cicatrices and indurated glands on each side of neck, married and has had seven children.* Only three of her children are now living; the youngest of them is twenty; all free of any scrofulous affection; one of her sons married, had one child which only lived a few days; of the four children dead, one, a daughter, died three years ago, aged twenty, of phthisis; another, also a daughter, died three years and nine months old of hydrocephalus; another, a male, died at four years of the same disease; the other died at thirteen months, apparently of tabes. Her mother died at forty-two, cause unknown; her father died at seventy; her uncles and aunts were healthy as far as she knows. Her husband is living healthy.

* The disease commenced three years ago on cessation of the menses.

Such are the cases of which we have observed 80; and in them we find reason to conclude the disease or predisposition to tuberculous affections to be hereditary in 42 cases; in very few of the remainder could we venture to assert positively that there was reason to conclude the disease or predisposition to it untransmitted; but in two or three instances, as in case 9 and in No. 15 of the cases given in the appendix, this might perhaps be conceded.* There appears some reason to conclude that the popular idea of evidence of the family taint often passing over one generation, or appearing in the uncles and aunts, while the parents are free from the disease under which their offspring labours, may not be incorrect.

But although the hereditary nature of scrofula be established sufficiently, questions remain with regard to the degree of influence in the causation of the disease, attributable to hereditary influence and to what may be termed, occasional causes, both pathological and external.

* According to Mr. Phillips's statistics, the hereditary influence exerted by scrofula would not be great; but only the history of the parents and offspring is taken into account. The same objection applies to the results of Barthez and Rilliet.

M. Lugol admits the influence of other causes than hereditary disposition, only in a subordinate sense. He does not believe any amount of these causes to be capable of producing scrofula in a person not hereditarily disposed. On the other hand, these causes when acting with sufficient intensity, are able according to him, to render parents capable of procreating only scrofulous children. The latter opinion might be supposed irreconcilable with his former one. In truth, how can we believe the morbid and external causes to be capable of producing a disposition in parents to beget scrofulous children, and, at the same time, refuse to admit that these causes alone, acting with *sufficient intensity* upon a previously healthy person, are able to render him scrofulous?

If a parent transmit the predisposition to his children, and this predisposition be produced by external causes, surely, according to M. Lugol's view, what he transmits to his offspring must exist in himself, and be capable of being developed in him as in his offspring into the actual disease?

Thus, while M. Lugol denies the capability of syphilis to produce scrofula in an individual previously healthy, he believes the importation of syphilis into Spain by the companions of

Columbus to have been the great cause of the (asserted) subsequent prevalence of scrofula in Spain, and consequently, as he puts it, of the decay which has taken place in the energy of the Spanish people, and of the fall of their power.* In like manner, he attributes to the wars of Napoleon, and the destruction of the young men of France capable of bearing arms, and the consequent begetting of the generation which ensued, by fathers who were too young or too old, the degeneration which, he

* M. Lugol is at least entitled to the credit of originality for his view of the cause of a great political event. We have had the downfall of Spain attributed to many causes ; to the abstraction of so much of the population of the country by the conquest and colonization of America ; to the expulsion of the Moors ; to the establishment of the Inquisition ; to exhausting wars ; to the imbecility of the court ; by Lord Byron to the publication of *Don Quixote* ; but M. Lugol finds out that all was owing to syphilis ! It will be observed that M. Lugol's assertion of the great prevalence of scrofula in Spain, is very likely one of those loose statements in which he so often indulges. Nevertheless, we do not think that the historian should look for the really important events of the time which he records, solely in what are generally considered the materials of history ; thus we find Gibbon mentioning among the great causes of the decline of the Roman empire, the gradual deterioration of the physical energies of the inhabitants of the provinces, beneath the weight of a political and social system in which the happiness of the many was sacrificed to the luxury of the few

says, took place in the offspring born about that period, and the increased prevalence of scrofula for a considerable time after the war.

The general law laid down by Dr. Pritchard; viz. 'that all original connate bodily peculiarities tend to become hereditary, while changes in the organic structure of the individual, from external causes during life, commonly end with him, and have no obvious influence on his progeny,' is not in accordance with the views of M. Lugol, since he admits the tendency of external causes acting on an individual to produce scrofula in his offspring. Nevertheless, as Dr. Holland observes, it is by no means certain that many exceptions to this law do not exist.*

The investigation of the history of families, with a view to ascertain whether or not an hereditary taint exists, is, it may be again stated, frequently one of the most difficult tasks that can be undertaken. In the first place we have the prejudice and self-love of the patient and his relations to contend with; then their ignorance of facts and of the value of symptoms; and lastly, the difficulty in many cases, of ascertaining the fate of members of a family who have

* Medical Notes and Reflections, p. 10.

been separated by distance: a hundred other obstacles intervene which may be readily imagined. Particular care should be used in concluding that a disease known to be hereditary, in many cases, has been produced merely by the force of external causes in one or two instances. For example: we had lately under our care a patient, aged thirty, a schoolmaster, who had been ill for six or seven months, and presented when he came to consult us, the symptoms of phthisis pulmonalis, of which disease he shortly afterwards died. Now the history of this patient, had one circumstance been overlooked, might have led us to attribute this disease to the action of external causes on a healthy constitution. His father and mother, brothers and sisters, were healthy, although others of his more distant relations had died of phthisis. He was born and lived during childhood and youth in a farm house, in one of the beautiful border glens, whence he was sent at an early age, to study theology at Edinburgh. Poverty caused him to submit to severe privations: he was unable to complete his course of study, and was obliged to teach in a humble way, and to labour unceasingly in his avocation. Now, how easily might we infer, that the difference between this person

and his brothers and sisters, brought up in the country, was owing to a different course of life? But upon further inquiry, we find our patient to have got a stiff knee; and that he suffered in infancy from an affection of the knee, which had produced partial ankylosis, and was in all probability, of a scrofulous character. Thus the seeds of the disease were probably in his constitution; but the circumstances in which he was placed may have acted as exciting causes. Now, it is worthy of remark, that if even the scrofulous affection had not broken out in childhood, the diathesis might still have been there, and our enquiries might not have led us to obtain evidence of the existence of hereditary phthisis.

A few instances have occurred in which the disease could not be traced, either to an hereditary taint, or to external influence. We are acquainted, in private life, with families in which an undoubted hereditary taint has disappeared, in the present generation, under the influence of favourable circumstances.

The capability of external causes to produce scrofula, would seem to be proved by instances like that recorded by Dr. Tyler Smith. In a workhouse, in Kent, out of 78 boys, and 94 girls, all the boys had scrofula, and 42 likewise

goitre ; while of the girls, 91 had enlarged glands, and 43, also, goitre : few of the patients had been thus afflicted, before they were subjected to the regimen of the house.

The loose manner in which the influence of external causes, has been discussed by Hufeland, and those who have copied him, has given force to some of the observations of M. Lugol.

The following may be enumerated as the principal of the occasional causes, so considered :

- 1st. Bad air, and defective ventilation.
- 2nd. Confinement, and want of exercise.
- 3rd. Imperfect nutriment, and exposure to cold and wet.
- 4th. Venereal errors.
- 5th. The influence of other diseases (called by Lugol pathological causes).
- 6th. The influence of climate, of age and sex ; and the various preventive causes may also be considered under this head.

1st. Great stress, as is well known, has been laid on the privation of air, in the causation of scrofula, by Baudelocque : he has even gone the length of considering this to be almost the sole cause of the development of scrofula. The case of the prevalence of scrofulous affections

in the village of Oresmeaux, under certain circumstances, and their extinction or mitigation from a change of these, is well known, and certainly appears almost in the light of an *experimentum crucis*.* The evidence of Mr. Toynbee and others, before the Health of Towns Commission, is strongly in support of the opinion of M. Baudelocque, which, on the other hand, the observations of Barthez and Rilliet would materially modify. Their remarks apply more particularly to tuberculization of the internal organs; but, as they observe, "if it were objected, that the results of M. Baudelocque apply more particularly to the external organs, we should reply, that the accidental product is always the same, whatever seat it may occupy, and that in consequence, its cause ought always to be the same." They find that of 57 children submitted to the action of a vitiated atmosphere, 40 died tuberculous and 17 non-tuberculous; and that of 173 children submitted to this influence, 101 died tuberculous and 72 non-tuberculous; they infer "that the alteration of the air is a powerful aid of the development of tubercles in predisposed persons, but that it is not indispensable; and that it must be allied

* See the 1st. vol. of the Health of Towns Commission Report, pp. 70-71.

with other causes to act efficaciously." We have seldom met with a case of scrofula in infirmaries or dispensaries, which might not with some stretch of imagination be referred to the influence of some one or other of the alleged predisposing causes, and scarcely a case, which by investigation and the exercise of reason, might not be shewn to be independent of any one of these causes. Nevertheless, as there is reason to believe the blood globules to be mainly concerned in the function of respiration, it is not improbable that the want of due arterialization of the blood by a sufficiently oxygenated air, may be essentially connected with the state of the blood which exists in this disease. Could we establish such a connection, more confidence might be entertained in the theory of Baudelocque, than can be given by the statistical results hitherto published.

2nd. To the influence of confinement, most parties bear testimony ; we have one fact which can hardly be disputed ; viz. that animals, when domesticated, frequently fall victims to scrofulous and tuberculous affections from which they are free, while in the wild state.

3rd. Barthez and Rilliet were only able to find 2 cases, out of 314 tuberculous children, where exposure to humidity appeared to be the

sole cause of tubercle. The researches of Mr. Phillips would also tend to prove that the influence of humidity has been much overrated.

Too much vegetable food has been assigned as a cause: also overfeeding, by most German authorities; thus, Drisse: "Grandfathers and grandmothers cramming the poor child, from morning till night, without thinking that the infant organism cannot change this great quantity of food into good blood." He then gives an example, tending, as he considers, to shew that scrofulous disease of the bones, may be brought about by this system.*

We shall give some examples with the view of shewing what opinions of this kind may be maintained. Being at Chamouni in 1834, our guide informed us, in answer to some enquiries, that scrofulous disease, goitrous affections, and cretinism were then almost unknown in the valley of Chamouni, where, formerly, they had been very frequent: this, he attributed to the introduction of the potato! In all probability, however, the extension of the cultivation of this useful vegetable to the foot of Mont Blanc coincided with the march of civilization, the advent of travellers, and of wealth, the formation of

* *Op. cit.*, §. 39.

roads and bridges, and the better lodging, feeding, and clothing of the people.

The following is an extract from the journal of our friend Mr. Potter:—"Copenhagen, Aug. 26, 1832. Went round the Penitentiary with Professor Otto; was much pleased with the cleanliness everywhere visible. I saw a great many cases of scrofula there. The professor told me that very often, the strongest and healthiest looking men came in, and after remaining a few months, were attacked with scrofulous affections, swelling of the glands, &c. This, he partly attributed to the horse flesh, on which the prisoners are fed. He further stated, that although a certificate was given by a veterinary surgeon, of the health of a horse before it was killed for this purpose, it was by no means improbable, that many diseased horses were sent. I have gone round all the principal hospitals of Copenhagen, without noticing any particular prevalence of scrofula in them."

If the feeding of these prisoners on horse flesh have any effect in developing scrofula, we should attribute this to the too great sameness of the diet, along with confinement, rather than to any other cause. Purely carnivorous animals, and North American Indians, who live much on flesh, appear to be very free from scro-

fula; but many favourable circumstances may be assigned, among the chief of which are air and exercise, which probably concur to render this exemption more complete.

Johnston, in his travels in Abyssinia, finds the people there to be liable to spreading ulcers from the want of salt, and conjectures that scrofula in England may arise from the same cause;* but spreading ulcers are not scrofula, and moreover there is no deficient use of salt in England.

In poor-houses and gaols we may have, if preceding opinions be correct, the opportunity of testing the combined influence of the causes already mentioned. The researches of Dr. Baly appear to prove that the inmates of gaols are more liable to scrofula.† We have examined, with the assistance of the official medical men, the inmates of three union workhouses.

In these three workhouses, there were altogether 144 persons under the age of fifteen, and 20 more in one of them, who went out to school, =164. The number of adults was 334.

No. 1 is a workhouse situated in a large manufacturing town; there were 112 persons

* Travels in Abyssinia, vol. 2, pp. 174-5.

† Medico-Chirurgical Transactions, vol. 10.

under the age of fifteen, of whom 17 had decided scrofula, and no less than 36 presented signs of the scrofulous diathesis (as these are generally regarded) manifested particularly by the presence of scrofulous ophthalmia. In the house there were also 216 adults, of whom only 8 had scrofulous affections.

No. 2 is a workhouse belonging to a seaport town. There were 35 children, of whom 20 went out to school; of the 15 in the house no less than 9 were more or less scrofulous; and not one of the children who went out to school, according to the report of the surgeon. Of 74 adult inmates, 12 had scrofula in various forms.

In No. 3, situated in an agricultural district, there were 18 persons under the age of fifteen, of whom 7 were more or less strumous, and 44 adults who presented 4 cases of struma, and one of bronchocele.

Having obtained copies of the diet tables in these workhouses, we could not find any deficiency of good and wholesome food; and in every instance, the situations of the houses appeared healthy. 60 oz. of bread, 23 oz. of flour, 6 oz. of meat, half-a-pound of potatoes, 14 oz. of oatmeal, and $7\frac{1}{2}$ pints of milk, would seem sufficient weekly provision for a child under

nine years of age! Perhaps the meat may be thought in too small a quantity, but the milk and bread were surely capable of supplying enough of azotized food. Nevertheless, scrofula was decidedly too rife in all these workhouses; the exemption of the children who went out to school, in No. 2, is a curious circumstance, and if more than accidental, would tend to shew the confinement to be the real cause of the frequency of scrofula in these cases.*

4th. Great stress has been laid upon the power of venereal errors, to produce scrofula. Most German writers, following Hufeland, regard onanism as a cause. M. Lugol considers this depraved habit, rather as a sign of the presence of the disease. Barthez and Rilliet find, out of 314 tuberculous children, 11 addicted to onanism; in 303 cases no good account could be got; and there were three, in whom the depravity appeared to be the sole probable cause. Of 212 non-tuberculous children, 2 were guilty of the practice: in 209, there were no satisfactory accounts, and in one only, it might appear to be the sole cause. The results of Barthez and Rilliet, exceedingly unsatisfactory as to the

* Mr. Phillips has succeeded in establishing the influence of bad food, and of an excess of vegetable food, in the causation of the disease.

influence of any one anti-hygienic cause, are sufficiently conclusive, with regard to the combined influence of several causes.

Of 142 children submitted to the influence of several of the causes, 92 died tuberculous, and 50 non-tuberculous; while of 100 who were not exposed to the influences, 59 were tuberculous, and 41 not so; 92:50 being very different from 59:41.

5th. The diseases which have been supposed to occasion scrofula or tubercle, are chiefly inflammatory affections, common continued fevers, hooping-cough, measles, syphilis, scarlet fever, variola, and vaccination. Barthez and Rilliet have collected the best evidence on these points. The question of the connection between inflammatory affections and tubercle, has been discussed in the 6th chapter. According to Barthez and Rilliet, to whose work we must refer for information on the whole of this subject, variola, instead of predisposing to tubercle or scrofula, as had been conjectured, appears to prevent, while vaccination favours the development of this disease.

Of 34 children who had variola or varicella (a long time before their death) and who had been perfectly cured of these affections, 19 died tuberculous, and 15 non-tuberculous. Of 209 children who died without having had small-

pox, or in whom it was terminal and quickly fatal, 127 had tubercles, and 82 had them not. Of 208 children who had been vaccinated, 138 died tuberculous, and 70 non-tuberculous. Of 95 who had not been vaccinated, 30 were tuberculous, and 65 not so.

6th. Variola, scarlatina, and typhoid fever, according to the observers just quoted, have a tendency to dispose tubercles to pass into the cretaceous state.

Intermittent fever is believed by many to be opposed to the development of tubercle or scrofula; and the countries in which intermittents prevail, are asserted to be peculiarly free from tuberculous diseases;* but this is doubted by others. At the recent meeting of the Italian scientific congress, very different opinions were avowed on the question of the antagonism of ague and tubercle; and M. Lefèvre, of Rochefort, has recently written to the Academy of Medicine, to state, that, in that town, where intermittents prevail, phthisis also is very common.†

Almost all authors, with the exception of Dr. Boyd, seem to consider that tuberculous affec-

* See Canstatt, *Op. cit.* Note, s. 238. See also a paper by M. Boudin (*Annales d' Hygiène publique*, Janvier, 1845.)

† *Archives de Médecine*, Octobre, 1845.

tions are more common in women than in men.* Out of 128 cases of scrofula (external tuberculosis) admitted into the new dispensary under our care, and that of our colleague, Mr. Potter, from February, 1844, to February, 1846, 62 were males and 66 females; 80 of the whole were below sixteen, and 48, above that age. One of the patients, affected with scrofula of the axillary glands, was a female, aged 60.

The researches which have been made on the frequency of tuberculosis at different ages, relate, almost entirely, to the internal forms of the disease. So far as scrofula is concerned, we know that it may occur at any age, and from our own experience, should be inclined to doubt, whether its frequency, at different periods of life, may be so different as is thought, from the relation to the number of people of different ages.†

It has been considered that the spring is the season of the year, at which scrofula is most apt to break out; and when scrofulous sores undergo a kind of exacerbation.

* Mr. Phillip's statement has already been referred to.

† It seems, however, to be sufficiently established, that those affections which are generally regarded as the signs of the scrofulous diathesis, make their appearance more commonly in early age. It is probable that the occasional causes will act more powerfully upon young persons.

The geographical distribution of scrofula, is an interesting subject; but the data which we have, furnish us with most imperfect information; only with regard to the internal forms of tubercular diseases, is there anything like exactitude.

NOTE, from Canstatt.—On the frequency of tuberculosis in different countries.—“We chiefly follow Andral in this matter. From the 60th degree of North latitude, to the 50th, tuberculosis is very scarce; for in 1000 cases of death, there are only 53 of consumption; (this appears erroneous, for scrofula is more frequent in Russia, than in England, the disease in Russia, affecting more the outward parts and bones; the same in Scotland, and in Iceland;) from the 50th to the 45th, the disease is more frequent: so in Vienna, of 1000 deaths, 114 arise from consumption; in Munich 107; in Berlin 71; in London 246. In Paris the proportion is a 5th; in Marseilles, a 4th; in Philadelphia, an 8th; in Nizza, a 7th; in Genoa, a 6th; in Naples, an 8th; in Milan and Rome, a 20th; the disease is also frequent in the North American States, particularly in Boston. * * * * * Consumption is said not to be scarce in Spain, Portugal, Madrid, Gibraltar, Lisbon, Azores, Malta, Greece; in the Mediterranean, and Indian Archipelagoes, Mauritius, and East Indies; in the West Indies, where it particularly rages among the Negroes; and on the Western Coast of Africa. This disease is more scarce, according to report, upon the Northern Coast of Africa, and in Egypt; in Persia; in the interior parts of North America; on the shores of the Ohio, Mississippi, and Missouri (according to Clark); also at the Cape of Good Hope. Does the approach to the sea exercise a beneficial or an injurious influence? For both sides, authorities may be quoted, and contradictory opinions supported by matters of fact. Aboard ships, and among sailors, the disease is scarce. Nothing favours the rise of tuberculosis more than transportation from a warm, to a colder climate.” s. 237.

CHAPTER VIII.

LOCALIZATION, MODIFICATIONS AND COMPLICATIONS OF SCROFULA.

Many of the diseases which have been set down as varieties of scrofula, ought to be completely separated from this affection, even if they do occur most frequently in scrofulous habits; for example, rickets, mere deficiency of earthy matter, or softening of bone, unless due to the secondary effects of the effusion of tuberculous matter, is not scrofula. The loose way in which M. Lugol speaks of scrofulous affections, and which is imitated by Dr. Evans, in the argument already exposed, is particularly to be condemned. Impetigo, eczema, and other affections of the kind, are frequently called scrofulous by medical men. The ophthalmia which is generally considered peculiar to strumous habits, is, in our opinion, by no means to be ranked as a true scrofulous affection. It is merely a form of ophthalmia rendered chronic and obstinate by the constitution of the patient. It is even doubtful, how far a

tendency to sore eyes, to eruptions of the skin, to worms, lice, &c., should be set down as a sign of the disposition to tubercular diseases, according to the researches of Barthez and Rilliet. "These affections are in general regarded as more confined to lymphatic children; some persons even regard them as constituting the first symptoms of scrofula. It seems to us that in general these different affections are, as nearly as possible, as common in children who are not tuberculous, as in those who are tuberculous, and that, in consequence, we should not see in them one of the characters of the predisposition to tubercles."*

Lupus is also set down as a scrofulous disease; it is certainly tuberculous; but the tubercles do not appear to have any resemblance to the true tubercles of scrofula. Both diseases appear to occur in somewhat similar constitutions, and we have met with instances of the existence of lupus and scrofula in the same individuals. Doubtless, many such instances might be found. In general, the whole host of external skin affections, set down as modifications of scrofula, are regarded as such on very doubtful grounds. But one thing is certain,

* *Op. cit.* p. 127.

according to our definition, these diseases are not *scrofula* ; although we may differ from Barthéz and Rilliet, so far as to believe them to be at least more common in scrofulous constitutions.

In the same loose mode of speech we hear almost every affection of the bones and joints, which is at all chronic in its character, set down as scrofulous. Necroses, ulcerations of joints, &c., are very commonly, and, as a matter of course, thus described. M. Nelaton has shewn in his excellent thesis, already referred to, that the tubercular affections of bones have their origin in the grey granulation, and in the grey infiltration ; the after processes resulting from the deposit of the tubercular matter essentially resemble the same processes in other organs ; but some difference arises from the peculiarity of the tissue.

We generally find the tubercle matter deposited between the membrane investing an organ and the parenchyma of the same ; thus in a specimen of tubercle of the heart, which we recently examined, all the tubercles were in contact with the endocardium or pericardium, although some of them had pushed completely through the muscular substance. In the tubercles of the spleen represented in the illustra-

tions, the morbid formations are connected with the investing membrane of the organ. In all the specimens of tubercle of the kidney which we have seen, the deposit was connected either with the mucous membrane lining the ducts of the organ, or with the external covering. In the same way with the brain, we generally find the tubercles in contact with the external or internal membranes. And so with the bones, the tubercles are in relation with either the periosteum or the medullary ramifications. Not that we should deny the existence of these morbid formations in the parenchyma itself of an organ.

The various local affections which the deposit of scrofulous or tubercular matter occasions, have been the subjects of so many dissertations, that any further reference to them is unnecessary here.

From the numerous researches which have been made on the relative frequency of tuberculization in different organs, have already been drawn such inferences as might elucidate the general questions discussed.

A pathological relation between gout and scrofula might perhaps be established, if we possessed analyses of the blood in the former disease.

Other diseases, as mania and epilepsy, might be more or less connected with scrofula; but the details of this subject are so ample, that a volume might be written on the matters indicated in the title of this chapter.

The relation of tubercle to cancer is an interesting subject of investigation. The microscopic characters of tuberculous and cancerous formations should induce us to regard these structures as the products of very different diseased conditions; and the rarity of their co-existence in the same individual strengthens this idea.

NOTE.—Since this chapter was written, the researches of Heller have made known to us that, in cancerous blood, there is a diminution of blood corpuscles, but a decided increase of fibrin, in one instance observed to an enormous extent. This leads us to observe, that an analysis of the blood, or urine, is of very little use, without some knowledge of the state of the patient, at the time the specimen analyzed was taken from him.

We are strongly inclined to suppose that the original states of the blood in scrofula, and in gout, may present much similarity; perhaps there may be more fibrin in the blood of gouty patients; and that from a deficiency in assimilative power in the former disease, the excess of albuminous matter is excreted from the blood in the form of tubercle, as already described; whereas in gout, the assimilation is more complete, and the excess of nutriment is manifested in the form of uric acid in the destructive digestion of the tissues: but this is, in great part, hypothetical.

PART II.

TREATMENT OF SCROFULA.

This part of the subject might be discussed under three heads ; first, the general principles of the treatment ; second, the particular remedies employed ; and third, the modifications of the treatment required by the different forms of scrofulous disease. We shall omit the subjects which might be included under the last head ; it being no part of our plan to enter, at length, into the pathology or treatment of the *varieties* of scrofula. The cases appended will, in many instances, furnish the means of exhibiting our views where these are, in any respect, original.

CHAPTER IX.

GENERAL PRINCIPLES OF THE TREATMENT OF SCROFULA.

I. The most certain indication in the general treatment, whether for the purpose of prevention or cure, is in the use of means, hygienic and medicinal, tending to strengthen the sys-

tem. In scrofulous constitutions, most frequently, a general debility is observed to precede the tendency to the absolute development of the disease. With the progress of the malady this weakness increases. This is not contradicted by the fact, that we, occasionally, see persons, as in some of the instances already mentioned, scrofulous, and yet of considerable bodily bulk. One or two exceptions could at any rate prove little; and there is reason to believe, that scrofulous persons have never the same solidity of fibre as those of healthy constitutions. In them, the tone of the nervous system also is, as it were, of inferior tension. Again, when the diseased process has actually broken out, a continuance of hygienic means of a tonic character, along with the administration of remedies of the same class, is still more urgently demanded. This is true, in general, of every scrofulous disease.

The hygienic means adapted to prevent the development of scrofula, where this is considered likely to occur, should be employed at as early an age as possible. The first care should be directed to the periods of suckling and dentition. Where the mother herself is scrofulous, a healthy nurse should, if possible, be provided; not from fear of the transmission of a virus

through the milk, but because a parent so diseased will probably be incapable of affording a due supply of nutriment to the offspring. Where the child cannot be properly provided for in this way, the use of milk prepared, as Dr. Paris recommends, by expression through a bag containing suet, may be advisable. Milk so impregnated with fat may be useful, where there is a tendency to mesenteric disease, in much the same way as cod-liver oil is beneficial in scrofula.

Warm clothing and good air are, especially, requisite for scrofulous children. Lloyd gives some remarkable instances in which warm clothing, without other means, appears to have cured scrofula, and prevented it from attacking the chest.* When the patient is moderately strong, a residence by the sea-side, and, at a sufficiently advanced age, sea-bathing, are advisable. Otherwise, a dry elevated table-land, or the sloping sides of mountains, appear to afford the most eligible sites of residence. Sheltered valleys, where the sun's rays do not sufficiently penetrate, and where currents of air are, in great part excluded, appear to be the hotbeds of scrofula. In England we might particularize many

* Lloyd on Scrofula, pp. 30-31.

parts of the Downs, the Mendip Hills, Cleveland, and the southern slopes of the Cheviots, as likely to afford favourable spots for the residence of such patients.

The diet should be nutritious ; and, we should conceive, chiefly composed of animal food. Stimuli should generally be avoided ; but good ale may be recommended. Exercise, bathing, and frictions of the skin are very beneficial. Examples of the good effects of regimen and of country or sea air are of constant occurrence.

Among other precautions, some have gone the length of proposing the legal prohibition of marriage in the case of scrofulous people. This absurd proposition has been chiefly advocated by M. Lugol. We should certainly like to know where M. Lugol would draw his prohibitory line. What amount of scrofulous disease would bring a person within the terms of such a law ? In the language of Dr. Samuel Johnson, to put in practice such a law would be " impossible if it were endeavoured, and would be foolish if it were possible." As the reviewer of M. Lugol, in the *Archives de Médecine*, observes, " one thing makes us uneasy for the results of this matrimonial legislation ; M. Lugol has not foreseen, that in interdicting scrofulous persons from marriage, he would not prevent

them from reproducing, and thus introducing into the world an innumerable mass of bastards, true parias, who would soon become very inquieting for the social state."

There are, probably, not many cases in which the influence of a careful system of physical and moral education is not capable of materially improving the stamina of a family. We are, ourselves, acquainted with more than one instance in which scrofula existing in the parents, and perhaps produced, or at least developed in great measure, through the complicated deleterious influences which poverty can bring to bear, has been, apparently, eradicated in the present generation, and the social progress of the family has corresponded with an increasing degree of physical energy and health. This doctrine follows essentially from the definition of the disease which we have given. If scrofula be merely a modification of the inflammatory process arising from a peculiar cachexia, and exhibiting every stage of deviation from the usual standard, we perceive at once how exaggerated are the notions of the excessive power of the hereditary influence, entertained by Lugol.

Something surely may be trusted to the sympathies of nature in marriage. A fine healthy

man or woman is little likely to become connected with a very scrofulous person who in general will exhibit external signs of *low breeding*. The thick lip, the lymphatic-like wrists and ancles, the general deficiency of fine contour observable in the well-marked instances of the scrofulous diathesis, are not likely to prove attractive in the matrimonial market. Again, if a scrofulous person marry with one non-scrofulous, there may be hope of an improved breed by such an alliance. And from the intermarriage of very scrofulous persons the progeny is likely to die off in proportion to the inveteracy of the diathesis.

Our function as medical men is to prevent and cure scrofula by hygienic and medicinal means; and the duty of the legislature in such matters is to place by wise laws the attainment of the greatest amount of physical comfort possible in the power of the mass of the people.

II. The principles on which the medicinal treatment of scrofula should be founded, arise evidently from the pathology of the disease. If we are called to see a patient in whom the actual diseased process is only imminent, we should have recourse, as a general rule, to the use of tonics, attending to the state of the se-

cretions and excretions at the same time, and often conjoining the employment of alteratives. Frequently the outbreak of the disease is preceded by a disorder of the digestive system, although to these symptoms of deranged digestion a very exaggerated importance has been ascribed; for we have observed cases in which the tongue continued clean, the bowels regular, and the appetite not very insufficient, before and during the formation of the tumours. The error of ascribing the symptoms of this disease to a deranged digestion, we have already noticed. Upon such a hypothesis Lloyd, following Abernethy, lays great stress on the employment of an alterative treatment by means of mercury; and on a similar view has the use of cod-liver oil been much recommended in Germany.

The ideas of Mr. Lloyd are capable of application in many cases. As these views were published before the use of iodine, they are especially calculated to correct the prejudice which many now entertain against the employment of mercury at all in this disease. Mr. Lloyd trusted chiefly to occasional doses of blue pill along with soda to correct acidity, and where there was a weak stomach and want of appetite, he had recourse to tonics.

In the work of Lloyd and that of Abernethy, cases shewing the successful results of this treatment are detailed. *

Where the tongue is furred, or spotted with reddish maculæ, the pulse quick and irritable, and the bowels constipated, a state very common at the commencement of scrofulous tuberculization, benefit will be often derived from the use of hydrarg. c. creta in a dose of three or four grains twice a day, along with seven or eight grains of magnesia, combined sometimes with rhubarb. In some cases we have seen enlargements of the glands disappear under this treatment, without the use of other remedies.

The total proscription of mercury is as unwarrantable as the exclusive use of iodine or cod-liver oil. A knowledge of the physiological law which regulates the action of the whole class of purely chemical compounds on the systems of men and animals, is of great value in correcting such exclusive notions: we are thus taught that the chemical and physiological, and consequently the medicinal properties of bodies stand in a close relation to each other, and that a similar connection exists between

* See Abernethy on local diseases, &c. pp. 180-198. (p. 9.

them as between the external forms and the physiological properties of plants. As the chemical characters of the groups formed by the elementary bodies and their compounds, pass gradually into each other, so do the medicinal properties of these substances. The *exclusive* pretensions put forth in favour of particular remedies become much softened down when subjected to the control of such a law. In truth considerable analogy exists between the action of mercury and that of iodine: the compounds of both substances are powerfully irritant in large doses, tonic and alterative in small doses, and, given so as to act constitutionally, appear to have the power of greatly accelerating and increasing the destructive digestion of the tissues; and both, when pushed to excess, give rise to dangerous constitutional effects connected with a peculiar erethism. Mercury is undoubtedly the more powerful remedy of the two. But in our practice we are not deterred by chimeras from the use of mercury in scrofula. Indeed the most potent remedy which we possess for effecting the removal of a scrofulous tumour, is in our opinion the sub-iodide of mercury, a substance whose powers of salivating have been strangely doubted;* but the

* See Cogswell on Iodine, p. 159.

properties of compounds follow the rule of the base, rather than that of the electro-negative element; and the sub-iodide is a true mercurial compound.

The uses of iodine and the analogous body bromine, and also may be added, of the muriatic and nitro-muriatic acids (according to Dr. Buchanan iodine is converted into hydriodic acid in the stomach,* and this has been confirmed by our experiments on bromine,†) are first as tonics, and secondly as deobstruents: all this class act upon the kidneys.

Tonics are admissible at every stage, and the best plan of exhibiting them, in our opinion, is to combine calumba with the saccharine carbonate of iron.

The hydriodate of potass has usurped the place of the alkalies, at one time much recommended. This compound, like the chloride of sodium, in all probability undergoes decomposition in the stomach, and exerts the power of both its constituents.‡

* Medical Gazette, vol. 13, p. 515.

† Edin. Med and Surg. Journ. Nos. 75 and 76. 1842.

‡ We have proved of the whole class of compounds, of chlorine, bromine and iodine, that their activity is in proportion to their solubility and facility of decomposition. We have, moreover, shewn experimentally that many of them *are* partially decomposed in the body. The elements

The merits of cod-liver oil will more particularly come under consideration in the next chapter. We have seen decidedly good effects from its use, especially in cachectic individuals. Some of the cases appended will illustrate this. The theory of Ascherson already mentioned, is too mechanical. He finds, that when albumen comes in contact with fluid fat, a coagulation takes place in the former, in consequence of which, a sacculated membrane or cell is formed, containing a molecule of the latter. He thus considers that the use of cod-liver oil in scrofula, may consist in its power of enabling, mechanically, the excess of albumen in the blood to be worked up into blood globules. The action of cod-liver oil is, in all probability, as a tonic, from the resinous principle which it contains; by stimulating animal heat; occasionally by acting as an aperient, and also, as a deobstruent, more particularly by increasing the quantity of urine. A more specific power is claimed for it by Klencke, who makes its use-

being liberated in the system in the nascent form, would thus be much more active. In all probability a great portion of the action of a substance, is thus owing to a series of combinations and decompositions which it effects and undergoes in the system, giving rise to numerous molecular changes.

fulness to be owing to its supplying the deficiency of the fatty principles of the bile, which, according to him, are not excreted in sufficient quantity in scrofula, but remain in the organ, constituting the fatty liver so often found in this disease.

Purgatives, of course, have their use in the treatment of many forms of scrofulous disease, and are frequently useful in *tabes mesenterica*. In many cases of this form of the disease, we have obtained good results by the use of small doses of elaterium.

According to Vering, blood-letting is occasionally useful in scrofula.*

The conclusion to which we are inclined to arrive, with regard to the general treatment of scrofula, is, that it should be eclectic, and to a certain extent even experimental. The remedies must be adapted to particular cases, and our present system of treatment still leaves so much to be desired, that frequent opportunities are afforded in which the use of new means cannot be improper, and may even be considered desirable.

* *Manière de guérir la Maladie Scrofuleuse*, p. 41.

CHAPTER X.

REMEDIES USED IN THE TREATMENT OF SCROFULA.

To describe all the remedies which have been used in the treatment of scrofula, would be both tedious and unnecessary. We shall content ourselves with saying something on those which appear most important, either from the success which has attended their use in former times, the extent to which they are used at present, or their novelty, and the consequent interest which they are calculated to inspire.

With the objects just indicated, in view, the remedies may be discussed under the following heads :—

- 1st. Digitalis, walnut leaves, vegetable tonics.
- 2nd. Elementary non-metallic bodies : chlorine, bromine, and iodine.
- 3rd. Alkalies and earths, with their salts.
- 4th. Metals, with their salts : antimony, mercury, copper, iron, and gold.
- 5th. Mineral waters and baths.
- 6th. Cod-liver oil.
- 7th. Electricity.

I.—DIGITALIS, &c.

Digitalis was first recommended by Van Helmont. It was used with success by Haller. He gave it in a case of "internal scrofula" in which success was previously despaired of. The remedy was persevered in until the skin separated in scales. The case was cured. Several instances of its successful application are recorded in the *Practical Essays*. Darwin succeeded in curing a case of scrofulous ulcers by administering the powder in the dose of 5 or 6 grs. thrice a day. The remedy was used externally, either in the form of the infusion, or of powder of the leaves; and the external and internal uses were conjoined.*

When we consider the powerful diuretic effects which foxglove can exert, we may easily understand how it comes to be useful in scrofulous affections: but this property is combined with so many inconveniences, as to account fully for the abandonment of this remedy, and the use of safer means which are also more efficacious.

Walnut leaves, after they had been for some time abandoned, have been again brought for-

* See *Travaux Thérapeutiques Anciens et Modernes sur la Digitale pourprée, &c.* Bayle, *Bibliothèque de Thérapeutique*. t. 3.

ward in the treatment of scrofula, by M. Negrier of Angers. This physician has published two papers on the subject, one in the Archives de Médecine, for April and May, 1841, and the other in the same journal for February, 1844. In the first of his papers he states he had used the remedy in 56 cases; of which, 31 were cured, and 18 much ameliorated. His facts are sufficiently miscellaneous: thus he includes scrofulous ophthalmia, and even chlorosis. The following is his account of the mode in which he uses the remedy.

“The infusions of walnut leaves are made by throwing a large *pincée* of the cut leaves into 250 grammes of boiling water. The infusion is to beedulcorated with sugar, or with the syrup whose preparation I am about to describe. I have always given from two to three cups of this infusion daily; as many as five may be given.

“The decoction of walnut leaves which acts so advantageously in lotions, and as a topical application with which the compresses used to dress the scrofulous ulcers are saturated, should be more concentrated than the infusion. I employ a small handful of leaves for a kilogramme of water, and the decoction is prolonged from 10 to 15 minutes. It is very useful locally, and

also in general baths ; its efficaciousness is especially remarkable as an injection into fistulous passages.

“The extract is prepared with the leaves of the nut, by the method of displacement. In employing the dry leaves, care can be taken to renew the preparation as often as there is need, during all seasons ; while in making use of fresh leaves, too much must then be prepared, and it is liable to alteration.

“The syrup is prepared with the extract of which 40 centigrammes are to be mixed with 32 grammes of simple syrup.”

To adults he gives from 32 to 69 *grammes* of this syrup in the 24 hours. His pills of the extract are composed of 20 *centigrammes* each, made solid by the addition of powder of the dried leaves. He gives two of these daily ; never more than four. He also sometimes makes the extract into an ointment, by the addition of axunge and essential oil of bergamot.

An analysis of M. Negrier's facts would occupy considerable space. On a careful consideration of the evidence which he adduces, in support of the virtues of the remedy, we are disposed to regard these as of a very doubtful character. The treatment was, in many of the cases, of such long duration, and the *apparent*

physiological operations of the remedy so obscure, that we cannot believe it a substance of any great power. It is probably beneficial internally as a tonic, and as an astringent when applied externally. In the latest paper of M. Negrier, he recounts some new facts. There appears at least to be little doubt of the success of his remedy in the cases of scrofulous ophthalmia.

There is scarcely a vegetable tonic which may not be used in scrofula. Cinchona, gentian, calumba, cascarilla, hop, and many others, have been more or less recommended. It is chiefly in the intervals of the *iodine treatment*, or in a case of marked debility, that we should recommend the use of these substances. We sometimes prescribe an 8 oz. mixture, containing an oz. of the concentrated infusion of gentian, with 70 or 80 minims of diluted sulphuric acid; a table-spoonful to be taken thrice a day. The combination of calumba, in powder, with the saccharine carb. of iron, in particular, has appeared to be useful as a general tonic.

II.—ELEMENTARY NON-METALLIC BODIES.

The strongest analogy in physiological and medicinal properties pervades the class of chlo-

rine, bromine, and iodine. We have shown in our paper on bromine, that there is every reason to believe any one of these bodies to be capable of producing the effects which can be obtained from another; but that the different forms in which we are compelled to use them, give rise to differences in action. Thus the very slight solubility of iodine almost precludes its use in watery solution; and the convenience with which solutions of bromine can be prepared, renders this body peculiarly adapted to form lotions for external application. Our experience, and that of our colleague, Mr. Potter, tends strongly to support these former observations, with regard to the utility of this substance used externally. It forms an easily prepared, elegant, and cleanly lotion; 8 or 12 minims of bromine being used to a pint, half a pint, or 8 oz. of water. Now the price of iodine having increased so much, bromine is by no means precluded from use on the ground of economy. Bromine can be bought at present, for less than 5s. an oz.; and if the present demand for iodine in the commercial world should continue, the use of bromine may be found advantageous, even economical, as no doubt the manufacturer could furnish it, were there more demand, at a cheaper rate. The bittern from the strong saline springs of Birtley, near Newcastle, contains both iodine

and bromine ; we have not ascertained the proportion in which the latter exists, but it appears to be sufficiently large to enable the manufacture of the substance to be carried on.

All the three elementary bodies are much more irritant, and in consequence, we may assume, more tonic than their hydracids, into which they are converted by remaining in the stomach, or at least in the course of absorption. The tonic effect which these substances produce in a small dose, is probably only a modification of the irritant action to which they give rise when administered in a quantity sufficient to produce marked physiological symptoms.

It is probable that we should find chlorine to be the most active, bromine the next, and iodine the least potent, physiologically, judging from comparative experiments on animals, and in accordance with the great law which makes strict relation subsist between the chemical, and the physiological and medicinal properties of bodies.

Great discussion has arisen as to whether iodine should be given in small, or in large doses. Baudelocque, Lugol, and Tyler Smith support the administration of small doses ; while Dr. Buchanan has been the chief advocate of the system of large doses. But in fact scarcely any

one administers the iodine pure in one way or another. It is the ioduretted solution of the hydriodate of potass, or the compound iodine tincture, which is always given. We prefer a medium system. We always give iodine in the form of the compound tincture of the London College, or a simple solution of hydriodate of potass. We commence, with adults, by giving 25 drops of the compound tincture thrice a day, which we augment gradually to 30 or 40 drops, if the patient can bear it; but in general when the dose becomes above 35 drops, nausea, pains in the stomach, and sometimes vomiting and purging are occasioned, in which case the dose is immediately reduced. When the patient can bear a good dose without the remedy disagreeing with him, in the way of its primary action, we do not find any inconvenience from its secondary symptoms; but we do not give iodine in a very cachectic habit, preferring, in such cases the use of iodide of potassium alone, or the syrup of the iodide of iron, or cod-liver oil.

The compound tincture of iodine, given in this way, improves the appetite, acts as a general tonic, and increases powerfully the quantity of urine, and also, according to our experiments, the amount of solids, and of urea. Some of the facts already recorded in the second chapter will

support these conclusions. All authorities agree with regard to the increase of urine, and the existence of iodine in this fluid in a combined form, when the element or any of its compounds is given internally.*

The following experiment was performed with the view of examining the subject more fully. The person experimented on resides with us, aged 24, extremely healthy and regular in all his habits. An account was kept of the diet during the course of the experiment, but the food was not weighed; and in fact, as we have ascertained, the food may be the same from day to day, and yet the amount of urine vary considerably from the effects of exercise, temperature, and other causes.

Urine before the iodine was given.

First day, 44½ fluid oz.; specific gravity, 1025. Urine almost neutral; slightly sedimentous.

Solids.....	52 grs.
Uric acid.....	0·35
Urea.....	13·50
Salts.....	12·10
Residue.....	26·05

* See Cogswell on Iodine, pp. 57-63.

In 24 hours:—solids, 1037·68; urea, 269·398; whole quantity of urine 19955·46.

Second day, 74 oz. of clear urine, specific gravity, 1015.

Solids.....	34 grs.
Uric acid.....	0·15
Urea.....	9·50
Salts.....	8·90
Residue	15·45

Solids, 1051·539; urea, 312·175; whole quantity of urine, 32860.

Third day, 39 oz. slightly acid; specific gravity, 10·5

Solids.....	50·5
Uric acid.....	0·15
Urea	14·30
Salts.....	11·50
Residue	24·55

Solids, 884·20; urea, 250·37; whole quantity of urine, 17509.

On the next day the quantity was 47 oz.; of the same specific gravity as the last.

He now commenced to take the compound tincture of iodine, in the dose of 25 drops, thrice a-day, increasing by 5 drops every third day. Next day the urine was 54 oz.; specific gravity, 1020; the day after, 59 oz.; of the same specific gravity. On the third day it was 67 oz.; of specific gravity, 1018. On the fourth, 52 oz.;

specific gravity, 1025. This specimen was analyzed. It was clear, acid, and highly charged with iodine. The following was the result.

Solids.....46 grs.

Uric acid..... 0.60

Urea13.40

Salts17.65

Residual bodies.....14.35

Solids, 1072.754; Urea, 312.498.

5th day, urine not kept.

6th 54 oz. specific gravity 1020

7th 47 1021

8th 96½ 1013

9th 90 1017

10th 85 1015

11th 49 1024

12th 64 1016

13th not kept.

14th 48 1024

He never could take more than 40 drops thrice a-day. The effect which iodine produces upon the urine, generally begins to be diminished in about a fortnight.

The analysis of the last specimen gave, in

Solids.....48.4 grs.

Uric acid..... 1.05

Urea.....18.00

Salts13.70

Residual bodies15.65

Solids, 1040·7; urea, 380·2; whole quantity, 21683·2.

In several of the analyses recorded in the second chapter, an increase in the quantity of the urine will be found to be produced by the use of iodine, and, in some of them, along with an increase of specific gravity, (see cases 4, 6, and 7, of the analyses of the urine). The increase of urea in case 7 seems too great to be otherwise than essential, and the same observation applies to the concluding analysis in the experiment just related. Nevertheless, further investigation of the subject is very desirable, and may possibly shew that this action on the urine, is not always an accompaniment of the use of iodine. Indeed the substance will not produce the same effects on all individuals. Other diuretics may be found, which have a similar effect; but the whole subject of the action of diuretics, on the various principles of the urine, is new and requires investigation.* We have not been enabled to make further researches, or to complete an experiment commenced, in which an attempt was made to weigh the food and measure the drink of every day, to make the exercise as regular as possible, to

* Colchicum increases the amount of urea and uric acid.

compare the ingesta with the egesta, and to note the state of the thermometer and barometer daily, both before and after the administration of iodine.

When we consider the probable connexion of the secondary digestion of the tissues of which the principles of the urine are the chief results, with the state of the blood and the respiration, we may understand the important part which the use of a remedy like iodine may play in the treatment of such a disease as scrofula : 1st. In quickening the powers of absorption and getting rid of the effused albumen, where this not in such a form as to preclude all action of the kind ; and 2nd. in removing the excess of albuminous substance in the blood. Again, we deem it by no means an improbable supposition that the chief seats of the formation of urea, may be in the lymphatic glands of the general system. This substance is not formed in the kidneys, as we know by the experiment of Prevost and Dumas. Now, is it not very probable that the lymphatic glands may play such a part on fluids absorbed from the digestion of the tissues, as there is reason to attribute to those of the mesentery and others in the course of the chyle, upon this fluid ?

The properties of the compounds of chlorine, bromine, and iodine, come under discussion, under the heads of their bases. Many speak most improperly of giving iodine when they administer the iodide of some base; no doubt the property of the base is materially modified; but the iodides of potassium, iron, mercury, &c., resemble more nearly the compounds of their bases, than they do their electro-negative elements in physiological and chemical properties.

III.—ALKALINE AND EARTHY OXIDES AND SALTS.

The alkaline and earthy oxides have been used, from a very early period, in the treatment of scrofula, in various forms, of which *venice soap* is worthy of notice.* The alkalies and their carbonates, and lime water have been especially used with benefit. In particular cases of gastric irritation connected with acidity, the alkaline carbonates will be found especially beneficial; and we have repeatedly combined them with bitters with good effect. Hufeland relates several cases cured by lime water. Brandish has particularly pointed out the use

* See Hufeland par Bonsquet, p. 290.

of caustic alkali ; and Sir Benjamin Brodie in a lecture published some years ago, very strongly advocated the virtues of alkaline remedies in strumous affections and goitre.

But these bodies have now been almost entirely deserted for the haloid salts, of which the chlorides, bromides, and iodides of most of their bases, have been used or might be used with more or less advantage.

The chloride of potassium is not used, so far as we are aware, in the treatment of scrofula ; but might in all probability be given now, with advantage, when the iodide is so dear. The experiments which we formerly published, prove this substance to be much more energetic than the corresponding compound of sodium, although not in accordance with the terms of our general law, so powerful as the iodide of potassium. There is scarcely a doubt but that the chlorides, bromides, and iodides of the same bases produce effects most identically similar in kind, differing only in degree.

The bromide of potassium is in accordance the same with law, more powerful than the chloride, less active than the iodide. Not being so apt to occasion nausea as the latter substance, it may be used in cases where this might disagree ; and our researches shew with similar physiologi-

cal and medicinal effects. As far as our observations, made since the publication of the paper referred to, have gone, they corroborate these former remarks.

The iodide is, as far as our enquiries go, best given in doses of three or four to eight grs., in solution, three times a-day to adults. We generally begin by dissolving a drachm in solution, in 8 oz. of water; sometimes we dissolve four scruples, or five or six scruples in the same quantity of water; and give a table-spoonful of the solution thrice a day: cases occur in which the hydriodate of potass can be borne where the compound tincture disagrees (case reported as No. 14, in the appendix, is an example.)

The effects of hydriodate of potass are principally manifested, 1st, as a tonic; 2nd, by increasing the quantity of urine; 3rd, sometimes by acting as a purgative. An increased tendency to perspire is also a common symptom, as with the iodine itself. The salt is readily absorbed and may be detected in the various excretions by the well known test for iodine. It is probably, as has been already stated, partially decomposed in the system.

The chloride of sodium has been recommended in scrofula and even in phthisis. Sea-water, as an external application, forthwith, comes un-

der consideration. The general law already laid down warrants the belief, that chloride of sodium possesses nearly the same properties as the iodide of potassium; but its action is much weaker. In many mineral waters found beneficial in scrofula, and believed to act through *homœopathic* doses of iodine and bromine, the active ingredient is, in all probability, the common salt which exists in large quantity.

The muriates of lime and baryta were greatly recommended by Hufeland. A curious case of the prompt cure of scrofula by a large dose of the muriate of baryta is related by Vering. "A girl of five years of age, very little susceptible of irritation, affected with scrofulous eruptions and with scrofulous tumours of the abdomen and neck, was ordered to take a drachm of the muriate of baryta dissolved in an ounce of water in the following doses. At first she took ten drops of the solution, the dose of which was daily augmented by five drops, and besides that, the external tumours were slightly rubbed every day with five grains of the extract of conium softened in saliva. The use of these remedies had provoked a sufficiently strong evacuation by stools and urine, and the lower part of the abdomen and the cervical tumours were already considerably

diminished in size, when the nurse finding this proceedure too long, took it into her head to abridge the cure by giving the patient the whole solution in the space of a few hours. According to the report of the father there came on in half an hour after the taking of the last dose, terrible spasms, a tightening of the neck, diarrhœa, vomitings, which almost made the eyes start out of their orbits ; then a strong fever, accompanied by a perspiration, delirium, extreme anxiety, and finally, a kind of stupor. The patient passed two days in this state, without the sending for assistance being thought of, although the difficulty of the respiration, the cold sweats, and the rattling in the throat, caused death to be expected every moment. The intestinal dejections and the urine were disengaged in large quantity, and the skin was covered with an abundant sweat, viscous and very fetid. On the third day all the symptoms of the scrofulous disease had disappeared ; the patient was, in reality, exceedingly weak, but the whole constitution of the body, the physiognomy even had undergone such a favourable change that a trace of the disease was no longer to be perceived.”*

* Vering, *Op. cit.* p. 259.

According to our experiments, the bromide and iodide of barium have the same physiological properties with the chloride. According to a German writer, mentioned in a recent number of the *British and Foreign Review*, the iodide of barium is apt to act too energetically on the uterine system. The following case would rather sanction this idea:—

June 7th, 1845.—A. P——— aged twenty, of red hair and sanguine complexion. Her father has a stiff knee, apparently from scrofula. She has scrofulous tumours on the right side of the neck, others about the angle of the jaw, on the left side, and a swelling of the left sub-maxillary gland. She has only been four times unwell during a year and a half, and then slightly so. B^s costive. T. pretty clean. P. 96. Appetite bad. To take two tea-spoonfuls, thrice a-day, of a solution of one drachm of the iodide of barium in 6 oz. of water.

14th. Has had a severe pain of the neck which ascended to the eyes. P. 100. T. clean. B^s now very costive. Has discharged a tapeworm, and apparently, from her description, the whole of it. To take a dose of castor oil every morning, and to continue the solution.

21. She menstruated on the 20th, and has been profusely so till now. Complains of pain in the left side. On account of the severity of

this pain, and the effect on the uterus, the solution was suspended. The after treatment was attended with very little success; but the patient was unwell again on the 12th of July. The patient referred to in case 6 of the 7th chapter used the same remedy; he had an enormous mass of enlarged glands on the right side of the neck, several of which had lasted four or five years; two or three had burst and left cicatrices. He took the iodide of barium (after a fruitless trial of the iodide of iron, and hydriodate of potass ointment) in the dose of a table-spoonful, thrice a-day, of a solution, containing a drachm of the salts to 8 oz. of water, and had an ointment composed of a drachm of the same substance to the ounce of lard, to be rubbed on the tumours. This treatment continued with occasional interruption, from the 20th of April to the 4th of August, had an exceedingly good effect on the tumours, which were greatly reduced. The remedy appeared to occasion headache and pain of the back.

IV.—METALIC PREPARATIONS.

The preparations of antimony, once much used in the treatment of scrofula, are now rarely exhibited; doubtless the action of the com-

pounds of this metal on the skin, is calculated to render them of some avail. Plummer's pill is sometimes exhibited as an alterative in this disease. We have obtained beneficial results in the treatment of impetigo, in scrofulous subjects, by combining the exhibition of mercury and antimony. Our general plan is to give three grs. of the hydrarg. c. creta along with five or six of the golden sulphuret of antimony twice a-day.*

Of the preparations of mercury the hydrarg. c. creta, the chloride and sub-chloride, the bromide and sub-bromide, the iodide and sub-iodide, the nitrate externally, and the blue pill, are those most likely to be used.

* In all probability the sulphurets of lead and antimony are acted upon by the muriatic acid of the stomach, and thus converted into compounds more capable of absorption. In the course of some experiments which we performed lately, we satisfied ourselves that the sulphuret of lead if administered for a long time to animals, is capable of producing the characteristic effects of lead. We found also that a solution of muriatic acid of the strength of three per cent., which is about that of the gastric juice, exerts an action upon powdered galena at the temperature of 100°. Dr. Christison asserts in his toxicology, that if the sulphuret of lead had a poisonous effect this would be contrary to the rule which makes unoxidized bodies inactive. This reasoning is a specimen of the strange views which prevail upon such subjects, for the sulphuret of lead is analogous to the oxide chloride, bromide, and iodide of the same base (chemically speaking).

The bromide and sub-bromide have been shewn to resemble corrosive sublimate and calomel very closely in their physiological and chemical actions. The bromide may be used with success in scrofula, giving it in small doses, precisely as if it were corrosive sublimate. The latter preparation is chiefly indicated in the combination of syphilis with scrofula. Case 23 in the appendix, exhibits an instance of the kind, in which this remedy was given with benefit.* Dr. Christison seems to mistake somewhat the relation which the iodides bear to other mercurial compounds, when he says, speaking of the iodide and sub-iodide (or biniodide and iodide, as he prefers to call them) "the biniodide is probably the most energetic; and at all events, there seems scarcely any reason at present for the admission of more than one in a pharmacopœia."† Now these bodies differ nearly as much in their physiological properties, as corrosive sublimate and calomel. The one, if given at all, should be administered in doses of from one-eighth to one-fourth of a gr., while the other may be given in two or three gr. doses; although

* Akenside prescribed corrosive sublimate in scrofula at the same time with the extract of conium and Peruvian bark, but without combining these remedies.

† Dispensatory, p. 529.

we generally give one grain of the latter thrice a-day. Cases will be found recorded of the internal and external uses of the sub-iodide.

Of the preparations of iron, the saccharine carbonate, the iodide with its analogous preparations the chloride and bromide, and the sulphate may be mentioned.

Dr. Tyler Smith objects to the use of the iodide, on account of its liability to undergo decomposition in the stomach. We recommend this body on account of the very circumstance which Dr. Smith quotes as an objection; but care should be taken, by means of Dupasquier's mode of preparation, to prevent the decomposition taking place out of the system. The administration of this salt in any other form than that of the syrup, or of the carb. of iron in any other form than the saccharine carb., should never take place.

In very cachetic persons, the result of our observation would lead us to prefer the syrup of the iodide of iron to any other compound of iodine; but the properties which it possesses are rather those of the base, than of the electro-negative element. All the preparations of iron act powerfully as stimulants of the intestinal canal, and probably upon the uterus. The syrup of the iodide seems indicated, especially

in scrofula where the menstruation is defective. In such cases, also, we sometimes combine the sulphate with aloes. The bromide apparently, according to our results may be used instead of the iodide.

The diniodide of copper has been found very useful in scrofulous affections of animals; but has not, so far as we are aware, been used in man.

The preparations of gold appear to bear a certain resemblance in their action to those of mercury; but they have not been proved to possess such a superiority as to render their use called for.

V.—SEA BATHING, MINERAL WATERS, &c.

The effects of sea-bathing as a therapeutic agent in the cure of scrofulous affections are generally admitted. It is probable that the beneficial action is due to the stimulation of the skin and the circulation. We find the following in the elaborate work of M. Chenu:—"sea-bathing favours the hæmatisation, excites the general circulation, and gives more of expansion to the capillary circulation. Under its influence the skin becomes coloured, and is injected more easily. The pulse is accelerated in nervous persons, and those more susceptible of impres-

sions; the opposite effect is observed in subjects of strong constitution. The only modification which it experiences in these latter, consists in more or less fullness. The circulation being generally excited, this explains the ordinary and prompt absorption of lymphatic swellings.* Some effect may be due to the inhalation of an air by the sea-side, impregnated with chlorine, bromine, and iodine, disengaged in the various processes going on about the part of the shore subjected to the action of the tide. This disengagement is probably owing to the action of various organic substances on sea water. The peculiar smell experienced by the sea side, seems to indicate the existence of these substances "it seems" says M. Chenu "to announce a slight disengagement of muriatic acid and is only sensible upon the margin, and at the surface."* The only attempt with which we are acquainted, to ascertain whether sea air does really contain chlorine, was made some years ago by an Italian experimentalist, whose name we do not remember. He hung a glass balloon filled with ice at some distance from the sea,

* *Essai pratique sur l'action thérapeutique des eaux minérales* par M. Chenu. t. I, p. 298. Paris, 1841.

* *Op. cit.*, p. 286.

when the wind was not blowing from that direction, and received the water condensed from the air by the balloon in a vessel; under these circumstance he was unable to detect any trace of the presence of chlorine. We proceeded in a different way: having a vessel with a solution of nitrate of silver, we forced through the liquid by means of a bellows, a quantity of air during several minutes; the result, was (the atmosphere being very calm, and the slight wind not directly from the sea, at about thirty paces from the sea shore) a distinct milkiness of the water, although there was no precipitate.

The internal use of sea water is not unlikely to be as capable of curing scrofula, as almost any of our therapeutic means; the chlorides of sodium, calcium, and magnesium which it contains must be admitted to be sufficient to produce tonic and alterative effects of no slight character.

Since the first discovery of iodine in the mineral waters of Piedmont, by M. Cantu, and the almost constant detection of this substance, or bromine, in every mineral water containing a large quantity of chlorides, in which the research has been undertaken; a ludicrous degree of importance has been attached to the existence of minute quantities of bromine and

iodine in waters known to be highly charged with the alkaline and earthy muriates; as if such difference existed between the activity of chlorides, and bromides, iodides, as that a proportion of $1\frac{1}{8}$ th of bromine, and $\frac{1}{8}$ th of iodine, to 189 $\frac{1}{2}$ grs. of chloride of sodium, alleged to be found by Mr. West in the Woodhall, (or Iodine!) spa, the water containing at the same time the chlorides of lime and magnesium, could be of such great consequence. But the greatest absurdity is the making bromine and iodine figure in the analyses uncombined, at all; as if these powerful electro-negative elements could remain for a *single moment* in such waters in a free state. According to Mr. West's analysis of this very water, there exists in it a quantity of bicarbonate of soda! Now we believe that bromide of sodium might be used as a condiment instead of the chloride.

In England the mineral waters of Shap and Shotley appear to be the best fitted for use in scrofula, on account of the large quantity of alkaline and earthy muriates which they contain.

M. Lugol has praised highly the effects of ioduretted baths. It is perfectly certain, as is shewn by Dr. Cogswell* that in these baths the

* Op. cit., p. 48.

iodine is volatilized. There seems no reason for ascribing any superiority to such baths over the similar application of sea water.

M. Bousingault has asserted that in the cordilleras of the Andes, the people are generally exposed to goitre; but that in certain valleys the saline fountains contain always iodine, and that those who use a salt made from the strongly ioduretted springs are exempt.

The ordinary conjunction of the use of sea-bathing and mineral waters with the other means of a hygienic character likely to prove beneficial in scrofula, should induce us in cases where the circumstances of the patient admit, to have recourse to such means, with which ordinary medicinal treatment may of course be combined.

VI.—COD-LIVER OIL.

Much credit is due to Dr. Bennett, of Edinburgh, for his exertions in bringing this substance before the notice of the profession. The chief precaution to be employed in selecting the remedy for use, seems to be to take care that the specimen has not been made from stinking livers, or that it is not the common cod oil which is used by curriers, and is made from

the refuse of the cod generally. To our certain knowledge much of this latter preparation has been sold, and used medicinally for the genuine oil of the liver. According to German authorities, the oil is best when removed from the livers by exposure of them to the sun in large glass cylinders, and collecting the fluid which spontaneously transudes and flows out. The following account is quoted from Klencke. "In recapitulating the three kinds employed in medicine, we have first, the oil of the liver, *oleum jecoris aselli aureum, subflavum*. This oil may, according to the researches of Dr. Baur, of Tübingen, be replaced by many other kinds of oil. This kind (*oleum subflavum*) has the appearance of good poppy oil purified, of a golden yellow colour, and transparent when it is examined in a glass bottle; in a smaller quantity it appears whiter. Its specific gravity, much less than that of the darker kinds, is 924 at the mean temperature of 15° of Reaumur. It shews itself feebly acid to reagents; the taste of it is sweet, resembling somewhat that of whale oil. In the cold it deposits stearin, which ought not to be separated from it. The second kind, which after Baur we designate by the name of *oleum jecoris aselli rubrofusum*, differs from the first, as well by its colour as by its smell and taste. Preserved

in a glass flask, it much resembles Malaga wine, of a reddish brown colour, is not troubled, and has the smell of salt herring, with a sharp taste. More acid to reagents than the *oleum subflavum*, it weighs more, the specific gravity being 927. The use of it soon becomes disgusting. The third kind, which is the darker, is of a black greenish brown shade; its greater consistence depends on the high temperature to which it has been subjected during its preparation. It is very acid, not transparent; we shall call it *oleum jecoris aselli fusco-empyreumaticum*. It has a very sharp taste, and a pungent smell; is empyreumatic and nauseous; the specific gravity is near 933 at the temperature of 15° Reaumur. These three different kinds are employed against very different diseases; but if by this remedy we see scrofula, rheumatism, necrosis, and paralysis cured, we may well conceive that the effects of these oils cannot be the same.*

The oil which was employed in some of the cases here appended, resembled rather his second species, whose chemical properties it possessed. It had a fine briny odour, and was taken by several patients without inconvenience, although others rejected it. They were

* Klencke, Op. cit. pp. 11-12.

directed to take it in water, and to suck an orange, or eat a raisin, a fig or a grape, after the dose was swallowed.

The effects of cod-liver oil have been attributed to its iodine, and also to its bromine. The observations already made with regard to ioduretted and bromuretted waters, will apply here. Klencke, who insists much on the different qualities of the different kinds of oils, seems to forget altogether other statements made by him, according to which both the vegetable oils and lard possess the essential properties of cod-liver oil. The theory on which Klencke recommends the oil to be given, has already been referred to. Besides this, he founds a good deal of its after operation on the alleged transformation of the absorbed fat of the oil into albumen. It is unnecessary to discuss views which rest upon a proposition so purely hypothetical, and so opposed to the statements of Liebig, which are at least entitled to so much respect, as to prevent the reception of a mere speculation, which stands in direct antagonism to them.*

When cod-liver oil is taken internally, ~~no~~ *an* odour can be perceived in the secretions and

* Chemistry of Physiology and Pathology, translated by Playfair, 2nd edition, pp. 95-96.

excretions; and in case 1 of the analyses of urine, we obtained it, or a quantity of oil at least, from this fluid. Applied externally, it appears to be absorbed through the skin. Klencke shaved two dogs, and subjected them to frictions of the oil; after three weeks of this treatment the animals were killed, and "the bile contained as much fat, the chyle as many corpuscles with nuclei, the animal was in general in as good condition, as if he had taken the oil internally."*

The oil applied to wounds causes them to suppurate more abundantly. Brefeld in many external cases applied an ointment made with four scruples of cod liver oil, a drachm of lard or white of egg, and two scruples of acetate of lead. We should certainly prefer the lard to the white of egg; knowing that acetate of lead and white of egg will combine chemically, and form a substance which, in all probability, is inert. We have employed the oil externally, and always alone: Cases 20 and 23, in the appendix, are examples, and apparently with some assistance to the internal administration. According to Klencke, the oil should not be given to plethoric people, or to very young

* Klencke, *Op. cit.* p. 143.

children. The dose varies from a tea-spoonful or two to half a pint daily. The therapeutic action has been discussed in the preceding chapter, and incidentally in connexion with pathological theories in other parts of this work.

We should certainly be inclined to recommend the use of this oil in cachectic cases of scrofula, both because we have seen its good effects, and because its use is now a fair subject of experiment, for which the treatment of this disease frequently furnishes a legitimate field.*

VII.—In the work of Labeaume, translated into French by Fabré Palaprat,† are several instances in which the application of galvanism to scrofulous tumours seems to have been attended with the result of either hastening their suppuration, or producing absorption. As we have now much superior modes of employing electricity medicinally, the use of it in this disease seems worthy of a trial.

* Patients who take the cod-liver oil almost invariably get stouter under its use. We have weighed phthisical patients and others, who were taking it from time to time, and have found them sometimes grow stouter even when the disease was unchecked.

† *Galvanisme appliqué à la Médecine*, par B. R. F. Palaprat, Paris, 1828.

APPENDIX.

CASES OF EXTERNAL TUBERCULOSIS, OR SCROFULA.

CASE 1. ENLARGEMENT OF CERVICAL GLANDS, &c.—
'H. F——, admitted February 1st, 1844, aged nineteen, of fair and florid complexion; was, three years ago, treated by us at the Gateshead Dispensary. She got well, and the tumours were absorbed under the use of bromide of potassium applied externally in the form of ointment, and taken internally. In the interval she has been troubled with various symptoms of indigestion, and also, with difficulty of breathing, occasional short cough, and head-ache. There are the marks of cicatrices, and beside one of them on the right side of the neck, under the angle of the jaw, a tumour of the size of a walnut has lately formed. She had eleven brothers and sisters, of whom five are living; one died of small pox, another of hooping cough, and four of phthisis. A sister, aged seventeen, is now under our care for scrofula; a brother is married but has no children; the eldest sister, aged thirty, has always been healthy; the youngest sister, aged eleven, is healthy. The mother aged fifty-two, healthy, has a brother and two sisters living; the brother, a widower, is subject to rheumatism, and has two children, healthy: the sisters are both widows and have families; the son of one of them had

a tumour removed and died of phthisis. The mother had also two brothers and a sister, dead, not apparently of any scrofulous or tuberculous affection. Her father, the grandfather of our patient, died upwards of fifty; the mother of cholera, at sixty. Our patient's father is living, he is subject to asthma; he had six sisters who died young, another of a uterine disease, having had a large family, of whom four sons and one daughter died of phthisis, one was drowned, four living, healthy. The menstruation has been very irregular. She has not menstruated now for three months; P. 60, small and tremulous; T. pale and slightly furred. About an hour, or an hour and a half after meals, she occasionally vomits a sour fluid. B: rather costive. The stethoscopic symptoms led us to conclude the existence of tubercles in the lungs. She was ordered to take twice in the day, forenoon and afternoon, a powder of seven grs. of the carb. of magnesia, and three grs. of rhubarb, and a teaspoonful of Dupasquier's syrup of the iodide of iron. On the 10th of February she had five grs. of the oxide of bismuth twice a-day instead of the rhubarb and magnesia; she continued to improve, and on the 27th the iodide was ordered to be taken in the dose of a teaspoonful three times a-day. On the 9th of March, as she had not menstruated, leeches were ordered to be applied to the thigh. On the 13th she menstruated. On the 16th the tumour was absorbed; the vomiting had ceased; her tongue was clean; P. 72; B: regular. She had no difficulty in breathing when she walked, as formerly, and her strength was much improved; but her legs ached when she walked. On the 30th she was

dismissed with recommendation to go to a suitable situation for the summer. During the summer she continued pretty well, but fell ill again during the winter; and on the 8th of March, 1845, was re-admitted with undoubted symptoms of phthisis. The further treatment of the case is foreign to our subject.

CASE 2. SCROFULOUS GLANDS OF NECK, AND ULCERS.—
 'April 13th. W. C——, aged fifteen, of dark complexion, stout; Gateshead workhouse; unable to give any satisfactory account of his family history. Ill for three and a half years with scrofulous tumours of the neck, some of which have suppurated. He has two foul ulcers from the suppuration of tumours on the left side of the neck, and six similar ulcers on the right side. The neck is enormously enlarged on both sides. No cough or chest affection. He complains of a slight pain in the region of the liver. T. very foul; B^s exceedingly costive; P. 80.'

He was ordered immediately a black draught: the bowels were freely opened. A lotion of bromine made by agitating fifteen minims of the element with a pint of water, was ordered to be applied to the ulcers, which were to be kept constantly moist, the aid of oil-skin being employed; and he was to take a grain of the sub-iodide of mercury in the form of pill, morning and evening.

On the 26th. 'P. 84; B^s open; Pain in right side better; T. clean.'

'30th. Urine much increased; P. 76; B^s freely opened; no return of pain on the right side; T. rather furred; gums sore. Tumours apparently somewhat lessened; and the appearance of the ulcers much improved.'

The pills were omitted, and instead of them, he was ordered to take a table-spoonful of a solution of one drachm of the hydriodate of potass in 8 oz. of water, thrice a-day. The lotion was continued.

On the 2nd of May the ulcers were begining to heal. He had an eruption resembling pityriasis on the belly and back. He was ordered a warm sea-water bath once a week, and generous diet with porter; and means were taken to insure him these.

During the remainder of the month he continued much in the same state; on the 13th he complained of the tumours causing difficulty of breathing. On the 4th of July an ulcer formed on the cornea of the left eye, and solution of nitrate of silver was applied to it; on the 18th two of the ulcers of the neck were healed; but the tumours did not appear much smaller; the eye was well. He was now ordered to give up the hydriodate of potass, and to return to the sub-iodide of mercury, one gr. thrice a day; a considerable increase of the urine was the result, and on the 1st of August he was salivated. The tumours continued of about the original size; one of them having suppurated, was opened. He was now ordered to take a dr. of the syrup of the iodide of iron, thrice a day, and to continue the bromine lotion. A new ulcer formed where the tumour was opened. He experienced more benefit under the last remedy, with the aid of occasional visits to the sea-side and baths. At the end of September, only one of the ulcers was open. The tumours were reduced to about half their size; and his aspect was greatly improved. The pityriasis was

nearly gone. He felt himself much stronger and had a better appetite. The treatment was now abandoned.

On the 4th of March, 1845, the tumours still continued, although there were no ulcers; he was then bled. The analysis of his blood is given in case 4 of the analyses of that fluid.

CASE 3. SCROFULOUS SWELLINGS OF THE NECK; TUMOURS AND ABSCESSSES OF THE THIGH AND ARM: DEATH BY EXHAUSTION.—‘May 7th. T. H——, aged seventeen; blacksmith. Complexion fair, freckled, with red hair; appearance exceedingly apathetic. Partial cataract of the left eye.

‘He has nine brothers and sisters, living, all healthy, five of them older than himself. On examining the mother, it would appear that none of her family had ever scrofula or phthisis. She admits, however, her husband’s family to have scorbutic affections.

‘The patient has scrofulous enlargement of the glands of the neck: one tumour of the size of an apple, at the angle of the jaw, on the left side; and eight smaller tumours about the face and neck. There are also four cicatrices of former ulcers. He has a large tumour of the cellular tissue of the left thigh, between the adductor and extensor muscles. The tumours have been twelve months in existence. During half of this time he was an out patient of the Newcastle Infirmary; he says without benefit.

‘Pulse 104. T. white at the edges with maculæ, red at the tip. Appetite very bad. B^s open. Complains of headache; languid and listless.’

He was ordered to take a pill containing a grain of the sub-iodide of mercury, thrice a day. On the 14th

the gums were slightly affected, and the urine had been much increased. P. 80. T. foul. B^s very open; and considerable effect had been produced upon the tumours of the neck. The pills were continued. On the 28th, he was unable to attend, from general languor and debility. He was salivated and had been much purged. The pills were omitted, and he was ordered a tonic mixture containing chiefly concentrated infusion of gentian.

On the 4th of June, the mercurial symptoms were subsiding. The large tumour of the neck was reduced about one half; the others were smaller: the tumour of the thigh appeared to be slowly suppurating. He was ordered the syrup of the iodide of iron in the dose of a tea-spoonful three times a day. On the 11th of June, there was still some soreness of the mouth; he was stronger; P. 100, T. pretty clean; occasional cough. B^s rather open. Appetite good: syrup continued.

On the 18th, the tumours having got no smaller, he was ordered to return to the pills of the sub-iodide of mercury in the same dose as formerly; and to use frictions of the ointment of hydriodate of potass. On the 2nd of July, the pills were omitted for fear of renewed salivation; and the syrup again returned to. On the 23rd, the sub-iodide was ordered internally and externally; a drachm being used to the oz. of lard, and rubbed into all the tumours. On the 6th of August, the tumours of the neck were on the whole smaller; one of them had suppurated, and formed an ulcer, with excessive granulations to which the sulphate of copper was applied. The attempt to absorb the tumours was now

abandoned: powders of the saccharine carbonate of iron and calumba were ordered, and tonic regimen enjoined.

The patient was lost sight of during the winter. He presented himself again on the 29th of March, 1845. The tumour of the thigh had wholly suppurated, and formed a sack, holding apparently a pint of matter. Another tumour, as large as an orange, had also formed and suppurated over the elbow of the same side. There was now no open sore of the neck; and only one tumour, that which had formerly been the largest, remained very distinct. P. 104, T. rather red: appetite indifferent. B^s open. The urine, which was in large quantity and slightly albuminous, is that described in case 8 of the analyses of urine. He had a troublesome dry cough. The abscesses were opened, and the powders of the saccharine carbonate of iron and calumba were again ordered: beefsteaks or mutton chops with porter, for dinner.

On the 5th of April, there had been a free discharge from the elbow, and but little from the thigh: P. 100. His cough was very troublesome. The urine, about three quarts in the twenty-four hours, of specific gravity, 1007; no sediment; more highly albuminous. 12th.—He continued much as before; 'leg healed well; slept badly; P. 110; evidently getting weaker'.

He was now attacked by nausea; fell gradually into a state of stupor, and died on the 1st of May. The terminal symptoms led to a strong suspicion of the existence of kidney disease; but we were not allowed to examine the body.

CASE 4. TUMOURS AND ULCERS OF THE NECK.—‘July 2nd, 1844. M. A. S——, aged twenty-three, of fair complexion; married. She has nine brothers and sisters living, some died young; some of those living are older than herself. Asserts that none of them, nor her father, mother, nor any of their relations, ever had a symptom of scrofula or phthisis. She has three children all healthy.

‘She was confined eight months ago, and after her confinement three of the glands on the neck began to swell: the swellings burst. There are now two cicatrices and an enlarged gland on one side of an irregularly round ulcer, of the size of a crown piece, with elevated edges on the left side of the neck. P. 100; T. clean; hearing much impaired on the side corresponding to the ulcer. She has not menstruated since her confinement: suckling.’ She was ordered to take a teaspoonful of the syrup of the iodide of iron thrice a day, and to apply the lotion of bromine, twelve minims to the pint, to the ulcer.

On the 9th of July, the ulcer had healed so as to leave only one-fourth of its former size open; the edges presented a healthy aspect; the enlargement of the gland was gone. On the 13th of August the sore was healed, and her general health greatly improved. She was dismissed.

She returned on the 22nd of April, 1845, ‘with an enlarged gland above the cicatrix corresponding to the healed ulcer, and a small ulcer, similar to that already described, near one of the old cicatrices. P. 112, full; T. clean; B: pretty regular. Her child was weaned a

fortnight ago; she has not menstruated since his birth. Affected with an incontinence of urine, being obliged to make water about every ten minutes.' Bled to about 4 oz. for analysis (see analysis 10 of blood). Ordered to take twenty-five drops of the compound tincture of iodine thrice a day, and to apply the ointment of hydriodate of potass to the tumour.

On the 29th, 'much relieved; able to retain her water; was in fact only obliged to micturate three or four times daily, during the week, until yesterday, when her complaint returned, but it is better to-day. Her water is increased in quantity. The tumour has suppurated and discharged much matter. T. clean; B. regular. There is a discharge of purulent fluid from the left ear, in which she is still deaf. Dose increased to thirty drops thrice a day.'

'May 6th, has menstruated.'

In another week she was well; the tumour was healed; the ulcer also healed; no discharge from the ear, although the deafness still continued.

CASE 5.—TUMOURS AND ULCERS OF THE NECK; DISEASE OF THE TARSAL BONES, AND ULCERS OF FOOT.—Treatment by preparations of iodine without effect; temporary cure by cod-liver oil.

'Nov. 21st. E. M——, aged fifteen, a smith; works hard;' case alluded to as the first in the analyses of blood and urine.

'Of fair complexion, blue eyes, and presenting several marks of the scrofulous facies. The nose in particular is red and shining, and the furrow above the upper lip deep.

‘ He has one brother and five sisters, all living, and older than himself, never had any others.

‘ 1st. A sister, aged thirty-three, healthy, married, and had five children ; of whom one was dead born, and another died, apparently of meningitis or hydrocephalus, and a third of cerebral disease after chorea, the others are living, healthy.

‘ 2nd. A sister, aged thirty-two, delicate, and subject to a cough, married, and has had four children ; of whom one died apparently of mesenteric disease ; of those living one is rather delicate.

‘ 3rd. A sister, aged twenty-nine, very healthy, married, and has had five children ; one of whom died of the effects of a fall : the other children are remarkably healthy.

‘ 4th. A sister unmarried, healthy.

‘ 6th. A brother healthy.

‘ The mother is fifty-five, healthy, and never had any symptom of scrofula ; yet she has a scrofulous facies.

‘ The father, sixty-five, a smith, strong, but subject to a cough.

‘ The mother had eight brothers and sisters ; of whom four were dead born ; of the other three one died abroad, another died of phthisis ; a sister died also of phthisis, leaving a family of five, of whom four died of the same disease.

‘ The father of our patient had a brother who died of paralysis ; he had five children who all died of consumption. There was also a sister who died of cancer of the womb, leaving several children, of whom some have families : one of them has scrofula.

A more thoroughly scrofulous patient, than the subject of this case, could scarcely be found ; yet his father and mother, with a tendency to tubercle, shewn by the results in both their families, have themselves exhibited no symptom of the actual disease.

‘He has been ill for three or four years with scrofulous disease of the cervical glands. There are several enlarged glands under the left ear, accompanied with considerable tumefaction of the skin ; two of these glands have formerly suppurated. P. 80 ; T. clean ; B^s regular ; appetite good. Appearance that of a boy of twelve or thirteen.’

The treatment was commenced on the 30th. He was ordered to take a tea-spoonful of the syrup of the iodide of iron thrice a day, and to use the ointment of the hydriodate of potass to the tumours.

‘Dec. 21st. Says that he feels better ; but complains of a short tickling cough. The stethoscopic examination of the chest yields no particular result. The tumours are somewhat smaller. T. slightly furred ; B^s open ; P. 80. He has got a pruriginous affection.’

On the 28th the general health was good ; one of the tumours enlarging and likely to suppurate.

‘January 4th, 1845. The larger tumours are diminished in size, and that which was likely to suppurate is partially absorbed. There are perhaps twenty or thirty tumours of various sizes on the neck and face ; P. 88 ; T. clean ; appetite good ; B^s rather costive.’

‘11th January. A slight slough has formed in one of the tumours : otherwise he is as before.’

‘January 18th. No further change; to omit the syrup of the iodide of iron, and to take three grains of the hydriodate of potass, in pill, thrice a day, and to continue the ointment.

‘25th. Some of the tumours appear rather smaller. The urine is very slightly increased; P. 92; T. clean; B^s regular. The sloughed gland on the right side of the neck was touched with sulphate of copper.

‘February 1st. Some of the tumours are larger and softer. P. 96; T. clean; B^s regular; complains of occasional nausea; urine slightly increased.

‘16th. Urine diminished in quantity; otherwise as before.

‘March 1st. Has had a cold and cough for the last week. The chain of tumours on the right side of the neck has increased; so that the tumours, from the size of peas, have become as large as marbles, extending from the clavicle to the angle of the jaw. Some of the glands on the left side of the neck and face, have begun to discharge. P. 84; B^s regular. To take twenty drops of the compound tincture of iodine thrice a day, and to continue the ointment.

‘March 15th. Is worse; complains of pain of chest and cough. Appetite bad. One of the tumours on the left side was opened, and about a drachm of pus evacuated. P. 100; T. pretty clean; sleeps much when in the house; B^s regular; urine rather increased in quantity since he got the tincture. To take thirty drops three times a day.

‘25th. The dose of the tincture has produced nausea, and even slight vomiting. Appetite bad; T. very florid;

B^s loose; P. 92, weak. Tumour again filled with pus, and opened.* A mixture was ordered containing an oz. of the concentrated infusion of gentian, and two dr. of carb. of soda, to 7 oz. of water. A table-spoonful to be taken three times a day: tincture omitted.

'April 1st. Much worse. Appetite bad. Does not sleep so well. B^s loose; stools watery; P. 100, weak; T. very red in the centre, foul at the edges. The tumour which was opened has formed a round hole, crater-shaped, with everted edges; more than an inch in diameter, and about half-an-inch deep.

'April 8th. The abscess discharges much. P. 96; T. cleaner; B^s loose; appetite better. To take a powder of eight grs. of columba, and the same quantity of the saccharine carb. of iron twice a day, and to apply the bromine lotion, eight minims to the half-pint, to the sores.

'14th. The abscess under the chin and the former ulcer are both healed. P. 100; appetite better; T. cleaner; B^s regular.

'22nd. A swelling of the left foot has come on attended with considerable redness and pain.'

The swelling of the foot went on increasing; and gradually two ulcers formed, one on each side of the instep; previously to the formation of the ulcers, lotion of acetate of lead was applied, and from the 31st of May to the 17th of June, he took three grains of the iodide of barium in solution thrice a day. Notwithstanding the treatment, the disease of the foot went on.

* The state of the urine is only described when it is not referred to in the account given in the 2nd chapter.

On the 17th of June he was confined to his bed. P. 120; T. red. Symptoms of hectic were coming on. The ulcers were from two and a half to three inches in diameter, and had the same crater-shaped aspect, which distinguished the ulcer of the neck already described. The ancle joint could be moved by the hand, although he could not move it by the muscles of the part. The ulcers were not connected with an abrasion of the bone: the disease seemed confined chiefly to the periostium, although the bones were enlarged. He commenced to take a table-spoonful of cod-liver oil thrice a day; and as the symptoms still continued, on the 21st the dose was increased to a table-spoonful six times a day. On the 28th he was decidedly better. The glands of the neck were smaller; all their ulcers continued healed. P. 130; T. clean; B^s open; stools twice a day of natural appearance. Countenance of a less melancholy character. The foot continued much as before, but less painful. He was ordered to take a table-spoonful of the oil eight times a day, and yeast was added to the poultices (which had been applied to the foot).

‘July 5th. The foot continues much as before. P. 120, stronger; T. clean on upper surface, red at the sides. B^s moved about twice a day; feels stronger. The oil agrees perfectly with him.’

He went on improving, and the following is the report on the 12th of July. ‘P. 130, pretty strong; T. clean; B^s open twice a day. Whole appearance greatly improved. The ulcers of the foot have lost their cupped appearance, and assumed, instead, a form tending to the convex. Ordered to continue the oil, and have a glass of porter every day with animal food.’

He went on improving ; the ulcers gradually healing, and the swelling of the foot falling, so that the proper shape became discernible. He also began to walk about with the aid of crutches. He was weighed on the 26th of August, and the weight was five stones ten pounds. On the 29th he still continued improving, gaining colour and strength. On the 12th of August the ulcers had nearly healed. The tumours of the face and neck were much smaller ; his appetite had fallen off. P. 92 ; T. clean. He was ordered to omit the oil for a few days. On the 16th he was a pound and a half lighter than when he was last weighed. He was sent to the country for a few weeks, and ordered to take a table-spoonful of the oil, and a tea-spoonful of the syrup of the iodide of iron together, thrice a day.

‘It is needless to relate the further progress of the case, at length. When we last saw him he was walking about without either crutch or stick ; he weighed six stones two pounds. The foot was very slightly swelled ; and the only trace of the disease of the neck was in the cicatrices which remained. The patient might be considered well. This beneficial effect may be ascribed to the use of the cod-liver oil.’ November, 1845.

He presented himself again a short ago ; the improvement in strength continued ; but three small ulcers appeared on the foot, evidently communicating with the tarsal bones. The cod-liver oil and syrup of the iodide of iron have been resumed. August, 1846.

CASE 6. SCROFULOUS SWELLING OF THE SUB-MAXILLARY GLAND.—‘February 4th. L. H——, aged three, of dark complexion. Her sister is also under treatment for struma.

‘For a month or six weeks, has been effected with swelling of the bowels and inordinate appetite. About the same time the gland began to swell, and is now of about the size of a pigeon’s egg; not very painful. P. 112; T. clean; B^s regular; stools slimy, and very fetid. The bowels are not painful on pressure.’ She was ordered to take six grs. of the saccharine carb. of iron, and four grs. of carb. of magnesia, twice a day.

On the 11th of March she was quite well: tumour gone.

CASE 7. SCROFULOUS ENLARGEMENT OF THE SUB-MAXILLARY GLAND.—‘February 7. M. H——, aged nine, dark complexion, sister of the preceding patient, and affected with a similar disease. An abscess has opened by the side of the tonsils by a small aperture into the mouth. P. 80; T. tolerably clean; B^s open.’ She was ordered to take two grs. of the hydriodate of potass and three grs. of rhubarb, in pill, thrice a-day. The tumour subsided; the small abscess healed; and she was well at the same time as her sister.

CASE 8. SCROFULOUS SWELLING OF THE CERVICAL GLANDS AND CELLULAR TISSUE BEHIND THE EAR.—‘March 11th, 1845. M. A. C——, aged nine, fair.

‘She has a brother aged twenty-five, who never ailed anything; also another two years older than herself. Another brother died, aged ten, evidently of scrofula, having taken the disease at four years of age. Her mother appears to be healthy; but her father, twelve years ago, had an affection of the hand, which appears to have been of a scrofulous character.

‘There is an enlargement of the glands and cellular tissue behind the ear. One of the glands after having

been swollen for a fortnight, burst a week ago, and still continues to discharge. There is also a chain of enlarged glands in the neck. She is subject to headaches, and fits, apparently of an epileptic character. She has had much opening medicine of late. T, covered with aphthous spots; P. 112; urine about a quart per diem.' She was ordered to apply the citrine ointment, mixed with an equal weight of lard, to the ulcer, and to rub it on the tumours, and to take three grs. of the hydrarg. c. creta, mixed with six of carb. of magnesia, and two of rhubarb, twice a day.

' March 18th. Tumours much smaller; better in her general health; has been free from fits during the last week. B^s open twice a-day during the week; urine exceeds a quart daily; P. 134; T. very foul.

' March 25th. Continues improving; tumours diminished; ulcer healed; B^s continue open; P. 108; T. much cleaner; still exhibits some aphthous spots; appetite good.' She was ordered to omit the mercury and chalk, and to take powders of magnesia and rhubarb.

On the 1st of April the tumours had almost disappeared, and she was ordered to go to the sea-side; her general health being greatly improved, and the state of her digestive organs excellent.

This case is one which illustrates the opinion of Abernethy, supported by Lloyd, of the benefit to be derived in many cases of scrofula from the use of mild mercurial alteratives.

CASE 9. SCROFULOUS SWELLINGS OF THE GLANDS OF THE NECK; AND ULCERS.—' March 8th, 1845. N. W——, sixteen, brass-finisher; unable to give any satisfactory

family history. Has been affected for six years with scrofulous swellings which have successively burst and left ulcers and a series of cicatrices in a chain round the neck below the chin. Two of the glands remain enlarged. P. 100; T. rather red; appetite good; B. tolerably regular.' He was bled for analysis. This is the case described in No. 6. of the analyses of blood, and No. 4 of those of urine.

The treatment was commenced on the 25th. He was ordered to take a table-spoonful of cod-liver oil twice a-day; but as it disagreed so much with him that he was unable to continue it, the compound tincture of iodine was substituted. Of this he took thirty drops thrice a day.

The treatment lasted till the 2nd of September. The dose of the tinct. was gradually augmented to forty drops, which however he complained of on the 10th of June as producing nausea and dizziness. The treatment was then intermitted for a week, and then resumed: after this he took thirty-five drops. The hydriod. of potass ointment was also rubbed upon the tumours. On the 15th of July some new tumours were observed on the right side under the ear, of the size of marbles, and hard. On the 2nd of September there was only a slight hardness of one of the glands on the right side; with this exception he was dismissed well.

CASE 10. SCROFULOUS DISEASE OF A CERVICAL GLAND; A LARGE SCROFULOUS ENLARGEMENT OF THE CELLULAR TISSUE OF THE LEG; ULCERS.—'March 18th. C. H——, aged ten and a half, fair complexion, scrofulous aspect. His mother, when she was young, had some scrofulous tumours.

‘He has been ill for a month with enlargement of a gland under the jaw on the right side. He has also an induration of the cellular tissue on the left leg, extending over the middle third of its inner aspect. Over this there is considerable redness; and it is painful on pressure. P. 100, very weak; T. clean; B^s open.’ Tumour of the neck having suppurated was opened: and poultices ordered to be applied. This is the case described in No. 6 of the analyses of urine.

The treatment was commenced on the 22nd of March. He was ordered to take a solution containing the syrup of the iodide of iron, so that he took thirty minims of the syrup thrice a day. This treatment was continued until the 3rd of May. During this period the tumour of the neck continued to discharge. His general health exhibited a little improvement, and the tumour of the leg went on to suppuration. On the 3rd of May the dose of the syrup was doubled. On the 10th the abscess of the leg was opened, and a large quantity of thick curdy matter, mixed with a serous fluid, was evacuated. On the 17th he complained much of sickness. T. rather foul; P. 112; B^s regular. The abscess of the leg continued to discharge; the tumour of the neck was almost absorbed. On the 24th the syrup of the iodide of iron was discontinued; and he was ordered to take two tea-spoonfuls of a solution of one drachm of the iodide of barium in 8 oz. of water thrice a-day. This was continued till the 5th of July. The result was exceedingly favourable. The P. became stronger and slower; the appetite improved. He got stronger. The discharge of the leg became diminished. A portion of the tubercu-

lous matter in the cellular tissue of the leg at this period remained unsoftened. On the 5th July the treatment was suspended, and he was sent to the sea-side for a few weeks. He returned on the 9th of August much better in his general health; but the leg was again swollen; and there were three ulcers formed, communicating with the sinuses in the cellular tissue. The lotion of bromine, eight minims to the 8 oz., was applied to the leg; and a tea-spoonful of the syrup of the iodide of iron taken three times a day. On the 16th poultices were substituted for the lotion, and the bromide of potassium given internally. He commenced with taking a table-spoonful of the solution of a drachm of this salt in 8 oz. of water, thrice a day. The dose was increased gradually to twice this quantity. Under this treatment he got well. On the 1st of November scarcely a trace of the former hardness of the cellular tissue of the leg existed; but a small ulcer, quite superficial, remained. On the 23rd of August he weighed five stones thirteen pounds; on the 13th of September he weighed six stones two pounds; on the 11th October six stones five pounds, and on the 28th six stones six and a half pound. This increase of weight coincided with an improved state of the general health. In the course of the present summer the ulcers of the leg again broke out; but he has again got well under the use of the iodide of barium.

CASE 11. SCROFULOUS SWELLING AND SUPPURATION OF A CERVICAL GLAND.—March 29. J. F——, aged seven, fair. Several of the family have been under our care, or that of our colleague, Mr. Potter, for phthisis and struma.

‘He has a swelling of one of the cervical glands, on the right side of the neck, about the size of a walnut, and quite hard. P. 96; T. covered with reddish maculæ; B^s regular. He was ordered to rub the hydriodate of potass ointment over the tumour, and to take a powder of magnesia and rhubarb twice a-day.’

On the 17th of May his general health was improved, but the tumour was no smaller. He was made to take the syrup of the iodide of iron, and to continue the frictions. On the 3rd of July he began to take the compound tincture of iodine in the dose of ten drops thrice a-day; but no effect was produced upon the tumour, which had suppurated on the 29th of October.

CASE 12. SCROFULOUS ENLARGEMENT OF THE GLANDS OF THE NECK.—‘April 8th. E. M——, aged thirty-seven, fair complexion, a widow. Family history imperfect.*

‘She has a series of tumours on the right side of the neck and under the chin, varying from the size of a walnut to that of a pea. T. foul; P. 96; B^s regular; menstruation regular.

‘She has had the tumours for six years; one of them opened spontaneously eighteen months ago, and has left a cicatrix. She had a similar tumour in one of the axillæ, which also burst and healed.

‘She is much troubled with head-ache, sickness, and want of appetite.’ She was bled. The analysis of the blood is given in case 15 of the analyses of that fluid; and in No. 7 of the analyses of urine, the same case is referred to.

* She had no children.

The hydriodate of potass ointment was prescribed, to be rubbed upon the tumours, and twenty-five drops of the compound tinct. of iodine to be taken thrice a-day, and gradually increased.

On the 12th she stated that the bleeding had considerably relieved her head symptoms. The dose of the tinct. was increased to thirty drops.

On the 19th she now felt sick after taking the medicine. 'Appetite improved; T. not so foul; P. 100; B^s open; sweats rather more.'

The tumours went on in a very gradual course of absorption. The dose of the tinct. was gradually increased, until on the 3rd June she took forty-five drops, at a dose; but this made her sick, and she was obliged to return to forty drops. On the 21st warm sea water baths were ordered to be taken twice a week, and a pill containing one grain of the sub-iodide of mercury thrice a-day. Frictions of the sub-iodide of mercury ointment, a drachm of the salt to an ounce of lard, to the tumours. This treatment diminished the size of the tumours. On the 28th of June the report was 'P 80, pretty strong; T. rather furred; B^s loose; open twice or thrice a day; sweats much, and makes more water. The tumours are decidedly smaller, but the skin over them is much irritated by the frictions.' On the 5th of July the treatment was intermitted on account of the irritant action of the sub-iodide, externally and internally. On the 15th one of the tumours which had suppurated, was opened; and she was ordered to take a table-spoonful of a solution of four scruples of the hydriodate of potass in 8 oz. of water thrice a day.

On the 22nd 'the solution made her sick, at first. One of the tumours under the chin is again diminished. The one which was opened is healed. P. 100; T. clean; B: regular.' On the 2nd of August the dose of the hydriod. of potass was increased; the solution being made with five scruples instead of four. Under the use of warm salt water baths, and sea air, with the foregoing treatment, she improved considerably; and on the 16th of September the report is 'the tumours on the right side are absorbed. A small hardness remains under the chin towards the left side. Patient perfectly well, strong and robust.'

CASE 13. SCROFULOUS SWELLINGS OF THE CERVICAL GLANDS.—'April 29. R. S——, aged twenty, fair complexion; forgeman. Family history imperfect; but several members of his father's family died of phthisis.

'He has several scrofulous swellings on the right side of the neck, so close together as to form one large tumour (about as large as an orange) of a botryoidal aspect on the right side of the neck below the ear. There is a smaller one on the left side. This swelling he has had for some years. He complains of head-ache and pain of the chest. Has lost flesh of late, and is unable to work at his business. Subject to bleedings from the nose. P. 88, rather jerking. T. foul; B: costive.' Was bled, and the analysis of the blood is given in No. 9 of the analyses of that fluid.

Four grains of the hydrarg. c. creta with eight grs. of carbonate of magnesia were ordered to be taken twice a day.

'May 6. Powders purge him much. P. 100, weak and somewhat irregular; T. cleaner. Says that his

head is better since he was bled.' To take thirty drops of the compound tinct. of iodine thrice a day; and to rub the hydriodate of potass ointment upon the tumours.

This treatment was continued till the 17th of June. The dose could not be increased beyond thirty drops on account of the sickness which it produced. At this period the tumours were no smaller; and the patient having probably got tired of the treatment, ceased to attend.

CASE 14. SCROFULOUS SWELLINGS OF THE GLANDS OF THE NECK.—'May 3rd. M. A. F——, aged seventeen, fair complexion, florid countenance.' The sister of the patient reported as case 1st.

'Four or five years ago she had a small scrofulous swelling of the neck. She was then treated by us, and took the iodide of barium, under the use of which she recovered at that period. She has now, just above a cicatrix on the right side of the neck, below the angle of the jaw, a commencing scrofulous swelling. In other respects she is well, although unable to bear much fatigue in her occupation, which is that of a domestic servant.'

She was bled, and the analysis is given as case 17 of the analyses of blood. 'To take thirty drops of the compound tinct. of iodine thrice a day; and to rub the ointment of hydriodate of potass upon the tumour.'

On the 7th of June the tumour was decidedly larger, and had become painful; and the tinct. which she had lately taken in the dose of thirty-five drops, disordered her stomach. Consequently the tinct. was given up; and a table-spoonful of cod-liver oil, thrice a day, prescribed instead. The cod-liver oil disagreed still more

with her. The tumour became larger, and another gland below it began to enlarge.

On the 5th of July she began to take a table-spoonful of a solution of four scruples of the hydriod. of potass in 8 oz. of water, thrice a day. Under this treatment the absorption of the tumours began to be slowly effected.

On the 2nd of August the dose of the hydriod. of potass was increased, five scruples being added to the 8 oz. From the commencement of the treatment the frictions of hydriod. of potass ointment had been used.

On the 31st of August the tumours were nearly gone, but she was not quite cured till the 25th of October.

CASE 15. SCROFULOUS ABSCESSSES AND ULCERS OF THE NECK.—May 13th. ‘R. D——, aged nineteen, stout, of light complexion, an enginewright.

‘He has seven brothers, four older, and three younger than himself, being all the children of his parents, and none of them ever had scrofula or phthisis (as far as can be learned from his account). His mother says that she had seven brothers and sisters, of whom one died in infancy, of what disease she does not know. Of these, two brothers and three sisters, who are living, all have families, which, as far as she knows, are healthy. Her father was a lead miner, who died of a chest affection, supposed to have been brought on by the nature of his work. Her mother died of old age. The youth’s father had ten brothers and sisters, of whom two sisters died in childbed, having caught cold. The others have been separated. The father is living, healthy. The grandfather and grandmother of our patient on the father’s side are living and healthy.

‘He has two tumours each about the size of a hen’s egg, one just above the manubrium of the sternum, another on the right side of the neck : both appear to contain pus. He has occasional pains in the chest and sometimes cough and spit. P. 84; B: regular; T. somewhat foul; appetite good.’

‘To take three grs. of the hydr. c. creta and six of rhubarb twice a day.’

On the 17th the T. was much cleaner. The tumours were opened and about $2\frac{1}{2}$ oz. of fluid, but thickish pus, were discharged. The analysis of this has been given.

‘To take a powder of seven grs. of the saccharine carb. of iron and eight grs. of calumba thrice a day.’

The abscesses formed ulcers, which discharged much, were foul and irregular, and to which a lotion of bromine was applied. He also took internally after the 17th of June a mixture containing concentrated infusion of gentian and muriatic acid; and on the 28th of June he was dismissed quite well, the ulcers having completely healed.

CASE 16. SCROFULOUS SWELLINGS AND ULCERS OF THE NECK.—‘May 24th. J. H——, aged fifteen, fair complexion, dark hair.

‘The history of the family is very imperfect, but his father died of consumption.

‘He has two scrofulous tumours under the right ear; one of them as large as a good-sized apple, the other smaller. He has a still smaller swelling on the left side, which has burst and partially discharged its contents, and forms now an irregular sore. The tumours commenced to form about eight months ago. P. 84; T.

tolerably clean; B^s open, by medicine; habitually constive; appetite pretty good.

‘He attributes the origin of the tumours to a blow.

‘To take twenty-five drops of the compound tinct. of iodine thrice a day, a dose of castor oil every morning, and to apply lotion of bromine to the abscess.

‘On the 21st. He makes much more water since he took the medicine. P. 108; T. clean; B^s open; appetite good. The dose of the tinct. to be increased to thirty drops.

‘June 7th. Another of the tumours has burst, and both discharge very much. The dose of the tinct. increased to thirty-five drops.

‘On the 17th. He complains that the medicine has made him sick. The ulcers look clean, and discharge little. He is ordered to return to the dose of thirty drops of the tinct., and to apply the hydriod. of potass ointment to the tumours; the lotion of bromine being continued to the ulcers.’ On the 22nd of July he commenced taking the syrup of the iodide of iron, a teaspoonful thrice a day.

On the 12th of August, the ulcers were healed, and the traces of the tumours very slight. He was much improved in strength, and was dismissed well.

CASE 17. SCROFULOUS SWELLING OF THE GLANDS OF THE NECK.—‘May 27th. A. N——, aged nineteen, fair complexion.

‘She has a brother and sister living, aged, respectively, twelve and sixteen, neither of whom have had a symptom of scrofula; but she had a brother who died at three years of age of water in the head. She says that

her mother and father are healthy. She cannot furnish any further information.

‘For a year and a half, she had a swelling on the left side of the neck, where there is now a considerable mass of very hard enlarged glands. P. 100; B^s costive; T. pretty clean; menstruation irregular.

‘To take a grain of the sub-iodide of mercury in pill thrice a day, and to rub an ointment composed of half a drachm of the same compound, and an ounce of simple cerate on the tumours.

‘June 3rd. Says that she is much weaker: the glands are smaller. She has got cold, and the interior of the mouth is sore. B^s freely opened; but says that she does not make any more water.’

She was made to intermit the treatment until the 7th, when (the soreness of the mouth having ceased) it was resumed, and continued until the 14th, when she complained of sickness and purging, occasioned by the medicine; she was also salivated, and had menstruated. The tumour was almost absorbed. The treatment was omitted until the 21st. She then still complained of sickness, the T. very foul; P. 104, very weak: the B^s freely opened. She was now ordered to take a powder of the saccharine carb. of iron thrice a day, and to apply the ointment of the hydriodate of potass to the tumour.

‘July 5th. Says that she feels better and stronger; appetite good; P. 80; T. foul. Another tumour has come below the original one, and is of about the size of a nut.’ The iodide of mercury in pill and ointment was repeated, and the other treatment omitted.

On the 22nd, the symptoms of mercurial action having again occurred, the hydriod. of potass was substituted for the iodide of mercury, internally and externally, in the dose (internally) of a table-spoonful of a solution of four drachms of the salt in eight ounces of water, thrice a day.

Under this treatment, she got strong and well, and the tumours gradually underwent absorption, so that on the 2nd September only a slight induration remained.

CASE 18. SCROFULOUS ENLARGEMENT OF THE GLANDS OF THE NECK.—‘July 15th. E. H——, aged twenty-four; eyes brown, complexion ruddy, hair dark, height 5ft. 5½ inches, weighs nine stones nine pounds, respirations per minute twenty, can expire, by a forcible breathing, 190 cubic inches of air at the temperature of 60°. She works in the fields.

‘She has two sisters, aged, respectively, thirty and eighteen, neither of whom has had any scrofulous symptom. She had one sister who died, aged twenty, after a week’s illness, and another who died young of small-pox. She had also other brothers and sisters who died in infancy. Her mother died at fifty-four of enlargement of the liver. Her mother’s sisters and their children, are, she says, disposed to phthisis. Her father is sixty, and healthy.

‘She has a chain of enlarged lymphatic glands on both sides of the neck, extending downward, and several others under the chin; the largest of them may be of the size of a walnut. B^s regular; T. red in the centre, furred, and chopped at edges. Appetite bad, otherwise well.

‘To take a table-spoonful of a solution of four scruples of the hydriodate of potass in eight ounces of water thrice a day, and to rub the hydriodate of potass ointment upon the tumours.

‘22nd. Appetite better ; T. pretty clean ; P. 100 ; B^r costive. Feels, generally, much better. She complains that the frictions make the glands sore ; but these are considerably smaller.’ The dose of the hyriod. of potass was increased to five scruples, and she was ordered to take two compound rhubarb pills every night.

The patient went on gradually improving in her general health, and on the 7th of October the glands were absorbed almost completely, and she was dismissed well.

CASE 19. SCROFULOUS SWELLINGS OF THE GLANDS OF THE NECK.—‘August 2nd. J. R——, aged twenty-five, a cinder-burner, fair complexion, five feet ten, weighed eleven stones, three months ago, expires 260 cubic inches of air at 60°.

‘He is an only child ; his father, aged sixty, is a stonemason, quite healthy. His mother died of phthisis when he was an infant.

‘For two years he has had swellings of the glands of the neck. There are several tumours and cicatrices down the neck, on the left side and under the chin. Some of the tumours are as large as a small apple. P. 72 ; T. clean ; B^s regular.

‘To take twenty-five drops of the compound tinct. of iodine thrice a day, and to rub the hydriod. of potass ointment upon the tumours.’

The treatment was continued to the 2nd of September ; the dose of the tinct. being gradually increased to

forty drops ; at this period, the tumours had almost disappeared, and he ceased to attend.

CASE 20.—SCROFULOUS TUMOURS OF THE NECK.—
‘ Aug. 9th. A. C——— aged fourteen, fair complexion ; height, five feet two ; weight, six stones ten pounds. P. 92 ; Respirations per minute, 24. Blows 140 cubic inches of air by a forced expiration at the temperature of 70°.

‘ The father is healthy ; her mother has now ulcers of the leg. She had two brothers who died young of measles and scarlet fever, respectively. One sister, older than herself, and two brothers younger, are living, neither of whom has any strumous symptoms. Her mother’s brother died of phthisis ; also her maternal grandfather. Her father also had a sister who died of the same disease.

‘ She has a large mass of scrofulous tumours on the left side of the neck ; T. clean ; B. regular.

‘ To take a table-spoonful of cod-liver oil thrice a-day, and to rub the oil upon the tumours.’

Under this treatment she went on well, the tumours became gradually smaller. The T. kept clean, and the bowels regular. The urine became increased in quantity ; and the P. rather quicker.

On the 13th of September, the dose of the oil was increased to a table-spoonful four times a-day.

On the 24th, she weighed seven stones three pounds. Her general health was good, and the tumours gradually decreasing.

On the 18th of October, she weighed seven stones four pounds.

On the 1st of November, the tumours were about a third of their original size, and the patient was well in other respects.

CASE 21.—SCROFULOUS TUMOURS AND ULCERS OF THE NECK.—‘August 26. J. T——, aged five years six months; fair; height, three feet six and a half inches; weight, two stones nine pounds. He has a brother living, younger than himself, and one born between the two, who died of a skin affection: nothing more can be learned of his family.

‘He has a scrofulous enlargement of a gland at the lower part of the neck. P. 100; T. tolerably clean; Bⁿ regular.

‘To take three grains of the hydr. c. creta, and six grains of carb. of magnesia twice a day, and to rub the ointment of the hydriod. of potass upon the tumour.’

The tumour supplicated on the 2nd of September, and left a sore which discharged much. To the sore, poultices were applied; and on the 24th of September, he commenced to take ten drops of the compound tinct. of iodine in water thrice a day.

Under the influence of the iodine tinct. and the use of poultices, the sore got well, and the tumour disappeared. On the 4th of November, he weighed two stones eleven pounds.

CASE 22.—SCROFULOUS SWELLINGS OF THE GLANDS OF THE NECK.—‘September 2nd. John M——, aged seven. Dark hair, fair eyes and complexion.

‘He has five brothers and sisters, some of whom are older than himself, and none of them has shewn any symptoms of the disease. His father and mother are

living and healthy ; no further information can be got. The origin of the tumours is attributed to a blow.

‘ He has had swellings of the glands of the neck for four months : some of those on the right side have suppurated, and been opened ; others on the left side, none of them considerable. T. clean ; B^s open ; P. 100.’

Ordered to take a dessert-spoonful of a solution of a drachm of the hydriod. of potass in eight oz. of water, thrice a-day.

Under this treatment, the absorption of the tumours was gradually effected ; and on the 28th of October, he was well, except that some of the cicatrices remained red.

CASE 23.—SCROFULOUS AFFECTIONS OF THE GLANDS OF THE NECK, COMBINED WITH SYPHILIS.—‘ September 16. T. C——, aged twenty-two, a smith. Fair ; height, five feet nine ; weight, eight stones ten and a half pounds. P. 110 ; Respirations 16. Blows 212 cubic inches of air at a full expiration at the temperature of 58°.

‘ Has four brothers living, all except one older than himself, and all healthy. Six brothers and sisters died in infancy. One sister died of phthisis at twenty-four. His father died from the effects of drink. His mother, aged fifty-two, is living.

‘ There are several enlarged glands round the neck, which have been felt for two years. He had chancre eight months ago, and has now an ulcerated sore throat. T. very pale, and with maculated patches ; B^s costive ; appearance cachectic.

‘ A table-spoonful of cod-liver oil to be taken thrice a day, and the oil to be rubbed upon the tumours. Also

a gargle containing two grains of nitrate of silver to three oz. of water.

'September 24. Throat better; weighs a pound more; P. 120; T. clean. Appetite better. Makes much more water.'

On the 30th, the ulcers of the throat were almost healed. The tumours of the neck were much smaller. The weight nine stones one pound. Hew as ordered to take a table-spoonful of the oil four times a day.

On the 22nd of October, the tumours were absorbed, except one, which appeared going on to suppuration. The throat had become bad again. He weighed nine stones two and a half pounds, and felt much stronger and better. The cod-liver oil was omitted; and the sixth of a grain of corrosive sublimate ordered to be taken thrice a day.

On the 1st of November, the tumour burst, and a sore remained which discharged much.

'November 22.—He has now taken the compound tinct. of iodine, the gland which has burst is nearly well, the throat quite well. He weighs nine stones ten pounds, and is to go to his work on the 24th.'

These cases have been selected, not because they are instances of successful treatment; but because out of the number of cases which we have had under our hands of late, these are some which have afforded fair opportunities of testing the success of the treatment. Many of the cases of scrofulous disease of the bones which pre-

sent themselves, are manifestly incurable ; and in other instances of external tuberculosis the patients so seldom give the treatment a fair trial, that the opportunity of judging fairly of results is not so very common. We have seen instances in which treatment, inefficacious in a dispensary practice, has succeeded better within an hospital ; owing, doubtless, to the application of a better hygiene. We could multiply cases of the kind already given to a great extent ; but those recorded may serve to elucidate our views of the treatment of the disease.

EXPLANATION OF PLATES.

EXPLANATION OF PLATE I.

(MICROSCOPIC FIGURES.)

Fig. 1 is a representation of the ordinary appearance of organized lymph, highly magnified, with a view to contrast this structure with that of tubercle. It is perfectly immaterial whether we consider the fibres of lymph to arise from cells in all cases, or to be primitive: the product of normal inflammation is in all cases more highly organized than the scrofulous matter or tubercle.

Fig. 2 is the representation of what is taken for a mixture of lymph and tubercle matters, referred to in page 51.

Fig. 3 is a slice of lung tubercle, magnified 400 diameters; the large bodies represented, are regarded as altered epithelial scales.

Fig. 4 is another representation of lung tubercle.

Fig. 5 shews the corpuscles and granules of tubercle; the *granulated* corpuscles which are taken to be the essential elements of tubercle, are shewn according to Lebert in fig. 11; the figure, however, we have not actually copied from Lebert: they are shewn after another drawing of our own in fig. 12; in fig. 7, from tubercle of the heart along with some apparently cellular structures.

Fig. 6 shews the same kind of structure from lymphatic glands, some of these, however, are regarded as altered cells of the gland, see p. 50.

Fig. 8, see p. 49.

Fig. 9 is a microscopic representation of the cicatrix found in the lung ; referred to in p. 165.

Fig. 10 microscopic appearance of *poussière tuberculeuse*.

PLATE II, AND FIGS. 1, 2, PLATE III.

Scrofulous mesenteric glands referred to in pp. 34-35. Fig. 1 in the injected gland spoken of ; fig. 2 that which could not be injected.

PLATE III

Fig. 3 represents some of the concretions described in analysis 8, chapter I.

Fig. 4 shews the tubercle of the spleen referred to in the note, p. 36, *a* represents the line of indurated tissue (of a blue colour in the specimen) surrounding the tubercle.

Fig. 5 shews the cicatrix of the lung spoken of in p. 165 ; the rest of the lung from which it was taken, was free of tubercle ; the specimen was found in an adult male subject in the Newcastle Medical School.

PLATE IV

Shews the scrofulous joint from which the bone was taken, on which the analysis No. 9, chapter I, was performed ; the softness of the bone is shewn by the sections easily made with a scalpel : the appearance of the parts was so highly characteristic, that it was thought worth while to append this illustration of a common enough affection : *a* is the astragalus ; *b* external malleolus cut through ; *c* a probe in a sinus leading into the joint ; *dd* are the diseased bones where the periosteum is destroyed.

Numerous coloured illustrations of tubercle in various organs, as the heart, kidneys, and mesenteric glands, were appended to the essay when it was sent to the Medical Society of London : in one of the cases of tuberculization of the

kidney, the other kidney being free of the disease, simply hypertrophied, weighed nineteen ounces.

There is a representation of tuberculated mesenteric glands, where the disease in a youth, aged seventeen, had gone on for years in the most insidious manner, although the most extraordinary appearances of disease were found after death ; the sigmoid flexure was completely closed by adhesions and scrofulous exudations, and the colon opened directly into the rectum which was transformed into a vast cloaca, and had lost all appearance of its original form. The tubercle of the spleen occurred in an adult whose lungs were quite free of tubercle.

Fig1.

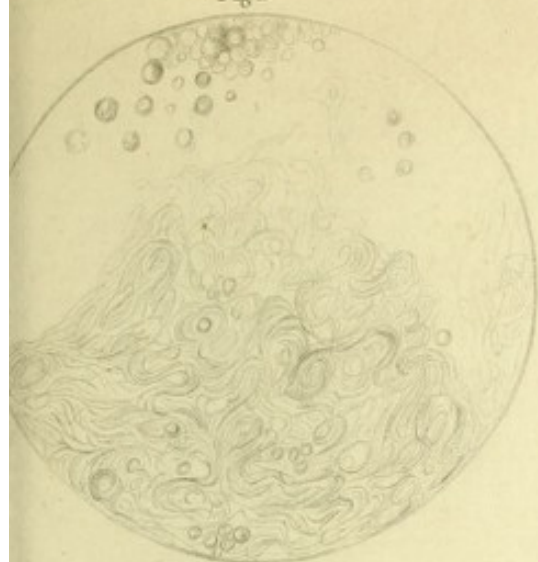


Fig2.



Fig 3.



Fig4.



Fig 5.



Fig6.

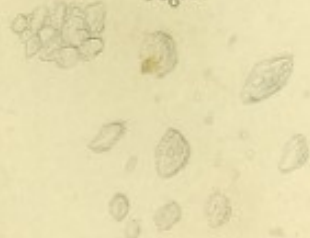


Fig7.



Fig 8.



Fig10.



Fig11.



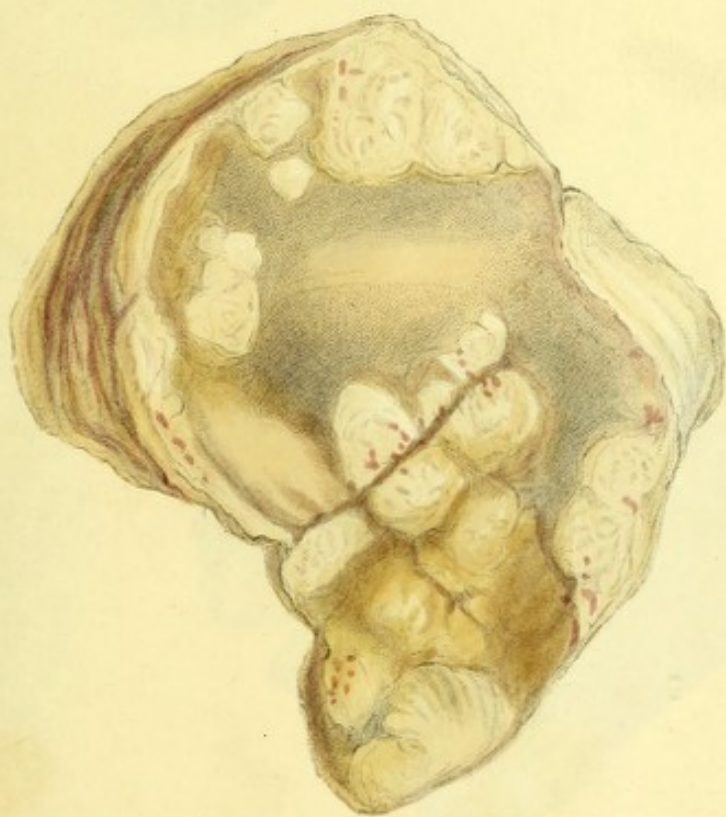
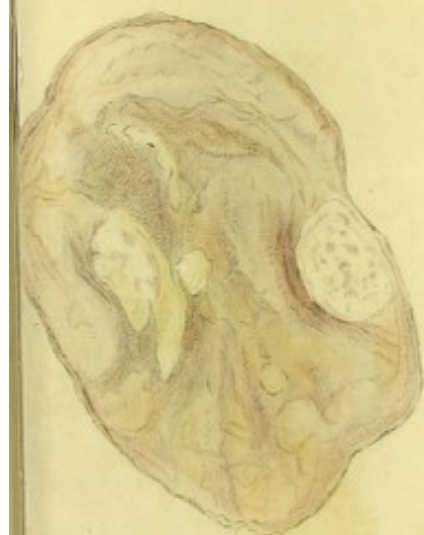
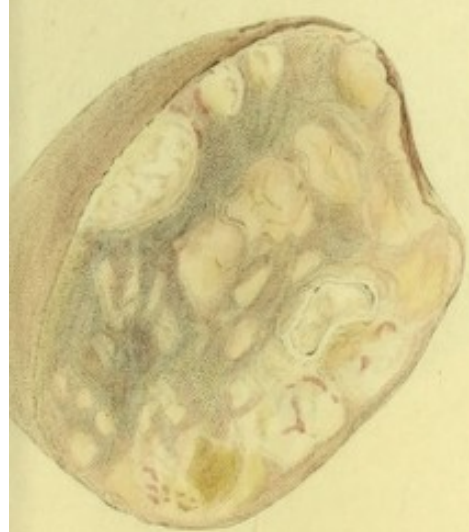
Fig9.



Fig12.







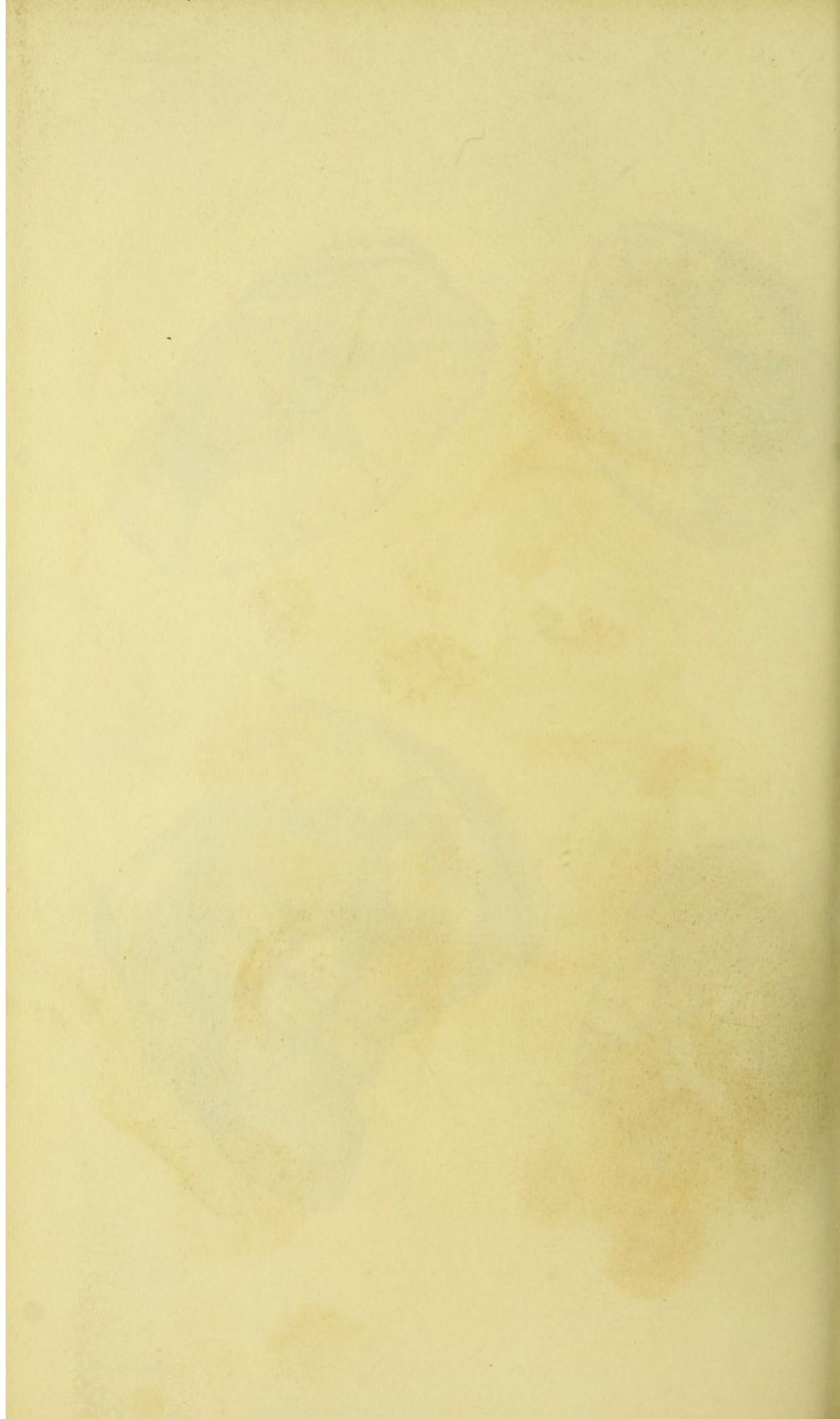


Fig 1.



Fig 2.

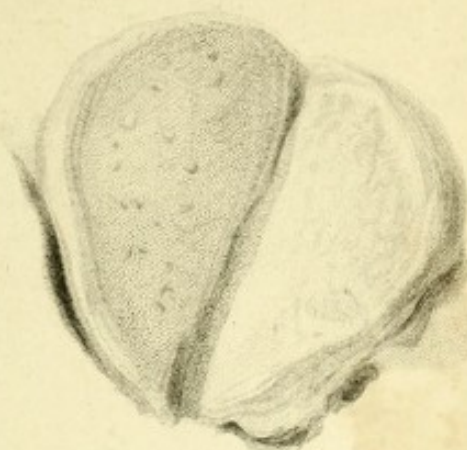


Fig 3.



Fig 5.



Fig 4.

