

A Treatise on some practical points relating to the diseases of the eye / by the late John Cunningham Saunders, to which are added a short account of the author's life, and his method of curing the congenital cataract, by his friend and colleague, J.R. Farre.

Contributors

Saunders, John Cunningham, 1773-1810.
Farre, J. R. 1775-1862.
Anderson, H.
Emory University. General Libraries

Publication/Creation

Philadelphia : Benjamin Warner, 1821.

Persistent URL

<https://wellcomecollection.org/works/t8hn59pm>

License and attribution

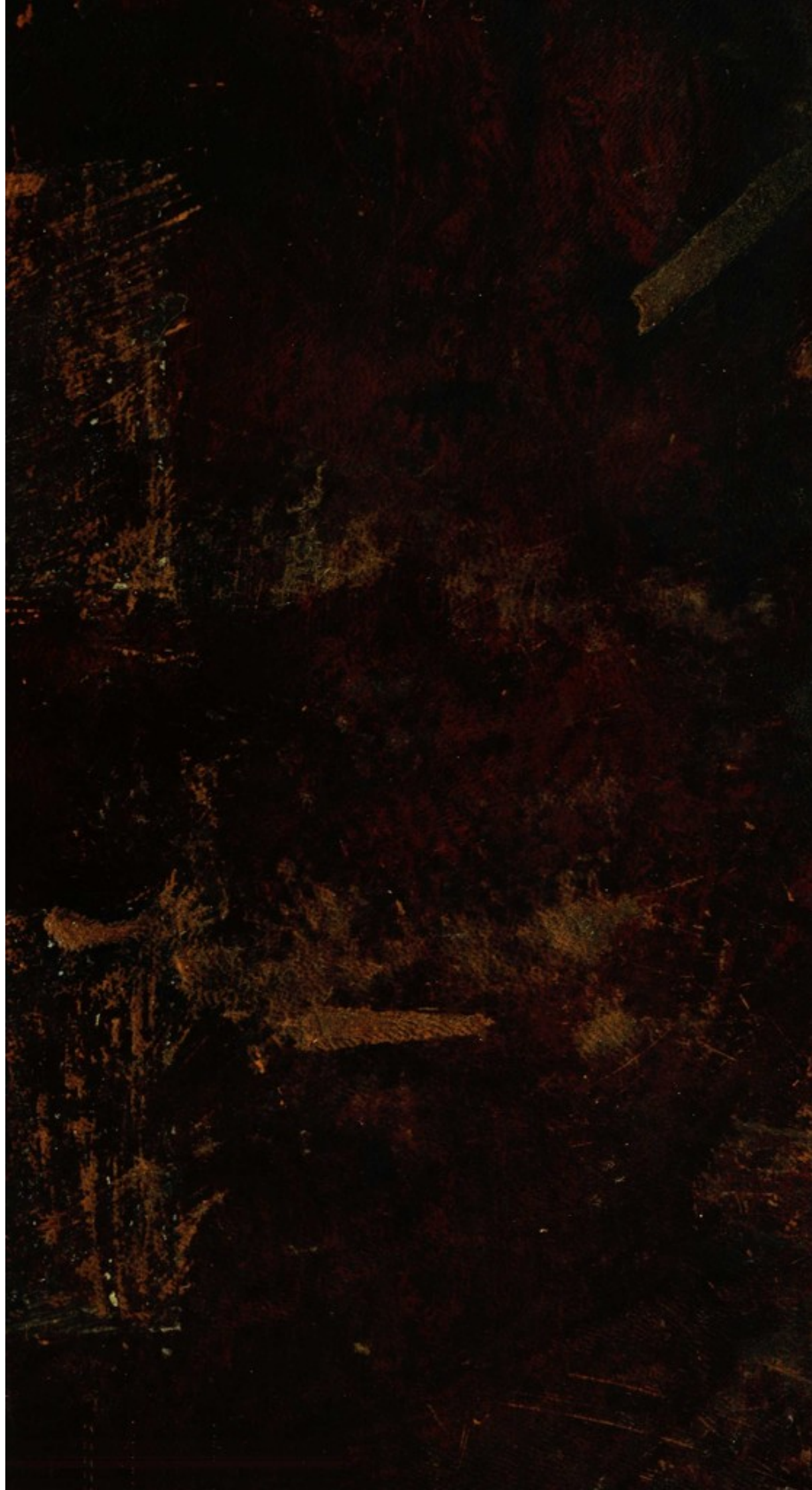
This material has been provided by This material has been provided by the Woodruff Health Sciences Center Library at Emory University, through the Medical Heritage Library. The original may be consulted at the Woodruff Health Sciences Center Library, Emory University. where the originals may be consulted.

This work has been identified as being free of known restrictions under copyright law, including all related and neighbouring rights and is being made available under the Creative Commons, Public Domain Mark.

You can copy, modify, distribute and perform the work, even for commercial purposes, without asking permission.



Wellcome Collection
183 Euston Road
London NW1 2BE UK
T +44 (0)20 7611 8722
E library@wellcomecollection.org
<https://wellcomecollection.org>



THE
ABNER WELLBORN CALHOUN
MEDICAL LIBRARY
1923



CLASS R

BOOK _____

PRESENTED BY

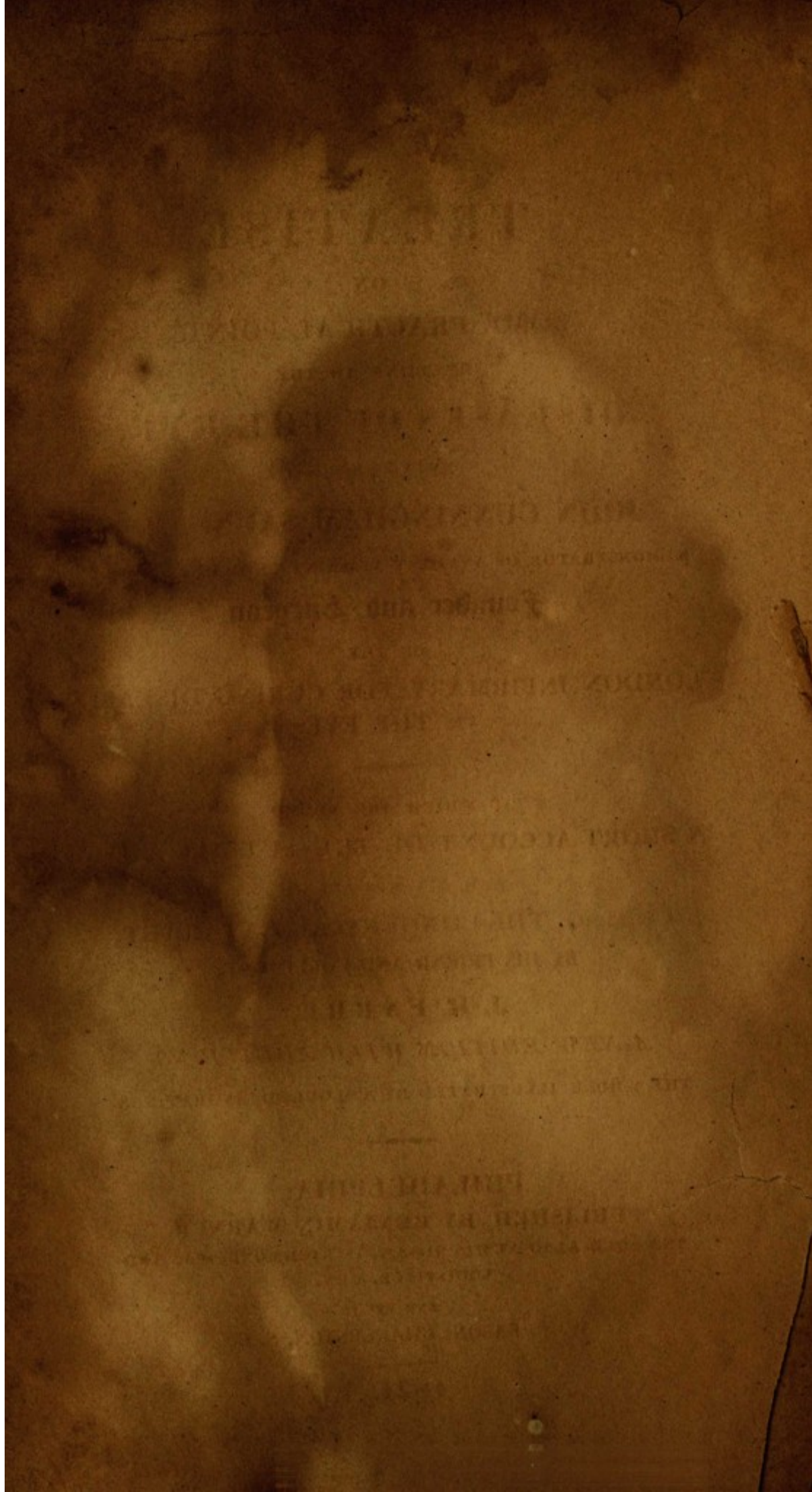




Geo. Loringhead

To
Geo. W. Loringhead

1836



A
TREATISE
ON
SOME PRACTICAL POINTS
RELATING TO THE
DISEASES OF THE EYE,
BY THE LATE
JOHN CUNNINGHAM SAUNDERS,
/ DEMONSTRATOR OF ANATOMY AT SAINT THOMAS'S HOSPITAL,
Founder and Surgeon
OF THE
LONDON INFIRMARY FOR CURING DISEASES
OF THE EYE:

TO WHICH ARE ADDED
A SHORT ACCOUNT OF THE AUTHOR'S LIFE,
AND HIS METHOD OF
CURING THE CONGENITAL CATARACT,
BY HIS FRIEND AND COLLEAGUE,
J. R. FARRE,
A NEW EDITION WITH ADDITIONS.
THE WHOLE ILLUSTRATED BY COLOURED ENGRAVINGS.

PHILADELPHIA:
PUBLISHED BY BENJAMIN WARNER,
AND SOLD ALSO AT HIS STORES IN RICHMOND, VA. AND
LOUISVILLE, KEN.

AND BY
W. P. BASON, CHARLESTON, S. C.

1821.

EMORY UNIVERSITY
THE A. W. CALHOUN MEDICAL LIBRARY

3050

TABLE OF CONTENTS

617
43

PREFACE TO THE SECOND EDITION

Observations on the arrangement of the
Tables Discovered by the Author
and published in the Journal of the
of the Academy

PREFACE TO THE FIRST EDITION

THE LIFE OF THE AUTHOR

CHAPTER I

EXPLANATION OF THE COGNOMEN

IN THE FIRST PART

CHAPTER II

EXPLANATION OF THE FIRST AND

SECOND PART OF THE EXTRACT

ADDITIONAL TO THE FIRST PART

OF THE FIRST PART

CARNEGIE LIBRARY



TABLE OF CONTENTS.

	PAGE
PREFACE TO THE SECOND EDITION	V
<i>Observations on the arrangement of Ophthalmic Diseases used by Mr. Saunders, and published in the Annual Reports of the Infirmary</i>	<i>xvii</i>
PREFACE TO THE FIRST EDITION	3
THE LIFE OF THE AUTHOR	5

CHAPTER I.

ON INFLAMMATION OF THE CONJUNCTIVA IN INFANTS	37
---	----

CHAPTER II.

ON INFLAMMATION OF THE IRIS, AND THE INFLUENCE OF THE EXTRACT OF BELLADONNA TO PREVENT THE CONSEQUENT OBLITERATION OF THE PUPIL	55
---	----

30587

CHAPTER III.

ON THE CURE OF THE INVERSION OF THE UPPER EYE-LID BY EXCISION OF THE TARSUS	74
---	----

CHAPTER IV.

ON SOME OF THE MORE IMPORTANT TER- MINATIONS OF OPHTHALMIA:	
--	--

I. BY EFFUSION OF COAGULABLE LYMPH	90
II. BY SUPPURATION	98
III. BY SLOUGH	100
IV. BY ULCERATION	125
PROTRUSION OF THE IRIS . .	128

CHAPTER V.

ILLUSTRATIONS OF SOME OF THE MORE IMPORTANT CHANGES OF STRUCTURE IN THE EYE	140
---	-----

CHAPTER VI.

ON THE CONGENITAL CATARACT	155
--------------------------------------	-----



EXPLANATION OF THE PLATES	211
-------------------------------------	-----

PREFACE

TO

THE SECOND EDITION.

THE first edition of this work was composed from Essays, Notes, and Cases, furnished by the industry, the talent for observation, and the judgment of the late Mr. Saunders. Those who are familiar with the duties of the Profession, must know, that the time which is occupied in noting and preparing for publication the results of practical enquiries and observations, is not drawn from hours of recreation, of which a medical man can scarcely be said to have any; but is actually taken from his hours of domestic comfort, nay even from those which he should devote to his health and to his repose: such at least was the manner in which Mr. Saunders occupied himself, even at a time when a prudent regard to his health, strictly required a cessation from mental exertion. The

public and the profession have acknowledged his services; and where the voice of the body has conferred this distinction on his memory, the editor of his work might stand acquitted, even although he should disregard the unjust and unmerited attacks of certain individuals, on the well earned character of his friend; and it is probable that he would have disregarded them, if the offence had not been repeated; but even forbearance has its limits, beyond which it becomes a dereliction of duty to be silent.

The late Mr. Gibson, early in the summer of 1811, wrote to Mr. Travers, for the purpose of ascertaining the method of operating which had been practised by Mr. Saunders. When this request was communicated to the Editor, he really gave Mr. Gibson credit for correct intention; and, in reply, requested Mr. Travers to state to him, that the subject of his inquiry would shortly be communicated to him, through the medium of the press, a part of the posthumous work of Mr. Saunders being at that time printed. But it appears from a paper dated at Manchester, June 13, 1811, and published by Mr. Gibson in

the Edinburgh Medical and Surgical Journal for October, 1811, that he had it in view, to claim the merit of suggesting the safety and expediency of operating on Infants, for the cure of Cataract: and this was done in a spirit of hostility to the memory of Mr. Saunders, which was wholly unjustifiable. Mr. Gibson, too soon for the profession which his labours had benefited, passed into that state which required the last offices of friendship; and his Biographer, Mr. James Wardrop, thought proper to recal feelings, which had slept with the ashes of his friend. Biography is indeed a useful branch of knowledge, when it simply records examples worthy of imitation; but it is perverted from this noble purpose, when the character of one individual is unjustly depressed, and used as a foil to augment the lustre of another. The injustice of such a proceeding excites our highest indignation, if the persons have conferred equal benefits on the Public; but especially so, if he that suffers the wrong, has actually done the greater service. The medical friends of Mr. Saunders, were not unconcerned observers of this new attack on his memory, which Mr.

Wardrop's sketch of the life and writings of Mr. Gibson served to cover. It produced in them feelings of the keenest regret and disapprobation, not only that Mr. Gibson, and his biographer should fall into the reprehensible mistake of imputing to Mr. Saunders motives of which his honorable mind was incapable; but that the conductors of the Edinburgh Medical and Surgical Journal should give a place to insinuations against him after having presented to the profession a long, liberal, and candid review of his posthumous work, in which a concluding paragraph, touching on this question, thus strongly conveyed their sentiments. "Those who undertake to perform any
 "operation on the eye, will undoubtedly
 "avail themselves of the important information contained in this treatise; and to
 "those who are anxious for direction in
 "the treatment of several diseases, we
 "earnestly recommend a diligent perusal
 "of its contents. *We have heard the question
 "discussed with little urbanity or candour,
 "whether Mr. Saunders be entitled to the
 "credit of a discoverer in that line of practice,
 "to which he devoted so many years of his
 "short and valuable life? After the clear state-*

"ment of what he had already done, and what he intended to do, with the facts and materials which he had collected together, it is not likely, we think, that his merit and originality will be disputed any longer."

The Editor replied in February, 1814, to the observations of Mr. Wardrop, which had appeared in that journal of the preceding month. Aware that letters of this description, uninteresting except to the parties whose feelings are aggrieved, are injurious to medical journals, he is less surprized that his reply has not been published, than that gentlemen, who, in their public capacity, had already passed a judgment most honourable to the memory of Mr. Saunders, should not have availed themselves of the first opportunity to notice and refute insinuations against him, which at a subsequent period they had inadvertently admitted into their journal. It remained for the Editor to insert the few remarks which the subject required, either in some other periodical work, or to publish them in the second edition of the Author's treatise. He has preferred the latter, as a more respectful tribute to the memory of his friend. In the brief account of the au-

thor's life, the communications are noticed which he had made to the profession as soon as his observations on the respective subjects of them were completed, as well as the unfinished manuscripts which the slow and painful progress of a fatal disease could not prevent him from composing:—These materials, preserved in his own handwriting, established beyond all question his intention of benefitting the profession by his labours. His printed declarations, both in the form of advertisements of his work on the congenital cataract, and of letter*

* TO THE COMMITTEE.

GENTLEMEN,

In addition to the remarks on the last Medical Report, which I had the honour of submitting to your consideration, permit me to add, that my process for curing the Cataract in Children, together with other observations relative to the Eye, which I am about to publish as soon as the necessary arrangements can be made, has already been freely communicated to an Individual; and the ample scene of experience, which this infirmary affords, opened to his view, from a disinterested view to promote his professional object. Mr. Adams has since settled in Exeter, and there established a Charity on the model of this Institution. This event I could not refrain from noticing, because it must excite in your minds, and the minds of the Governors, the grateful reflection, that your benevolence has given life and activity to an Institution, which has bene-

to the Governors of the Infirmary, on the extension of his plan through the medium of one whom he had gratuitously instructed, confirm that intention; and finally, if his enemies would search into his very bosom, his private correspondence is now open to their examination.

An injury of a different description from that which these observations are intended to notice, and which has been recently exposed by a General Committee* of the Infir-

fited Society not only in its own operation, but by giving direct origin to an establishment, producing its contingent of good in another part of the kingdom. That which was so liberally given in the spirit of private friendship, has been so long withheld from the public in the hope of making it more worthy of their acceptance, and not through a mercenary motive, as some have malignantly observed, or an inclination to *boast* the possession of a secret! A conscientious discharge of my duty is all my merit—and all my boast, the reward which has been bestowed on it, your applause and the approbation of the Governors.

I am, Gentlemen, Your obedient Servant,

J. C. SAUNDERS.

Ely Place, March 25, 1809.

* SEE A SPECIAL REPORT OF THE GENERAL COMMITTEE OF THE LONDON INFIRMARY FOR CURING DISEASES OF THE EYE; IN WHICH CERTAIN PRETENSIONS OF SIR WILLIAM ADAMS, ADVANCED IN THE OFFICIAL PAPERS PUBLISHED BY

mary, required an examination of this correspondence, and the following declaration of the Medical Officers of the Infirmary, called forth by the review of it, is a tribute at once just and honourable to his memory.

“ And here your Medical Officers must
 “ be allowed to express their high respect
 “ for the honourable feelings, and perfect
 “ approbation of the professional conduct
 “ of Mr. Saunders, in the transactions
 “ which they have just reviewed. Possessing, through the public confidence in
 “ his character and talents, an unrivalled
 “ field of observation, it was his first object
 “ to convert this to the public benefit, by
 “ adding to the stock of professional knowledge; and he trusted for his recompense to that rank in public opinion

ORDER OF THE HON. DIRECTORS OF GREENWICH HOSPITAL, LATELY SUBMITTED TO A MEDICAL COMMITTEE, APPOINTED BY GOVERNMENT, AND AFFECTING THE RIGHTS OF THE INFIRMARY, AND THE MERITS OF THE LATE JOHN CUNNINGHAM SAUNDERS, ESQ. ITS FOUNDER AND SURGEON, ARE EXAMINED AND DISPROVED BY THE CORRESPONDENCE OF MR. SAUNDERS, AND OTHER DOCUMENTS. LONGMAN & Co. 1815.

“ which is the just reward of such exer-
 “ tions. The temptation of private emo-
 “ lument was in vain held out to him. His
 “ unalterable purpose was to communicate
 “ his knowledge to the profession, as soon
 “ as he deemed it sufficiently matured by
 “ experience, to be worthy of their accept-
 “ ance. The proposal of selling to the
 “ public the improvements, which their
 “ liberal patronage had enabled him to
 “ make, was therefore rejected by him
 “ with a degree of indignation, which must
 “ endear his memory in the estimation of
 “ all honourable minds.”

The above citation* forms a part of the
 report made by a medical Committee, con-
 sisting of Mr. Travers, Mr. Lawrence, and
 the Editor to the General Committee of the
 Infirmary, on the evidence submitted to
 their examination; and it seems proper in
 this place to add their sentiments respect-
 ing Mr. Saunders's merit, in applying an
 operation, distinct in its principle† from
 extraction and couching, to the cure of ca-
 taracts occurring in infants.

* Special Report, page 14.

† Mr. Gibson adhered to the principle of couching.

* “ Your Committee take this opportunity to remark, that to *Mr. Saunders* is *exclusively due* the application of the third operation, or that by solution, to the cataracts of persons born blind, even in the earliest stage of infancy; in the opinion of your Committee, *one of the most valuable and splendid discoveries of modern surgery*. He first *systematically* applied the same principle to the treatment of cataract in the adult, in its different forms; but the lamented arrest of his career by death, rendered the result of his experience on this subject incomplete.”

A few Surgeons had at sundry times attempted to operate for the cure of cataract in young children; but either their benevolent efforts had wholly failed, or proved so fortuitously successful, that when Mr. Saunders directed his attention to these unhappy cases, he found them entirely abandoned by the profession. On the 25th of March 1808, he announced the important fact to the public, that the operation for cataract might be performed even on

* Special Report, page 17.

infants with the greatest success. On the 13th of June, 1811, Mr. Gibson stated the same thing. At this time however, sixteen months had already elapsed since the regretted death of Mr. Saunders; and not only his pupils, but even the pupils of his successor, had practically confirmed his statement. Mr. Gibson asserted that he has operated upon children of all ages for ten preceding years. Why then did he not sooner communicate so important and interesting a fact to the profession? why was he silent during three years, in which he knew of the claim of another? and why, above all, did he omit the circumstantial evidence which is essential to the support of such a claim. The general result of his experience is said to be stated from a considerable number of cases; but not a single case is given, either generally or particularly—not even the name of a patient, or the date of an operation. His communication on this occasion carries with it the internal evidence of a hasty production, and not the maturity of ten years' experience.—The editor, before he finally quits a subject painful to his feelings, and forced upon his consideration, cannot omit to

notice the strange inconsistency of Mr. Gibson and his biographer, in objecting to the reasonable delay which Mr. Saunders, animated with a desire of rendering his present more worthy the acceptance of the profession, thought it his duty to observe; whilst Mr. Gibson himself in conducting his own operations for the cataract on *infants*, felt himself justified in using a far greater delay before he submitted his observations to the profession at large. The Editor, however, cannot reconcile the statement of Mr. Gibson with the fact, that some of the oldest and most eminent medical men in Manchester, had not even heard of his operations on the infant, previously to the expediency and safety of performing them having been ascertained by Mr. Saunders.

The Editor has deemed it proper merely to reprint the first edition, and, instead of annexing additional notes to particular passages, to subjoin to this preface a few remarks which may render the work more useful to the student.

Charter House Square

December 14, 1815.

Observations on the Arrangement of Ophthalmic Diseases used by Mr. Saunders, and published in the Annual Reports of the Infirmary.

THE following table of the diseases of the eye was not intended as a classification for medical purposes; but as a summary of the cases cured at the Infirmary. It appeared in the annual report of that Institution, for the year 1810, and was the last medical report of the patients which had attended the Infirmary during the life of Mr. Saunders. The introduction of it in this place will afford some idea of the relative proportion of the varieties of ophthalmic diseases, and present an opportunity of offering some additional remarks on them.

MEDICAL REPORT.

Admitted from the 25th of *March* 1809, to the 1st of *January* 1810, 2179.—Remained under care, on making up the last ANNUAL REPORT, 356. Total 2535, of whom 327 are still under the care of the Charity—266 have absented themselves, are incurable, or only relieved, and 1942 have been cured, as under the following heads.—viz.

Inflammation	- - - - -	588
Inflammation with thickened Eye-lids, approach-		
ing the state of Lippitudo	- - - - -	157
	Carried forward	745

	Brought up	745
Inflammation accompanied with purulent discharge. Adults	- - - - -	30
Inflammation with purulent discharge. Infants		52
Inflammation with Pustules of the Cornea	-	184
Inflammation with Ulcers of the Cornea	-	353
Inflammation with Ulcers of the Cornea, and Crusta Lactea in an extreme degree	-	26
Protrusions of the Iris through openings of the Cornea caused by ulceration	- - -	23
Inflammation of the Iris	- - -	25
Inflammation of the Iris from Syphilis	- -	13
Opacities of the Cornea	- - -	73
Gutta Serena	- - -	2
Debility of the Retina, from various causes, producing imperfect vision	- - -	6
Strabismus, with double vision	- - -	4
Paralysis of the upper Eye-lid	- - -	1
Tinea	- - -	167
Lippitudo	- - -	53
Preternatural growth and excrescences of the Conjunctiva	- - -	8
Adhesion of a large portion of the Eye-lid from Burn	- - -	2
Inversion of the Eyelids	- - -	4
Eversion of the Eye-lids	- - -	
Tumours in the Eye-lids	- - -	58
Diseases of the Lachrymal Passages	- -	33
Wounds and Injuries of the Eye	- -	47
Cataract—Restored to sight by the operation for,—	- - -	33
		<hr/> 1942

Physicians, in treating of Nosology, have thought fit to multiply the genera of diseases in an artificial manner. They teach us, that inflammation, instead of being a single genus, consists of as many genera as there are organs in the body; but nature manifests by similar phenomena in all tex-

tures, that although it may vary in its seat or degree, yet it constitutes only one disease.

Under any arrangement of the morbid conditions of the eye, which we may choose to form or adopt, inflammation must be the chief object of our consideration. The Editor may be permitted to make the following alterations in the arrangement of Mr. Saunders, to prevent the varieties in seat and degree, which have a natural connexion, from being disjoined, without considering himself pledged to pursue any further at present, the investigation of the Nosology of the eye.

Diseases affecting the Tunics and Appendages of the Eye, and impairing, or likely to impair, their structure.

I. Inflammation.

I, 1. Inflammation of the Tunica Conjunctiva—Idiopathic—(Ophthalmia.)

- a. Varies in degree—Acute—with puriform discharge—(Ophthalmia Mucosa.)
- b. Varies in duration—Chronic—with thickened eye-lids, approaching the state of Lippitudo—with granulations, or excrescences of the conjunctiva—with varicose blood-vessels of the conjunctiva of the Cornea.

I, 2. Inflammation of the Tunica Conjunctiva—Symptomatic—(Ophthalmia Scrophulosa.)

- c. Varies in degree—Acute—with pustules—with ulcers of the Cornea—with porrigo of the face or scalp.

d. Varies in duration—Chronic—with the accompaniments of b.

From I, 1, and 2, a, b, c, d, result,

Opacities of the Conjunctiva of the Cornea,
(Nebula—Pterygium.)

————— and of the Cornea Propria (Albugo—Leucoma.)

Effusion of coagulable Lymph or Pus in the anterior chamber. (Hypopyon.)

Protrusions of the Iris through sloughs or ulcers of the Cornea, (Procidencia Iridis.)

Inversion of the Eye-lids—(Trichiasis, Entropium.)

Eversion of the Eye-lids, (Ectropium.)

I, 3. Inflammation of the Iris—Idiopathic—(Ophthalmia Iridis.)

I, 4. Inflammation of the Iris—Symptomatic—(Ophthalmia Syphilitica.)

I, 5. Inflammation of the capsule of the Lens (Cataracta Membranacea.)

I, 6. Inflammation of the Lens (Cataracta.)

I, 7. Inflammation of the Choroides (Ophthalmia Choroidæa.)

e. Varies in degree—Acute—
(Amaurosis.)

f. Varies in duration—Chronic
(Amaurosis Lenta.)

} Amaurosis.

} Symptomatica.

I, 8. Inflammation, excoriating the edges of the eye-lids (Lippitudo, Ophthalmia Tarsi.)

I, 9. Inflammation with pustules of the ciliary Margins (Tinea Ciliaris)

I, 10. Inflammation of the Lachrymal passages, (Fistula Lachrymalis.)

II. Tumours.

Diseases chiefly affecting the Function of the Eye.

III. 1. Amaurosis (Idiopathic.)

2. Amaurosis (Symptomatic.)

g. Paralysis of the Levator of the superior Palpebra.

h. Strabismus.

When the capillary arteries are in a state of active congestion, effusion commences from their extremities. This condition of arteries is called inflammation; and although the action be morbid, it often preserves the life of the part, which, under the various circumstances exciting congestion, would die, if this process did not take place.

The first effusion is a mere increase of the fluids which are separated from exhalent or secreting arteries. Thus, when cellular membrane, or the investing membranes of internal cavities are feebly inflamed, it is serous; but when the membranes which line external surfaces, or those which are exposed to irritating matters, are inflamed in the like degree, the effusion is simply an increased quantity of the mucous fluid with which those parts are naturally covered. The conjunctiva being a membrane of the latter description, an encreased effusion of mucus is the natural result of ophthalmia. When serous effusion does take place, it is observed only in the reticular texture under the conjunctiva, by which this membrane

is puffed up around the cornea, and presents a *spurious* appearance of chemosis, an event of little importance; or it occurs within the globe, and increases the aqueous humour, which is a more serious result.

The second effusion, being the unchanged contents of the overcharged vessels, is sanguineous, and constitutes the hemorrhagic stage of inflammation. In ophthalmic cases, it is even less frequent, yet not more important than the serous effusion. Its seats are the same, namely, under the conjunctiva, or other tunics, and in the chambers of the eye; but in the latter it is rare, except from injury.

The third effusion consists of fluids, which, in a natural or healthy state, are not separated from exhalent or secreting arteries, and vary in their qualities according to the textures from which they proceed:—thus when serous membranes, and cellular or fibrous textures are acutely inflamed, instead of serous or bloody fluids, coagulable lymph is effused on their surfaces, or within their substance; but when mucous

membranes are as highly inflamed, instead of simple mucus, a puriform fluid is secreted in great abundance. The conjunctiva thus highly inflamed, is covered with this altered mucous; but if the ophthalmia be seated in the textures which are beneath the conjunctiva, then coagulable lymph is deposited in their interstices in proportion to the intensity of the inflammation.

The fourth effusion is pus, which is formed in cellular textures, or between serous membranes, when inflammation has reached its utmost limit. It always affords evidence of the preceding stage, which is necessary to it, and is manifested by the presence of coagulable lymph, as well as of pus. A soft or semifluid lymph, the produce of an arterial action a little below that bolder action which perfects the adhesive stage so essential to the suppurative, is often confounded with pus. Happily the effusion of pus is by far a less frequent result than that of coagulable lymph, in cases of ophthalmia.

These effusions may be combined in

various degrees; but although the first and second are often attended with the most serious results in other organs, it is the third, and especially the effusion of coagulable lymph, which chiefly demands our attention in Diseases of the Eye. The deposition of coagulable lymph is either a restorative or a disorganizing process, according to the circumstances which give rise to the action; or the intensity with which it is performed. Nature proceeds by a general law, and it is the duty of those who observe the process to control it, when it tends to disorganization, but to aid it whilst it preserves and restores. When a wound is inflicted on the eye, it must, in common with every other texture of the body, inflame to be restored. The series of vessels which are divided, must be permanently closed at their truncated ends, by the adhesive process; but when the fine collateral branches suffer in consequence a high degree of congestion, an effusion of coagulable lymph takes place from their extremities, which elongate or grow into this substance, and finally inosculate, and heal the wound. Thus inflammation be-

comes a life-giving, and life-preserving process. After a breach of surface by ulcer or slough, we also hail the presence of coagulable lymph, as the sign of a restorative power; and in directing the healing process, it is the chief business of art to regulate its excess or defect, by depressing in the former case, or increasing in the latter, the power of the heart and arteries.

But the effusion of coagulable lymph becomes a disorganizing process, 1st, when it is largely and rapidly deposited as a preparatory stage to the formation of pus; or 2ndly, when, although it be more slowly deposited, and there be no tendency to pass into the superative stage, it impairs textures by adhesion, or actually obliterates their vessels by compression. This is the disorganizing inflammation which it behoves us to watch, and promptly to counter-vail, and happily we are furnished with great powers to arrest and subdue it, if they be timely applied.

Art, thus instructed by observation, attempts to relieve active arterial congestion,

either by diminishing the force of the heart and arteries, or by changing the action at the extremities of the latter.

The force of the heart and arteries is diminished, 1st, by blood-letting, general and topical. There is no organ of the body upon which the beneficial effects of venesection are more strikingly manifested than on an eye *recently* inflamed. Whilst the blood flows, the congestion may be seen to diminish; and if it be deemed expedient to continue the bleeding until a state of deliquium approaches, the conjunctiva becomes for a time nearly pallid. In ophthalmia it may therefore be said to shorten the curative process; but the most successful efforts of art do not suddenly extinguish inflammation, they only diminish it. When a wound is inflicted on the eye of a healthy person, the inflammation which follows, although simple is sometimes severe. An example of this occurs at page 202, in the case of Smith. The inflammation was very acute, and affected the internal as well as the external tunics of the eye. Within the short period of thirty-two hours after the

operation, which gave rise to the ophthalmia, the abstraction of one hundred and seven ounces of blood, of which forty-eight were taken from an artery at a single bleeding, served only to arrest the process of disorganization, by checking the effusion of coagulable lymph, and by preventing the suppurative process which would inevitably have been the result of such an excess of arterial action; but the inflammation, although controlled, was not subdued for a considerable period afterwards: time, and other aids were required for its resolution.

The ophthalmia mucosa has been marked in the preceding table merely as a higher degree of simple inflammation of the conjunctiva. It is true that in some cases, especially of the adult, there are strong grounds for believing that the disease may be communicated from one person to another, and if this be certain, there does, in such instances, appear to be a specific difference in the disease; but there are other cases in which the observer may note this inflammation either in its mild or virulent

states, passing through its several stages, without being able to trace any evidence of its contagious nature.

Although this disease, even in its virulent form in the adult, be considered simply as the most acute inflammation of which the tunica conjunctiva is susceptible, yet, because of its intensity, and of the facility with which the cornea is destroyed, or materially impaired in its structure, at the points where the pressure of the inflammation is chiefly sustained, blood-letting will not always succeed in arresting it previous to disorganization. But further, although prompt and free bleedings, by diminishing the force of the heart and arteries, be one of the most effectual checks on disorganizing inflammation; yet the most experienced practitioners will differ in opinion respecting the degree to which arterial action should be reduced in those who are acutely inflamed. There is a point of reduction beyond which the further abstraction of blood will protract the cure of the ophthalmia mucoso. This degree varies with the individual; but it may be esti-

mated by the effect of the remedy on the general appearance of the patient, and on the particular state of the pulse. When young and vigorous men are seized with this inflammation, copious venesection is essential to its cure. It has indeed been carried to an enormous extent in the army; but such practice, when applied under the most favourable circumstances, namely, at the commencement of the disease, in men capable of bearing this reduction, has not always prevented it from passing into its most inveterate chronic state; and if applied to men badly fed, and breathing the impure air of a large city, it would be destructive.

In the ophthalmia scrophulosa, when the ulcers which succeed to pustules are deep, and attended with a considerable effusion of coagulable lymph, especially if it be deposited in the anterior chamber, then bleeding, general or topical, in proportion to the powers of the patient, is beneficial. In the ophthalmia iridis, the utility of venesection has been sufficiently marked by the Author, in his Essay on that subject; but

in considering the operation of mercurials, we shall direct the attention of the profession to a more efficient remedy.

In whatever cases of ophthalmia venesection be considered as essential to the cure, topical bleeding may justly be superadded as an auxiliary. We except, however, bleeding by scarification of the conjunctiva in every *acute* variety of ophthalmia. The Author's reasoning on this point in the infant (page 45) is equally applicable to the adult.

Exceptions to general and topical bleedings occur in the ophthalmia mucosa in its stage of passive congestion; but more especially when sloughs, or sloughing ulcers of the cornea appear. The treatment under the latter circumstances is marked with great precision and judgment in chapters I. and IV. A doubt on this point may be resolved even by an indisposition to heal in other textures of the body. A child in whom one eye had been recently destroyed by inflammation, applied with the conjunctiva of the other eye in a state of vascular con-

gestion, and a small dull speck on the cornea. The state of congestion seemed to demand local bleeding at least, aided by the minor parts of the antiphlogistic treatment. These were ordered, but presently countermanded on observing eight small ulcers on the nates and perinæum, in a foul and sloughing condition. The extract of bark was freely given, and in forty-eight hours the ulcers assumed a florid and healing aspect. By this time the dull speck of the cornea had opened into a small ulcer, which readily healed, and this eye was saved. Under the state simply of passive congestion, the contraction of the inflamed vessels is retarded by general bleedings if carried beyond a certain extent; but is materially aided by astringent applications. In this state, a solution of alum freely and frequently injected over the conjunctiva, checks and often prevents the elongation of its vessels into granulations, processes, and folds, which are too commonly produced in the chronic state of the ophthalmia mucosa.

General and even topical bleedings are

seldom useful in the ophthalmia serophulosa, except in the stage above noted, when its ulcers are attended with a too abundant effusion of lymph. In the contrary state, in which its ulcers are transparent, we seek rather to assist than to depress the restorative process. In general, the treatment of this ophthalmia is found to be most effectual, when instead of attending merely to the local inflammation, the improvement of the constitution is secured, by sending the patient into a pure atmosphere; by regulating the temperature of skin; by gently cleansing his alimentary canal; by giving tone without stimulating, to which end the mineral acids, especially the diluted sulphuric and nitric, conduce; and lastly, by nourishing the body without heating it. Yet a vegetable diet affords no security against scrophula—it sometimes engenders it. From the age of one year and upwards, almost all the children of the poor, who are affected with ophthalmia, are attacked with this variety of it. Where the restorative powers of the constitution are perpetually invigorated by breathing a pure air, many defects in diet are compensated; but on

the other hand, it borders on rashness in those who attempt to invigorate the body by a highly stimulant diet, whilst it degenerates in an impure air, and a disorganizing scrophulous inflammation is set up in any of its textures. An observer of nature will avoid both extremes. Thus the food which nature provides for the infant, whose fine vascular tissue is the most easily impaired, is very nutritive without being stimulant: it is a bland animal secretion, and is much purer, and far better adapted to its ends than the food which art commonly prepares for the weaned child. Hence, what might be anticipated is true, that the ophthalmia scrophulosa is of rare occurrence in infants at the breast, compared with children after they have been weaned. The ophthalmia mucosa (described in chap. I.) is the disease of the former; the ophthalmia scrophulosa, of the latter: and the occurrence of the pustules which are peculiar to it, often proves to be the first manifestation of a strumous habit.

But 2dly; the force of the heart and arteries is diminished by emetics. The true

principle on which these remedies are administered, and the mode in which they diminish active arterial congestion, and in the same proportion arrest effusion, is so distinctly pointed out by the Author (see page 60) that it is only necessary to refer to that passage to show that he was not inattentive to this method of subduing inflammation.*

* The opinion of the Medical Officers of the Infirmary on this point was thus expressed in the Special Report of the General Committee (p. 9, 10.) :

“ The ophthalmia, called Egyptian, being an acute inflammation of the conjunctiva, may be immediately stopped by such means as are employed to arrest other inflammations. Medical men are already acquainted with several modes of accomplishing this object; even with that particular mode, which Sir William Adams employs, and represents as his own discovery; viz. the administration of emetics. The use of emetics in inflammation is an old practice, respecting the propriety of which, in the general treatment of these affections, the opinions of professional men, are, and will probably continue to be divided; but even with regard to the particular application of this treatment, the colleague of Mr. Saunders must recall Sir William's recollection to his days of instruction at the London Infirmary for Curing Diseases of the Eye, when he was there taught the curative powers of emetics, in the acute forms of oph-

3dly. The force of the heart and arteries is diminished by purgatives. These excellent means are of more general utility in ophthalmia than either of the former. In the most inveterate cases their use is indispensable, and must be repeated even after it would be injudicious to enfeeble the pulse to that great degree which may be done either directly by the abstraction of blood, or indirectly by continually nauseating the stomach. But in the milder varieties of ophthalmia, purgatives are of themselves sufficient to cure the disease. Doses of calomel, given exclusively with this view, often subdue at once the incipient stages of the ophthalmia serophulosa. But in the advanced stages of it, they must be given

“thalmia. Amongst the formulæ kept at that Infirmary,
 “none was more constantly used by Mr. Saunders at the
 “commencement of acute ophthalmia, whether of the ex-
 “ternal or internal tunics of the eye, than a simple solu-
 “tion of tartar emetic, so administered as either to nau-
 “seate, or to produce full vomiting. His correct reason-
 “ing on the latter effect of this remedy will be found in
 “his Essay on Inflammation of the Iris, which was first
 “published in the Medical and Physical Journal, in the
 “year 1806.”

with more circumspection and reserve. Purgatives have this marked advantage over other remedies, that they set free functions; the disordered state of which constitutes one of the most prolific causes of that very habit of body which produces serophulous inflammation

Although the most obvious means of reducing inflammation consist in diminishing the force of the heart and arteries; yet it is often more expedient to attempt at once to alter the action which is going on at the extremities of the inflamed arteries. The stages of disorganizing inflammation differ only in degree and duration. Sometimes this is so well marked as to admit of the distinction into acute and chronic inflammation. The latter perhaps ultimately proves more destructive than the former, because it is more insidious. A rapid and excessive effusion of coagulable lymph is generally attended with suffering enough in the patient to alarm the medical observer; but a slower disposition of it in concealed textures too frequently impairs the natural structure of the part, without giving those

bold signs of organic mischief, which would command attention, and urge the timely application of the efficient means of cure. In the eye the process can commonly be seen, and on this account those, who are rightly instructed in pathology, have a better opportunity of detecting and arresting the effusion of coagulable lymph into the natural textures of the organ, at the very commencement of the process. The ophthalmia iridis affords one of the most striking illustrations of disorganizing inflammation. The beauty and delicacy of the structure, the importance of its function, the defined seat of the disease, the distinctness with which all the stages of the process can be discerned through the transparent cornea, the probability of partial or total disorganization and loss of vision, if the case be left to nature; and the equal probability of cure if the aid of medicine be rightly applied, give to the inquiry a degree of interest and importance which can scarcely be exceeded even by inflammation of the organs which are essential to life. But further, the process of cure displays not only the power of the remedy, but the

mode in which it operates. The Author's description of an inflamed iris is written with admirable accuracy, but the distinction between the simple and siphilitic inflammations of this texture is less certain, except the admitted secondary symptoms of the latter, be also present. The certainty with which the mercurial action arrested the deposition of coagulable lymph in syphilitic inflammation of the iris led the Editor to give this remedy a fair trial in simple inflammation of the iris, in which the disorganizing process by the adhesive inflammation is precisely the same, however it may differ from the former in its exciting cause. The result of the trial has perfectly satisfied him that the mercurial action *alone*, when properly kept up, is sufficient to subdue the ophthalmia iridis in its most acute stage. Although the full action of mercury is often efficient in arresting that disorganization of the various parts of the body, which results from the *gradual* deposition of coagulable lymph within their interstitial textures; yet the free abstraction of blood is still essential to prevent its bolder, and more immediately destructive effusions in

phlegmonous inflammation. It is, however, too low an estimate of the operation of mercury, to consider it only as a specific against syphilis, or as an evacuant, and promoter of certain secretions and excretions—it powerfully alters the action of inflamed arteries, more especially in respect to the effusion of coagulable lymph, which it, in various degrees, controls, or even altogether suspends.

In relation to general practice, this is perhaps the most important view which can be taken of the operation of mercury on the vascular system; but it is not the place to inquire into the state of the body under which mercury is either capable or incapable of arresting the effusion of coagulable lymph. The curative result is sufficiently uniform in ophthalmia iridis, if the mercurial action be excited in the early stages of the inflammation, to urge the adoption of this treatment in preference to any other; but if the disorganizing process be very rapid, the use of this important remedy, which demands time to be efficient, may be aided by general or topical bleeding. It is not the

quantity of mercury, but the mercurial action, which is required to interrupt the disorganizing process; and the former must be kept up till the latter is subdued. The observations of the Author on the application of the belladonna to prevent the contraction of the pupil, must be strictly attended to. If smeared over the brows and eye-lids, its effect is produced without irritating the eye.

Although inflammation is most effectually subdued, either by diminishing the action of the heart and arteries, or by altering the action of the inflamed vessels yet the attempt at curing by metastasis, or by transferring the inflammatory action to another, and less important seat, is sometimes successful, and will justify the use not only of blisters, but also of issues or setons in obstinate cases of ophthalmia: their use, however may more generally be dispensed with than in many other cases of inflammation.

It must be admitted that inflammation of the iris is most commonly idiopathic, yet

it unquestionably is also a symptomatic disease. It occurs in combination with the secondary symptoms of syphilis, and sometimes, though less frequently, as a sequel of rheumatism. Although inflammation of the choroides cannot be so clearly proved as inflammation of the iris, for the latter can be seen; yet it may be inferred from the rapidity with which the sensibility of the retina is impaired, or quite lost, in the acute varieties of the disease. It cannot be too strongly impressed on the minds of physicians and surgeons, that amaurosis is frequently the result of inflammation of the *internal* tunics of the eye, which has been either overlooked, or inadequately treated. The retina cannot suffer compression, either from the turgid vessels of the choroides, or from the matters effused from them, without immediate danger of the destruction of its sense. The method of cure is the same as in inflammation of the iris, the former being in reality only an extension of the latter disease, but no time must be lost in applying the remedy. In the chronic variety of the inflammation, the mercurial course may be less active,

but it must be continued for a much longer time, or until the action of the vessels be permanently changed. In the preceding table, these varieties of symptomatic amaurosis are marked in connection with the ophthalmia choroideæ; but all the other varieties which are either symptomatic, or sympathetic of the affections of distant textures, viz. of the brain, of the stomach, of the uterus, &c., are referred simply to disordered function, not being necessarily connected with altered structure of contiguous parts. It is probable that some cases of idiopathic amaurosis may be the direct effect of an inflamed retina; this may be supposed from the intensity of the suffering, and the rapidity of the loss of vision; but as they cannot be certainly distinguished from cases of inflamed iris and choroides, they have not been marked in I. The sense of seeing in the retina is connected with a certain condition of its arteries. It is not unusual under a sudden loss of blood, for the patient, previous to fainting, to exclaim, "I am blind:" this is the amaurosis of exhaustion, and is temporary; but under excessive determinations of blood to the head, the eye-lids droop, the pupils dilate,

and blindness ensues: this is the amaurosis of congestion, and is more permanent. They are opposite, and extreme cases. It is probable that instances of idopathic amaurosis, which result from the use of the organ, are cases of congestion, simply in the vessels of the retina. They occur in watch-makers, engravers, compositors, and in persons who are continually employed in observing very minute, or very bright objects. The approach of the disease is insidious, the patient perseveres in the exciting causes, and vision is lost beyond the help of art. The last observation leads to the very obvious, and most important, yet much neglected practical rule of wholly abstaining in the incipient stage of amaurosis, from exercising the eyes on small objects, or from exposing them to heat, or even to a strong light. The Medical Report of the Infirmary will serve to convey a notion of the relative proportion of ophthalmic diseases, if the cases of amaurosis be excepted, because the proportion of incurable to curable cases, is the very reverse of what obtains in every other species or variety of these affections. In the arrangement offered in explanation of the Medical Report, such

alterations are suggested on the subject of amaurosis as it is probable the Author himself would have made in submitting it to the observation of medical men. Palsy of the eye-lid and squinting are both introduced in the table as symptomatic affections. The cases *here* referred to usually occur in combination with the amaurosis, which is symptomatic of sensorial congestion, and are successfully treated only by the means which gradually unload, and alter the action of the capillary arteries. Strabismus, and perhaps parrlysis of the upper eye-lid, may occur as idiopathic affections; but the object of the preceding remarks is fulfilled, when they simply illustrate what the Author has arranged, written, or done.

Inflammation of the capsule of the lens produces capsular, but not always lenticular cataract. This fact is finely displayed in opacities of the posterior layer of the capsule, or that portion of the membrane which is common to the lens and vitreous humour. This variety of cataract is commonly mistaken for amaurosis, because,

although the patients vision is nearly lost, the pupil appears black, and is sometimes even irregular, and partially contracted, as it commonly is in that variety of amaurosis, which is the result of chronic inflammation of the internal tunics of the eye. The free dilatation of the pupil by the extract of belladonna, which the Author introduced into general practice, affords an unerring means of discriminating this variety of cataract from amaurosis. The seat and extent of the opacity in the posterior layer of the capsule can be distinctly discerned through the transparent lens, when the pupil is fully dilated. The frequent application of the belladonna alone suffices in some of these cases, for all the purposes of vision; but when the opacity is so extensive, that the use of the belladonna does not assist the patient, then the Author's operation on the capsule is the effectual remedy. The directions given in the chapter on cataract, for effecting the central aperture in the anterior layer of the capsule, and for promoting the solution and absorption of the lens, are to be observed until these ends are accomplished,

and then a central aperture must be made in the posterior layer of the capsule, in the same manner as it was effected in the anterior. The opacity of the capsule does not necessarily produce an opacity of the lens, or a lenticular cataract; yet when the lens is wounded, it soon becomes opake. This opacity can only be the effect of inflammation excited by the wound, just as the transparent substance of the cornea is rendered opake, after a wound, by the deposition of lymph. Other causes which excite inflammation of the tunics of the eye, are also productive of cataract, so that it is proper to direct the attention of the profession to inflammation, as a cause of cataract, which was the motive for connecting them in a tabular view, without by any means intending to assert that it is the only cause of that disease.

It was the Editor's intention to have entered next into a comparative view of the merits of the operations for the solution, and the extraction of the cataract, in the *adult*, founded on an experience derived from the extensive trial of both, commenced

at the Infirmary, by the Author, and continued by the eminent surgeons who have succeeded him. But the time has elapsed which he would willingly have devoted to this service, and other duties now press upon him, and compel him to postpone this inquiry, together with the remarks which he had to offer on the parts of the table, which he has not yet considered. Whilst he regrets that the delay in preparing for publication this Second Edition has rested wholly with himself, the profession will do him the justice to believe that the circumstances which prevented him from sooner complying with their wishes, were such as he was altogether incapable of controlling.

Charter House Square,

July 16, 1816.

HENRY CLINE, ESQ. & L.
AND
JAMES COOPER, ESQ. & L.

THE EDITOR OF THE

NEW YORK

THE PRESIDENT
TREASURER, VICE-PRESIDENTS
COMMITTEE, AND GOVERNORS

OF THE

AMERICAN

FOR THE

BY

THE

THAT

EXCELLENT HABIT HAS BEEN PERMANENTLY

ESTABLISHED

THIS WORK

IS

RESPECTFULLY

BY

THEIR FATHERLY

THE EDITOR

TO
HENRY CLINE, ESQ. F. R. S.
AND
ASTLEY COOPER, ESQ. F. R. S.
UNDER WHOM THE AUTHOR ACTED,
AS
DEMONSTRATOR OF ANATOMY:
TO
THE PRESIDENT,
TREASURER, VICE-PRESIDENTS,
COMMITTEE, AND GOVERNORS,
OF THE
LONDON INFIRMARY
FOR CURING DISEASES OF THE EYE;
BY
WHOSE MUNIFICENT SUPPORT
THAT
EXCELLENT CHARITY HAS BEEN PERMANENTLY
ESTABLISHED:
THIS WORK
IS
RESPECTFULLY INSCRIBED
BY
THEIR FAITHFUL SERVANT,
THE EDITOR.

REVIEW

It offers this tribute to the memory of a friend, the Editor has endeavored to render the service to the faithful record of what the Author had written of him.

In the first three chapters the manuscript was sufficiently complete to admit of publication in the form of distinct essays, in which the Author intended that it should appear, but in Chapter IV the Editor was obliged to depart from the original plan of the work, and to connect under the stages of inflammation facts which were too valuable to be lost. This advantage, however, arises from it, that the organ of vision is thus subjected to the same general views of disease and rules of treatment, by which the judicial process of a similar kind in other organs are controlled.

The arrangement of the cases in Chapter

PREFACE.

IN offering this tribute to the memory of his Friend, the Editor has endeavoured to limit the service to the faithful record of what the Author had written or done.

In the first three Chapters the manuscript was sufficiently complete to admit of publication in the form of distinct essays, in which the Author intended that it should appear; but in Chapter IV. the Editor was obliged to depart from the original plan of the work, and to connect under the stages of inflammation facts which were too valuable to be lost. This advantage, however, arises from it, that the organ of vision is thus subjected to the same general views of disease, and rules of treatment, by which the morbid processes of a similar kind in other organs are controlled.

The arrangement of the cases in Chapter

V. is merely intended to point to a practical distinction of some importance. Few cases of the malignant fungi can fall under the observation of an individual; for which reason they are the more worthy of being recorded, and of being illustrated by correct Engravings. It is the only method of communicating to medical men correct notions of diseases which are imperfectly comprehended, and which are apt to be confounded under one generical term.

The Chapter on the congenital cataract has been composed from the notes of the Author, and from direct observation on almost all the cases, public and private, on which he operated.

Charter House Square,
November 27th, 1811.

A
SHORT ACCOUNT
OF THE
LIFE OF THE AUTHOR.

JOHN CUNNINGHAM SAUNDERS was the youngest son of John Cunningham and Jane Saunders, of Lovistone, in the county of Devon.

He was born on the 10th of October, 1773, and at the age of eight years was sent with his brother* to a school at Tavistock, where he remained several years, and made considerable progress in classical learning. His education was completed at a seminary at Southmolton, where he remained till the end of the year 1790. He

* To his only brother, the Reverend Onesiphorus Sheere Saunders, of Barnstable, the Editor is indebted for these particulars.

was then placed under the care of Mr. John Hill, surgeon, of Barnstable. In many instances whilst he was under the tuition of this gentleman, who had a high opinion of his abilities, he manifested much professional acuteness. At the expiration of an apprenticeship of five years, he came to London to complete his medical education without a single introduction to any one who could direct or assist him in his studies: a circumstance which, in estimating his professional merit, justly tends to exalt his character.

On his arrival in London, among the distinguished schools of surgery for which the Metropolis is justly celebrated, he selected St. Thomas's and Guy's Hospitals, which, for the eminence of the Teachers and for the extensive field of observation, that they afford, are not surpassed by any similar establishment. In this great school he applied himself to anatomy with the assiduity of one emulous of professional distinction; and so rapid was his progress in the acquirement of it, that at the end of two years the important appointment of

Demonstrator of Anatomy at St. Thomas's was conferred on him by the Teachers of Anatomy and Surgery at that Hospital. It is the strongest proof of his merit that Mr. Astley Cooper, on being called to the chair, elected him to the very office which he himself had recently filled. From this period he resided with Mr. Cooper for several years, and as a dresser under him, finished his surgical education.

He continued to discharge the duties of his office with great advantage to the anatomical classes until the spring of 1801, when he resigned it, and went into the country: but in the autumn of the same year he was induced to return to London, and was re-appointed Demonstrator of Anatomy, which post he filled with increasing reputation to the very winter that terminated his valuable life. His demonstrations, which consisted of a series of practical lessons in anatomy, gave great satisfaction to the classes, and the pupils expressed their acknowledgement of the services he had rendered them, by presenting him on more than one occasion with plate, on

which they had handsomely inscribed their sense of his merit, and the grateful expressions of their regard.

After his return to London, the subject of his final settlement occupied much of the attention of himself and his friends, whose warm attachment to him ever increased in proportion to their intimate knowledge of him. He wished to establish himself as a surgeon in London, and with this view took a house in Ely place. He shortly afterwards (April 7th, 1803,) married Miss Jane Louisa Colkett, the second daughter of Daniel Colkett, Esq. and had one daughter who died in her infancy.

In October, 1804, he published a proposal of founding a Charitable Institution for the Cure of Diseases of the Eye and Ear. The plan was encouraged by a number of gentlemen, to many of whom he was not even previously known. The Charity was established, and has ever since continued to receive increased proofs of public favour. It now bears the name of

the LONDON INFIRMARY FOR CURING DISEASES OF THE EYE, to which class of diseases it has been found expedient to limit it. Mr. Saunders himself in the following letter noticed its origin, and at the same time announced that he had successfully operated on the congenital cataract, even in infancy:—

“ TO THE COMMITTEE.*

“ GENTLEMEN,

“ AS you have resolved to submit this Charity in a regular form to the notice of the public, it will not be foreign to the design, if I should revert to the circumstances which attended its origin.—On the 1st of October, 1804, I published a Proposal for instituting a DISPENSARY for the relief of the poor afflicted with Diseases of the Eye and the Ear. This Proposal was sanctioned by the testimonials of the Phy-

* This letter was published by the Committee in their Report of the progress of the Charity for the year 1808.

sicians and Surgeons of St. Thomas's and Guy's Hospitals, where I had been engaged in professional studies ten years, during eight of which I had acted as the Teacher of Practical Anatomy. The plan was immediately encouraged—this Charity was instituted under the name of the **LONDON DISPENSARY FOR CURING DISEASES OF THE EYE AND EAR**, and opened for the reception of patients on the 25th March, 1805.

“ Subsequently to the date of my Proposal, a similar Institution, honoured with the Royal Patronage, was formed and established in Westminster. Although the Prospectus of the Royal Infirmary was not heard of until many months after the Publication of my Proposal, yet it must be admitted that that Institution first appeared before the Public in a regular and organized form, and this, which is the original, is consequently considered by all who are unacquainted with the facts as the copy. Apprehensive of this impression, I immediately claimed by public advertisements, which were never answered, the priority of my Proposal.

"I should be excused for thus obtruding on your notice if I sought merely the indulgence of honest pride, by maintaining this just claim to respect, but I should yet more readily be excused, when you reflect, that if I had abandoned this claim, the Public would continue to regard me as an humble copyist.

"In the return which I have now the honour of delivering to you, the Cured are arranged under the heads of the Diseases with which they were afflicted. In addition to the observations made on the last Report, which are equally applicable to the present, there is one point on which I must beg the indulgence of expatiating; I mean the adaptation of an operation on the cataract to the condition of childhood, by which I have successively cured, without a failure, fourteen persons born blind, some of them even in infancy, and it has just been performed on an infant only two months old, who is in a state of convalescence. As I reserve for another occasion the communication of the method which I pursue for the cure of very young

children, I shall no farther compare it with extraction, than by observing; that extraction is wholly inapplicable to children, or only fortuitously successful. Those who on all occasions adhere to this operation, and have never turned their thoughts towards the application of means more suitable to this tender age, have been obliged to wait until the patient has acquired sufficient reason to be tractable; otherwise when they have deviated from this conduct, the event has afforded little cause of self-congratulation.

“How great the advantage of an early cure, is a question of no difficult solution. Eyes ORIGINALLY affected with cataracts contract an unsteady and rolling motion, which remains after their removal, and retards, even when it does not ultimately prevent, the full benefit of the operation. A person cured at a late period, cannot overcome this awkward habit by the utmost exertion of reason or the efforts of the will. But the actions of the infant are instinctive. Surrounding objects attract attention, and the eye naturally follows them. The ma-

nagement of the eye is therefore readily acquired, his vision rapidly improves, and he will most probably be susceptible of education about the usual period.

"I am,

"GENTLEMEN,

"Your obedient Servant,

"J. C. SAUNDERS."

"Ely Place, March 25, 1808."

During this period others had also profited by that ample field of experience which the Infirmary afforded Mr. Saunders. He instructed Mr. Adams, in the most disinterested manner, in the diseases of the eye, and in the operation for the cataract, which is subsequently described; and thereby enabled him to establish an Infirmary at Exeter, on the model of the London Infirmary. He also admitted Mr. Stevenson to the practice of the Infirmary, as a pupil, for three months.

In the beginning of 1809, Mr. Saunders announced by advertisement in the medi-

cal journals, his intention of publishing a Treatise on some practical points relating to the Diseases of the Eye, and particularly on the nature and cure of Cataract in persons born blind. He was so completely occupied with his public and private professional duties, that only a small portion of his time, during the summer months, could be devoted to the labours of an author; yet, when it is considered that not quite five years had elapsed from the establishment of the Infirmary before his valuable life was closed, it must be admitted that he was not inattentive to that service, as he had published during this period a work on the Anatomy and Diseases of the Ear, and an Essay on Inflammation of the Iris, as a specimen of a series which he meant to communicate on the diseases of the eye. In the course of this year his inquiries on the congenital cataract were nearly concluded, and after the anatomical lectures had closed, he commenced the manuscript of his intended publication. He wrote the Essay on Inflammation of the Conjunctiva in Infants, and on the Cure of the Inversion of the

upper Eye-lid by excission of the Tarsus, which together with the Essay on Inflammation of the Iris, form the three first chapters of the following work. But he was not enabled even to correct what he had written. The attacks of the disease which proved fatal to him were now so frequent, the pain of his head was so excruciating, and in his intervals of ease he was so much deprived of that energy of mind which had been natural to him, that although he struggled to redeem his pledge he was unable to accomplish his intention. The Editor cannot overlook his notes of cases, taken at this time in a tremulous and sometimes illegible hand-writing, without the most painful recollection of his sufferings. But even in this state he could not be prevailed on to quit the scene of his hitherto active labours for temporary repose in the country.

His disease commenced with the following symptoms: Acute pain of the scalp, investing portions of the occipital and right parietal bones, accompanied with a sensation of icy coldness (unreal) in the affected

part, urgent vomiting, pulse sometimes frequent at others undisturbed. These paroxysms generally passed away in a night, almost always in the space of twenty-four hours, and returned at uncertain intervals. They were excited by a current of cold air chilling the skin, by indigestion, or by anxiety. He was habitually temperate: he disliked wine, and took even malt liquors with caution, for they aggravated the paroxysms of the disease.

He was subsequently affected with an imperfect amaurosis of the right eye. The eye was carefully examined, but the pupil was found to be of its proper size and figure, and it contracted or dilated in proportion to the quantity of light which fell on the retina. The following circumstances were remarked in the progress of this symptom: luminous bodies, to use his own expression, were shorn of their beams; objects, besides being obscured, were diminished in size, and deranged in position; the accurate distinction of colours was lost, apparently because the action excited by the predominant colour dwelt on

the retina. Blood was freely drawn from his neck by cupping, he was confined to a dark room, under a very low regimen, and his bowels were kept open; yet during this period he suffered two severe paroxysms of his disease in quicker succession than usual. They were, in this instance, distinctly accompanied with frequency of pulse, and terminated by sweat. His pulse was naturally frequent and very full, like the pulse of a patient under pleuritis, his radial arteries were unusually large.

At the approach of the winter of 1809, the paroxysms of head-ach and vomiting became more frequent. He had sensibly wasted, and was often distressed with dyspepsia and palpitation. In giving his last demonstration, in November, 1809, he felt oppressed by the heat of the room and the numerous class which surrounded him, and was obliged to retire, leaving his demonstration unfinished. His attention was first interrupted by a numbness of his right leg, his expressions were confused, and he continued to repeat the words he had last

uttered: although he was conscious of his error, he could not correct it. The voluntary muscles were affected, and he walked with an unsteady pace. From this period he frequently lisped, and had a difficulty in retaining his saliva.

On the 4th of January, 1810, he experienced a similar attack, which chiefly affected the voluntary muscles. He was unable to walk without support. His countenance was pallid and disfigured, and bore, instead of its wonted expression, the character of fatuity. His extremities were chilled. He was relieved by going to bed, and diluted with warm tea. On the following day he was more than usually unsteady in walking. He suffered other attacks of his disease, similar in kind, but varying in their degree, in one of which he fell in the street. He attributed this unsteadiness in moving to a defective sensation, for he did not always distinctly feel the ground. He continued his professional pursuits; and, in the intervals between the attacks, he was capable of walking a considerable distance.

The functions of the alimentary canal became more disordered. Various mild fluids taken for breakfast, were rejected by vomiting. Nothing was so grateful to his palate as water. His appetite for dinner was irregular, and his stomach would receive only the most simple diet. His bowels were torpid. His heart palpitated more frequently than usual. His skin was pallid: the capillary arteries, far from being loaded, had not matter enough for nutrition; he perceptibly wasted, his mind became unequal, and his spirits low. As soon as the amaurosis of the right eye manifested itself, the evacuant plan was pursued, and stimulants were refrained from to the extent which he could bear. At no subsequent period did his declining strength admit of further reduction. The torpor of his bowels, in the earlier stages of the disease, was relieved by doses of the submuriate of mercury and the compound extract of colocynth, or the sulphate of magnesia: in the latter, by rhubarb, to which was added a portion of the subcarbonate of soda. In the country he was ruddy, and enjoyed health. In the impure air of a

large city, and still more of a dissecting room, to which, during so many winters, he had been exposed, his colour had insensibly faded, and his health had been less vigorous. He was repeatedly, but in vain, solicited to reside at a small distance from town.

On the 9th of February, 1810, I was called to him at three in the afternoon, and found him unusually low. He had just dined, and had been induced, from a feeling of languor, to take three glasses of wine, which in him was an excess; but his pulse was not sensibly affected by it. Between five and six o'clock he visited a patient in Ely Place. At nine I again saw him. He calmly conversed with me for nearly an hour on professional subjects, but chiefly on his own case, and especially respecting the palpitation, which so often distressed him. He thought it proceeded from organic disease of the heart. This led me to examine the seat of that viscus. Its pulsations were certainly felt lower than usual. His pulse at the wrist was then seventy-four and regular. In a few mo-

ments after this examination he complained of a numbness of the little toe of the right foot, and immediately remarked that he had, of late, occasionally felt a pressure about the calf of that leg, even when undressed, as if it were girt with a tight pantaloon. In an instant afterwards he grasped the scalp over the right side of the occiput, the old seat of pain, his face was pale, covered with sweat, and convulsed on the right side. He drew up his right leg and dropped to the right side. He looked at me, and said with a failing articulation, "paralytic fit." He attempted, but could not drink some cold water, which was offered to him. His pulse was now one hundred and forty in a minute. He several times pronounced the name of his wife with an affecting emphasis, and became insensible; a deep apoplectic stertor seized him, and his pulse fell to forty. These fatal changes were rapid; but at a time of such painful anxiety, it cannot be stated with precision how soon they were accomplished. Ten ounces of blood were taken from his arm with no obvious advantage, therefore the temporal artery was immediately afterwards opened,

and sixteen ounces more were rapidly drawn off from it. The stertor ceased, and the pulse rose and became free; but these were the only effects which resulted from the abstraction of blood. He remained without sense or motion, and his pupils were dilated in the utmost degree. His neighbour Dr. Squire, and Mr. Battley, had come to his assistance; and shortly after them, Mr. Cline and Mr. Cooper arrived. Mr. Cooper proposed to take more blood from the temporal artery. It was suffered to flow, but it had now almost lost its arterial character, and resembled venous blood. The vital functions were ceasing; respiration every now and then paused, and he expired in the space of two hours and a half after the apoplectic attack.

It is remarkable that the retina of the right eye, for some time previous to his death, had recovered its sensibility in a degree sufficient even for his professional pursuits.

The following description of the morbid appearances is given by Mr. Ashley Cooper,

who examined the body three days after death.

“ The dura mater adhered firmly to the inner side of the cranium, especially over the right eye; but it was apparently free from disease. The tunica arachnoidea and pia mater were healthy. Although other parts of the body had become changed by putrefaction, the brain possessed an uncommon degree of firmness. On cutting open the lateral ventricles a quantity of coagulated blood was found at the posterior part of each, and nearly an ounce of bloody serum was discharged. The clot of blood extended from the right ventricle in the direction of its inferior cornu, and that part of the brain, which was in contact with it, had a soft and broken texture. The weight of the clot was at least one ounce. In the pons varollii there was extravasated blood, disposed in streaks.

“ The lungs were perfectly healthy, except that the upper part of each had contracted a slight adhesion to the chest.

About two ounces of bloody fluid were found in each cavity of the pleura, which was supposed to be the result of putrefaction. The pericardium contained about one ounce of a similar fluid. The heart was large, and its texture so soft that it broke down very readily under the pressure of the fingers; but this was more especially observable on the left side. The valves on both sides of the heart and arteries were sound.

“ The stomach was distended with air, and contained a small quantity of undigested matter; its left extremity was discoloured by resting on the spleen. Both small and large intestines wore an healthy aspect, except that the peritoneal coat of the small intestines was in a few places discoloured by putrefaction. The liver appeared of a dark blue colour, but its texture was unchanged. The gall bladder contained a small quantity of bile, and the excretor ducts were not larger than natural. The spleen was of its usual size, and of a deep purple colour. The pancreas was healthy. The kidneys and uri-

nary bladder were altogether free from disease."

Mr. Saunders was of the middle size, well made, and of an engaging mein. His mind was active, but its original bias was not in favour of the medical profession. Warm in his temper, naturally brave, and enthusiastically fond of whatever was truly British, his wish was to have distinguished himself in the service of his country. But although he was not led by choice to cultivate surgery; yet from the moment he engaged in it, he pursued that line of study which most surely led to professional distinction.

He was generous in his private practice, and perfectly unreserved in stating his opinions on the cases submitted to his judgment. In his public practice he truly deserved the title of a benefactor, for he never would accept any remuneration for his services, although a very liberal one was offered to him by the General Committee of the Infirmary. To that honourable body, and to the Governors in general,

the Editor feels that every acknowledgement is due for the esteem with which they repaid the labours of the Founder during his life, and for the honours which they conferred upon his remains. A more respectful tribute was never paid to the memory of any medical man. In republishing the proceedings of the General Committee, the Editor on this occasion is anxious to offer in particular a public acknowledgment to Henry Kensington, Esq. the Treasurer of the Infirmary, to Mr. Alderman Ansley, and Richard Heathfield, Esq. Vice-Presidents, and to Richard Battley, Esq. Secretary, with whom they originated. To no gentlemen more than to these is the Infirmary indebted for its prosperity, and none had a better opportunity of observing and estimating the services rendered by its Founder. The resolutions were moved at a very full meeting by Mr. Heathfield, and the following particulars, at the request of the Committee, were added by that gentleman in an Appendix to the report of the Charity published in 1810.

“ THE Committee now address the

Governors, under much affliction for the Death of the excellent Founder of this Charity. In MR. SAUNDERS the Members of the Committee have lost a Friend with whom they were proud to act: the Governors, a scientific and humane dispenser of their Bounty; the Public, a Man in whom great force of genius, integrity, and diligence, were directed with eminent success to a great public object, and whose actual progress was by himself only valued as an earnest of future public good.

“Impressed by considerations inseparable from the melancholy occasion, the Committee, at a Special Meeting on the 14th of February, unanimously agreed to the following Resolutions, viz.

‘That the Committee unfeignedly lament the irreparable loss this Charity, and Society at large, have sustained by the death of J. C. SAUNDERS, Esq. late Surgeon to this Infirmary.

‘That this Committee have ever recognised in MR. SAUNDERS the union of

the most singular simplicity of Character with the highest order of talents.

‘That his Humanity in the treatment of the poor objects of this Charity, has only been equalled by the extraordinary skill he has applied to their relief.

‘That the adaptation of an operation to the cure of Children born blind with Cataract, afforded the assurance of further extensive benefit to Society, and entitles him to rank as a Benefactor to Mankind.

‘That the President, Vice-Presidents, Treasurer, and Committee, do attend the Funeral of MR. SAUNDERS, and that the Governors of this Charity, generally, be invited to join in that mark of respect to his Memory.

‘That a general Meeting of the Governors be called for Tuesday, the 27th of February, to consider in what manner the sense entertained of the Character

and talents of Mr. SAUNDERS can be further appropriately manifested.

‘That a copy of these Resolutions, and an invitation to attend the Funeral, be transmitted to every Governor.’

“And at the special general Meeting of the Governors which ensued, the Committee had the satisfaction to find the sentiments of the Governors in strict unison with their own, and the following Resolutions were passed with the same unanimity.”

‘That the work intended to be entitled
 “A Treatise on some Practical Points relating to the Diseases of the Eye, and particularly on the Cure of Cataract in persons born Blind;” which was in preparation for publication by Mr. SAUNDERS, be published at the expense of this Institution, for the benefit of his widow.

‘That a Subscription to the Work will be an appropriate mark of the respect en-

tertaind by the Governors for the Memory of the late MR. SAUNDERS; as every Governor will thus have an opportunity of associating his name with that of MR. SAUNDERS; and of possessing himself of a Memorial of that estimable Man.

‘That in the opinion of this Meeting, the publication of the work will not only be an appropriate manner of conferring a mark of respect upon the memory of MR. SAUNDERS; but will also promote the objects of the Institution, by extending to the world that knowledge which he so successfully applied to the Poor under its care.

‘That the proceeds of the work (free from every deduction) be appropriated to the sole use and benefit of MRS. SAUNDERS.

‘That a book be opened to receive the names of subscribers, and the number of copies for which they may wish to subscribe.

‘That a portrait and bust of MR. SAUNDERS be obtained and placed in the Committee Room.

‘That in the opinion of the Meeting it is expedient, that a book be opened to receive subscriptions, towards the erection of a Monument, from such gentlemen as may be desirous of offering that further mark of respect to the memory of MR. SAUNDERS.’

“In furtherance of these Resolutions, a portrait of MR. SAUNDERS by Devis, and a bust by Giannelli, are placed in the Committee Room of the Infirmary, and active measures were adopted for the publication of the work at the expense of the Institution; but the Governors having since deemed it more expedient that it should be published in the usual mode, have carried into effect the principal intention of their Resolutions on the subject in a manner not less beneficial to MRS. SAUNDERS. They have also presented to the work the engraved portrait of the Author.

“ The following unfinished draught of an address to the Committee, Mr. SAUNDERS put into the hands of his friend and colleague only a few days before his death; observing, at the same time, that he thought it better to rest his claims to the continued patronage of the Governors, simply on the merits of the Medical Report rather than on any appeal to their feelings. Those sentiments which a characteristic delicacy of feeling induced him to withhold, the Committee deem too interesting to be suppressed, especially as they have now acquired the force of parting words.”

‘ TO THE COMMITTEE.

‘ GENTLEMEN,

‘ Five years have now passed since my proposal for establishing this Infirmary was submitted to your notice, during which I have incessantly and anxiously laboured to redeem the pledge then given to make it a beneficial Institution to Society. My anxiety has been relieved, and my labour con-

soled in the progress of this Institution, by repeated instances of your respect; and the recollection of them at present only heightens the satisfaction I feel, on finding myself confirmed as the conductor of an establishment supported by liberal and zealous advocates, and possessed of the means of performing an important part in Society, and esteemed by Society for it.

‘ In prosecuting the object of attracting public attention towards this Institution, I trust I have kept free from the practice of any disingenuous art. Popularity has not been snatched; but studiously and unremittingly sought: it was expected only as the reward of service; and that share of it which has been gained, is ascribable to the estimation in which the Governors have been pleased to hold this service. I have confided the character of the Institution to the quantum of professional good;—excepting you may be pleased to add, that mindful of being an agent for liberal and philanthropic men, I have always administered with humanity and attention to the

feelings of the poor, that relief which their bounty has supplied.'

"They close this brief memorial respecting MR. SAUNDERS, with the record of the distinguished respect conferred upon his remains.—On Tuesday, the 21st of February, his funeral was attended by a numerous company of Gentlemen, consisting of the Officers and Governors of the Institution, of Physicians and Surgeons of the highest professional rank, and of Medical Practitioners and Students.

"The Right Reverend John Luxmore, D. D. Lord Bishop of Hereford, who most impressively performed the sacred office of Burial, received at the church the procession, which moved on foot from MR. SAUNDERS's late residence in Ely Place, to St. Andrew's, Holborn, in the following order:

"THE REVEREND CHARLES PRYCE, M. A.
 Curate and Joint Lecturer of St. Andrew's Holborn, and
 Joint Lecturer of Christ Church, Middlesex.

THE TREASURER

AND

VICE-PRESIDENTS—Pall-Bearers :

Scarfs, Silk Hat-bands.

MOURNERS :

Crape Hat-bands, Cloaks.

PHYSICIANS AND SURGEONS :

Scarfs, Silk Hat-bands.

COMMITTEE :

Silk Hat-bands, Cloaks.

MEDICAL PRACTITIONERS :

Crape Hat-bands, Cloaks.

GOVERNORS :

Crape Hat-bands.

**STUDENTS OF ST. THOMAS'S AND GUY'S
 HOSPITALS :**

Crape Hat-bands, Cloaks.

SECRETARY.

CARRIAGES

OF THE BISHOP OF HEREFORD ;

PRESIDENT ;

VICE-PRESIDENTS ;

GENTLEMEN."

CHAPTER I

ON INFLAMMATION OF THE CONJUNCTIVA IN INFANTS

INFANTS soon after birth are subject to an inflammation, which, as it affects the tunica conjunctiva in a very peculiar manner, has been most commonly designated the purulent ophthalmia of infants. If the purulent discharge continued the essence of this disease, no very good objection could be made to the name, as it applies itself to a fact which is very obvious and striking. But the appellation arises merely from the strength with which that circumstance strikes the notice of the observer, and does in fact comprehend no more than one symptom, the mind of the inexperienced practitioner may be too much engaged in it, and may not be sufficiently alive to the stage of the disease which precedes the formation of that pure

CHAPTER I.

ON INFLAMMATION OF THE CONJUNCTIVA IN INFANTS.

INFANTS, soon after birth, are subject to an inflammation, which, as it affects the tunica conjunctiva in a very peculiar manner; has been most commonly denominated the purulent ophthalmia of infants. If the purulent discharge constituted the essence of this disease, no very good objection could be made to the name, as it applies itself to a fact which is very obvious and striking. But as the appellation arises merely from the strength with which that circumstance strikes the notice of the observer, and does in fact comprehend no more than one symptom, the mind of the inexperienced practitioner may be too much engaged in it, and may not be sufficiently alive to the stage of the disease which precedes the formation of the puru-

lent discharge. The conjunctiva, which is principally the seat of this inflammation, like all membranes endowed with secretory powers, is prone to undergo a change in consequence of inflammation, by which the properties of its secreted fluid are altered, as in a certain degree happens in catarrhal inflammation of the membrane of the nostrils, and in a still greater degree to the membrane of the urethra under the irritation of syphilitic virus. In the latter instance the secreted fluid assumes the appearance, if not the properties of pus: so strict a resemblance has the discharge, that the term puriform fluid seems highly eligible. In the inflammation at present under consideration, the discharge resemble pus full as much as the discharge from the urethra in gonorrhœa, and the matter passes through as great a variety of tints, from straw-colour to green, &c.

The inflammation commences by a slight redness on the inside of the eye-lids, particularly about the inner canthi; they are soon covered with a thin gluey matter, which quickly inspissating, fastens them

together, and when they are forcibly opened, a large gush of tears succeeds. The eye-lids tumefy very soon; the viscid discharge increases in quantity and speedily assumes a purulent form, whilst the tumefaction of the palpebræ increases. The conjunctiva now loses its character, its vascularity becomes extreme, and the minute colourless vessels which nourish its own peculiar texture, are so enlarged and turgid with arterial blood, that the larger branches which run beneath it are totally obscured. The surface of the conjunctiva is of a beautiful scarlet, and resembles (to use an anatomical illustration) a finely injected foetal stomach. The swelling of the palpebræ is so great, that when the child cries, the orbicularis muscle projects the morbid conjunctiva, and consequently everts the eye-lids; ejecting at the same time a considerable quantity of the puriform discharge. As the disease advances, the cornea becomes more or less cloudy, and by the extent of this cloudiness the degree of approaching slough is marked: for the whole of the cornea, if the whole become cloudy, will ultimately slough, and the form of the eye be totally

destroyed. I do not mean to say, that in every instance in which opacity of the cornea is apparent, the cornea is about to pass into a sloughy state: on the contrary, opacity is often the mark of a healthy action commencing around the breach of the cornea, for the purpose of restoring the part, and ought to be hailed as a happy omen. I am now speaking of a peculiar duskiness of the cornea, which begins during the progressive state of the inflammation which is antecedent to any loss of substance, but is indeed a sure sign that such loss is about to take place. When this duskiness comes on, supposing only a portion of the cornea about to slough, the extent of it in the space of twenty-four hours becomes definite, in the same space of time it becomes elevated and apparently lessened in extent, a groove of fissure forms between it and the rest of the cornea, portions of it are carried off by the discharge and tears, or sometimes it separates altogether in one mass. I have several times washed out with a syringe these little sloughs entire. But although I am as certain of the fact as the most fre-

quent observation can make me, I am equally sure, that most commonly when this disease destroys vision, the destruction is accomplished in a more gradual manner, not by a slough of very considerable extent and through the whole depth of the cornea at once, but by a succession of sloughs. In other words, the ulcer left by the casting off of the dead piece of cornea, becomes in turn sloughy, and extends itself by a succession of sloughy surfaces, until the last lamina of the cornea sloughs, or being protruded by the pressure from within, ulcerates, and the aqueous humour escaping, the iris passes through the breach of the cornea. Already the whole surface of the eye has been in an ill-conditioned inflammation; the ulcer, or rather the surface of the cornea around the protruding iris, is indisposed to heal; so that more and more of the iris protrudes, this in turn ulcerates, and the crystalline and vitreous humours all issue at the orifice.

This is the most violent state of the disease, and is less frequent than a more moderate but still malignant form, in which

opacities or small specks are produced by the ulcerative process on some parts of the cornea.

That the inflammation itself immediately destroys the parts by sloughing or ulceration, is a truth of which I am perfectly convinced. I am equally certain too, that the eye is not destroyed by suppuration, as some have supposed. I saw a child, in whom half the cornea was in a perfectly sloughy state, yet the iris was not affected, as far as was visible through the portion of the cornea still clear, nor was there a particle of matter in the anterior chamber. I foretold that the eye would be lost, and I observed the process; a hemisphere of the cornea completely cast off, and the iris came through the breach.

If we consider the rapidity with which this inflammation extends itself over the whole surface of the eye, and that the destruction of the organ takes place from a sloughing of the cornea, we shall be induced to admit, that it is nearly allied to erysipelatous inflammation. It is true, that

this inflammation on the skin produces vesications full of discoloured serum, to which we see no precise resemblance in this case of the eye; for in consequence of the difference in the nature of the surfaces, some variation will take place; but as they coincide in this essential particular, the production of sloughs, I hold myself warranted in considering this ophthalmia of infants, to be an erysipelatous inflammation of the conjunctiva.

The discharges are only symptoms, varying according to the degrees of the inflammation, and marking its stages.

Setting out on the principle, that the destruction of the eye is accomplished by a mortification of the whole or a portion of the cornea, or that vision is impaired, when the disease is less violent, by ill-conditioned ulceration, I think myself authorized to condemn the indiscriminate use of stimulant injections. A strict antiphlogistic plan is clearly indicated in the commencement of the inflammation. On this account leeches should be applied as near the eyes

as possible, and the bleeding from the bites suffered to continue a considerable time. The bleeding will be profuse from the bites of leeches in infants newly born in consequence of the extreme vascularity of the skin; and a sufficient number should be applied, so as to produce the effect of general as well as local bleeding, which will be known by the child's skin becoming pale. By this plan the tumefaction of the eye-lids will soon be reduced, which is in itself a sign of subsiding inflammation, the discharge will be more ropy and bland in its appearance, and the vessels within the conjunctiva and sclerotica will begin to appear. In the space of twenty-four hours the danger will be considerably diminished, and the antiphlogistic plan being a little longer continued, the activity of the disease will be subdued—then by the use of mild astringents, the discharge will gradually cease in the course of a fortnight or three weeks, and the eye will be left free from the most trifling defect,

Some persons, tempted by the sanguine appearance of the conjunctiva, think that

drawing blood by means of scarifications of the conjunctiva, is a preferable mode to that of leeches. But it can never be paramount in its effects to the proper application of leeches in infants, in whom I have stated the bleeding by the latter to act generally on the system, whereas a teaspoonful or two is the utmost which can be procured by scarification of the conjunctiva. Scarifications, as far as I have seen them employed in the active state of the inflammation, are certainly injurious; they have manifestly aggravated the symptoms; and I conceive it will appear highly improbable, that the infliction of mechanical injury on a part already actively inflamed, can be advantageous—a similar practice does not obtain in surgery on other parts of the body.

But my objections here will be, perhaps, answered by an appeal to experience, and I would willingly enter into a little discussion of the subject. When the activity of the inflammation is gone, the vessels of the conjunctiva that have been engaged in the process, remain preternaturally enlarged. At such time the division of a great

number of them, might cause the whole series to contract, and thus accelerate the diminution of the vascularity, and the adhesive inflammation might only produce a degree of re-action, which would then be immaterial. But the condition of the part is widely different during the progressive state of inflammation. At this state the wounds of the lancet are only additional stimuli co-operating with the disease, and consequently exasperating the state of the eye. Now those gentlemen to whose experience I may be referred for confutation have not specified any conditions under which their scarifications have been made, and therefore, I may fairly presume, that they were made after the inflammation was on the wane; and here again, I must observe, that scarifications cannot with propriety be used, if there be any ulceration or sloughing of the cornea produced by the disease; for a division of the vessels would only be an interruption to the restorative process, which may be about to commence.

The disorder of the bowels, which during this attack is considerable, ought to be

carefully regarded. The stools are often green, and should be corrected by magnesia and rhubarb. Sometimes the bowels are constipated, and demand the employment of a more active cathartic, Calomel: gr: 1.

Hitherto I have confined my observations on the treatment of the disease, to the progress of the inflammation to its utmost possible height, without producing any disorganization. If the application be made previously to this period, the disease is perfectly manageable, and as far as my experience authorizes me to say, the practitioner may safely give a favourable prognosis. But when the cornea grows dusky (the inflammation still continuing active) the danger is great. It is the unerring harbinger of approaching mortification of the part. Before the obscure part becomes definite, it is impossible to state what the event may be; however, when it begins to elevate itself, it is not difficult to foresee to what extent the sloughing will take place; and if it be not at once of the whole substance of the cornea, the case is

generally under controul, and the destruction of the eye may be prevented. Now, it may be fairly determined, how far the sight will ultimately be affected, by the position and bulk of the sloughy part, with regard to the pupil; bearing in mind, as I shall have occasion hereafter more particularly to explain, that the magnitude of the scar will be very considerably less than that of the slough; nor indeed, if the sloughy part of the cornea should be of the whole depth, ought the eye to be considered necessarily lost; for if it be small, it will only be a case of *procidentia iridis*, the major part of which cases I shall hereafter prove to be very tractable.

At the time when the slough is about to separate from the living parts, the inflammation has always moderated, and it will therefore be expedient to resort to astringent applications. Very moderate astringents are the best for it is well known that these points are not to be gained by force. Half a grain of the sulphate of zinc to an ounce of water, will suppress the discharge more rapidly than a stronger solution. For

when these substances are used of a greater strength, they set up an inflammatory process which is prejudicial, and they certainly increase the discharge in the same proportion as they aggravate the inflammation. What I have myself employed, has been a solution of alum, varying from two to six grains to the ounce of distilled water; and I have never had occasion to employ any other astringent. During this period the utmost vigilance is requisite, and the eye ought to be carefully inspected at proper intervals, so that the actual state of the sore may be known. If the practitioner remain in ignorance of this, the blame may be laid to his own supineness; for, I will take on me decidedly to say, that there is no case in which, by the assistance of Pellier's elevator, and most commonly without any instrument at all, the eye cannot be sufficiently exposed to see the whole of the cornea. The parts ought to be examined, so that if the ulcer of the cornea, after the separation of the dead part, re-acquires a sloughy surface, proper remedies may be used. Under such circumstances the tonic plan must be adopted. The extractum

cinchonæ is a very convenient form. The quantity of a few grains, divided into minute pills, may be given without difficulty in a little pap. I have given the quantity of six grains to a child a month old, every four hours, with the best effect. For the sore, before sloughy, has speedily acquired a healthy bottom, all farther spreading has ceased, and the process of granulation advanced rapidly. It will be difficult for me verbally to characterize the appearance of the sloughy surface. It is cindery—ragged—flocculent; whereas the healing surface is besmeared with lymph, which adheres firmly to the part on which it is poured out; a halo of lymph deposited in the laminae of the cornea surrounds the ulcer, and vessels advance towards it from the sclerotica, and may be seen, as it were, running into the lymph. The process of restoration does not seem to be materially affected by the continuation of the discharge, and the ulcer is often healed previously to its total cessation. Indeed the discharge in itself is of trivial import, as it will cease by the use of moderate astringents in the course of a fortnight or three

weeks, if there be no ulcer of the cornea; but if there be an ulcer, however favourably this effect of the disease may go on, the discharge will be continued by the irritation, for three or four weeks longer. But only let the ulcer assume the healing appearance, and the eye may be pronounced out of danger.

If the ulcer left by the slough, should extend itself by the ulcerative process only, it must be treated in the manner which I shall lay down, when I discuss the subject of pustulous ophthalmia. This disease does not, at its first commencement, excite the apprehension of the by-standers, and is generally suffered to advance considerably before any application is made, so that in general (particularly among the lower classes of society) the inflammation is spontaneously decreasing, at the time the surgeon first sees the patient; or otherwise sloughs or sloughy ulcers already exist upon the eye. A person unaccustomed to the observation of diseases of the eye, may, on such occasions, easily be deceived, and think the eye irretrievably gone, when it

is really in a state of convalescence: for example the whole of the cornea may be perfectly opake, so that the iris is eclipsed, and yet this opacity shall be a good symptom, for the healing ulcer is surrounded with a halo of lymph, which will certainly disappear as soon as the part has completely cicatrized.

During the inflammatory process, whenever the child cries, a large quantity of puriform fluid issues from between the eye-lids, which at the same time are everted. When the tumefaction is great, the upper eye-lid overlaps the lower, and is always partially everted. Whilst the eye-lids are everted, the conjunctiva remains morbid, and the puriform discharge continues. Frequently, when the activity of the disease is removed, it is necessary to apply compresses on the eye; and the lids being thus retained in their proper place; the conjunctiva will collapse so as to fall within the eye-lids. But the eversion in some cases is so great, that this method alone will be insufficient, and it will be necessary to cut out a very considerable portion of the

morbid conjunctiva, after which the eyelids may easily be returned, and kept by proper bandages in their station: or, what is more manageable, the compress may be crossed by strips of adhesive plaister. In the case which I shall relate by and by, the discharge was as completely retained as possible by the compress and sticking plaister, and yet, during the week in which the eye was kept thus closed and immersed in it, three ulcers of the cornea actually healed, and the discharge ceased, without any application whatsoever to the eyes:—a fact which affords an additional proof that the discharge in itself is not mischievous to the eye. I have also seen children, in whom the discharge had continued for many weeks very copiously, without producing the slightest defect of the cornea; whereas in many cases, in which it had only continued a fortnight previously to their application, all the mischievous effects already recited had taken place. But although the discharge be incapable of doing mischief; yet, on the decline of the inflammation, the conjunctiva is sooner restored from the ill-conditioned

state which protracts the discharge, by the use of astringent injections.

The inflammation being abated, the discharge generally ceases in about a week; but the morbid structure of the conjunctiva continues a much longer period; five or six weeks elapse before it becomes smooth and pale, as in the healthy state. Occasionally the conjunctiva remains granular, and requires some attention. The ointment with the nitric oxyd of mercury may be advantageously used to extinguish the last remains of the disease. But this point will be more fully considered in a succeeding part of this treatise.

CHAPTER II.

ON INFLAMMATION OF THE IRIS, AND THE INFLUENCE OF THE EXTRACT OF BELLADONNA, TO PREVENT THE CONSEQUENT OBLITERATION OF THE PUPIL.

SCARCELY any disease to which the eye is subject, has a more immediate or rapid tendency to destroy vision, than inflammation of the iris. As soon as this delicate and irritable substance is attacked with inflammation, the brilliancy of its colour fades, it becomes thickened and puckered, the inner margin is turned towards the crystalline lens, and the pupil is exceedingly contracted. The vascularity of the sclerotica is very great, whilst that of the conjunctiva remains much as usual, and it may be easily perceived that the plexus of vessels lies within the latter tunic. The anastomoses of those minute vessels are very numerous, and form a species of zone in the junction of the sclerotica and trans-

parent cornea. The vessels disappear at this part as they penetrate the sclerotica, in order to pass to the inflamed iris, and are not continued over the transparent cornea, as in a case of simple ophthalmia. The irritation, on exposure to light, is distressing, and the patient is much incommoded by any pressure on the globe of the eye, or by its rapid and sudden motions. Considerable uneasiness is felt over the eye-brow, and acute lancinating pains shoot through the orbit towards the brain. Occasionally, when the inflammation is violent and extends to the other tunics, the eye is totally destroyed by suppuration. But it rarely advances to this extreme. The inflammation generally terminates in the adhesive stage. Lymph is then deposited on the anterior surface of the iris, and between the iris and capsule of the crystalline lens; and often in so large a quantity, as to extend through the pupil and to drop pendulous to the bottom of the anterior chamber. If this process be not interrupted, the pupil is entirely obliterated; or the iris adheres to the capsule of the crystalline lens, leaving only a very minute aperture

which is most commonly occupied by an opake portion of the capsule, or of organized lymph; and the patient is totally blind. Red vessels appear on the anterior portion of the iris, running in a thin adventitious membrane, which the adhesive process causes to be formed. This is the usual catastrophe of an inflamed iris, abandoned to the natural process. It is some consolation to think that this state is not absolutely irremediable. The patient has a chance of relief by submitting to an operation for cutting an aperture in the iris, and removing the opake capsule and crystalline lens. But it is not my intention to handle this point. My inquiry is entirely directed to the most eligible mode of treating this state of the eye, and preventing the obliteration of the pupil. I am confident I shall be able to show that inflammation of the iris is manageable, and that, if it should have advanced to the deposition of lymph, and even in a certain degree to the organization of that lymph, the obliteration of the pupil may still be prevented, and a very good degree of vision preserved.

As to the first part of this process, whilst the action of the vessels of the iris is simply increased, and no lymph is deposited, we are to be guided by the symptoms above-mentioned, viz. the aspect of the iris, the appearance of the vessels on the sclerotica, and the contraction of the pupil, and should immediately have recourse to the most vigorous means of relief! The application of leeches, mild laxatives, and a simple regimen, the ordinary practice in a common ophthalmia, will be inadequate. In a healthy person labouring only under this local disease, blood-letting in a degree sufficient to reduce the pulse very considerably, most active cathartics, and deprivation of solid food, will be barely sufficient to stop its progress. For no great degree of action is requisite to complete the mischief; a small quantity of lymph will suffice to unite the iris to the capsule of the lens. In an adult, where there is no contra-indication, sixteen to thirty-two ounces of blood may therefore be taken in the course of twenty-four hours; but the quantity must be regulated by the judgment of the practitioner. I only mean

to inculcate the necessity of taking a sufficiency to reduce the pulse and arrest the symptoms, and that if the symptoms should recur as the pulse rises, the bleeding should be repeated. I have generally taken away blood by opening the temporal artery. Some may be inclined to think that the division of this artery will diminish the quantity of blood in the inflamed parts. But is it not immaterial whence the blood is taken? Is not the benefit which the division of the temporal artery produces simply in proportion to the necessity of reducing the force of the circulation, and therefore in the ratio of the quantity of blood abstracted? Can it be conceived that the division of the artery will be effectual in lessening the quantity of blood, when we consider how many small vessels concur to supply the globe of the eye and parts situated in the orbit? The more minute any set of vessels are, the more frequent their inosculations; and it may fairly be presumed, that if all the vessels were divided which distribute branches to the orbit, and from their situation are divisible, whilst the vis a tergo remained the same, the in-

inflammation would not be reduced. Our chief object is, therefore, to impair the force of the heart, and nothing will more completely accomplish this intention, than the abstraction of blood. Whatever other means medicine furnishes, may be employed with the same view. It may therefore be right; after the exhibition of cathartics, to employ the tartarized antimony in moderate doses, in order to enfeeble the pulse. If vomiting be excited by it, I see no cause of regret, as the straining of the eye in the act of vomiting is more than compensated by the weakness of the pulse which the state of nausea produces.

General blood-letting, with the means here recommended, will often reduce the inflammation; but after a degree of general bleeding, which the practitioner may be unwilling to exceed, or in a constitution where it may be injurious, the application of leeches is a powerful auxiliary. The best method is to apply them as close as possible to the eye, and to repeat their application at short intervals, so as to keep up a perpetual oozing of blood from the

neighbouring vessels, and to prevent the complete turgescence of those which are inflamed. If the inflammation should stop at this stage, the cure will be completed by covering the eye with a weak solution of cerussa acetata, and keeping the patient in a darkened room until the iris is restored to the proper exercise of its functions. But this is not the ordinary termination of inflammation of the iris; it generally passes on to the adhesive stage. Lymph is deposited between the iris and capsule, and becoming organized, unites them. Whether the capsule of the lens partakes of the original inflammation, is matter of doubt. I have found, in the examination of adhesions between the iris and capsule of the lens, that the vessels have been derived principally from the iris; and it is a well known fact respecting the formation of adhesions, that when two surfaces are thus joined, most of the vessels proceed from that which is most active, *i. e.* the surface most inflamed.

It has already been stated, that inflammation of the iris is attended with a re-

markable contraction of the pupil; and the lymph, which at first simply agglutinates the iris and capsule, ultimately consolidates them, and an immovable opake substance is interposed between the light and the immediate organ of vision, the retina. The pupil is seldom *completely* obliterated. An aperture, about the size of a pin hole, is left in the iris; but this is rarely beneficial to the patient, as it is occupied by some opake matter. Although, in the natural and healthy state of the eye, all the various motions of the iris result from impressions on the retina, to which as a regulator of the quantity of light, it acts in perfect subserviency; yet the contraction of the pupil, which happens during the inflammation of the iris, must not be regarded as a sympathetic action; on the contrary, its cause is to be sought in the irritation of its muscular fibres, which the inflammation occasions; for, however the stimulus of light may be withdrawn from the retina, the contracted pupil remains stationary. The indication, in the management of this state of deposited lymph, is to effect, as much as possible, the dilatation

of the pupil, that when the iris shall be fixed to the capsule of the lens, as it certainly will be by the adhesive inflammation, there shall remain a sufficient aperture to transmit light to the bottom of the eye. The larger this aperture the better, as the pupil is generally rendered to a certain degree opake by the lymph which has been deposited on the capsule of the lens. Happily, we are furnished, in the extract of belladonna, with a perfect specific for this purpose. It is already well known, that the application of this substance to the surface of the conjunctiva, excites so strong a contraction in the radiated fibres of the iris, that the pupil is remarkably enlarged, and the whole of the crystalline lens becomes apparent.

We observe certain natural actions in the iris. We see the pupil diminish by the contraction of its circular fibres; and enlarge by the contraction of the radiated, according as the retina sustains a greater or less degree of light. These are its sympathetic actions with the retina. Again, we perceive that, if one eye be shaded

whilst the other is exposed to a strong light, both pupils will be contracted, but not in the same degree as each pupil would be, if both eyes were exposed to the same light. Therefore the iris acts in association with its fellow, and the association is stronger, as the sympathy between the iris and its retina is weakened. In a case of gutta serena in one eye, the most complete I have ever observed, and which had existed thirty years, the iris annexed to the insensible retina varied precisely as the iris of the sound eye was affected by the changes of light to which it was exposed.

The stimulus of the belladonna destroys, for a time, both the sympathetic and associated motions of the iris. Under its influence, the radiated fibres are permanently contracted, and the iris does not change its state in obedience to any impulse of light on the retina; much less from association with the other iris. It has, therefore, a specific influence in exciting a strong contraction of the radiated fibres; and this influence is so great, that in the utmost dilation of the pupil, which has attended

the most perfect insensibility of the retina, I have invariably caused a still greater dilatation by the application of belladonna. Indeed, in a case of trembling cataract, where the lens undulated in the vitreous humour, and the iris vibrated with the motions of the eye, as a rag floating in a stream would be agitated by the impulse of the current; when, from inspection of the iris one would have conceived it to be perfectly inert, I excited a visible action by the belladonna.

Now this substance, if properly applied to the eye during the adhesive process of inflammation, will cause the inner margin of the iris to expand and recede from the axis of the pupil, and will thus overcome the restraint arising from the agglutination of lymph; by elongating the organized bands which connect the iris and capsule, if they have not been of long duration. Thus the adhesions are drawn out to a degree of tenuity, and consequently transparency, and a considerable quantity of light is admitted. If the effect of the in-

inflammation has been slight, the adhesions will be trivial, and the pupil only slightly irregular. The iris will retain a certain power of action, and vision will be very little injured. In general the pupil is misshapen, and the iris perfectly fixed: but if the aperture be of sufficient size, and the capsule not rendered too opaque, the patient will enjoy a very useful degree of sight. The reader will observe, that in this communication I have been speaking of inflammation of the iris, as of a disease which I have often seen uncombined with any superficial ophthalmia. It must, however, be granted, that generally an inflammation of the conjunctiva, in a greater or less degree, is associated with it; but unless there be deep ulcerations, or sloughing of the cornea, the treatment of the case will not materially vary. But this state of the iris sometimes arises from syphilis. Then the general plan of treatment here proposed must be changed for the specific remedy, and mercury must be vigorously exhibited, if it be proposed to obviate the effect of inflammation, which is the same

whether the inflammation be general or specific. In either case the use of the belladonna is equally advantageous.

CASE I.

James Bradshaw, a young man, robust, and of a florid complexion, applied at the Dispensary, March 27th, 1805, being afflicted with a violent ophthalmia that made him blind in the right eye. There were evident marks of inflammation of the iris, but this was complicated with a considerable superficial ophthalmia and diffusion of lymph in the transparent cornea. He was treated much according to the plan inculcated in this Essay for the space of a fortnight, but without any success. Disappointed in the employment of means, which I thought must have proved effectual in suppressing pure inflammation, I was induced to investigate the case with the most particular attention. I found on examination a painful and contracted state of the elbow, but no enlargement of the bones or

thickening of the ligaments. This symptom, in conjunction with the state of the eye, determined me to treat the case as syphilis. In the space of ten days the inflammation had decreased, the transparent cornea was clear, and the state of the iris perceptible. The pupil was very minute, and evidently opaque, and the patient, notwithstanding the restoration of the cornea to its original transparency, could barely perceive the largest objects. The mercury was continued, and the inflammation had subsided, still the sight improved very slowly in consequence of the contraction of the pupil. I now applied the extract of belladonna three times in the day. In the course of twenty-four hours the pupil was drawn into a most irregular figure. Two bands attached to the inner margin of the iris, and joining each other like the letter T, cut the pupil as it were into three. These bands were gradually elongated, and became extremely minute. The belladonna was continued to the latter end of June, when the pupil had nearly recovered its circular form, and his vision

being extremely good, scarcely, if at all, inferior to that of the other eye, he ceased to attend any longer at the Dispensary.

CASE II.

J. Richardson applied at the Dispensary, Nov. 29th, 1805, on account of acute inflammation of the iris, the pupil being much contracted and opake from the deposition of lymph. The eye was nearly blind on his admission. He lost a pound of blood by opening the temporal artery, and was treated in other respects on the plan previously laid down. Dec. 6th, the inflammation had subsided, but the pupil still remained contracted and opake, and vision very imperfect. The extract of belladonna was now applied three times a day; and at the same time, proper means were taken to expedite the absorption of the lymph. Jan. 20th, he left the Dispensary, being restored to perfect vision. The iris enjoyed a certain degree of action, but the pupil could not dilate to an equal de-

gree with that of the other eye, the iris being restrained by its attachment to the capsule of the lens.

CASE III.

Jan. 23d, 1806, Mary Skinner, a woman of a plethoric habit, applied at the Dispensary labouring under acute inflammation of the eye. The pupil was contracted, and rendered opake by a deposition of lymph. She was blind on her admission. The temporal artery was divided, and she was otherwise treated on an active antiphlogistic plan. On the 31st, the inflammation had subsided, the pupil was a little clearer, and she could distinguish large objects. Feb. 5th, the pupil was still contracted as at first. I now applied the extract of belladonna: in the course of two days the pupil was considerably enlarged and oval; and by the exhibition of proper remedies, the lymph occupying the aperture was nearly absorbed. The iris, however, remains fixed by ad-

hesions, and the pupil does not vary. Her sight is very good.

CASE IV.

Ann Row, Feb. 14th, 1806, applied at the Dispensary, after an ophthalmia of the left eye, which had spontaneously subsided. She remained blind. On examination of her eye, the pupil was very small, oval, and occupied by lymph. No symptom of inflammation was now present. She took calom. gr. ij. every night, and every other morning a brisk cathartic. The extract of belladonna was applied three times a day. The pupil enlarged under its application to a very proper size, but was oval, considerably opake, and perfectly fixed by adhesion of the iris to the capsule. Enough was clear to admit of her seeing objects of moderate size. She could distinguish well enough to tell the time by a watch within a second or two. The defect arose, not from the contraction of the pupil (that was sufficiently opened by the belladonna), but

from the remaining opacity of the capsule. She left the Dispensary, April 10th, as I could not render any more service by the continuance of this plan.

CASE V.

April, 23d, 1806, Margaret Onbird was recommended to my care by Mr. R. Pugh, jun. of Gracechurch-street, being blind in one eye. In this instance an ophthalmia, which had not been very severe, had terminated spontaneously some time before her application. The pupil was contracted, irregular, and opake. She was treated precisely as the case recited above. In the course of a fortnight the pupil was much enlarged, but nothing could be more irregular, in consequence of the adhesions being elongated by the retraction of the iris. She has continued the plan to the present time. The pupil is less irregular, having assumed an oval form, and is tolerably clear. She can now read a moderate print with this eye; but, on her ap-

plication, could not perceive a single letter of the largest dimensions. The pupil, although large enough, is perfectly fixed, as in the former instance.

June 16, 1806.

CHAPTER III.

ON THE CURE OF THE INVERSION OF THE UPPER EYE-LID, BY EXCISION OF THE TARSUS.

THE exquisite perfection of the human body, in all ages a theme of the philosopher's admiration, is confirmed by the labours of the pathologist. Led by his investigations to observe the excellence of the original structure of the organs, and the changes which they suffer from accident and disease, he still finds, even under the condition of great mutilation, that their functions, although impaired, are performed. Every integral part of our frame is shewn by the anatomist to consist of a series of minuter parts, of which some are indispensable, others are superadded, in order that its operations may be accomplished in the best of all possible modes.

Surgery is very rarely able to reinstate the parts which are the subjects of its operations in the full possession of their original powers. All which can be accomplished by it, is more commonly only an exchange of a greater defect for a less. The surgeon ought not to overrate his art; he must yield to the condition of nature. To distinguish, in the composition of the organs, between the parts which are principal, and those which are accessory, is his chief object, as the latter may be often sacrificed for the benefit of the system, when their structure is so changed, that the operations of that system, to which they belong cannot proceed. The excision of the tarsus and the skin, containing the roots of the cilia, is an operation which, by reflecting on their particular office, was suggested to my mind for curing the inversion of the eye-lids; and I shall establish its expediency, safety, and certainty, not by hypothetical reasoning, but by the decisions of experience.

Among the parts which are subservient to the eye, the eye-lids hold a conspicuous

station. They are so nicely adjusted to the surface on which they move, that they are enabled most perfectly to co-operate. The eye-lids may be considered as curtains advanced before the eye, that may be opened and shut at will. If no other object were sought than the occasional closing of the eye, for the temporary suspension of the sense, a simple elongation of the skin endowed with muscles would, perhaps have been sufficient; but nature, consummate in design; and omnipotent in the execution of it, has foreseen all things which can concur for the safety and protection of the organ, and the perfection of the sense. For these reasons the cilia are given: they are placed in the margin of the eye-lid in such a direction, that they are a safeguard to the eye, by repelling particles that would otherwise strike on its surface; and they increase, under certain circumstances, the distinctness of vision, by intercepting the perpendicular rays of light. If we are led to an examination of the final cause for which the tarsus enters into the composition of the palpebræ, we may conclude, from the event of its

extirpation that it is more in relation to the cilia than the muscles. From its firmness and elasticity, it is a support to the other parts of the palpebræ, and a protection to the eye, and its concavity being perfectly adapted to the convexity of the globe, the muscles effect their motions with greater celerity and precision; yet its principal use is to sustain the roots of the cilia on the exterior surface of its ciliary margin, which maintains a given position, and thus enables the hairs to lie in that direction which was intended by nature. It is evident, that the cilia could not sustain themselves on the margin of a flexible substance, acted on by strong muscular fibres; the contraction of the orbicularis would perpetually invert them. The existence of cilia, therefore, necessarily calls for the existence of the tarsus.

These are the only necessary observations to be made relatively to the structure of the eye-lids, in regard to the disease which is the subject of this essay. If any one finds it expedient to revive his ideas of

their structure, these points are minutely treated in systems of anatomy. I write only for surgeons, and I conclude that they are acquainted with anatomy, as I cannot perceive with what propriety any one can undertake operations on the human body without this necessary knowledge.

The superior palpebræ, when inverted in the slightest degree, is the cause of a most vexatious irritation on the eye; but when a large portion is inverted, the case becomes most distressing from the violent ophthalmia which is produced. No disease of the eye is more intolerable. The friction of the cilia on the eye is never intermitted, and the patients health and strength fail through the never-ceasing irritation. The cornea is ulcerated, and becomes opake in consequence of the inflammation, and the sight is ultimately destroyed. Nor is this a termination of the unfortunate patient's misery; except, as occasionally happens, the cornea thickens and indurates in an extraordinary degree, assuming a shining white appearance, like a macerated liga-

ment; and then the patient's repose is found in the insensibility of this new-formed substance.

The appearance of the disease in its inveterate form is truly disagreeable. The discharge, the copious flow of tears, the excoriation of the cheek, the opacity of the cornea, the villous, granular, or fungous conjunctiva, render it a disgusting spectacle. The patient carries his head obliquely; and, in the most awkward manner, attempts to bring the pupil opposite to the objects which he wants to see, without exciting the common actions which take place for such purposes. And this may easily be explained, without any subtilty of exposition. In the natural state of the eye, not only are the eye-lids in form accurately adjusted to the eye, but, for wise purposes, certain motions are associated. Thus the Levator Oculi and the Levator Palpebræ Superioris always act together, or the eye would only be elevated to be lodged under the eye-lid and the pupil would be covered. But when the patient

attempts to look up, there is an accession of pain; for at each endeavour in the Levator Palpebræ to elevate the eye-lid, as this motion cannot be accomplished, the only result is, that the ciliary margin is drawn towards the globe forcibly, and the cilia are more closely applied to the cornea, which, at the same time, is passing up in a direction contrary to the points of the cilia, and the friction is more intense. In all cases, the patient practises awkward motions to see objects, without turning the eyes in a direction which increases the friction; but he, who has the upper eye-lid inverted, in order to evade any turning up of the eye, distorts the head so as to have the appearance of a wry neck.

This picture which I have drawn, although melancholy, is not overcharged. Considering that I am addressing men acquainted with human misery, it may be deemed superfluous; but I am anxious that this truth should be impressed on the reader's mind: that the excision of the tarsus and roots of the cilia, however severe and

formidable in apprehension, is instituted for the cure of a most excruciating disease, and that the occasion demanding it is imperious.

It will not, perhaps, be of very material importance here to investigate the causes which lead to the inversion of the upper eye-lid. Most probably in all instances, excepting burns or wounds, inflammation is the primary cause. This disease is rarely met with among the opulent; for these, although equally liable to inflammation as the poor, are not equally exposed to the dreadful results of it, having it in their power to obtain proper medical assistance; at least, they are not compelled to labour, and are therefore capable of avoiding the aggravation of the disease from exertion, which must be admitted to be at least as great an evil as the former is a benefit. By frequent ophthalmia, attended with ulceration of the conjunctiva, and, lastly, of the tarsus itself, such a vicious bending of it takes place, that every attempt at re-establishing its original position must be fruitless. Although, by detaching it from

the external and inner canthi, and by keeping it everted for a considerable time, until the incisions be healed, the ciliary margin may, for a time, be clear of the eye; yet this flattering appearance, increased by the temporary relief of the patient, together with the returning transparency of the cornea, the friction being taken off, is but of short duration. The altered state of the tarsus preventing its accommodation to the surface of the globe, is not corrected; and so great is the tendency of this diseased substance to incurvate, that the inversion of the eye-lid very soon is again confirmed. What, then, shall we do? Shall we persevere in unsuccessful attempts to cure the patient, by re-establishing the parts in their original and perfect state? When the tarsus is completely changed, this object is impracticable; and it is our duty, as it is decidedly in our power, to emancipate the patient from his misery, by its excision—an operation, which, although it leaves the person in a state less perfect than we could wish, leaves him in the most perfect state that his condition admits of. The operation proposed by Dr.

Crampton, is highly successful, and, as I am inclined to think, unexceptionable in the earlier periods of the disease, before an unconquerable inclination of the tarsus towards the globe is produced; but in this ultimate and inveterate state of the disease, in which the contraction is often consequent on the cicatrization of the tarsus itself, it is altogether inexpedient. It is unadvisable both on the part of the patient and the surgeon; the latter is exposed to censure by his unsuccessful operation, the former is deterred by the pain which he has undergone, and, in despair, abandons himself to his fate. Now the extirpation of the tarsus, which I have executed with the most happy results, is much more easily performed, and subsequently to the performance, is followed with no pain or uneasiness to the patient. The certainty of its relieving the patient, is what I more value than the credit, if there be any, of having suggested it.

The opinion expressed by Dr. Crampton, respecting the insertion of the levator palpebræ, contrary to the explanation of

former anatomists, I find to be perfectly correct: that it is inserted into the integuments and conjunctiva. This insertion of the levator led me to suppose, that, if the tarsus were removed without the destruction of the muscular fibres, these preserving almost entirely their former attachments, no particular shortening of the eye-lid would arise from it. Now this actually turns out to be the case; and the deformity is not considerable. But, in judging of the deformity, we must not institute the comparison with the perfect state, but with that of the disease; and then we shall observe, that the appearance of the person is manifestly improved, whilst he is at the same time relieved from a most miserable condition, and is very often restored to a perfect state of vision, except the thickening of the cornea shall have too far advanced.

A piece of thin horn, or a plate of silver, having a curvature corresponding with that of the eye-lid, is to be introduced, and its concavity turned towards the globe, within the eye-lid, which is to be stretch-

ed upon it. An incision is to be made through the integuments and orbicularis palpebrarum immediately behind the roots of the cilia to the tarsus, and should extend from the punctum lachrymale to the external angle. The exterior surface of the tarsus is then to be dissected until the orbital margin is exposed, when the conjunctiva is to be cut through directly by the side of the tarsus, which must now be disengaged at each extremity—the only caution necessary being to leave the punctum lachrymale uninjured. Nothing can be more simple than this piece of dissection; and if any embarrassment arises, it is from the hemorrhage of the ciliary artery, which must necessarily be divided, and this hemorrhage renders it somewhat difficult to observe the punctum, when one wishes to divide the tarsus by the side of it. If the operation itself be simple, the subsequent treatment is still more simple than the operation. In a word, no dressing is necessary, and it is only adviseable to cover the eye, to conceal a disagreeable object from the patient's friends. In a few days an union will have commenced between

the section of the integuments and conjunctiva, and the elevation of the skin will go on like that of the original eye-lid, less complete indeed, but sufficiently so to leave the pupil clear during a moderate elevation of the eye. In all the patients on whom I have operated, a fungus of considerable size has sprouted from the centre of the section. This must of course be managed by caustic or the knife; and the latter is to be preferred, because it excites no subsequent irritation.

A partial inversion of the cilia is very frequently produced by a small cicatrix on the interior surface of the tarsus, by the contraction of which a portion only of the tarsus, together with certain of the hairs annexed to it, is turned against the cornea. This partial inversion is oftener vexatious than dangerous, as the patient, when informed of the cause of irritation, relieves himself by extracting the offending hairs. Provided the roughness of the cicatrix be not sufficient to cause any hurtful friction, the radical cure is within the patient's power, and may be obtained on very easy

terms. Let a similar substance be introduced between the ball of the eye and the tarsus as for the excision of the tarsus, and the eye-lid being firmly supported and stretched, a piece of skin, containing the roots of the inverted cilia, must be dissected out.

The inferior palpebra, as it is similarly formed, is subject to the same causes of inversion as the superior, viz. contractions and changes of the figure and structure of the tarsus from inflammation and ulceration. No cases of inversion from these causes have occurred to me; but I have had several instances of it in consequence of encysted tumours. When these form between the conjunctiva and tarsus, their globular form affects the eye-lid, before they acquire much bulk. They are so situated, that, in proportion as they increase, they carry the orbital edge of the tarsus outwards, and, in the same proportion, the ciliary edge will be made to approach the globe. The irritation which they produce excites the contraction of the orbicularis, and those fibres that lie on the margin of

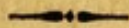
the eye-lid cause it to roll on the little tumor and the tarsus and cilia are lodged between a fold of the skin and the eye-ball. When the eye-lid is once inverted, every contraction of the orbicularis confirms the disease, which can never be spontaneously relieved by any natural effort of the parts.

An inversion of the inferior palpebra is not unfrequently produced by inflammation of the conjunctiva, and is very easily obviated by keeping the eye-lid depressed by strips of adhesive plaister. Every one must have noticed in ophthalmia the enlargement of the portion of conjunctiva that connects the eye-lids and the globe. It very often lies as a distinct membranous fold between them, and in cases of very severe ophthalmia occasionally protrudes. In cases wherein the irritability of the patient occasions a violent nictitation, this species of inversion occurs; for the tumefaction of the conjunctiva causes a kind of roller to be formed just against the orbital edge of the tarsus, by which it is determined outwards; and over this roller, by the strong contraction of the orbicularis, the

eye-lid is turned and lodged between the projecting conjunctiva and the eye. Just as this inversion has commenced, the simple restoration of the eye-lid to its proper position, and keeping it there, will be sufficient. If the proper means for stopping the ophthalmia be at the same time employed, the inflammation subsiding, the conjunctiva will collapse and contract, and the cause of the inversion will be withdrawn. But if this be neglected, the roll of conjunctiva, exposed to pressure and friction, will thicken and indurate to a very great degree. I recommended the excision of this part of the conjunctiva which is thickened, and is the cause of the inversion; after which operation it will be requisite to apply a compress, that will carry the orbital edge of the tarsus inwards. This compress will resist for a time the contraction of the orbicularis, and when the cicatrization at the orbital margin is complete, the eye-lid will maintain its proper situation.

CHAPTER IV.†

ON SOME OF THE MORE IMPORTANT TERMINATIONS OF OPHTHALMIA.



I.—BY EFFUSION OF COAGULABLE LYMPH.

THE cornea is nourished by colourless vessels, that the design of its formation may be accomplished. Notwithstanding the peculiarities of its structure, it is susceptible of very high degrees of inflammation, under which coagulable lymph is effused between its lamellæ, and especially between its anterior lamella, and the portion of the conjunctiva which is intimately united to it. If the inflammation pauses

† In this Chapter, the passages which are included between asterisks, and the cases, are inserted from the Author's Notes.

at this stage, although the opacity be total, the lymph, which has been deposited, is not organized, the interstitial texture of the cornea is only loaded with it, and on the decline of that action of the capillary arteries which occasioned its effusion, the lymph will be gradually removed by the absorbents. But if the inflammatory action prevails, the deposition of lymph is increased, and the process of its organization may be distinctly observed. Red vessels from the sclerotica and conjunctiva advance towards the bed of lymph, and shoot into it in straight lines. The thicker layer of lymph first receives them, and beyond this organized mass is diffused a halo or fainter circle of lymph. By active treatment the effusion is arrested, the red vessels contract and disappear, the lymph which had been deposited is absorbed, and the cornea recovers its transparency.

The adhesive inflammation sometimes pervades the anterior chamber, so that lymph is not only deposited between the lamellæ of the cornea, but also between the cornea and iris. The quantity effused

into the chamber varies. It may occupy only a line in the form of a crescent, immediately above the junction of the cornea and sclerotica; it may accumulate up to the very margin of the pupil, or even rise in irregular masses above the pupil. The effusion of lymph is often limited to the anterior chamber; but the inflammation may extend to the posterior chamber also, and then the capsule of the crystalline lens will become opaque, the pupil will adhere to it, or even be filled with coagulable lymph, remaining fixed, irregular in its figure, or very much contracted.

At uncertain periods after the deposition of lymph within the anterior chamber, the process of its organization commences. Red vessels shoot more readily from the iris into the lymph which has been deposited on that membrane, than from the junction of the cornea and sclerotica into the lymph which has been effused from their internal surfaces; yet they may be distinctly observed to proceed from this source also.

The eye is in considerable danger during this stage of inflammation; and it is of the utmost importance to arrest the effusion of lymph, and thus to prevent the growth of new vessels—a process often fatal to the natural structure. To particularize the treatment would be only to repeat what has been already recommended in the chapter on inflammation of the iris.

The above remarks apply to the adhesive stage of simple inflammation. The following are to be considered as additional observations on the same stage of syphilitic inflammation of the iris.

* The diseased masses of lymph are originally deposited on the coloured superficies of the iris, and secondarily the posterior service may be inflamed; but whenever the pupil is obliterated from this cause, it is in consequence of the long continued superficial disease. The pupil is generally large at the first attack of the disease. In the case of Mr. S. coagulable lymph was effused up to the edge of the pupil, the cornea was very obscure, a circular mass

of lymph was deposited in the pupillary edge of the iris, and at last assumed a scarlet appearance in consequence of the lymph becoming vascular; ultimately it was absorbed, and only a slight adhesion at one point was discernible. In a case of Mr. Haslam's recommendation, the mass of lymph were pendulous from the edge of the pupil into the anterior chamber.*

* The diagnosis between syphilitic and simple inflammation of the iris may be formed from the following appearances:—In the syphilitic, the iris is much more thickened and puckered, the texture appears more changed, the irritation on exposure to light is less, the pain is most intense at night, red vessels are seen in the substance of the iris—a circumstance not often observed in the early state of simple inflammation of the iris, in which patients, from the severity of the pain, are sooner induced to apply for relief—the pupil is not so much contracted as in the simple inflammation; and although the general appearance of disease be greater, the pain is

actually less, the blindness is often total:—to which, perhaps, may be added, that the lymph is deposited, as it were in drops, and assumes a tubercular appearance.—See *plate I. fig. 1, 2.*

CASE I.

Mr. R. applied, totally blind; the pupil was oblong, irregular, and large; the iris puckered, thickened, and full of vessels; the eyeball enlarged: the vascularity of the sclerotica was not great. The disease had been for a long time treated as simple inflammation. He was completely cured in a fortnight by taking eight grains of calomel daily.

CASE II.

*Dec. 1st. Mr. T. applied, totally blind from an ophthalmia of a week's duration. The eye-ball was enlarged; the iris very much diseased; the pupil dusky, oval, but in the highest degree irregular. From its

appearance I pronounced it to be syphilitic, and gave him two grains of calomel with half a grain of opium every five hours. In two days the tumefaction was less, in a week he began to see, and in a fortnight the pupil became nearly regular, large, and clear.

Dec. 14. He could read small print. Six grains of calomel were continued daily.*

CASE III.

May 8th. Robert Tannis applied at the Infirmary with a slight ophthalmia, painful at night; the pupil was hazy and large, and two tubercles projected from its edge. He was put on a mercurial course, and his amendment was marked by the diminution of the tubercles. The result of the case is not recorded.

*The inflammation in some cases seems to have extended to the other tunics of the eye, and to have affected them in the same

manner as the iris itself. In these instances the eye-ball appears full, the patient is slightly incommoded by pressure on the eye, (I allude to the chronic state, the inflammation having disappeared), the sensibility of the retina is impaired, and in some instances totally destroyed. Is not this the natural termination of the disease when inadequate means are used? The following case, in the left eye, affords an example of it.*

CASE IV.

* Sept. 3d. I observed the following appearances in the eyes of L. H. caused by a violent ophthalmia, which attacked them two years ago. The left eye was tumid and uneasy under pressure, the iris convex and puckered, the pupil small, the capsule slightly opake, the retina insensible—for she was perfectly blind, although the pupil was sufficiently clear to admit some light. In the right eye, the iris was prominent, convex, and slightly puckered, the pupil of a moderate size, the capsule opake, and

vision bad; but the retina was sensible, and no pain was felt when pressure was made on the eye-ball.*

A representation of the destruction of the eye by syphilitic inflammation of the iris, may be seen in plate I.—See *fig. 2, 3, and explanation.*

II.—BY SUPPURATION.

The cornea, when the eye labours under a high degree of inflammation, has sometimes a circular patch of lymph deposited on it, and the inflammation continuing a little abscess is formed, and is productive of extensive ulceration. An active antiphlogistic treatment will very often prevent suppuration, and then the worst that can happen will be the organization of the lymph, which will constitute a speck much smaller than the cicatrix of the ulcer would be, if it went into abscess: more frequently, however, the lymph will be absorbed, and no defect will remain.

When the inflammation pervades the anterior chamber, and affects the surfaces which constitute its parieties, coagulable lymph, it has been said, is effused in greater or less quantities, according to the vigour of the inflammation. It does not seem to be necessary that the lymph should be organized, in order that suppuration of the eye may take place. All the stages of inflammation glide into each other by very insensible degrees. Thus, lymph is deposited in layers, or in granules, each susceptible of being organized, in masses varying in consistence, less and less capable of receiving new vessels, until pure pus is effused. Under a partial suppurative inflammation of the eye, the cornea retains its life, and a sufficient degree of transparency to admit of the accumulation of lymph or pus, or the intermixture of both in the anterior chamber, being distinctly observed. Soft lymph and pus so exactly correspond in colour, that no distinction can be founded on this circumstance; but the figure of the matter deposited affords a ground of discrimination: the lymph rises in irregular masses, the pus maintains



a level. If the entire eye-ball is involved in the suppurative process, its disorganization is effected with incredible rapidity.

III.—BY SLOUGH.

The conjunctiva, like other mucous membranes, is indisposed to the adhesive inflammation; but when the action of its arteries is urged beyond that degree which constitutes congestion, and presents the ordinary form of ophthalmia, the effusion of a puriform fluid takes place, and in the most aggravated state of the inflammation, portions of the conjunctiva and cornea die, and are separated by the sloughing process. The puriform effusion is simply the result of a high degree of inflammation of the conjunctiva, as a mucous membrane, and is precisely the same in the infant and in the adult. In this metropolis the former is more frequently the subject of it than the latter. From the 25th of March, 1806, to the 31st of December, 1809, the return of the cured of the various diseases of the eye at the Infirmary,



amounted to six thousand seven hundred and forty-four; of which the relative proportion of adults and children cured of this acute inflammation of the conjunctiva, was one hundred and thirty-three; but that of infants, one hundred and eighty-two. This inflammation is remarkable chiefly for three circumstances—the excessive tumefaction of the conjunctiva, the copious secretion of a puriform fluid, and the changes induced on the cornea. The tumefaction of the conjunctiva of the palpebræ produces a disgusting and alarming appearance: this, indeed, may be followed by a change of structure in that membrane, which may protract the disease in a chronic state, but the most destructive effect takes place at the junction of the conjunctiva and cornea. The conjunctiva investing the anterior surface of the sclerotica, being connected by a loose reticular texture, admits of tumefaction; but that portion of it which invests the cornea (their union being intimate) must partake of the unyielding nature of the latter texture. How great the stress of the inflammation is at this junction of the tunics, appears first,

from the state of chemosis, or circular overlopping of the cornea by the conjunctiva of the sclerotica; and secondly, from the sloughing of portions of the conjunctiva and cornea within this circle. What has already been said on inflammation of the conjunctiva in infants, may be applied to the adult: *that the destruction of the eye is accomplished by a mortification of the whole, or of a portion of the cornea, or that vision is impaired, when the disease is less violent, by ill-conditioned ulceration:*—to which may be added, that the slough commonly extends in the circumference of the cornea, forming a groove which includes a third, a half, three fourths, or even the whole of the cornea.—*See plate 1, fig. 6.*

It is worthy of observation, that whilst the conjunctiva is tumid to a degree that exceeds every other form of ophthalmia, and the destruction of the cornea is going on by a succession of sloughs, commencing at its exterior lamella, and extending with more or less rapidity to its most internal, still the anterior chamber, as far as it can

be observed, is free from the deposition of coagulable lymph. Indeed, this inflammation has little in common with adhesive inflammation:—on this ground, as well as on the production of sloughs, the author's opinion of its being allied to erysipelatous inflammation might be supported. The truth seems to be, that it is the acute inflammation proper to mucous membranes, and the cornea suffers by contiguity under the peculiar circumstance above noted. The adhesive inflammation does not appear in the earlier and most dangerous stage of the disease, and the most favourable prognosis is derived from the evidence of its existence in a halo of lymph surrounding the groove left by the separation of the slough, and in the advance of red vessels into the lymph, to begin the process of reparation.

In proof of the identity of this inflammation in the infant and adult, the author has left the following observations and cases of its termination in both by slough of the cornea.

* In the acute inflammation of the conjunctiva in adults and infants, which has been termed the purulent ophthalmia, when the disease runs to excess, and is injuring the eye, the cornea becomes obscure at certain places—the sign of approaching death of the part. Supposing the death of the cornea to be partial, the opaque part becomes defined, soon it is slightly elevated, a little transparent line surrounds it, and ultimately, this line marking the ulceration, the opaque part is cast off in a slough, leaving the bottom transparent.*

* Sometimes, after the slough has been cast off, the cornea is farther injured by the ulcerative process: if this happens, the breach in the cornea remains clear at the same time that it is enlarging, except the ulcer be filled with the mucous discharge, a circumstance that frequently occurs, and which may readily be ascertained by injecting water on the ulcer; but otherwise it is not difficult to distinguish between mucus and lymph, because the latter cannot be deposited on the ulcer, without a cer-

tain portion of it being diffused in the cornea around the ulcer.*

* But it not unfrequently happens that the cornea is destroyed by a succession of sloughs: in such cases, if a portion of the cornea has already been cast off, instead of a clear transparent surface, a larger portion becomes opake; this being separated, a third portion, still larger, dies, and the anterior chamber is opened.*

* Although the appearance of red vessels in the neighbourhood of an opake portion of the cornea may generally be considered as a mark of healing, yet I have often seen half of the cornea dead, opake, and about to be cast off, with the one half full of red vessels; but then this has had its surface previously sloughy and destroyed. I noted a case, in which one hemisphere of the cornea was dusky and elevated, the other hemisphere being covered with red vessels, which seemed to run under the opake part. In the case of Sanderson, recommended to my care, in 1808, by Mr. J. Weston, surgeon, half of the cornea was

dead and about to be separated, but not to the last lamina: the other half, which was full of vessels, had cast off the superficial part just before his application. Ultimately, the whole surface of the cornea sloughed, and at its centre completely through. The breach was filled up from its circumference with lymph which remained opake. On the 20th of October, 1806, a similar case of an infant was brought to me with a sloughy state of the cornea, a fortnight after the inflammation had commenced. The slough had extended nearly through the whole of the right cornea, and red vessels were observed on the rest of that tunic.*

CASE I.

* Aug. 14th, 1806. Ann Stuart, a fortnight old, was attacked seven days ago with inflammation of both eyes. The puriform discharge came on rapidly. This appearance was the first thing particularly noticed by the parents and nurse. The mother said, that she had observed a red-

ness in the corners of the eye-lids, on the evening preceding the morning in which the puriform discharge was copious, and the palpebræ closed and tumid. On the 14th, the palpebræ were exceedingly swollen, the upper overlapping the lower, and completely covering them. They were too much swollen to admit of examination in the common way. I syringed them, and with Pellier's elevator ascertained that the cornea was not affected. The conjunctiva was as red as scarlet, and granular, resembling a finely injected villous tunic of the intestine; the discharge was yellow and stained the linen of a straw colour. I freely scarified the conjunctiva of the eye-lids, and injected a solution of alum, in the proportion of two grains to one ounce of water: the bowels being costive, a grain of calomel and a solution of manna were given.

15. The tumefaction of the eye-lids was much reduced; a portion of the cornea in each eye, but most extensive in the left, was dusky and opaque; the bowels were

open: the scarification and injection were repeated.

16. The opake portions had much increased, particularly in the left eye, being equal to a third of the cornea; the vascularity of the sclerotica was great: the scarification was repeated, but the injection of alum omitted, and instead of it water was injected twice a day; a leech was applied to each eye, and the solution of manna was given as before.

17. The opake spots of the cornea had not increased; the leeches drew a large quantity of blood, the child was pale and languid, her eye-lids were much reduced, and the discharge was whiter; her bowels were lax: no medicine was given.

18. The inflammation was apparently greater; leeches were applied, and the aperient was repeated.

19. The wounds made by the leeches bled freely, the child was languid and

pale, free from pain, and slept constantly: water was injected as before, and medicine omitted.

20. The eye-lids were much reduced, but the puriform discharge continued, the opake portions of the cornea were elevated and puffy; the bowels were open.

21. The opake portions of the cornea had contracted, a little fissure was observed by the side of the largest, *i. e.* of the left eye; the bowels were natural: medicines were omitted.

22. In the morning, on injecting water into the eyes, the opake substance of the left cornea was separated in a complete mass, leaving a deep, but nearly clear pit. In the evening, the surface was semi-opake from lymph.

23. Morning. The left cornea was more opake from the deposition of lymph; the eye-lids were reduced nearly to their natural size; the discharge had moderated,

and was white.—Evening. The left eye continued in the state reported in the morning. A part of the slough of the right cornea had separated.

24. Morning. The edges of the ulcer of the left cornea had contracted, and were beginning to cicatrize; the discharge was less, and semi-mucous; the right cornea completely cast out its slough.—Evening. The pit left in the right cornea was deep: bowels were regular.

25. Morning. The ulcer of the left cornea was healing; the ulcer of the right cornea had a surface of lymph, and the discharge from the conjunctiva was more viscid.

26. The left eye was healing fast; the right continued nearly in the same state.

27 and 28. The ulcers continued to heal.

30. The left cornea had become more opake, and was enlarging.

Sept. 1. The left cornea protruded more at the part which had sloughed.

9. The solution of alum was injected.

12. Tears were observed in both eyes. The left cornea was clearer, but continued to enlarge and protrude.† The ulcer of the right cornea had nearly healed.

20. The puriform discharge had ceased.*

CASE II.

*Feb. 7th, 1807.—Tye, a child, aged two years and a half, was brought to me with an acute ophthalmia. The right conjunctiva was very vascular, and discharged a puriform fluid; the left was slightly inflamed. I scarified the conjunctiva of the right palpebræ freely; prscribed purgatives and small doses of tartarized antimony.

† Staphyloma.

Feb. 10. The right palpebræ were excessively tumid, and the puriform discharge was very great. I examined with difficulty, and found on the cornea an opake spot. Six leeches were applied on the palpebræ; and a dose of jalap was given.

11. The tumefaction was much reduced, the sloughy spot of the cornea was yellow, and rather elevated. The left eye was much inflamed; the palpebræ were tumid and discharging. Two leeches were applied to the left palpebræ, and she took a dose of jalap.

12. The yellow spot of the right cornea was contracted, and elevated, with a groove around it. The left palpebræ were rather more tumid. Purgatives were ordered.

13. A part of the slough of the right cornea had separated. Her stools were green. I repeated the dose of jalap, and gave cretaceous powders every four hours.

14. The rest of the slough was separat-

ing, having a groove around it. The ophthalmia in both eyes was less; the breath sour. A dose of calomel and jalap was ordered.

21. The slough of the right cornea was entirely cast out. I injected a weak solution of the argentum nitratum, and gave a dose of the diluted sulphuric acid three times a day.

22. The left eye was open, the ulcer of the right cornea healing, and the conjunctiva less tumid. The injection and the acid were repeated.

March 13. Cured. A very small speck remained on the right cornea.*

CASE III.

*Sept. 19, 1806. Thomas Green, a middle-aged man, applied with a violent inflammation of both eyes, and bore in his hand a handkerchief, stained of a straw colour, with the discharge that issued from

the eye-lids; the conjunctiva was highly red and villous, no distinct vessels being visible on that of the palpebræ, and, to a certain degree, they were obscure on that of the eye-ball; the pain was by no means great; the inflammation came on suddenly, with a sensation of grittiness, five or six days previously to his application. Twelve ounces of blood were taken from his arm, and he was directed to take purging powders of calomel and jalap, on the 19th and 20th.

21. Morning. The cornea of the right eye, which, on the 19th, was slightly opake at three different places, now presented three distinct ulcerated surfaces, clear grooves almost through the cornea. The iris and anterior chamber were perfectly free from change. Four leeches were applied to the right palpebræ, and three to the left, and a purging draught was ordered.—Evening. The inflammation of the left conjunctiva had decreased, and the puriform discharge was less. The right remained in the state described in the morning. Four leeches were applied.

22. Morning. Four leeches were applied to the right palpebræ, and a dose of a cathartic mixture was given every four hours.—Evening. Three leeches were applied.

23. The ulcers were apparently filling up.

24. The ulcers were overlapped by the conjunctiva. A purging powder was prescribed for him.

25, 26. The ulcers were filling up; the cathartic was daily repeated.

27. The inflammation was increased in a slight degree: leeches were applied to the palpebræ, and a dose of *Ol. ricini* was given.—Evening. The inflammation was rather mitigated.

29. One of the pits was a little deeper, others were stationary.

From the 29th of Sept. to the 7th of Oct. the ulcers were stationary and without

vigour: during this time he took a laxative every other morning.

Oct. 7. Observing that the pulse was languid and small, and that the process of restoration did not go on with sufficient celerity, I resolved on giving the cinchona.

8. Two drachms of the extractum cinchonæ, dissolved in equal parts of aq. menth. pip. and aq. ammoniæ acet. were taken in twenty-four hours.

10. The same medicine has been continued. The improvement was remarkable and decisive; the ulcers were healing through their whole extent. I encreased the extractum cinchonæ to three drachms daily.

11. The ophthalmia had ceased, and the ulcerated groove was filling up fast.

Nov. 10. The ulcers were quite healed, and his vision was perfect.*

CASE IV.

* June 15, 1809. Sophia Thomas, an adult was sent to the Infirmary by a Governor. The conjunctiva were acutely inflamed, and the discharge was puriform. A dose of calomel, a cathartic powder every day, and a weak lotion of cerussa acetata were prescribed.

June 17. The tumefaction of the conjunctiva and the puriform discharge were very great. Leeches were applied to the palpebræ. The calomel was repeated with a very active cathartic mixture.

20. The inflammation had abated, and the medicines were repeated.

23. There was a chemosis of the left eye, and an ulcerated groove extended more than half around the circle of the cornea. A very strong solution of the extractum cinchonæ, to which the aqua ammoniæ acetatæ was added, was given every three hours. The application of

the lotion to the tumid palpebræ was continued.

24. The left eye had sloughed at the inferior part of the cornea, but the right eye was better. The extract was changed for the powder of bark, of which a drachm and a half in water, acidulated with the diluted sulphuric acid, was given every four hours.

26. The mortification of the left cornea was checked, and the puriform discharge of the right eye had ceased. The bark and acid were continued.

27. The left cornea was very sloughy, but the puriform discharge was subsiding. The medicine was repeated.

July 8. The bark was continued, interposing occasionally a mild laxative (ol. ricini.)

Finally, the left cornea had suffered so much from the sloughing process, that vision was lost. The right eye was cured. The cinchona was continued for a time in

small doses twice a day, and a dose of rhubarb and magnesia was occasionally given.*

CASE V.

* Aug. 16, 1809. Sarah Freston, an adult applied at the Infirmary for an acute ophthalmia. Patches of an opake substance were observed in the circumference of the left cornea, slightly elevated, and apparently sloughy. The cornea was dim. Sixteen ounces of blood were taken from her arm, and a cathartic was given to her.

18. Ulceration had commenced around the opake spots, and extended very considerably. The same process had commenced on the right cornea. The cinchona was given.

21. The ulcers had now coalesced in the left cornea, so that the central portion of it was surrounded by an ulcerated groove. The right cornea had also cast out its

sloughs, but the ulceration did not extend in that eye. The cinchona was continued.

23. The ulceration had stopped. The groove in the left cornea was vascular, and apparently healing, the central part of the cornea being opake. In the right eye also the groove in the cornea was healing. The cinchona was discontinued.

24. The aq. ammon. acet. diluted was given every six hours, and occasionally a mild laxative (ol. ricini.)

Sept. 5. The medicines had been continued. In the right eye the ulcers had healed, and vision was good. In the left eye almost the whole of the central part of the cornea was opake, the groove was vascular, and undergoing the healing process.*

In cases I. and II. it will be remarked, that the author scarified the conjunctiva; but in his Essay on Inflammation of the Conjunctiva in Infants, written nearly three years after these cases were noted, this

practice is condemned. In truth it was no hasty opinion of its inefficacy that he had adopted: he was experimentally convinced of its evil tendency. Against the practice of scarification he had conceived no prejudice, for although he finally rejected it in acute inflammation of the conjunctiva, yet in the chronic inflammation of that membrane, he continued occasionally to perform it. The reader is referred to the first chapter of this treatise for the mode of treatment which he ultimately approved and wished to recommend in these infantile cases.

It was his intention to have written a similar essay† on the acute inflammation

† In this Essay, the granular state of the conjunctiva, a change of structure which is occasionally produced by this acute inflammation, and which protracts the disease in its *chronic* form, would have been further considered. He noticed it at the conclusion of Chapter I.; and the treatment which he intended to recommend in the inveterate form of the disease, after having long practised it with success, was excision of the granular portions of the conjunctiva. For this operation he preferred the scissars to the knife, and he prevented the subsequent morbid growth of the conjunctiva by frequently injecting on it a solution of alum, or of the nitrate of silver.

of the conjunctiva in the adult, in which he would have proved at large, that sloughs, or ill-conditioned ulcers of the cornea; were the most frequent terminations of the disease, when it proved injurious or fatal to vision. No one could more highly appreciate than himself active depletion, as the means of preventing the effusion of lymph or pus. Many parts of this treatise will afford proof of the bold and successful use of the lancet; and it is not to be interpreted to its prejudice, because, in the *ultimate* stage of an inflammation, which partakes more of the erysipelatous than the phlegmonous character, *i. e.* which, passing over the adhesive and suppurative stages, runs hastily into the gangrenous, he has advised the liberal use of the cinchona. But as this is a practical point of some importance, it may be proper to remark, that this mode of treatment was regulated entirely by the powers of the patient and the appearance of the organ. During the acute inflammation which preceded the slough, he evacuated in proportion to the intensity of the inflammation and the strength of the patient; but when the inflammation lapsed into ill-conditioned ulceration or

more especially into slough, he sustained the prostrate powers of the system by the use of the cinchona, and regulated the function of the bowels only by the gentlest laxatives. Case III. was the first instance in which he ventured on the cinchona, and he has clearly marked the period and the circumstances under which he gave it: "Observing that the pulse was languid and small, and that the process of restoration did not go on with sufficient celerity, I resolved on giving the cinchona." Such is the rapidity with which this inflammation passes into its destructive stage, that the poor suffering under it seldom apply at a public charity during the period in which the lancet can be used with advantage, or even with safety. It too frequently happens that sloughs or sloughing ulcers have already appeared on the cornea, and it is necessary to commence at once with the cinchona. Cases IV. and V. are added to exemplify the period at which the evacuant should yield to the tonic plan of treatment. In the former, as soon as the ulcerated groove appeared on the cornea, the cin-

chona was given: in the latter, the period proper for its use is defined with a degree of accuracy which marked his habit of minute observation, and his judgment as a pathologist. He suspected on the 16th that the opake spots of the cornea were sloughs; but on the 18th he was convinced of it by the breach around them; he therefore gave the cinchona; he continued it on the 21st, whilst the ulceration extended in the form of a groove, but discontinued it on the 23d, when the groove had become vascular, and the opacity of the cornea was then occasioned by lymph deposited around the ulcer. The efforts of art had succeeded. The deposition of lymph, and the growth of new vessels, afforded proof not only that the sloughing of the cornea was arrested, but that the process of restoration had commenced, and it would not have been prudent to have risked a more vigorous action.

To these remarks on the sloughing of the cornea may be added the following rare observation: * In very old and feeble

persons, under the condition of a very moderate redness (one can scarcely say inflammation) of the eye, the cornea becomes turbid and dusky, all its lustre goes away, it appears bedewed with a sort of mucus, as the eye of a dead person: in this state the cornea very soon falls into a state of dissolution. See the cases of Mrs. Deland and Scroop, 1807-8.* The cases referred to cannot be found. He considered that this sort of gangrene bore an analogy to the mortification of the toes in old persons.

IV.—BY ULCERATION.

Ulcers of the cornea constitute the most numerous class of the diseases of the eye. The medical reports of the Infirmary for three years and nine months, ending December 31, 1809, present a total of six thousand seven hundred and forty-four patients cured; of which number one thousand nine hundred and eighty-three were cases of ulcer of the cornea; or of pustules of the conjunctiva, which usually terminate in ulcers of the cornea.

Pustules† of the conjunctiva, aggregated at the margin of the cornea, or appearing separately or successively over any part of its surface, constitute a specific character of strumous ophthalmia, with which the morbid appearances peculiar to that constitution are in various degrees connected.

This form of ophthalmia is produced in large cities by the operation of causes against which poverty cannot guard: namely an impure atmosphere, improper food, and cold. Of these causes, none is more productive of strumous ophthalmia, than the want of a pure atmosphere, and therefore the children even of the affluent suffer. The milder cases of this disease yield to a purer atmosphere, and a few doses of calomel and rhubarb, but a too frequent repetition of calomel is injurious. Notwithstanding the unusual sensibility of the eye, denoted by the aversion to light, which the patient strongly expresses; yet, if the

* The term pustule of the Conjunctiva is usually applied to an appearance which resembles Aphtha in the incipient stage.

inflammation is not acute, and the ulcers are indisposed to heal, the cure is greatly facilitated by injecting on them a solution of nitrate of silver, in the proportion of two grains to an ounce of distilled water. For this purpose a silver syringe is used, and the fluid is directed on the ulcer in a fine and continued stream. But if the inflammation occasions a greater deposition of lymph around the ulcer than the healing process actually requires, general or topical bleeding, according to the age and strength of the patient, and more frequent purging, are attended with great advantage. In this state of the eye every stimulant application is avoided. The ordinary lotions are a very diluted solution of the superacetate of lead used cold, or a decoction of poppies applied tepid, according to the sensations of the patient.

The condition of the anterior chamber and its parietes, in every case of acute inflammation, demands the most attentive observation. It affords the best means of estimating the danger, and of regulating the mode of treatment. And although in

combination with ulcers of the cornea, lymph, or even pus, should be effused within the chamber, yet an active antiphlogistic treatment will often rescue the organ, the healing process will go on with rapidity, and the power of the absorbents will be manifested, by removing the effused matter to an extent which might have been deemed impossible.

PROTRUSION OF THE IRIS.—This alarming event, so threatening to the utility and beauty of the organ of vision, is a frequent result of sloughs and ulcers of the cornea. If the anterior chamber be opened simply by the ulcerative process, the efforts of nature may succeed in repairing the injury. Medical aid will only be required to regulate the effusion of lymph, which is necessary for the restoration of the part, by correcting its defect or excess. But it is the sloughing process which chiefly proves destructive, and most speedily effects a breach in the cornea, of which the inevitable consequence is a protrusion of the iris. The intention in the mode of treatment is to arrest the slough-

ing process, and to excite the adhesive, by which the protruding iris will be united to the breach in the cornea, and its further prolapse will be prevented. With respect to the internal treatment, the remarks on sloughing ulcers have been anticipated by the previous consideration of the termination by slough, but the local treatment will be illustrated in the following cases. Let it be remarked, however, that the treatment varies with the character of the inflammation.

The annexed cases I. and II. were instances of simple ulceration, and the character of the inflammation was phlegmonous. In these the gentlest depletion sufficed, and nature almost unassisted may be said to have effected the cure. In Case I. this is evident; and in Case II. it is probable that the adhesion of the iris to the edges of the ulcer of the cornea would have been completed without the use of the *argentum nitratum*. In cases similar in kind, but exceeding these in degree, the depletion must be proportioned to the excess in the effusion of lymph. Of these there are

many in which free bleeding from the arm or temporal artery will immediately reduce the action to its salutary degree, and the healing of the ulcer will, from that moment, go on with rapidity.

Cases III. and IV. were examples of slough, or sloughing ulcers of the cornea consequent to acute inflammation of the conjunctiva, and as the former or the phlegmonous were characterised by the effusion of coagulable lymph around them, so the latter or the sloughing ulcers were distinguished by the actual privation of lymph. The efforts of art were intended to change the character of the inflammation, and, by enabling the part to take on the adhesive process, to arrest the disorganization of the eye.

This practical point ought not to be misunderstood. It is the restorative process, flagging and incapable of accomplishing its salutary purpose, which art is endeavouring to assist. The acute inflammation of the conjunctiva; which gave rise to this destruction of the cornea, might have

been prevented at its accession, or arrested during its early progress by free bleeding, but the mischief is now done, and to persist in active depletion when the cornea is dying and separating by successive sloughs, and the iris is daily protruding more and more, must be, to say the least of it, a hazardous practice. The point here insisted on is obvious, if Cases I. and II. be contrasted with III. and IV. In the former, the iris adhered as soon as it entered the breach of the cornea; but in the latter, for want of lymph, it continued to protrude notwithstanding the effort to increase the general power of the system by the cinchona, until the latter was aided by the local application of a solution of the argentum nitratum.

But the stages of inflammation are never stationary, and in many of these cases the natural powers recover themselves sufficiently to heal the breach in the cornea. In others, notwithstanding the termination by slough, the inflammation, instead of decreasing, as it usually does at this period, continues so acute as to demand the fre-

quent application of leeches to the tumid eye-lids, and the repeated use of purgatives instead of the bark.

CASE I.

*Nov. 10th, 1806. Frances Colbeck had suffered for three weeks an ophthalmia attended with great pain, when, on her application, a small protrusion of the iris was perceived through an ulcer of the cornea. The rest of the iris nearly touched the cornea; and the pupil was of a moderate size. The pain had almost ceased. Only a purge and a lotion of cerussa acetata were ordered.

11th. The protruded iris adhered to the edges of the ulcer, which was evident from the rest of the iris having apparently retired from the cornea: *i. e.* the further escape of the aqueous humour having been prevented by the adhesive process, the anterior chamber had nearly recovered its space.

12th. The ophthalmia was still subsiding, and the anterior chamber was more complete; but the pupil was very contracted. A purge was ordered, and the extract of belladonna was applied.

22d. A white ring around the base of the prolapsed portion of the iris was the sign of an organized adhesion. The protrusion flattened, the pupil enlarged, and vision improved fast.

Dec. 5th. The prolapse of the iris had flattened to the level of the cornea, and her vision was very good.*

CASE II.

* Oct. 19th, 1806. Elizabeth Oliphant applied at the Infirmary for an ophthalmia of ten days duration. Two considerable ulcers were formed on opposite sides of the right cornea. The ulcers were very deep particularly that which was situated nearest to the inner canthus. Motion of the eye-lids excited pungent pain on the

surface of the eye-ball. She immediately took six grains of calomel and a scruple of jalap. A purge without calomel was ordered to be repeated in the morning, and as a lotion, only a weak solution of the *cerussa acetata* was used.

22d. The ulcers were deeper, but the pain was less. Two scruples of jalap and crystals of tartar were given.

25th. The ulcers were still deeper, particularly the nearest to the inner canthus. A space of the cornea, deeper than the base of the ulcer and twice its breadth, was nearly opaque from lymph. I touched the surface of each with a solution of the *argentum nitratum*.

27th. The iris protruded through the ulcer towards the inner canthus, but adhered and was unattended with pain. The other ulcer was healing.

28th. The process of restoration went on with rapidity in both. The adhesion of the protruded iris to the edges of the ulcer

was established. The pupil was very small and drawn on one side. No laxatives: moderate diet.

Nov. 10th. The cornea around the edge of the protruded iris, and also around the other ulcer, was clearing, and the tumor formed by the iris had diminished. The pupil was enlarged, and she began to see. No medicines.

Nov. 22. The adhesion of the iris to the cornea was perfect, and the protruded portion was so much flattened as to be only a little more elevated than the rest of the cornea. Her vision was very good.

At the time I applied the solution of the *argentum nitratum* the ulcer was conical, the ulceration through the exterior laminae being largest, and decreasing towards the interior, where a little vesicle appeared, protruding and convex. The cornea is always perforated by the ulcer when this appearance takes place.*

CASE III.

* On the 5th of Nov. 1807, Ann Perkins applied, in the advanced stage of an acute ophthalmia, with the right eye lost in consequence of the separation of a slough of the cornea, through which half of the iris was protruding. On the left cornea there was a large ulcer, disposed to spread, its base being convex and transparent. She was ordered to take, in the space of every twenty-four hours, a saline mixture, in which two drachms and a half of the extract of bark were dissolved. A solution of alum was injected over the conjunctiva.

6th. The ulcer had extended, and its base was more convex.

12th. The medicines prescribed on the 5th had been continued.

13th. The iris protruded. The injection of alum was omitted.

To the 21st the medicines as before. The puriform discharge had continued equally from the first—the injection of alum had not at all restrained it. The iris had protruded more and more through the aperture in the cornea, having no adhesion at its base.

22d. A solution of the *argentum nitratum* (two grains to the ounce of water) was injected at the base of the protruding iris, and over the surface of each eye. In twenty-four hours, adhesion at the base of both protrusions had taken place.

25th. The protrusion began to flatten. She continued convalescent.

29th. The puriform discharge had subsided by the daily use of the solution of the *argentum nitratum*.

Dec. 4th. In the left eye the pupil was of a moderate size, and vision very good. In the right eye the protruding iris had flattened. A little aperture remained in the place of the pupil, but it was not suffi-

cient for distinct vision. The belladonna was daily applied.

18th. A fresh ophthalmia supervened, and the cornea about the protrusion again ulcerated. The solution of the argentum nitratum was injected, and on the 20th the ophthalmia had subsided.*

CASE IV.

* May 14th, 1809. John Cooper applied with four distinct ulcers in a circle near the margin of the cornea. The ulcers were deep, and the discharge was puriform. He was directed to take half a drachm of bark and five grains of rhubarb every five hours, and to use the lotion of cerussa acetata.

The same remedies were continued to the 20th.

22d. The iris had prolapsed at the most depending ulcer, but seemed to have adhered, for the aqueous humour filled the anterior chamber, and the pupil contracted

on exposure to light. The cornea was opaque opposite to the pupil, and his vision was dim. The powders were repeated.

24th. The iris had further prolapsed. A solution of the argentum nitratum (in the proportion of two grains to an ounce of distilled water) was injected on the protruded iris. Half a drachm of bark with ten grains of rhubarb was given every six hours.

June 5th. The bark had been regularly continued, and the rhubarb occasionally.

The union of the iris with the breach of the cornea was established.

The bark was continued to the 16th of June, and then omitted. He afterwards took only a scruple of rhubarb with five grains of ginger every other morning.

23d. The eye was cured, and he saw.

CHAPTER V.

ILLUSTRATIONS OF SOME OF THE MORE
IMPORTANT CHANGES OF STRUCTURE IN
THE EYE.

AMAUROSIS COMBINED WITH CATARACT.†

THIS organic disease is very rapid in its progress, and produces blindness in the course of a few days: even on the first application of the patient, the loss of vision

† This form of Amaurosis is intractable. The author has described its ultimate stage, which may easily be distinguished from uncombined cataract; but the incomplete state of the disease is actually confounded with simple opacity of the lens:—A pupil somewhat dilated and still, or sluggishly contracting over a yellowish lens, even in a strong light, with a tendency in the vessels on the anterior part of the globe to assume a fascicular arrangement, are sufficiently diagnostic of the disease.

is often found to be total. The pupil is dilated, the lens protrudes, the convex iris seems to touch the cornea, the humours of the eye are turbid and dim, especially

There is a second and by far the most common form of Amaurosis, in which the pupil is not only motionless or nearly so, but is also contracted and irregular, and the humours are misty. This likewise seems to be an organic disease, and, although slower in its progress than the former, is generally incurable.

In a third form of Amaurosis, which is commonly called *Gutta Serena*, *a simple loss of sensibility in the retina, whether it is idiopathic or symptomatic is ascertained by observation on the pupil. A diminution of power is indicated by a sluggish motion in the iris, and even if the pupil does vary, yet it contracts very slowly when exposed to light, and dilates equally slow when the light is withdrawn. When the sensibility is totally exhausted, the pupil is largely and permanently dilated. If only one eye be affected, the motion of the iris seems to be restored whilst both eyes are open to receive the light, but then this activity arises from an association of its motion with the other iris, for if the sound eye be covered, the iris of the blind eye will relapse into its original inactivity.* As a symptomatic affection it is, in recent cases, capable of being cured—first, when it is accompanied with paralysis of the upper eye-lids and a flushed face, marking arterial congestion of the encephalon. Secondly, when it arises from the disordered functions of the abdominal viscera, but especially of the alimentary canal or of the uterus. Thirdly, when it attends syphilitic inflam-

the crystalline, which becomes tawny, or quite opaque, the vessels of the sclerotica and conjunctiva are unnaturally large, and run in distinct clusters. The disease remains stationary, as far as I have observed, with occasional pains of the eye or head.

AMAUROSIS PRECEDING THE DISORGANIZATION OF THE EYE, AND THE PROTRUSION OF FUNGI, NOT MALIGNANT IN THEIR NATURE.

CASE I.

In 1807, a girl about ten years old, was brought to the Infirmary, for the purpose of gaining an opinion whether she was blind. Of that there was no question, as the affected eye gave no sign of vision.

mation of the iris. The first is cured by active depletion, by a gentle but long continued mercurial course, and by a very abstemious diet; the second, by restoring the function; the third, by the specific remedy.

This was the state of the eye: The sclerotica was unusually vascular, but not inflamed. The vessels were large and serpentine. The iris retired from its situation, seemed to be twice as far from the cornea as is natural. The pupil was dilated, and the iris contained many distinct red vessels. The cornea, the aqueous, crystalline, and vitreous humours were at this time transparent. In the course of a few weeks the crystalline became opaque; the iris, covered with lymph, and as red as if injected, advanced towards and touched the cornea; shortly, a blue excrescence was thrown out at the superior part of the eye; at that part of the sclerotica which unites with the ciliary ligament. It increased rapidly and became as large as the anterior portion of the globe. This tumour ulcerated, for a long time a thin watery fluid was discharged, then pus, and lymph which trailed out through the aperture. After some months this aperture closed, the eye-ball, much reduced in bulk, became tranquil, and even retained some vestiges of the cornea, the blue excrescence being totally extinct. During this process there was no-

thing like acute inflammation, and the pain was very trivial.

CASE II.

In 1809, a boy about three years old, was brought to the Infirmary. On the inferior part of the iris a small patch of lymph was deposited, the pupil was not influenced by it, but varied as usual.† There was no ophthalmia, nor any irritability from exposure of the organ to light. In a fortnight the mass of lymph was so much increased that it occupied the inferior half of the anterior chamber. Now a process of organization commenced in the lymph, and an action analogous to inflammation was set up in the cornea: it became turbid and vascular, the iris and cornea united, a blue mass arose in the situation of the

† In this case the period at which the retina lost its power, is not noted, but as the organic change commenced at the anterior part of the iris, and the pupil varied as usual, it is probable that the Amaurosis did not happen so early as in the former case.

ciliary ligament, which together with the whole of the cornea ulcerated or suppurated, and an ill-conditioned and very luxuriant fungus shot forth. By degrees this fungus diminished; and finally the eye ball healed.

AMAUROSIS PRECEDING THE DISORGANIZATION OF THE EYE, AND THE PROTRUSION OF MALIGNANT FUNGI.

CASE I.

At the age of nine months, the disease commenced in the left eye of Master E. L. which when I first saw him, although not inflamed, was vascular and a little enlarged. The iris, in particular, was full of red vessels, and the pupil was very large and fixed. The retina appeared like a concave silver plate, in the posterior part of the eye. This eye was blind, but he suffered little or no pain, and was, in other respects, in good health. At the age of fifteen months the right eye was attacked, and ex-

hibited similar appearances. The left eye was now much changed: the crystalline lens had dropped from its situation, and lay in an opake state at the inferior part of the vitreous humour. About three months before his death, the left eye, which had been for some time very irritable, suddenly enlarged, and began to protrude beyond the eye-lids in the form of a red mass, which ultimately acquired the size of a large apple. About a fortnight before his dissolution, he fell into a state of stupor, with occasional screaming. He soon became frequently convulsed, and died in one of these fits. I examined the right eye a few days before his death, and observed that what had previously exhibited the appearance of a concave metallic plate, in the situation of the retina, had advanced, and apparently occupied every part behind the iris. It seemed to touch the iris, and the eye gave the appearance of a white cataract with a dilated pupil. This was, however, a deception, as it only occupied the space of the vitreous humour, the crystalline lens being in its natural situation, and transparent.

DISSECTION. The tumour of the left eye being cut in various directions, was found to consist of a hard, fibrous, and vascular mass. None of the original parts of the organ could be distinguished. The head being opened, it was ascertained that the disease had extended in the course of the left optic nerve to the ganglion, the whole of which was converted into a bloody tumour, too soft to be analyzed by the knife, and which melted, as it were, under the touch, although the examination was made shortly after death. The left optic nerve was sound from the ganglion to its thalamus, and the right, on each side of the ganglion. The ventricles were unnaturally large, and full of water.†

CASE II.

Miss G. æt. 35: observed a defect in her vision about the 17th August, 1809. She

† Case I. is reprinted from a valuable work on Fungus Hæmatodes by Mr. Wardrop, to whom it was communicated by the author. But Fig. 6. Plate II. which repre-

came under my care, at the recommendation of Dr. Outram, in the beginning of September. She was then blind in the left eye, the pupil of which had its usual black appearance, and was rather more dilated than that of the right eye. Some trifling variation was observed in its dimensions when the eye was exposed to a bright light.

Sept. 15. The pupil was fixed, but not much dilated, a tawny substance† covered with a vascular plexus, appeared behind it sufficiently distinct, but was rendered completely evident by enlarging the dimensions of the pupil with the Extract of Belladonna. The mass of disease was mostly situated towards the external canthus, and opposite to this portion of the vessels of the sclerotica were turgid and serpentine. The excision of the eye was proposed.

sents the disease of the right eye, was, by permission of Mr. Astley Cooper, engraved from an original drawing taken from the preparation in his collection.

† Plate II. Fig. 3. 4.

Sept. 18. In the night she was attacked with a most violent paroxysm of pain, which commenced during her sleep, from which she was suddenly awakened. Having been also agitated in a dream through apprehension of the expected operation, to which she had consented, a degree of incoherence, approaching to delirium, came on. On the 19th, at twelve o'clock, this had subsided, but the severity of the paroxysm was such, that her face was covered with large drops of sweat. No appearance of inflammation as yet was present, but the iris was protruded by the increasing tumour, and nearly touched the cornea. In the evening the eye-lids were swollen, and the conjunctiva was tumid, from serum effused under it. This tumefaction increased, although the pain had subsided, and continued even to the day of the operation; but as this seemed to be merely the effect of the paroxysm, during which the internal diseased mass had acquired so much additional bulk, it was looked on as symptomatic, and not sufficient to contra-indicate the extirpation of the eye.

21st. The operation was performed.†

CASE III.

“ In the year 1803, Mrs. L. gradually, and without any pain, or apparent disease, lost the sight of her right eye. About two years after she was attacked with violent pains in that eye, and in the head on the same side; and, from this time, became subject to occasional ophthalmia. In June, 1807, the ophthalmia was extremely severe, attended with violent pain both in the head and right eye. The cornea was

† Mr. Cooper and the Editor were present at the operation, which was supposed to have succeeded, as no unfavourable symptom had occurred previously to the author's death; but she has since been under the care of Mr. Cooper, and the following symptoms were noted by him on the 26th of February, 1811. “ Frequent giddiness, pain of the head shooting into the left orbit, from which there is a considerable discharge; a tumour on the eye-lid, several tumours in the breast, three on one side of the abdomen, and one on the other, one at the scrobiculus cordis, and another at the bend of the elbow; shortness of breath, cough, great pain in the right kidney.”

considerably opake, the iris was rather contracted, not perfectly circular, and quite immovable, though the eye was sensible to the action of light. The other eye was also at the same time slightly inflamed. The inflammation and pain in the latter soon subsided, and were removed in the former in about a month; and no more was heard of the patient till the latter end of April, 1808. There was then a very perceptible, and rapidly increasing enlargement of the contents of the orbit of the eye, The cornea had lost all its transparency, and was thickly covered with minute red vessels. The inflammation of the conjunctiva had obscured almost the whole of the sclerotica; but a distinct view of a small segment of its circumference, clearly shewed the globe of the diseased eye to be smaller than that of the sound one. This circumstance, when combined with the great prominence of the diseased eye, furnished strong reason for suspecting that it was constantly pressed upon and protruded by a tumour in the interior part of the orbit. In this stage of the disease an operation was judged the only means of re-

lieving the excruciating pains of the patient, which, though in some degree constant, experienced the most violent exacerbations every evening. On the 9th of January, 1809, the whole contents of the orbit were removed by Mr. Saunders, with the greatest care and ability; on this occasion the os unguis was found slightly diseased.

“ For two days after the operation the patient enjoyed perfect ease. On the third day some pains in the head returned, and though the parts healed well, were considerable, till within the last seven weeks of her life. About that time, after a sleepless night, in which she had experienced much more pain than usual, all pain suddenly left her, and she sunk into a state of mental imbecility, in which she was often unable clearly to distinguish her most intimate acquaintance. Her appetite was excellent and her sleep sound, but more than natural; when awake she was animated with such high spirits, as generally induced her to address and reply to her friends in a facetious, though not always appropriate

or completely intelligible manner. This state continued till she died on the 11th of July, 1809, in the 77th year of her age."†

CASE IV.

"Mrs. A, at the age of sixty-six, was affected with an ophthalmia of the right eye, preceded by amaurosis. At first view, the disease of the eye bore some resemblance to a cataract; but after an interval, the duration of which is not distinctly recollected, and during which the eyeball had been more inflamed and painful, its tunics gave way, and a fungus projected anteriorly. From that period the fungus gradually increased, and she suffered acute but transitory pains, which extended into the head, and to the parts surrounding the eye. She had frequent,

† For the particulars of this case, the Editor is indebted to the learned Physician under whose direction the operation was performed; and for the morbid appearances to Mr. Cooper, to whom Mr. Saunders gave the preparation. See plate II. fig. 5.

and sometimes considerable hemorrhages from the fungus. Mr. Saunders was consulted; but the stage of the disease admitted only of palliatives. At the age of seventy-three and a half she had become much emaciated, her general complexion was sallow, her pains were aggravated by frequent cough, and she suffered much from want of sleep. The left eye was free from pain, and its vision was perfect. A moveable tumour, situated over the right parotid, projected towards the cheek. The appearance of the fungus at this period is faithfully represented by Plate III. She gradually declined, and died about the termination of her seventy-fourth year."†

† This concise history was obtained by favour of Mr. Weston, who observed the disease from the early period above noted.

CHAPTER VI.

ON THE CONGENITAL CATARACT.

UNTIL the author directed his attention to this interesting subject, no surgeon appears to have given it a distinct consideration, or to have viewed it in any other light than as an occasional variety of the disease, which was to be treated precisely by the same means as the cataract of the adult. The bolder operators who have essayed these means, have found them to be inapplicable to the condition of infancy; and therefore the child thus affected, has been consigned to blindness for at least the first eight years of its existence, as a less evil than the hazard of an operation at so tender an age.

The efforts of nature in disease are seldom stationary, and even when they fail to accomplish the cure, the correctness of the intention may be clearly discerned-

thus in the congenital cataract, after the crystalline lens is converted into an opake substance, it is gradually absorbed; and in proportion to the progress of absorption, the anterior lamella of the capsule retires upon the posterior, until they form one membrane, which is white, opake, and very elastic. This is the conversion of the lenticular into the capsular cataract: all that is capable of being absorbed, nature herself removes, and she only fails to accomplish her purpose, because the capsule cannot be destroyed by this process. It will presently be shewn in what proportion this result occurs, and as the process is commonly completed long before the eighth year, the surgeon, who is now called upon to fulfil his engagement, finds a substance which he will in vain endeavour either to extract or depress.

Although the congenital cataract is a frequent disease, yet its cause is necessarily obscure, because it commences at that period of human existence which seems to preclude the observations of the pathologist. It has been said, that as soon as the

lens becomes opaque, the absorption of it generally commences; but among the exceptions to this order of events, there is one sufficiently frequent and remarkable to engage our notice. There is a form of the congenital cataract in which the centre of the lens is opaque, and its circumference is perfectly transparent. (*See plate IV. fig. 3.*) In these cases the lens remains of its natural size, as long as its circumference preserves its transparency, which, if undisturbed, it will do for many years; but as soon as the capsule and lens are penetrated, even with the finest instrument, the opacity proceeds, and is soon completed, sometimes in the space of two days. From this period the process of absorption commences, and the bulk of the lens is diminished with greater or less rapidity in proportion to the manner in which the wound has been inflicted. Inflammation is thus ascertained to be a cause of cataract. It remains to be observed, whether the congenital cataract may not also be referred to a change of structure which is independent of inflammation, or to actual malformation.

It is a fact not less curious than affecting that this disease in many instances attacks successively the children of the same parents. From June 1806 to December 1809, sixty cases were submitted to the author's care: of these, two brothers, between whose ages there was a difference of six years, were both affected with congenital cataracts. In a second family, two brothers, twins, became blind with cataracts at the age of twenty-one months, each within a few days of the other. It is remarkable that the four cataracts had precisely the same character. In a third family, a brother and two sisters were born with this disease. The eldest sister was affected with it only in one eye, the brother and youngest sister in both eyes. In a fourth family, three brothers and a sister had all congenital cataracts. The eyes of the elder brother are represented by *fig. 3. 4. plate IV.* The character common to the cataracts of the other three is, with a slight exception, conveyed by *fig. 3.*

The congenital cataract is an opacity either of the lens or its capsule, or of both.

The lens is either solid, soft, or fluid; but more frequently it is partially or completely absorbed, and the cataract is capsular. These appearances have been noted in forty-four of the sixty cases, and the proportion is shewn by the annexed Table,†

† Solid opake lens, with or without opacity of the capsule. Three single, two double cataracts	5
Solid lens, opake in the centre, transparent in the circumference, with capsule in the same state. Five double	5
Soft opake lens, with or without opacity of the capsule. Two single, two double	4
Soft opake lens, with solid nucleus. One single, two double	3
Soft opake lens, with dotted capsule, the spots white, the spaces transparent. Two double	2
Fluid cataract, with opacity of the capsule. Two single	2
Fluid cataract, with opacity of the capsule and closed pupil. Two double	2
Opake and thickened capsule, the lens been completely absorbed, or the remains of it being thin and squamose. Six single, twelve double	18
Opake and thickened capsule, with only a very small nucleus of the lens unabsorbed in the centre. Two single - - - - -	2
Opake and thickened capsule in the centre, remains of the lens in the circumference. One double - - -	1

in which the corresponding character of congenital cataracts in the eyes of each individual is shewn by the number of double cases. It is still more remarkable that the same character should be preserved in the cataracts of several children of the same family.

The facts which have been now stated, shew that the majority of these cases are capsular cataracts, and that the only difficulty in the way of nature is the capsule. To effect a permanent aperture in the centre of this membrane is the business of art, and applies to every case of congenital cataract which can occur.

Children thus affected possess various degrees of vision. Some indistinctly see external objects, others can discern only bright colours or vivid lights. If the privation of vision be nearly complete, volition, for want of an external object to attract these organs, is not exercised over the muscles belonging to them, and their actions are not associated, but the eye rolls

here and there with rapidity, and trembles as it moves.

The excessive mobility of the eye, the unsteadiness of the little patient, the small field for the operation, and the flexibility of the opake capsule, are the difficulties with which the surgeon has to contend. The author overcame them by fixing the eye-ball with Felliér's elevator, controlling the patient, dilating the pupil with the belladonna, and by using a diminutive needle, armed with a cutting edge from its shoulders to its point, and thin enough to penetrate with the most perfect facility. *See plate VIII. fig. 2.*

The extract of belladonna, diluted with water to the consistence of cream, is dropped into the eye; or to avoid irritation, the extract itself is smeared over the eye-lid and brow. In the space of half an hour, or rarely exceeding an hour, the pupil is fully dilated, and the application should then be washed from the appendages of the eye. The child must now be placed on a table parallel with a window, from which

the eye, that is to be submitted to the operation is farthest. Four assistants, and in stouter children five, are required to confine the patient. The first fixes the head with reversed hands, the second not only depresses the lower lid with his fore finger, but also receives the chin of the child between his thumb and fore finger, as in a crutch. By this means the play of the head on the breast is prevented, a motion which the child incessantly attempts, and which will very much embarrass the surgeon. The third assistant confines the upper extremities and body; the fourth, the lower extremities. The surgeon, seated on a high chair behind the patient, and taking Pellier's elevator in his left hand, and the author's needle in his right, if he is about to operate on the right eye, or the speculum in his right hand, and the needle in his left, if the operation is to be performed on the left eye, proceeds in the following manner.

ANTERIOR OPERATION.



I.—ON A CAPSULE CONTAINING AN OPAKE LENS.

The surgeon gently introduces the bow of the speculum under the upper eye-lid, his assistant at the same time depressing the lower, and at the moment he is about to pierce the cornea, he fixes the eye by resting the speculum with a moderate pressure on the eye ball. The position of the operator enables him to do this with perfect safety, and by that consent which can only exist between the hands of the same person, he not only discontinues the pressure, by using the speculum merely as an elevator of the lid, as soon as his purpose is accomplished, but he with facility renews or regulates the pressure at any moment in which it may be required. He penetrates the cornea as near to its junction with the sclerotica as it will admit the flat

surface of the needle to pass, in a direction parallel and close to the iris, without injuring this membrane. (*See plate, VI. fig. 4.*) When the point of the needle has arrived at the centre of the dilated pupil, he does not boldly plunge it through the capsule into the lens, and perform any depressing motion; it is a material object with him not to injure the vitreous humour or its capsule; neither does he lift the capsule of the lens on the point of the needle, and by forcibly drawing it forward into the anterior chamber, rend it through its whole extent. Such an operation would dislocate the lens, deliver it into the anterior chamber, or leave it projecting in the pupil, and stretching the iris; and, although its soft texture in the child should exempt him from any disorganizing inflammation, the most favourable result will be a permanently dilated iris, deforming the eye. He proceeds with a gentle lateral motion, working with the point and shoulders of the needle only on the surface and centre of the capsule, in a circumference which does not exceed the natural size of the pupil. His object is *per-*

manently to destroy this central portion of the capsule: merely to pierce it would not answer his intention, because the adhesive process will speedily close the wound. Having acted upon the centre of the anterior lamella of the capsule to the extent which he wishes, he gently sinks the needle into the body of the lens, and moderately opens its texture. In doing this he may, if he pleases, incline the edge of the needle, by which motion the aqueous humour will escape, and the lens will approach his instrument; but at the same time his field for operating will be diminished by the contraction of the pupil. The needle and speculum are now to be withdrawn, the eye is to be lightly covered, and the patient put to bed.

Inflammation is seldom excited by this operation on the child; but its first approach, marked by pain and unusual redness of the conjunctiva, or serous effusion under it, must immediately be arrested by the application of leeches on the palpebræ, and, in stouter children, by bleeding from the arm, followed by purgatives and a

very low diet. Soon after the operation, the extract of belladonna should be applied over the eye-brow, to prevent, by a dilatation of the iris, the adhesion of the pupillary margin to the wounded capsule. Nature now performs her part of the cure, and the lens, loosened in its texture, and through the aperture in the capsule subjected to the action of the aqueous humour, is gradually dissolved and absorbed.

A single operation sometimes suffices, and the cure is completed in the space of a few weeks; but if the process does not advance with sufficient rapidity, the operation may be repeated once or oftener, interposing at least a fortnight between each operation. If the adhesive process has counteracted his former operation on the capsule, he will take care now to effect the permanent aperture in its centre, and he may use greater liberty than at first in opening the texture of the lens.

Some have supposed that the fluid cataract is not only the most frequent, but the most manageable of the congenital ca-

ses. Both suppositions are erroneous. It is not only the least common, but the fluid when extravasated, sometimes excites a hazardous inflammation. In these cases, after puncturing the anterior lamella of the capsule, and discharging its contents into the anterior chamber, it will be prudent to desist for the time, and to guard against inflammation: by this operation the case will be converted into a capsular cataract.

II.—ON AN OPAKE CAPSULE, ITS LENS HAVING BEEN NEARLY OR QUITE ABSORBED.

The surgeon may in this case use the needle with much more freedom than in the lenticular cataract; but in other respects he proceeds in the manner above described. If any portion of the lens remain as a small nucleus or scale in the centre of the capsule, his efforts will be exclusively directed to detach this portion, by which he will fulfil the intention of the operation, that of effecting a permanent aperture in the centre of the capsule. But

although the lens be completely absorbed, and only a capsule of a dense reticulated texture be opposed to the needle, he will still attempt to make a breach in its centre; for if it yields at its circumference, the pupil will be more or less covered with it, and the operation will be imperfect, because this thickened capsule is never absorbed, and the pendulous flap is incapable of presenting a sufficient resistance to the needle to admit of its being removed by a second operation. (*See plate VI. fig. 1, 2, 3.*) It sometimes happens that the texture of a capsule, on which the first or second operation has made no impression, will break up under the repeated touches of the instrument in a subsequent operation. Having fulfilled his principal intention of securing an aperture in the centre, if the capsule yields readily to the instrument, the surgeon during the same operation may lacerate its circumference, to render the pupil clear in its utmost degree of dilatation, always remembering that this liberty ought to be taken only in cases that are capsular. *See plate V. fig. 2. plate VI. fig. 5, 6.*

POSTERIOR OPERATION.



I.—ON A CAPSULE CONTAINING AN OPAKE LENS.

The needle is passed into the eye at the distance of a line behind the junction of the cornea with the sclerotica. If the surgeon chooses to exceed the line, he is still more secure; for the nearer he approaches the junction of the tunics, the more liable he is to an accident, which will for the time defeat his operation. As the iris is intimately connected with the corpus ciliare, this ligament, if the instrument be entangled in it, will be detached from the sclerotica, to which tunic it has a very slender attachment, and the iris itself will appear† to be torn from its insertion, the

† The *actual* separation of the iris from the corpus ciliare by this operation is a rare accident: the Editor has only once observed it.

blade of the instrument been seen between it and the sclerotica. This accident is rather frequent, but it is never followed by any untoward result, if the instrument be immediately withdrawn. As soon as the needle has penetrated the tunics, he gently depresses its handle so as to direct its point towards the capsule through the thin edge of the lens; and steadily projecting its flat surface between the capsule and lens, he arrives at the centre of the capsule, which he opens, taking the same precaution as in the anterior operation, not to rend it extensively, lest he should dislocate the lens. He now cautiously opens the texture of the lens, and withdraws the needle. In his subsequent operations he will complete the central aperture in the capsule, and then loosen the texture of the lens, suffering the flocculi to fall into the anterior chamber, but not projecting into it any considerable portions of the lens, for the process of its solution and absorption is best accomplished in its natural position.

II.—ON AN OPAKE CAPSULE, ITS LENS HAVING BEEN NEARLY OR QUITE ABSORBED.

In penetrating the eye-ball, the point of the needle must be directed with a sufficient degree of obliquity backwards to avoid the iris, which, in consequence of the absorption of the lens, may have receded more into the posterior chamber. The handle of the instrument must afterwards be depressed, so as to direct the point around any central nucleus or a scale of the lens, for the purpose of detaching it. (*See plate, V. fig. 1.*) If the lens be wholly absorbed, the observations which have already been made on the anterior operation in capsular cases, apply to the present. The flexibility of the capsule is so great, that in attempting to rend its centre with the edge of the needle, a backward or depressing motion is often unavoidable. The surgeon has more power in the posterior than in the anterior operation; but the latter excites less pain and inflammation, and inflicts a slighter, if any injury, on the vitreous humour.

The number of operations which may be necessary to accomplish the cure of a congenital cataract will very much depend on the texture of the capsule and the size of the lens. It is frequently cured by a single operation, more frequently it requires two, often three, sometimes four, but very rarely five. The period of cure will of course depend on the same circumstances. Some are cured in a few days, the greater number in one or two months, in many the process is protracted to three, and in a few to four or even five months.

The following is the total result of the author's operations on the congenital cataract: In sixty patients he succeeded in giving sight to fifty-two. In thirteen of them he operated on single eyes. In two of these, one of whom was an idiot, a pupil of each was completely cleared; but the retina being insensible, the operation was not attempted on the other eyes. In a third the result is not noted, except that he considered it a hopeless case when the operation was tried. A fourth was altogether unmanageable, being not only afflict

ed with congenital blindness, but also deafness.† In a fifth the eye was lost by supuration. In the remaining eight he was successful; of these five had each previously lost an eye; one by variola, and four by operations performed by other surgeons, three resulting from attempts to extract. In forty-seven patients he operated on both eyes. In one of these, who was an idiot, no vision was obtained, although a perma-

† This youth was of course dumb, and the only inlets to knowledge which his mind could command, were the senses of touch and smelling. By these he distinguished with facility persons and things. He frequently amused himself with feeling for the door of any room in which he chanced to be, and having taken the key from the lock, he would strike it forcibly against his teeth. Of some indistinct vibrations on the organ of hearing, he probably was thus rendered sensible. He expressed pleasure by leaping, and was encouraged and governed by the touch; but the access to his reason by this sense was too imperfect to control him when his fear was strongly excited by pain and restraint. When therefore the operation was attempted, his struggles could not be overcome by the greatest manual force, and it became necessary to withdraw the instrument. Of a second attempt he seemed to be fully aware, as soon as he was conducted into the room where the first operation had been attempted, and immediately resisted it powerfully.

ment aperture was made in each capsule. In a second the operation was completely successful on one eye, but failed in the other by the supervention of acute inflammation which closed the pupil with lymph. In a third the operation proved unsuccessful in both eyes by the same result as the last—a closed pupil from adhesive inflammation. In a fourth the consequent inflammation passed into suppuration, but the other eye was cured. Two were under care at the time of his death, one of whom was already cured in a single eye. Forty-one were cured in both eyes.

These operations were performed on patients at the following ages: Five, from two to nine months; nine, from thirteen months to two years; four, from two and a half to three years; five, from three and a half to four years; eight, from four to six years; seven, at seven years; eight, from seven to nine; ten, from nine to fifteen; four, from twenty to twenty-eight. Thirty-eight of these patients therefore were at the interdicted ages, but the operation failed in only two of them: in one,

at the age of three years and a half, who had an insensible retina, and was an idiot; in the other, at the age of seven years, by adhesive inflammation.

The greatest success attended the operation between the ages of eighteen months and four years; and if any intermediate time be selected, the Editor is inclined to recommend the age of two years. The parts have then attained a degree of resistance which enables the surgeon to operate with greater precision than at an earlier period; yet the capsule has not become so tough and flexible as it does at a later period after the lens has been more completely absorbed.

But this is not the greatest although a considerable advantage of an early operation; for in cases in which the patient has no perception of external objects, the muscles acquire such an inveterate habit of rolling the eye, that for a very long time after the pupil has been cleared by an operation, no voluntary effort can control this

irregular motion, nor direct the eye to objects with sufficient precision for the purpose of distinct and useful vision. The retina too by a law common to all the structures of an animal body, for want of being exercised, fades in power. Its sensibility, in many of the cases cured at the ages of four years and under, could not be surpassed in children who had enjoyed vision from birth; but at eight years, or even earlier, the sense was evidently less active; at twelve, it was still more dull; and from the age of fifteen and upwards, it was generally very imperfect, and sometimes the mere perception of light remained. But these observations do not apply to those congenital cataracts in which only the centre of the lens and capsule is opaque, the circumference being transparent, for in those the retina is exercised by a perception, although an imperfect one, of external objects, the motions of the muscles which direct the globe are associated, and an absorption of the lens does not take place: therefore in this variety of the disease, the argument in favour

of early operation is not so much a medical as a moral one—it is preferable for the purposes of education and enjoyment.

On the subject of education it is important to state, that the first step towards it ought to be a certain training of the eye in respect to external objects. When an adult who had previously enjoyed good vision; is cured of a cataract, he is at once familiar with every object he sees. But when a child who has been blind from birth is cured, the actions of the retina must be frequently repeated to acquire precision and perfection. The Author in a letter on this subject, written only on the day preceding his death, offers the following observations: * To turn the faculty of sight to use, so as to display precise notions of objects, demands experience, which can only be given by the exercise of vision with considerable intention for a long time. The operation has no power to confer actual knowledge of objects. It only prepares the eye for receiving, and afterwards the intellect must be employed on the objects so received, before any readiness can be

acquired. The child therefore must be the object of his parent's attention, and be regularly and diligently exercised about large objects at first, and be taught to know them, then with smaller, and so on by degrees.* The very interesting observations of Cheselden are partly, but not wholly confirmed by the progress in vision of some of these cases. He was in every respect fortunate in his subject for observation—a young gentleman, at an intelligent age, with a favourable cataract, a quick retina, and, it may be concluded from his remarks, a steady eye. The majority of the Author's congenital cases were too young for this inquiry, and those at a maturer age had either too much mobility of the eye, if previously quite blind, or an imperfect acquaintance with objects if the circumference of the capsule and lens was transparent, and consequently very few of them were fit subjects for similar experiments.

The youth on whom Cheselden operated, had no judgment of the shape of bodies, much less of the rotundity or inequality of surfaces as represented by light and sha-

dow; he was ignorant by sight of what he knew by touch; frequent repetition was required to impart the knowledge of any object, and he could at first bear but a little exercise of the retina. These facts are to be referred to the inexperience of the organ, and accord with the above remarks in proving, that sight like touch requires practice for perfection. That objects appeared to him extremely large at first; that he had inadequate conceptions of space and no judgment of distance, in a great measure also resulted from inexperience, frequent comparison being indispensably necessary to regulate and even to impart these ideas. But that all objects should seem to touch his eyes, cannot be conceived in the sense in which it is meant, however closely the similitude between sight and touch be drawn. An intelligent girl, on whom the operation had been performed at the age of twelve years, was examined respecting this point, after she had acquired a knowledge of distances: she had remarked, that at first she actually could not see objects except they were very near to her eyes, and on this account fell over

every thing in her way. These patients are indeed short-sighted for some time after the operation, which affords another reason for their slow acquirement of the knowledge of distance.

The child is very awkward in using convex glasses, and extremely unwilling to wear them. The early use of them indeed is inexpedient. Let the eye first gain by practice all that it can naturally acquire, and the knowledge thus obtained will be more considerable than could have been expected without the aid of the lens. It may be commonly remarked, that the extraordinary employment of the sense of touch is surrendered in proportion to the improvement in vision, but is it at first immediately reverted to under any difficulty of finding the object sought.

In the adult, the solubility of the lens had been already proved by Scarpa, Hey, and other distinguished surgeons, but especially by Pott, whose accurate observations first established the fact; not only when it was detached from its capsule, and

sunk in the vitreous humour, but even whilst it remained in its seat, provided its capsule was opened. After a passage which is quite in point, he adds: "In order to render the fact still more clear, I have sometimes, when I have found the cataract to be of the mixed kind, not attempted depression; but have contented myself with a free laceration of the capsule, and having turned the needle round and round between my finger and thumb within the body of the crystalline, have left all the parts in their natural situation; in which cases I have hardly ever known them fail of dissolving so entirely as not to leave the smallest vestige of a cataract. In a few instances, where I have had fair opportunity, I have pushed the firm part through the pupil into the anterior chamber, where it has always gradually and perfectly dissolved and disappeared, not producing pain or trouble while such dissolution was accomplishing."

In the child, the preceding observations on the congenital cataract prove that na-

ture herself attempts the cure by the absorption of the lens: on this procedure therefore as the section of the cornea at so early an age is followed by the most unfavourable result, and depression cannot be accomplished, owing to the texture of the cataract, is founded the third operation, of which the essential part, as far as art is concerned, being the proper aperture in the capsule, it may be said to be *an operation on the capsule*, in contradistinction to extraction and depression, which imply principally the removal of the lens from its seat.

If the observations of others on the adult, or his own on the child, had failed to indicate to the Author the advantages of the operation on the capsule; accident, that fruitful source of improvement in medical science, would have pointed out to him its utility. The frequent occurrence of penetrating wounds of the cornea, the consequent formation of cataract, and its occasional cure by the natural process resulting from the very mode in which the

wound was inflicted, did in fact induce him to perform his anterior operation.

* Feb. 5th, 1808. J. Jaques punctured with a very fine awl the transparent cornea, pierced the margin of the iris, and the capsule of the crytalline lens. The wound had now produced a cataract, and was attended with a great degree of ophthalmia, and a slight adhesion of the wounded iris to the capsule towards the inner canthus. The inflammation subsided by the usual means, and on the 20th of March, the pupil being dilated with the belladonna, a crucial aperture was observed in the capsule, and the lens itself was becoming flocculent. On the 27th of June he finally presented himself at the Infirmary. The lens was gone, and the pupil clear, except at the margin of the adherent point of the iris, where a little of the capsule was seen. He was fitted with proper convex glasses, and saw as well as any one could do after the best operation for the cataract.*

In the child, the operation on the capsule is the only one which is suited to that

age. But in the adult, it is to be considered as one of three operations, in the choice of which surgeons will differ according to the bias which unavoidably results from education or habit. The removal of the opake lens from the axis of vision is not the sole end of the surgeon's skill. This great object of art may be obtained at too high a price, if parts which are essential to the perfection of vision, be permanently injured. By extraction, it is accomplished at the expense of the cornea and iris; by depression, at that of the vitreous humour, and sometimes of the retina. In both, the advantage lies in the expedition of the cure. No one who is competent to judge of the difficulty of perfectly performing either, can for a moment withhold the tribute of his praise from the successful operator. Each has been advocated by surgeons of the highest reputation, and who can doubt the merits of both, when a Pott is opposed to a Richter. In the operation on the capsule, art and nature conjointly proceed in the cure: the part which the latter has to perform is, it is true, slowly accomplished, but its perfection is more than an equivalent for

delay. The degrees of vision from that which is perfect to the stage of amaurosis, which permits the unhappy sufferer to distinguish only day from night, are so very various, that the merit of this or those operations must ultimately turn, not on the time in which the cure is completed, but on the comparative number, to whom, by the aid of an external lens, perfect vision shall be restored. If the success of the operations could be proved to be equal, even then the preference would be due to that operation which every well educated surgeon can perform, rather than to that which, in the hands of a very few, can accomplish the cure in the shortest period. The Editor, leaving each operation to rest on the basis of its intrinsic merits, proceeds to shew the progressive improvements which the Author made in his operation on the capsule, which purpose will be best answered by a comparative view of its effects on the ordinary cataract of the adult, and the congenital cataract of the child.

Aware that, in the adult, he was yielding up an advantage of much importance

to the surgeon, in declining to attempt the immediate removal of the opake lens from the axis of vision, he resolved to hasten its absorption by subjecting it in the most extensive manner to the action of the aqueous humour. To fulfil this intention, he first operated through the posterior chamber with his larger needle, (*plate VIII. fig. I.*) with which he freely divided the capsule, and cut up the lens in its seat, disregarding its flocculi, or even small pieces which fell in abundance into the anterior chamber, even up to the margin of the pupil. During 1806, and a part of 1807, he practised this operation: the end in view was sooner attained, but frequently at the expense of a dangerous inflammation.

The result of the same operation on the congenital cataract being in general so very favourable, all its circumstances were carefully reviewed and compared, and its success was found to be connected with the absence of inflammation, or the existence of it in a stage that could be easily controlled. But as the more frequent occurrence of acute inflammation in the

adult, could not be attributed, to any difference in the mode of operating, the condition of the parts concerned in the operation demanded a strict comparison. In the congenital cataract this striking difference was remarked: either it consisted entirely of capsule, or the lens was relatively soft. In the merely capsular cataract, the iris sustained no pressure after the operation; in the lenticular, the softer lens was broken down by repeated touches with the instrument into fine fragments or flocculi, which, if they remained in the posterior chamber, produced no pressure on the iris; or, if they fell into the anterior chamber, did not in general excite acute inflammation. But in the ordinary cataract of the adult, the lens was comparatively hard and slow of solution, especially its nucleus or central part, and having lost the support of the anterior lamella of the capsule from the extensive division of that membrane, it was apt to revolve on the instrument, or by a partial dislocation to produce a permanent pressure on the iris. The result of the inquiry was this: In the capsular cataract, inflammation

very rarely followed the operation; in the lenticular, the inflammation was in proportion to the irritation or pressure which the iris sustained. It is admitted that inflammation does also occur, independently of pressure, from the extravasation of a fluid cataract, and sometimes simply from the puncture.

The restoration of vision in a shorter period, even to a large proportion of patients, appeared to the Author to be too dearly obtained, if the chance of this blessing was for ever lost to the unhappy few. He would fain have carried the operation to that perfection which could command success. He had experienced that a permanent aperture could be made in the capsule, that the lens was soluble in proportion to its consistence, as long as it was subjected to the action of the aqueous humour, to which there seemed to be no exception but the ossified lens—a rare disease. In proportion therefore as he could diminish the risk of inflammation, the certainty at which he aimed would be attained. With this view he considerably re-

duced the size of his needle. (*See plate VIII. fig. 2, 3.*) But a still more important change was that which he now made in his manner of using the needle. Proceeding according to the method of performing the posterior operation already described, he made an aperture only in the centre of the capsule, not exceeding the ordinary size of the pupil. Thus whilst the opening was large enough to subject the lens to the action of the aqueous humour, *a sufficient portion of the circumference of the anterior lamella of the capsule was preserved to confine the lens in its seat.* (*See plate VII. fig. 2, 3.*) The lens itself he used tenderly, working a little at its centre with a lateral motion of the needle, which is by far the safest method of opening its texture. Sometimes the touch with the instrument was directed backward to avoid the slightest pressure on the iris. He was now content to obtain by several operations what in his first method of proceeding he had gained by two.

The slower process which resulted from this operation, induced the Author to make

more free with the anterior lamella of the capsule, and to slit or lacerate it beyond its centre. This was done in the case of *David Davis, but the capsule was rent to a greater extent than it was intended, in consequence of the unsteadiness of the muscles of the globe, and the strong action into which he threw the orbicularis palpebrarum. The unsupported lens revolved on the needle, stretched the iris, and projected in the pupil. It was carried back with great care, and even partially depressed, so as completely to relieve the iris. It was unfortunate for the man that he was an out-patient, and was conveyed two miles after the operation. Sixteen ounces of blood were taken from his arm before he was dismissed. In the evening the lens had again advanced and pressed the iris, which bulged towards the inner canthus; the pupil was dilated and he now complained of a heavy dull pain affecting the forehead. The cornea began to slough around its juncture with the sclerotica in forty-two hours, although in the first twenty-four he had lost sixty-four ounces of blood.*

In his subsequent operations, the Author so generally succeeded in guarding against the dislocation of the lens, by confining his operation to the centre of the capsule, that this untoward event never again occurred. In a few patients he even opened the texture of the lens without attempting to effect the central aperture in the capsule according to his usual practice, and indeed the very principal of his operation; pointing out by this attempt his great desire to leave the lens in its proper seat, reserving the completion of his plan for a second operation, when the lens, reduced in bulk and loosened in texture, should do less injury to the iris. He finally attempted to diminish inflammation by performing his anterior instead of his posterior operation. His method of doing this has been already described with sufficient minuteness, and the preference to this operation is founded on the comparatively slighter injury that results to the eye from a penetrating wound through the cornea.

If the operation on the capsule be per-

formed either on the child or the adult with strict attention to the rules laid down in the former part of this chapter, and to the cautions inculcated in the latter, inflammation will very rarely defeat the intention of the operator. But if in a case of acute inflammation consequent to the operation, depletion should fail to arrest the adhesive process, and the pupil become closed with lymph, it may be cleared by a repetition of the same operation after the inflammation has been subdued. It is also especially applicable to cases of secondary cataract, as they have been termed; *i. e.* to unsuccessful cases of extraction or depression in consequence of the reunion of the wounded edges of the capsule, and the opacity of its anterior or posterior lamella, as in the following example:

*Eliz. Shadbolt, couched seven years ago, applied at the Infirmary on the 28d of June, 1808, for a capsular cataract. The capsule was at least three lines behind the iris, its anterior layer having retracted. The opacity was in the centre, and the black pigment was extended from the cili-

ary processes to nearly opposite the pupil. The capsule was opened very freely, and she saw directly after the operation.*

In the adult, if the texture of the lens is nearly uniform and permeable, the cure is completed in a space of from three to five months; but if the texture is firmer, and the nucleus large, the cure cannot be accomplished in less than seven months. On this account the Author, who thought highly of extraction, and performed this operation with dexterity and success, was inclined to extract the lens when its texture was unusually hard. The Editor cannot assert that he would ultimately have conceded thus much in favour of extraction. It was intended that such decision should result from a very long and impartial trial of both operations. With respect to the softer lens or the capsular cataract, he was satisfied of the superiority of his operation. Surgeons who can extract well, are entitled to make this election; but it is too well known how very limited the success of extraction in general practice has proved, to need in this place further remark.

To those who are inclined to operate on the capsule and lens only in their seat, but who rejecting the suggestions derived from experience, prefer the bolder operation which the Author first practised, to the slower, but less hazardous one which he finally approved, some of the following cases will be useful in indicating the extent to which it will sometimes be necessary to carry the means that countervail inflammation.

It may not be improper to close these observations by declaring that the excellence of the Author's operation does not rest merely on the evidence of the Editor. Mr. Travers, since he was appointed Surgeon of the Infirmary in March, 1810, has cured by this operation forty-seven patients, and although many of these were cases of congenital cataract, the majority were cases of ordinary cataract in the adult, in whom the lens was frequently of a firm texture.

CASE I.

*On the 19th June, 1806, I operated with the large needle (*plate VIII. fig. 1.*) on the right eye of Neale, a boy seven years old, affected with congenital cataracts. I cut the capsule and the lens freely, and left the whole in their situation. In the evening he complained of slight pain, and in the morning the eye was inflamed. Four ounces of blood were taken from his arm, and eight leeches were applied to the eyelids.

22d. The inflammation had moderated, but the iris was much dilated. In three weeks the cataract was absorbed, and a large portion of the pupil was clear.

Sept. 1st. The pupil was perfectly clear, and had returned to its natural size, the iris having recovered its action very gradually.

July 7th. I operated on his left eye.

On lacerating the capsule, a semi-fluid substance filled the anterior chamber.

8th. The eye was inflamed. He was twice bled in the course of this day, and leeches were applied to the eye-lids.

10th. The nucleus of the lens was in the anterior chamber, and the cornea was opake.

12th. The semi-fluid portion of the cataract had disappeared. The capsule was retracted and irregularly opake like net-work. The pupil was so largely dilated that the iris was almost invisible.

Sept. 19th. Very little opacity remained, the iris was gradually returning to its proper state, and his vision was good in both eyes.*

CASE II

* Fanny Crawford, at the age of thirteen was admitted into the Infirmary for

congenital cataracts. Each lens was opaque in its centre, but transparent in its circumference, and of its natural size.

Aug. 18th, 1807. I operated on the left eye, and very freely opened the capsule and the texture of the lens, leaving the latter projecting towards the cornea. In the evening she felt great pain, which was increased on exposure to light; the pupil was rigidly contracted around a small portion of the lens; which projected through it, and the iris was convex at many places, having contracted over the projecting portions of the lens. Eight ounces of blood were taken from her arm, and five grains of calomel were given to her.

19th. The pain had ceased, but the eye was irritable, and the iris and pupil remained in the state last described. The inflammation was subdued by taking away eleven ounces of blood, which occasioned her to faint, and by purging her.

24th. The detached capsule adhered to the iris at two points.

30th. The operation was repeated on the left eye, but the motions of the needle were directed backwards. The capsule was found to be more tough than before, and the needle was rather freely used. In the evening she suffered considerable pain in the eye. Eight ounces of blood were taken from her arm, and she was briskly purged with calomel and magnesia vitriolata.

31st. The eye was inflamed, the iris adhered towards the external canthus, and the pupil was contracted around a projecting portion of the lens. I opened the left temporal artery, and she lost eight ounces of blood. She presently afterwards bore the light without shrinking or watering of the eye.

Sept. 1st. She had no pain, the pupil contracted and dilated, the extent of the adhesion was not visible in consequence of the numerous particles of the lens in the anterior chamber, rendering the whole obscure. She took a scruple of jalap, and afterwards a quarter of a grain of tartarized antimony every four hours.

5th. The absorption of the lens was going on fast.

13th. The operation was repeated, and no inflammation succeeded.

Oct. 10th. By a fourth operation a large aperture was made in the capsule, and she saw.

11th. She had no inflammation. The aperture was occupied by flocculi.

22d. No inflammation resulted from a fifth operation, by which the left eye was perfectly cured, and the pupil left regular.

Nov. 8th. The operation was performed on the right eye; I opened the capsule extensively, loosened the texture of the whole lens, and projected a considerable quantity of its particles into the anterior chamber.

9th. During the night more of the lens entered the anterior chamber. The oph-

thalmia was considerable. She lost eight ounces of blood from the arm; and the same quantity on the following day.

11th. The inflammation had ceased. The iris bulged a little, but the pupil was free.

Dec. 5th. The operation was repeated without any unfavourable result.

Jan. 1st, 1808. The right eye was also perfectly cured.*

CASE III.

* Eliz. Augier, born blind with cataracts, was submitted to the operation at the age of two years and two months.

Nov. 8th. 1807. I operated on both eyes. The cataracts were chiefly membranous and tough. The capsule was opened extensively in the left eye, and little less in the right.



21st. The right capsule had re-united but a considerable absorption of its contents had taken place. In the left eye the remains of the lens was concave, and the rent in the capsule had not coalesced. The operations were repeated. In the right eye I opened the capsule extensively, but exactly in its centre. A large portion of it was very dense and opaque. In the left, a small nucleus was detached and pushed through the pupil, leaving it clear.

22d. The pupil of the left eye continued clear, and the small nucleus lay in the anterior chamber without exciting ophthalmia. The right capsule remained open.

28th. No ophthalmia followed the operations. She saw with the right eye, although in the upper part of the pupil a large portion of the capsule remained. The nucleus in the left wasted fast.

Dec. 6th. The operation was repeated on the right eye, and the lower part of the capsule was lacerated, but she disengaged

her head, and I was obliged to withdraw the needle without detaching the capsule to the extent which I had intended.

7th. The inflammation was slight, but some adhesions of the capsule to the iris were about to take place. The belladonna was applied.

12th. An absorption of all the lower part of the cataract in the right eye had taken place. The nucleus in the anterior chamber of the left eye was almost gone.

Jan. 4th, 1808. Both eyes were cured.*†

CASE IV.

* On the 18th of Feb. 1807, at three o'clock *p. m.* I operated on both eyes of Smith.‡ The cataract in the left eye was

† The Editor has seen this little patient in the course of the present year (1811) and her vision is perfect.

‡ Smith was a robust countryman. The operation was performed with the large needle, and the Author freely divided the texture of the capsule and lens.

particularly hard. He was much affected by the operation with tremors and nausea. At half past ten at night he had the following symptoms: Pain of the head intense, respiration much affected, nausea, eructation, occasional vomiting, pulse full, and rather hard. Twenty-six ounces of blood were taken from his arm: an ounce and a half of magnesia vitriolata was given to him, but was rejected by vomiting in half an hour. At half past one he was rather easier. I examined his eyes: both pupils were much dilated, and did not contract on exposure to light.

19th. He had no sleep during the night, and at half past seven in the morning the pain was rather greater; all the other symptoms remained. The vascularity of the sclerotica was great. I opened the left temporal artery, and drew off forty-eight ounces of blood. He was faint and easier. After taking eight drops of tincture of opium to compose his stomach, he dozed for two hours. At half past ten he took six grains of calomel; and at half

past one, four spoonfuls of a solution of magnesia vitriolata. At three the medicine had not operated. Four grains of calomel were repeated, with an ounce of ol. ricini. At half past ten at night the pulse had risen; no stools had been obtained, and he had frequent nausea. Thirty-three ounces of blood were taken from his arm. He fainted. After this evacuation he remained low and tranquil, and his respiration became natural; his eyes were not more inflamed than they had been in the morning; both pupils were dilated.

20th. He had slept two hours during the night, the pain was less, but the vascularity of the sclerotica was still great, especially of the right eye: the nausea had ceased. He took ten grains of calomel with two scruples of the cathartic extract, and was purged four times. In the evening he was tranquil, the pain was nearly gone, except a little in the right eye.

21st. The right eye was very vascular, and a little painful. He was purged very

much by three grains of calomel and half a drachm of cathartic extract. In the evening his tongue was furred and dry, the right eye still painful, but not more so than in the morning. He was ordered to dilute. I purged him simply every day from the 21st of Feb. to the 2d of March, when the pain increased. Two grains of calomel with one grain of opium and one of antimonial powder were given at night, and a purging powder in the morning.

3d. The pain was less. He had been able for four days past to distinguish the hands of my watch. The medicine was repeated.

5th. The inflammation had subsided in the left eye, and was much reduced in the right. The medicine was continued.

15th. For several days he had been able to see with the right eye, although it was still inflamed. The ophthalmia had not relapsed in the left, in which absorption went on fast, and the lens was pellucid in its centre.

31st. There was still a considerable ophthalmia of the right eye. The left remained free from inflammation, but the pupil was contracting, and the iris adhered.

April 9th. The left iris adhered very much to the capsule, which was tough. I cut the capsule with the needle opposite to the pupil, but could not detach the adhesions.

June 5th. The cataract of the right eye was gone, but the cornea from continued inflammation was cloudy, and the iris was dilated.

7th. I operated on the left eye. The pupil was irregular, but not very small. Two points of the iris projected towards the centre of the pupil, and were firmly fixed. I operated with the small needle, and detached the points of adhesion; the pupil dilated after the operation, and recovered its circular form.

9th. He felt no pain, but the eye was

very red, and apparently inflamed. He saw large objects.

24th. He was restored to perfect vision. For distant objects his right eye required a lens of three and a half inches focus; his left, of four and a half; for near objects, each eye a lens of two.*

CASE V.

* March 16th, 1807. I operated on the right eye of Mrs. Clements in the usual mode, at eleven o'clock. In the evening she complained of a good deal of pain. I examined the eye, but there was no inflammation. Twenty drops of tincture of opium were given to her.

17th. She had slight ophthalmia, the pain was still sharp, the pupil contracted, the eye hurt by light, the pulse languid, and some prostration of strength.

18th. The ophthalmia was rather acute. She was ordered to take a solution of

magnesia vitriolata until she was freely purged.

19th. The ophthalmia was still acute. The salts were continued.

20th. The inflammation was less.

31st. The inflammation had ceased. The pupil dilated and contracted with great freedom, the cataract was much reduced, but still blocked the pupil. In this case the pain was the indication of the ophthalmia about to succeed; perhaps it is always so, and the apparent prostration of strength ought to be disregarded.

April 5th. The capsule having coalesced, and no farther absorption going on, I repeated the operation, and found the iris adherent at one point. I tore the capsule very freely, and left a good deal of the pupil clear. In the evening the pain was trivial.

9th. The capsule had not re-united, and she saw large objects.

April 25th. Her vision was perfectly restored. Focus for distant objects, three inches and a half; for near objects, two and five eighths.*†

These cases are intended to exemplify the operation which the author performed during the year 1806 and the greater part of 1807. This operation was not commonly followed by a hazardous inflammation, if either the lens was very permeable and favourable for solution, or the cataract was capsular; and the cure was unquestionably more speedily accomplished by it. In Case V. vision was useful in little more than three weeks, and perfect in six. But when the lens is of a firmer consistence, Cases II. and IV. may serve as instances of the acute inflammation which is apt to supervene, and which cannot always be prevented from terminating in a closed pupil, in consequence of the effusion of coagulable lymph. The preference therefore to the

† The communications between asterisks in this chapter are taken from the notes of the Author.

more cautious operation on the centre of the capsule is justly founded, for in proportion as the certainty of the cure increases, the time in which it can be accomplished becomes a subordinate consideration. The fifth, sixth, and seventh plates are added to illustrate more fully than cases could do this latter method, viz. his anterior and posterior operations on the capsule.

EXPLANATION
OF
THE PLATES.

PLATE I.

Fig. 1. Shews the early and curable stage of syphilitic inflammation of the iris. A zone of red vessels is seen around the junction of the cornea and sclerotica, the pupil is very irregular, and a tubercle of lymph, of a yellowish colour, appears on the iris towards the external canthus. The vascular zone is characteristic of the early stage of inflammation of the iris, but is common both to the simple and syphilitic forms of the disease, therefore it is mentioned among the signs of the former, (see page 55,) but it is not included in the diagnosis of the latter: (See page 94.) The female from whom this drawing was made,

FIG.1.



FIG.1.

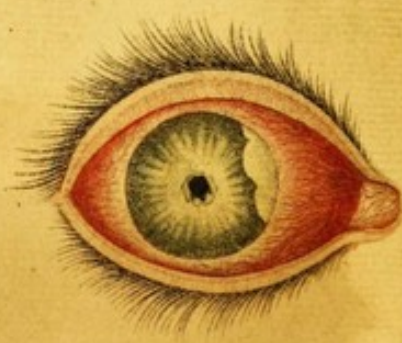


FIG.2.



FIG.5.



FIG.3.



FIG.4.



applied at the Infirmary nearly blind under the secondary symptoms of syphilis. Although she was delicate, and an unfavourable subject for depletion, her temporal artery was divided, and she was put on a full course of mercury. In a fortnight the lymph was absorbed, and the ophthalmia had apparently ceased. Supposing herself cured, she ceased to attend the Infirmary, but returned in two or three weeks with her eye in the state which is represented by this coloured engraving. A mercurial course again arrested the disease.

Fig. 2. Shews the advanced and incurable stage of syphilitic inflammation of the iris, combined with amaurosis. The inflammation is diffused over the external tunics, the pupil is dilated, and is not in the centre of the iris, and three tubercles or organized lymph are seen on the iris towards the external canthus. It was taken from the eye of a man affected with secondary symptoms of syphilis, who applied at the Infirmary in this stage of the ophthalmia, which terminated in the dis-

organization of the eye, although he submitted to a full course of mercury. The treatment happily preserved his other eye, on which the zone of red vessels had already appeared.

Fig. 3. Shews the termination of the disease represented by *fig. 2*. The iris and cornea are in contact, both of these tunics are very much diminished and obscured; the sclerotica is very tumid and irregular on its surface, as if ready to burst at many points. The man suffered much pain in his head, and his health rapidly declined. On a consultation it was resolved to make a free incision through the tunics of the eye. This was done by Mr. Travers. No discharge attended the operation. Poul-tices were applied, the eye gradually subsided, became tranquil, and healed.

The following figures in this plate are taken from drawings which were executed under the author's direction, but he has not left any reference to the cases.

Fig. 4. Shews a puckered iris, a pupil

contracted and adhered to the capsule, which is becoming opaque, a deposition of lymph on the iris towards the internal canthus, and a diffused inflammation of the conjunctiva and sclerotica.

Fig. 5. Illustrates the adhesive inflammation of the cornea. The conjunctiva and sclerotica are partially inflamed; a considerable deposition of lymph, in the form of a crescent, is seen between the conjunctiva and anterior lamella of the cornea, with a halo of lymph extending beyond it, and eclipsing the greater part of the pupil; a great many vessels, in a state of congestion, are seen in the act of organizing the lymph which they had previously effused. See the first section of Chapter IV.

Fig. 6. Illustrates the sloughing of the cornea. The conjunctiva is acutely inflamed; a considerable portion of the cornea, at its junction with the sclerotica towards the inner canthus, has sloughed, and left a deep ulcer in the form of a groove; and the ragged edge of the cornea

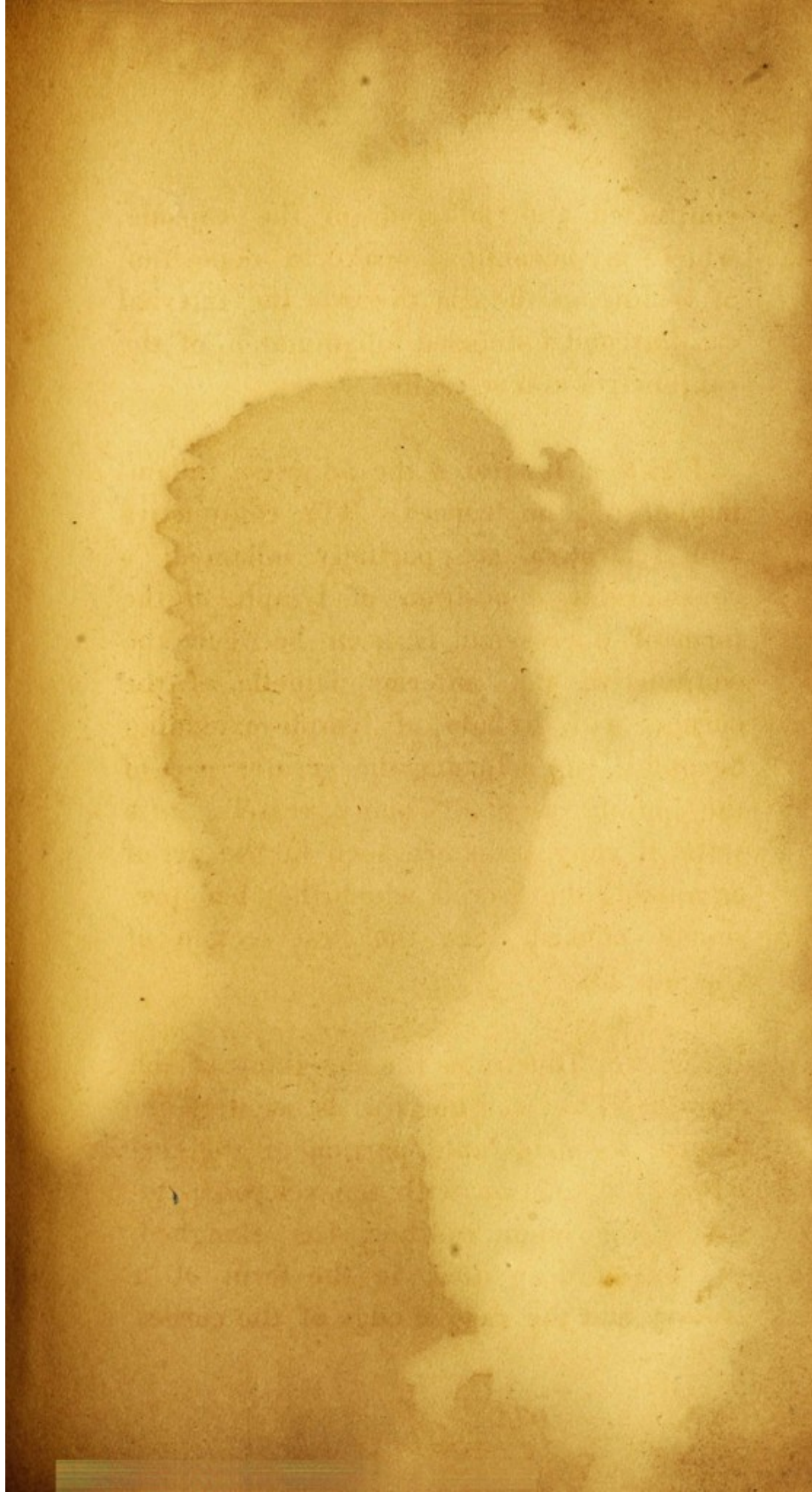


FIG.1.



FIG.2.



FIG.4.



FIG.3.



FIG.5.



FIG.6.



has a faint halo of lymph, which marks the commencement of a salutary action. Below this ulcer another portion of the margin of the cornea is dead. This portion is opaque, its colour a dusky white inclining to yellow, a faint line of separation on either side of it marks the ulcerative process by which it is about to be thrown off. See the third section of Chapter IV.

PLATE II.

Fig. 1. and 2. Represent the upper eyelid in its closed and open state after the excision of the tarsus, according to the method recommended in Chapter III. for the cure of inveterate inversion.

Fig. 3. and 4. Represent the external appearance, and internal structure of the eye of Miss G. See her case in Chapter V. In the former the pupil is oblong and dilated, and a tawny substance is seen

posterior to the lens. In the latter the section was carried through the centre of the optic nerve, tunics, and humours. The line of the sclerotic coat is perfect except at a single point, where it is slightly elevated by the extension of the disease towards the exterior of the globe. The insinuation of the disease between the fibres of the sclerotica was perhaps too minute for delineation. This is the only part of the coloured engraving which does not perfectly represent the preparation. "The crystalline humour retains its usual situation, but the vitreous humour and retina occupy only one half of the globe of the eye, being displaced by the substance which grew on the opposite side of the interior of the globe, and constituted the disease for which the organ had been removed. Its size is large enough to occupy nearly one half of the common seat of the vitreous humour. It seemed to be composed of a yellow coloured coagulable lymph streaked with black, and to have originated from the inner part of the sclerotica, for the choroid coat was ascertained by dissection to quit the sclerotica and pass

on the inner side of the tumour. The sclerotic coat at the part at which the tumour adhered most firmly was partially absorbed; and a portion of the disease, about the size of the head of a pin, had insinuated itself between its fibres, and was ready to appear on the outside of the sclerotica. The retina is compressed into the centre by the tumour on one side, and the vitreous humour on the other, which is not diseased, but is coagulated by the spirits of wine in which the eye had been previously immersed. The shrinking of the cornea, the tints of the lens, and optic nerve, are also the effects of the spirits of wine."

Fig. 5. Shews a more advanced stage of the same disease, by which the different parts of the organ are altered and confused. It represents a section of the eye of Mrs. L. whose case is related in Chapter V. At the upper part of the figure, the optic nerve is seen in the centre of diseased adipose substance, with a discoloration of its medulla at the dissevered extremity. From the junction of the optic nerve and eyeball the line of the sclerotic coat may be

followed on one side of the figure; but on the other, "it appears that the sclerotic coat had ulcerated near to the entrance of the optic nerve, and that the disease had communicated itself generally to the adipose membrane in which the eye is embedded. From the fat it had extended to the dura-matral covering of the optic nerve, and the nerve itself had at that part taken on a similar diseased action; so that an insulated disease had been thus produced in the nerve about three quarters of an inch from the eye, the nerve remaining sound between this spot and the posterior part of the globe."

Fig. 6. Represents the disease of the right eye of Master E. L. the history of which is given in Chapter V. "The tumour, which differs from the other cases in its seat, texture, and colour, is formed of the tunica aranea, vitreous and crystalline humours, enclosed in the retina, and of a soft coagulable lymph disposed in small lobes."†

† The description of appearances marked by inverted commas was obligingly communicated by Mr. Astley Cooper, who dissected the diseased eyes.

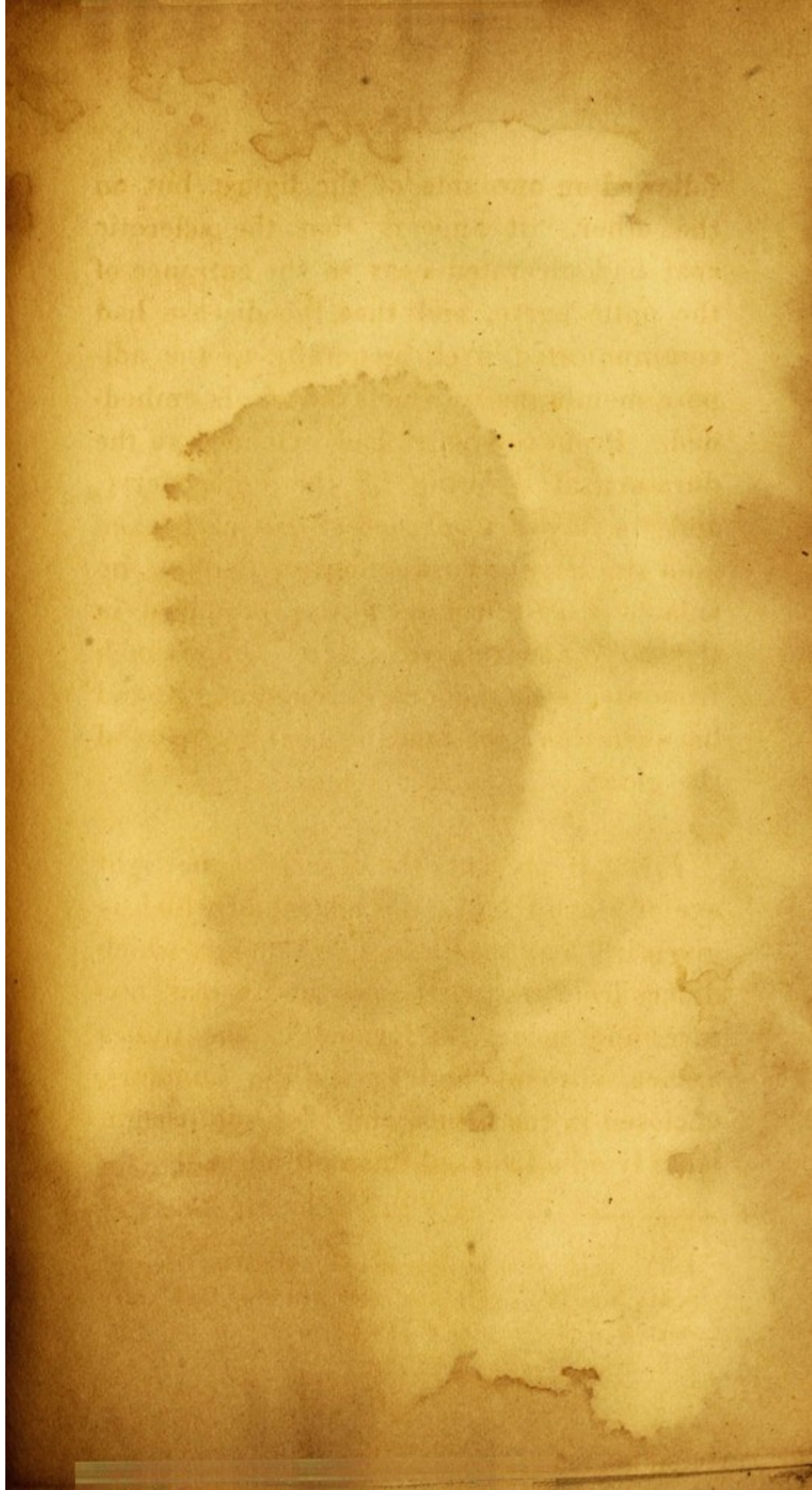






FIG.1.



FIG.2.



FIG.3.



FIG.4.



FIG.5.



FIG.6.



PLATE III.

This plate is intended to represent an external and ultimate appearance of the disease, which has been shewn in its internal and incipient stage in *fig. 4. plate II.* The upper eye-lid is much enlarged, and partially everted by a fungus, the surface of which is irregular, somewhat fissured, and stained with blood. The colour of the fungus varies; some portions of its surface are florid and luxuriant; others, especially the most depending, are in a state of decay.

A section of this fungus and of the contents of the orbit would have afforded a more interesting, because a more characteristic view of the disease; but an examination after death was not permitted. See the case of Mrs. A. in Chapter V.

PLATE IV.

This plate affords a view of some of the most remarkable varieties of the congenital

cataract. The dilated pupils in several of the figures manifest the advantage of the application of the belladonna in exposing a larger surface of the cataract, by which its character is ascertained, and the operation on the capsule is performed with greater precision. Compare *fig. 1*, in which the pupil is dilated, with *fig. 2*, which shews the state of the pupil previous to the application of the belladonna. The former represents an opake capsule, containing only the remains of a lens, which is thin and squamose; the latter, a purely capsular cataract, the lens having been completely absorbed.

Fig. 3. Shews a lens of which the centre is opake, but the circumference is transparent, with the exception of three opake radiated lines, which seem to indicate some variety in the configuration of the two parts, and also render it probable that this form of cataract may be referred to a change of structure which is independent of inflammation. The very white spot in the centre of this figure represents an opacity of the capsule. *Fig. 5.* shews the same eye with the pupil undilated.

FIG. 1.

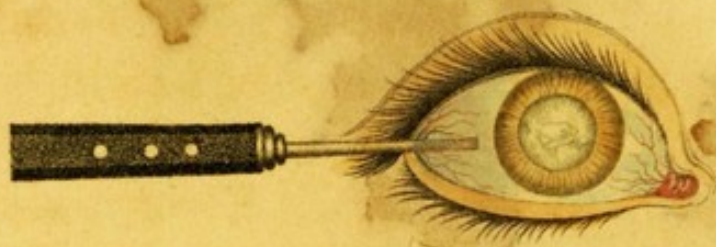
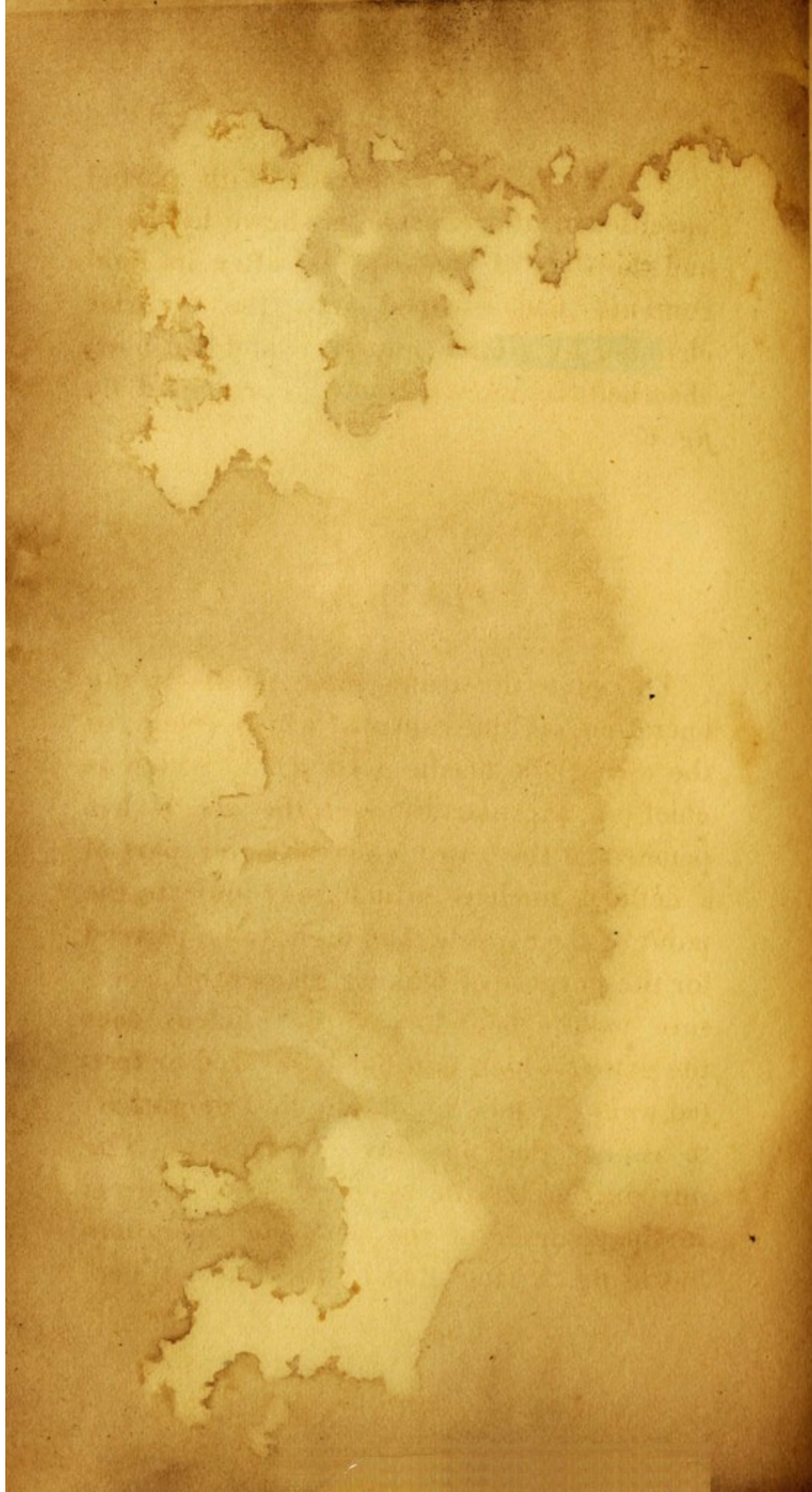


FIG. 2.



FIG. 3.





A fluid or milky cataract, with partial opacities of the capsule is shewn by *fig. 4*, and the state of the capsule, after its fluid contents had escaped into the anterior chamber by simple puncture, and had been absorbed, is more clearly represented by *fig. 6*.

PLATE V.

This plate illustrates some points in the operation on the capsule, which relate to the use of the needle. In *fig. 1*, which is chiefly a capsular cataract, the needle has penetrated the capsule at the outer part of a defined nucleus, which may indicate the point of the capsule that ought to be pierced for the purpose of making the central aperture, as the boundary of the nucleus does the extent which is to be dissevered or fretted away (if possible in the first operation) to render that aperture permanent. The introduction of the needle in this figure is in the manner of the posterior operation; but in *fig. 2*, after that of the anterior ope-

ration, by which some progress in the opening of the centre of the capsule is represented. The point of the needle is too much out of view, and should be acting rather more on the centre of the capsule. In *fig. 2*, the cataract is purely capsular and congenital; but in *fig. 3*, it is purely lenticular, and a form of the ordinary cataract of the adult, which is the best adapted for the operation on the capsule. If the tint of the lens be somewhat yellow, and especially if it also incline to brown, its texture is much firmer, and its solution is more slowly effected. The needle is here introduced for the purpose of shewing that in the posterior operation it is made to penetrate the very edge of the lens, and to appear under the capsule just within the dilated margin of the pupil. This is done merely to avoid the entanglement of the instrument in the centre of the lens, which interferes with the intended precision and gentleness of the operation on the capsule. The needle is to be steadily passed between the lens and the capsule, and the latter opened at its centre.

FIG. 1.



FIG. 2.



FIG. 3.



FIG. 4.



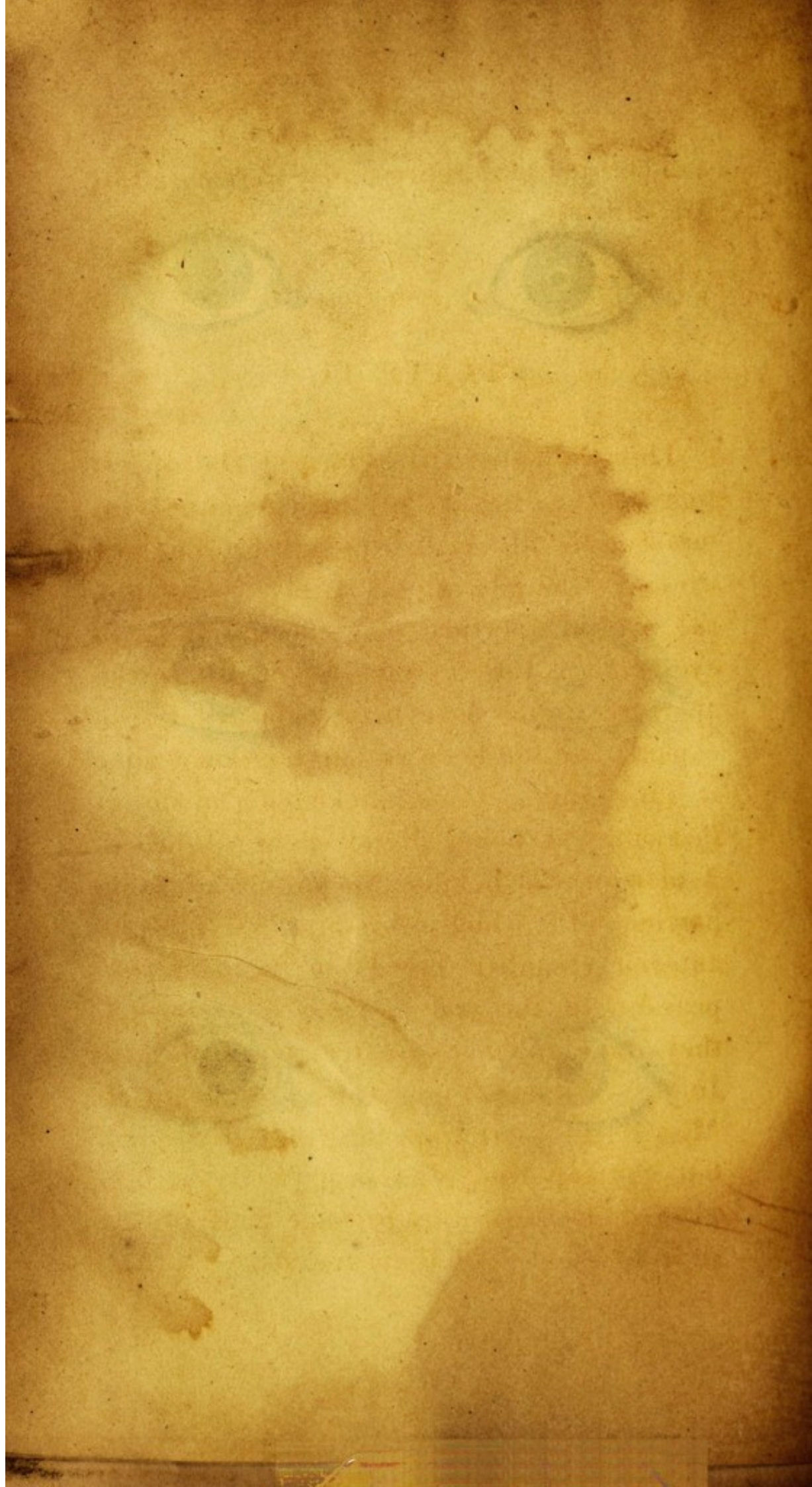
FIG. 5.



FIG. 6.



H. Anderson Sc.



The eyes here represented were cured by Mr. Travers.

PLATE VI.

This plate shews the effect of the operation on the capsule in the congenital cataract. In *fig. 1, 2*, which represent the eyes of Chapple, a girl twelve years old, the central aperture was effected in both eyes; and as the cataract was capsular, the aperture would have been enlarged if the capsule had not been so tough as to render it impossible. This thickened capsule is incapable of being dissolved or absorbed. A margin of it behind the pupil, and some portions of it which were detached into the anterior chamber, presented the same appearance at the end of three years which they did immediately after the operation. In *fig. 3*, representing one of the eyes of Miss F. the central aperture was attempted, but the intention was imperfectly accomplished, because the inferior half of the capsule yielded at its circumference also,

and thus the superior portion was left pendulous and incapable of being removed by any subsequent operation. In this patient the disadvantage of a protracted operation was very manifest. It was performed on both eyes at the age of ten years, but such a tremulous motion of them had been acquired, that she cannot even now, although three years have elapsed since she was cured, direct her eyes to objects with sufficient precision. In *fig. 4*, not only has the central aperture been effected, but the pupil has been cleared, except at its inferior margin, to which a small portion of the capsule, in the form of a crescent, adheres. It was engraved after a drawing made from the eye of Miss D. This young lady had a cataract of some duration from a puncture with a fork. Two opake spots of the cornea, one over the pupil, the other below, at the junction of the cornea and sclerotica, mark where its points entered. A small opake spot of the cornea towards the external canthus, was the part at which the needle was introduced. The eye was cured by a single operation, performed only ten days before the author's death. On cases of

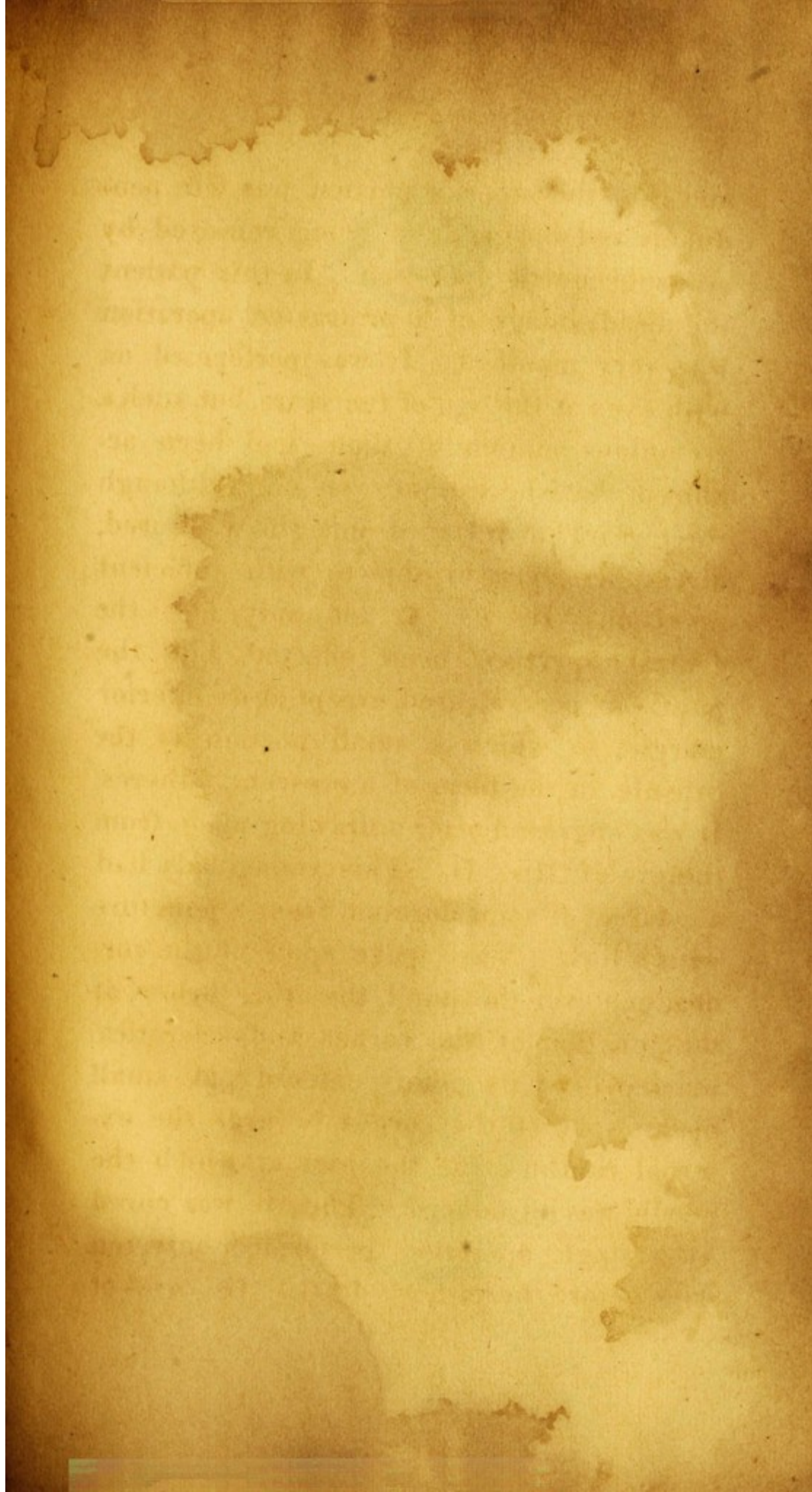


FIG. 1.



FIG. 2.



FIG. 3.



FIG. 4.



FIG. 5.



FIG. 6.



cataract of one eye, the other being perfect, whether the cataract was primary, or arose from injury, he operated with the happiest results. In *fig.* 5, 6, not a trace of the capsule remains; even when the pupil is dilated in its utmost degree, as in *fig.* 6, by the belladonna. This beautiful operation was performed, at the age of three years, on Jane Yardley, who had been blind from birth. The cataract consisted of the thin remains of an opake lens, yielding in its texture, and contained in a capsule also thin and yielding. Each eye was cured by a single operation, performed on the same day. The cataract was first broken up in the centre, and then from the circumference of the pupil. She had vision in five days, saw very well in seventeen, and perfectly in forty-eight, when both pupils were as clear as they are represented by these figures.

PLATE VII.

Fig. 1. Presents a form of cataract which is rare, except in patients who are born

m m

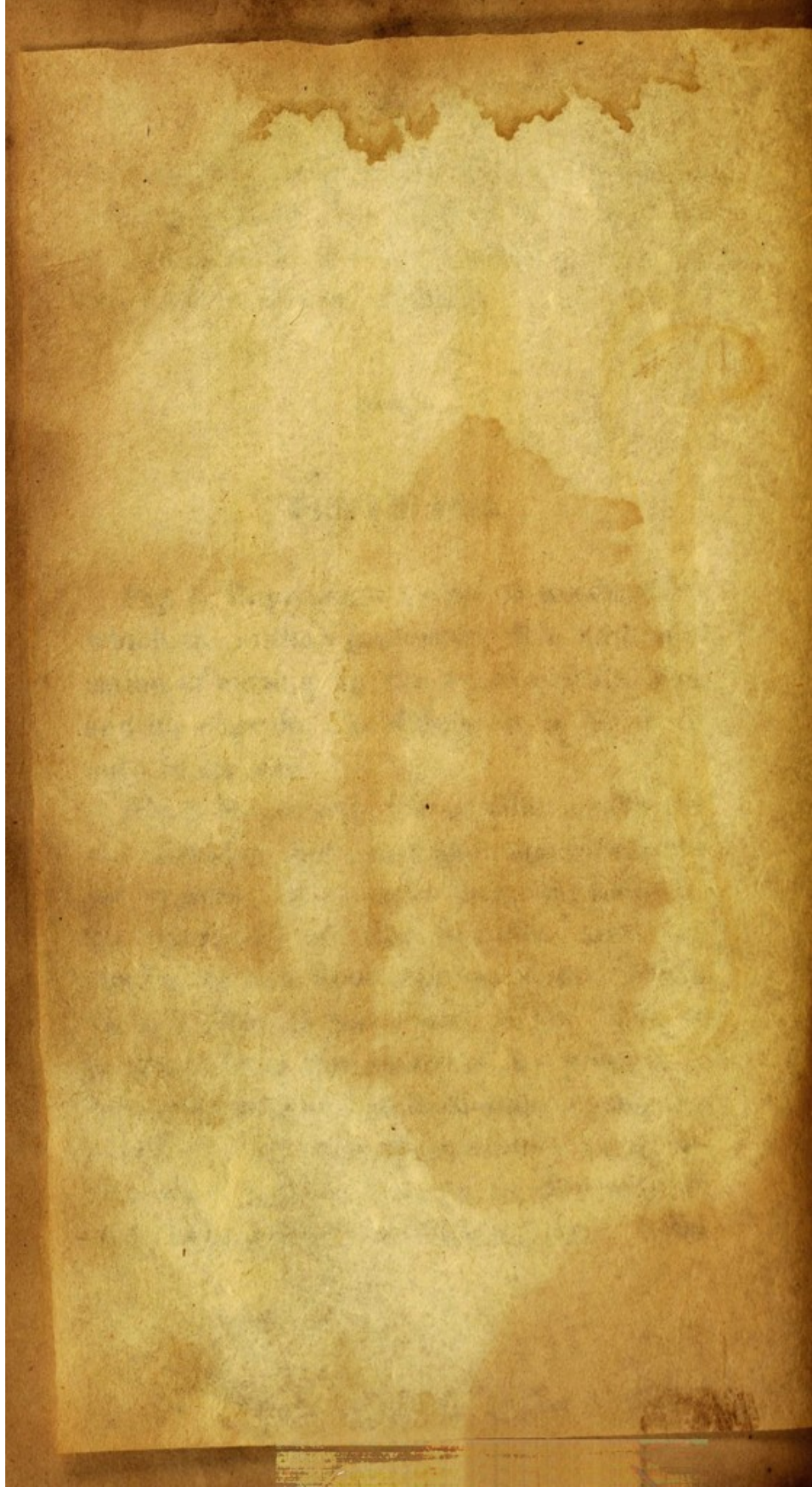
with the disease. But this was not a congenital case. The young woman whose eyes are represented by this coloured engraving, for both were thus affected, came to the Infirmary prepared to submit to the operation. The influence of the belladonna displayed the character of the cataract, and to her great joy enabled her to read the smallest print. The centre of the capsule is seen to be irregularly opaque. Its whiter colour distinguishes it from the opacity of the lens, which is much more extensive, but regular and defined. The black circle represents the transparent circumference of the lens through which light was admitted to the retina. Every morning a little of the diluted belladonna was dropped into her eye, and she saw perfectly during the rest of the day. She was content with this advantage, and declined the operation.

The other figures in this plate are intended to shew the effect of the operation on the capsule in the ordinary cataract of the adult; and, with the exception of the sixth, they are purposely taken from some of the Author's last patients. *Fig. 2, re-*

presents the left eye of Ann Story, perfectly cured of a cataract, which consisted of a solid opake lens with an opake capsule adhering to the iris. Mr. Travers has since cured her right eye of a cataract by the same operation. By *fig. 3*, the left eye of Mary Nieve is delineated. She was affected in both eyes with lenticular cataracts, of which she was perfectly cured in this eye by three operations in the space of five months, and in the other the cure was nearly completed when the author died. The pupil is somewhat dilated with the belladonna, to shew how considerable a portion of the anterior lamella of the capsule he thought it expedient to leave *in the lenticular cataract*, for the purpose of supporting the lens in its natural situation during the process of its solution. The aperture made in the other capsule was precisely like the one which is here represented, and the Editor designedly selected the patients whose eyes are represented by *fig. 2, 3*; because, the central aperture in these being smaller than usual, they more distinctly illustrate his last operation. Nieve's was the only case in which the Author made the capsu-

lar aperture in the form which is represented by *fig. 3*. In every other instance it approached to the figure either of an oval or a circle, and he endeavoured to limit its extent to the natural size of the pupil. In the eye which *fig. 4*, represents, more of the anterior lamella of the capsule was undesignedly destroyed than he considered to be safe: barely enough was left to embrace and fix the lens. This event having happened in his third operation, he did not again operate on that eye, knowing that a very slight pressure of the instrument would cause the lens to revolve, and pass into the anterior chamber. He therefore left it to be slowly dissolved, for the solution of a hard lens can only be hastened by occasionally opening its texture. She had been above eight months in the Infirmary when Mr. Saunders died, at which time the appearance of the lens is represented in *fig. 4*. All that is seen posterior to the pupil, is the remains of the unabsorbed lens: its surface is irregular, and a dark spot above and below marks at each place a breach through it, by which she saw double with one eye. The solution

went on very gradually, and after a few months more the pupil became perfectly clear, and she read with facility a very small print. The cure of the other eye (*fig. 5.*) had been attempted by another surgeon, but the essential point in the operation, the central aperture in the capsule, had been neglected. Under a slight dilatation of the pupil several apertures are seen in its circumference, but its centre is blocked with the remains of an opake capsule. *Fig. 6.* is added to shew the effect of making too large an aperture in the anterior lamella of the capsule. Wheatley, admitted into the Infirmary in 1810, was dismissed with a free aperture in the capsule, and a lens partially dissolved, so as to leave a segment of the pupil clear. The eye was perfectly free from inflammation, and his vision was very useful; but as the solution went on, the large nucleus lost its support, and dropped into the anterior chamber, as it is represented. From that moment inflammation was excited, and has been kept up in different degrees for more than twelve months, by which the process of solution



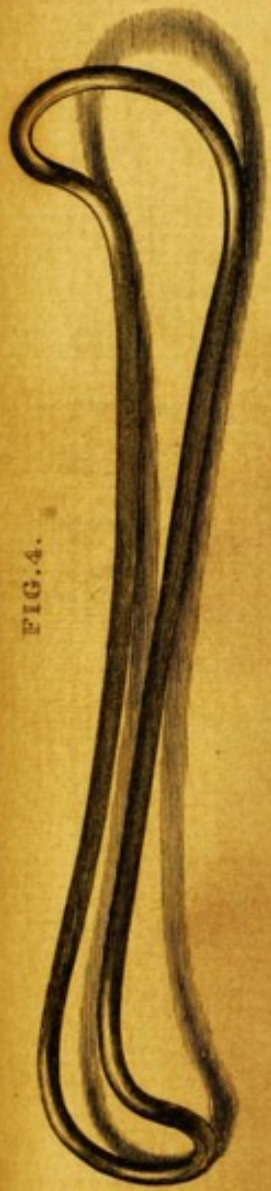


FIG. 4.



FIG. 3.



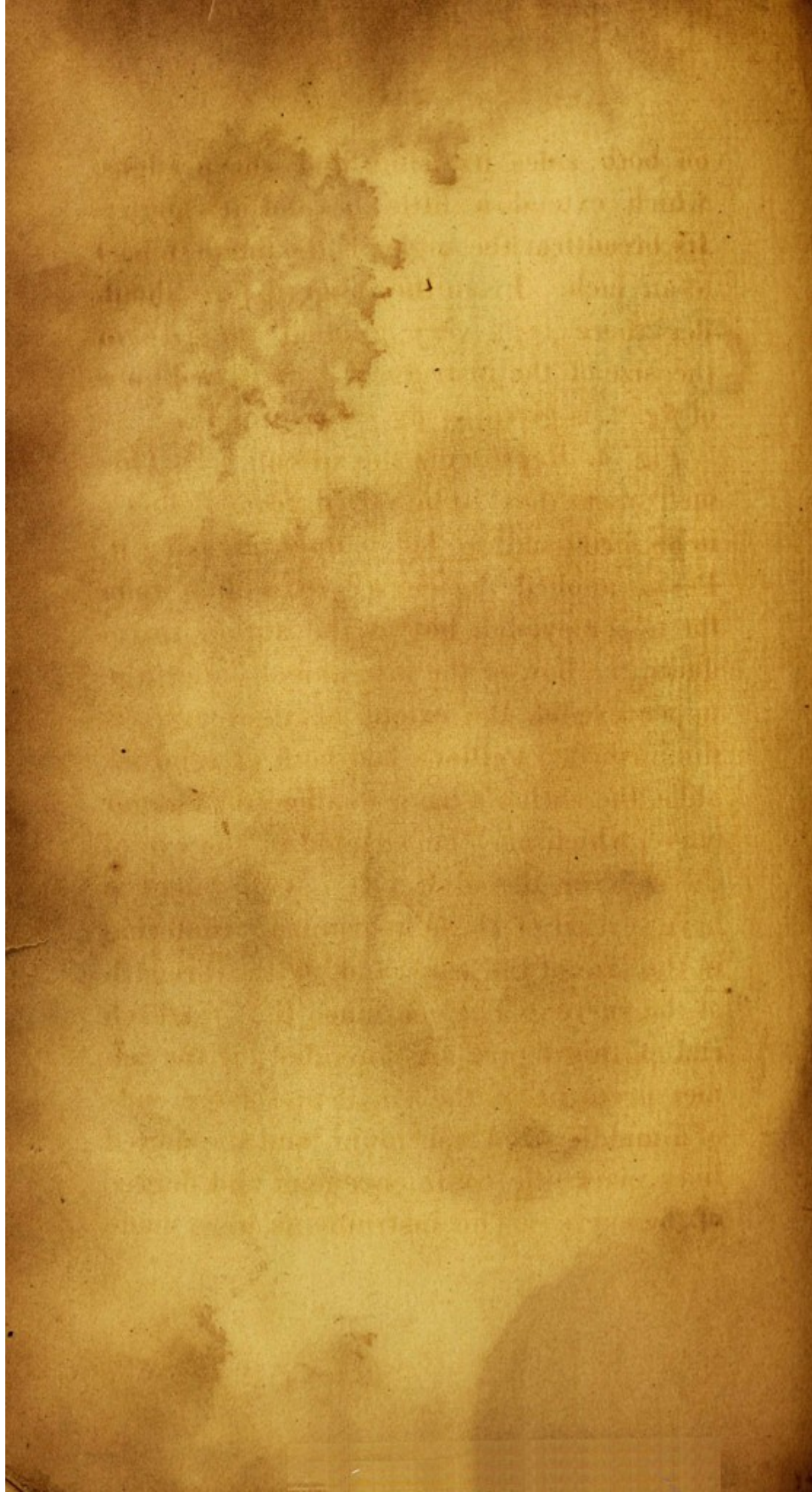
FIG. 2.



FIG. 1.



H. Anderson & Co.



on both sides its point very sharp edges, which extend a little beyond its angles. Its breadth at the angles is the thirtieth part of an inch. From the point to the shoulder there is a very gradual increase in the size of the instrument. A lateral view of *fig. 2*, is given by *fig. 3*.

Fig. 4. Represents the speculum. This instrument has been varied from Pellier's in its form, and in the manner of using it. Pellier applied the curved extremity upon the upper eye-lid; but as the author introduced the bow of the instrument under the upper eye-lid, the extent of the curve is diminished. Pellier's had both extremities alike, the author's has a smaller and a larger curve, which may be adapted to the eye of the child or the adult. It is convenient to have several of these instruments, differing in the size of the wire, and in the breadth of the curve. The continued lines of each end of this figure are intended for the ad-measurement of the small and large ends of a middle sized speculum, and the dotted lines mark the commencement and degree of the curve. The instruments were made

by Mr. William Smith, of St. Saviour's Church Yard, who was always employed by the author for that purpose, and is the instrument-maker to the Infirmary.

FINIS.

THE
ANATOMY
OF
THE HUMAN EAR,

ILLUSTRATED BY A
SERIES OF ENGRAVINGS,

OF THE NATURAL SIZE;

WITH A TREATISE ON
THE DISEASES OF THAT ORGAN,

THE CAUSES OF DEAFNESS,

AND

THEIR PROPER TREATMENT.

BY THE LATE

JOHN CUNNINGHAM SAUNDERS,

DEMONSTRATOR OF PRACTICAL ANATOMY AT ST. THOMAS'S
HOSPITAL, FOUNDER AND SURGEON OF THE LONDON
INFIRMARY FOR CURING DISEASES OF THE EYE.

FIRST AMERICAN FROM THE SECOND LONDON EDITION.

WITH NOTES AND ADDITIONS BY

WM. PRICE, M. D.

ONE OF THE SURGEONS TO THE PENNSYLVANIA HOSPITAL, &c.

PHILADELPHIA:

PUBLISHED BY BENJAMIN WARNER, AND SOLD ALSO AT HIS
STORES IN RICHMOND, VA. AND LOUISVILLE, KEN.

AND BY
W. P. BASON, CHARLESTON, S. C.

1821.

FRANKISH, PRINTER.

THE ANATOMY

DISEASES

THE HUMAN BODY

THE ANATOMY
AND
DISEASES
OF
THE HUMAN EAR.

T. ESTLEY COOPER, Esq. F. R. S.

The dedication of this book to you
induces at once my gratitude and my
ambition. I send myself of this opportu-
nity to acknowledge the many obligations
which your kindness and humane attention
have conferred on me. With pleasure I
render this tribute to your friendship.
In seeking the authority of your name, I
have consulted the means of enhancing my
own reputation. Who can more properly
patronize a work on the War, than one who
has signified himself by the elucidation of
its details. — He so well appreciates the
merits which it may possess, or shield its
defects against the severity of criticism —
The world is acquainted with your profes-
sional abilities, and respects your opinion.
Your enthusiasm and unremitting labors
tend to cultivate the department of history,
are displayed in the works which you have

TO ASTLEY COOPER, Esq. F. R. S.

SIR,

The dedication of this book to you indulges at once my gratitude and my ambition. I avail myself of this opportunity to acknowledge the many obligations which your kindness and uniform attention have conferred on me. With pleasure I render this tribute to your friendship.

In seeking the authority of your name, I have consulted the means of enhancing my own reputation. Who can more properly patronize a work on the Ear, than one who has signalized himself by the elucidation of its diseases?—Who so well appreciate the merits which it may possess, or shield its defects against the severity of criticism?—The world is acquainted with your professional abilities, and respects your opinion. Your enthusiasm and unremitting endeavours to cultivate the department of Surgery, are displayed in the works which you have

already given to the public; and it is confidently predicted that your talent for observation, quickened by an ardent desire to improve the science, will contribute fresh accessions to our knowledge, and add lustre to the profession.

But it is not merely by your own labours, great as they are, that you benefit society. Placed as a principal teacher in the first medical school in Great Britain, you impart a portion of your energy to your pupils, many of whom will be excited by the influence of your example to professional exertions not unworthy of the place where they received their education.

I am, Sir,

With respect and attachment,

Your most obedient Servant,

J. C. SAUNDERS.

Ely Place, March 12, 1806.

ADVERTISEMENT
TO THE
AMERICAN EDITION.

SINCE the publication of Mr. Saunders' work on the Ear, medical literature has been enriched by a valuable treatise on the same subject by Mr. Curtis, a pupil, and the most distinguished successor, of Mr. Saunders, in the treatment of diseases of that organ.—Various other essays, and cases of a similar character having since appeared in the British Journals,¹ it has been the object of the Editor to embody in the present edition of Mr. Saunders, all the valuable information to be derived from these sources, so as to render the work as complete a Monograph on the Diseases of the Ear, as the present state of Surgery will admit of.

Philadelphia, Nov. 20th, 1821.

ADVERTISEMENT.

THE very high estimation in which this work is held by the Medical World, and by the Anatomical Student in particular, has induced the present publishers to bring forward a new edition in an octavo volume, that its usefulness may become more general from the portableness and the convenience of its form, as well as on account of the reduced price at which it can be disposed. Another consideration has had much weight in determining its size, that of making it uniform with Mr. Saunders's work on the Eye; both of which it is presumed will long remain examples of the deep researches of a mind, whose wonderful penetration left no subject undeveloped to which he applied its powers, and which gained for its possessor a fame in the annals of science, which will only cease to exist when science itself shall fail to benefit mankind.

ANATOMY
OF
THE HUMAN EAR.

CHAPTER I.

A Description of the External Part of the Ear, viz. the Auricle and the Meatus Externus.

THE HUMAN EAR, of which I propose to treat in the following anatomical description, is an organ of the most curious and exquisite structure, composed of many parts, all elaborately formed for the reception, transmission, and perception of sound. The complexity and minuteness of many of its constituent parts render it a very difficult subject for description. It will, therefore, be expedient, in order to

increase the perspicuity of the explanation, to adopt a division that shall be easy, natural, and consistent.

The analysis of the human Ear, shews, that it is composed of three parts, evidently constructed for different purposes. The external part is constructed relatively to the medium by which the sense of sound is excited, and its configuration is well adapted to collect the pulses of the air, and to direct them inwardly towards the seat of hearing. The internal part is the seat of hearing itself, and consists of a number of cavities, that contain a membranous texture, on which the sentient extremities of the auditory nerves are expanded. The middle part is a beautiful piece of machinery, connected with the external and internal parts, and designed to transmit the impulses of the air to the auditory nerves.

The terms external, middle, and internal, here employed to denote the three divisions of the Ear, express nothing more than their position. They have been adopted, defective as they are, since lan-

guage does not afford any terms more comprehensive, whether we would derive them from the uses of each division, or the different parts which it comprehends. But the inadequacy of the terms cannot impair the propriety of the division. It is in fact the division of Nature, and results from the different functions, severally performed by the different parts.

The external part has obtained in common language, the appellation of the Ear, a word full as often used to express the whole organ. To avoid the confusion of applying the same general term to the whole as to one of its parts, I shall, in this treatise, call it the Auricle.

The Auricle is placed by the side of the head, and joined by its root to the Os Temporis: The margin of that side, which is turned from the head, is considerably elevated, and the general concavity within the margin is, by the rise of the surface, subdivided into certain curvilinear grooves, all of which tend towards a canal, formed

in the root of the Auricle, the Meatus Externus.

The Concha, the deepest and largest depression of the Auricle, is situated at the entrance of the Meatus Externus. The boundaries of the Concha are formed by four eminencies, viz. the Tragus, Helix, Antihelix, and Antitragus. The Tragus and Helix bound it before, the Antihelix and Antitragus behind.

The Tragus is placed immediately behind the Condyle of the lower jaw. It rises into a little knob, and lies on the fore-part of the Meatus Externus.

The Helix arises from the Concha, which it partially divides into a superior and inferior depression. It advances from its origin a little before the Tragus, is soon reflected in the form of a curve, and in its descent gradually becoming less distinct, is lost in a soft pendulous substance, the Lobe.

The Antihelix lies within, and opposite

to the Helix, and is formed with a similar curve. Above, it consists of two ridges, which unite, and the eminence, formed by their union, is continuous below with a little projection, called the Antitragus, from its possessing a situation directly opposite to the Tragus.

A considerable groove is formed between the Helix and Antihelix, which increases in depth, as it approaches the Concha, where it terminates. Another groove, formed between the two ridges of the Antihelix, joins the former just before its termination in the Concha.

These are the most remarkable appearances of this side of the Auricle. The opposite side possesses little that requires particular attention. It may be said to be convex, but in the general convexity the projections of the Concha, Helix, and Antihelix, are readily distinguishable.

The Auricle is composed of an elastic cartilage, and the common integuments. Its figure is chiefly derived from the carti-

lage, in which the eminences and depressions, already mentioned, are fashioned, except the lower part of the Helix and the Lobe. These are nothing more than duplicatures of skin, containing a portion of fat.

The root of the Auricle is disposed in the form of a tube, but it is to be observed, that the cartilage itself does not complete the circle. This is effected by the junction of the Tragus to the Helix, by a ligamentous fascia, and the common integuments.

This tubular part of the Auricle is united to a tubular part of the Os Temporis, and they form by their union the Meatus Externus, a canal leading to the interior parts of the Ear. The length of this canal varies in different subjects from an inch and a quarter to an inch and a half, and its area gradually diminishes as it approaches its termination. Its shape is rather elliptical than cylindrical, its direction inwards, with a slight declination. It is not rectilineal but winding. It is first turned upwards, then downwards, and is again slightly bent

near its termination. Its lower part is longer than the upper, for it terminates, as it were, by an oblique section, which is closed by the Membrana Tympani, in such a manner, that the Membrana Tympani makes an obtuse angle with the canal above, an acute angle below.

The common integuments, having covered the cartilage of the Auricle, enter the Meatus Externus, and having reached the bony portion of this canal, become extremely thin. They form a lining for the Meatus, and terminate in a pouch, that is placed in contact with the exterior surface of the Membrana Tympani.

The skin of the Auricle, and that of the Meatus Externus, are both perforated with numerous small holes, the orifices of sebaceous follicles in the former, in the latter of the ceruminous ducts.

The Ceruminous Glands themselves are placed exteriorly to the Cutis of the Meatus Externus, in the interstices of a reticular membrane. They are about the size of

Millet seed, approach to a spherical or elliptical form, and are tinged of a slight yellow by the Cerumen which they contain. Each little gland sends a small duct, that opens in the Meatus Externus, and discharges the Cerumen, which is there found, and answers the purpose of keeping the Membrana Tympani moist.

The Auricle is retained in its situation by the ligamentous connexion of the cartilage with the bone of the Meatus Externus, and by a strong ligament, that passes from an acute point of the Helix to the Zygomatic process of the Os Temporis.

The description just given, is taken from the Adult Ear. In the Fœtal Ear, the parts of which are less completely formed, the Meatus Externus is almost entirely cartilaginous and membranous. Instead of a process of the Os Temporis forming a considerable part of the Meatus Externus, nothing more is discovered in the Fœtus than a slender piece of bone of an elliptical figure, but not making a complete ring. It contains the Membrana Tympani, and

adheres to the rest of the Os Temporis only by its extremities. The space between the Tragus and this ring of bone, is occupied by a very dense membrane, that seems placed there as a kind of bed, in which bone is afterwards deposited. As ossification extends, the different parts of the Os Temporis are consolidated. Indeed soon after birth, the Fœtal ring is united to the rest of the bone, and is gradually elongated during the progress of growth, until it occupies the place of the membranous substance just mentioned.

It has already been said, that the Meatus Externus terminates obliquely, and that its lower part is longer than the upper. A little groove, making three-fourths of an Ellipse, is formed in its extremity. It contains the Membrana Tympani.

The Membrana Tympani is the partition between the external and middle part of the Ear, and is so called from its closing the orifice of a cavity named the Tympanum.

CHAPTER II.

A Description of the Middle Part of the Ear, viz. of the Tympanum, of the Machinery contained in the Tympanum, and of certain Parts annexed to each.

THE Tympanum is the cavity that lies immediately at the bottom of the Meatus Externus. It is formed between the squamous and petrous portions of the Os Temporis. Its figure, although irregular, approximates to the spherical.

The regularity of the bony superficies, in which the Tympanum is placed, is interrupted by numerous little pits, spiculæ, and foramina. The depth of the Tympanum is not equal in all directions. Its greatest depth is opposite to the aperture of the Vestibule, the least to the apex of the Cochlea. The former scarcely exceeds

three lines, the latter is hardly two. The length and of breadth the Tympanum are nearly equal, each measuring about the third of an inch.

The Mastoid cells are placed behind the Tympanum. They are large and numerous, freely communicate with each other, and open by a large aperture in its posterior and superior part. They may be considered as a part of the Tympanum, for the communication is perfectly free, and they are both lined with a delicate and vascular membrane, that secretes a fluid to moisten the internal surface, at the same time that it answers the purpose of a periosteum to the bony superficies.

In the anterior and lower part of the Tympanum is placed the aperture of the Eustachian Tube. The Eustachian Tube proceeds from the Tympanum, passing obliquely forwards and inwards by the side of the internal Ala of the pterygoid process of the Os Sphenoides, and opens in the superior and lateral part of the Pharynx above the velum Palati Mollis. The Eu-

stachian Tubes reach their termination in the Pharynx, with so great a degree of convergency, that if they were produced, they would meet each other at the back of the Vomer.

The Eustachian Tube is composed of bone and cartilage. The bony portion is lined with the same membrane as the Tympanum; the cartilaginous with a reflection of the membrane of the Pharynx, which is blended so intimately with the former, that no line of distinction is perceptible.

The bony portion is an elongation of the Tympanum, and ends in a scabrous extremity, that receives the cartilage. The cartilaginous portion, as it is called, is not entirely composed of cartilage. It consists on the fore part of a dense membranous substance, which, together with the cartilage, affords a surface for the origin of two muscles, the Levator Palati Mollis and Circumflexus Palati.

The two portions united, constitute a

tube about an inch and an half, or an inch and three quarters in length, of an elliptical figure, the major axis of which is vertical. The magnitude of this tube varies much in different places. Its orifice in the Tympanum is about two lines in its major axis. Hence it gradually lessens, until it does not exceed one. This magnitude it preserves for a short space, but at the junction of the bony portion to the cartilaginous, it suddenly enlarges, and continues to increase, until it terminates in the Pharynx; where it opens by an orifice, large enough to admit a goose quill.

Besides the apertures already mentioned, viz. the aperture of the Mastoid cells, and that of the Eustachian Tube, two others present themselves in the interior superficies of the Tympanum. These are the aperture of the Vestibule, and the aperture of the Cochlea; the former called the Fenestra ovata, the latter the Fenestra rotunda.

The Fenestra ovata is placed in the upper part of the internal superficies of the

Tympanum, in an oblique direction, but parallel with the plane of the Membrana Tympani. It is not perfectly elliptical. Its upper part is the segment of an ellipse, the lower a straight line, connecting the extremities of the segment. It exactly resembles the base of the Stapes, a bone, hereafter to be described, which shuts it up, and therefore in the recent state, this aperture is not to be discovered unless the Stapes be displaced.

The Fenestra rotunda is lower than the Fenestra ovata, and nearer the Mastoid process. This aperture is also shut in the recent state, by a membrane of an oval figure, similar to the Membrana Tympani, and like that, convex internally. It is placed someway within the Fenestra rotunda, and is not discoverable without dissection, even in the Foetal Ear, in which the bone is less evolved.

The Tympanum is separated from the Meatus Externus by the intervention of the Membrana Tympani.

The Membrana Tympani is pellucid and of an elliptical figure. Its major axis is placed neither vertically nor horizontally, but obliquely. It is fixed in the elliptical groove, at the termination of the Meatus Externus, except in the posterior and superior part, where the groove is deficient. There it is attached to a rough surface of the bone.

From what has been already said of the oblique termination of the Meatus Externus, it must be evident that the Membrana Tympani is very much inclined, and that its superior and posterior part is not so far distant from the orifice of the Meatus as the inferior and anterior. It is a thin pellicle of membrane, strengthened without by the cuticle of the Meatus Externus, and within by the lining of the Tympanum. Although always in a certain state of tension, yet it is not a plane: on the contrary, it is very convex towards the Tympanum, and the convexity is of a conical figure, the apex of which is in the centre. To this the Manubrium of the Malleus is attached.

The Membrana Tympani is exceedingly vascular. Numerous little vessels descend along the Manubrium of the Malleus, from which diverging twigs proceed. These form beautiful and intricate inosculation with a plexus of vessels ranged in the margin of the membrane.

The Tympanum contains four little bones, articulated with each other, and forming a chain of communication between the Membrana Tympani, and the Membrane of the internal part of the Ear, in which the sense of hearing is seated. They are the Malleus, Incus, Os Orbiculare, and Stapes.

The first of these is the Malleus, which may be divided for the purpose of description into three portions, namely, the Manubrium, the Head, and Processus Gracilis.

The Manubrium adheres to the Membrana Tympani. It is incurvated, particularly at its extremity, which reaches the centre of the Membrana Tympani, and draws it into its convex state.

The Head is joined to the Manubrium by a slender portion of the bone, which some have called the neck. It makes a considerable angle with the Manubrium, and its direction is obliquely upwards and backwards. It is of a globular form, but on one side the surface is irregular, to fit it for a firm articulation with the Incus.

The Processus Gracilis passes off just between the Head and Manubrium, with which it makes almost a right angle. It is articulated in a particular groove of the Os Temporis, and is fixed by a ligamentous substance, which has been described by anatomists as a muscle. It turns in this groove, and is, in a word, a pivot, on which the motions of the Malleus are performed.

The second bone is the Incus. It may be divided into the body and two crura.

In the body of the bone is the irregular articular surface, by which it is so firmly connected with the Malleus, as to be almost immoveable.

The two Crura are of unequal lengths: The shorter Crus is thicker than the other, and is placed almost horizontally. It articulates in a little depression near the aperture of the Mastoid cells. The ligaments, which retain it in this articulation, allow a considerable degree of motion.

The longer Crus descends from the body of the bone, is more slender than the other, and bent at its extremity towards the Stapes, with which it articulates by the intervention of the Os Orbiculare. Its direction in the Tympanum is parallel with the Manubrium of the Malleus, and consequently with the Membrana Tympani.

The third bone, the Os Orbiculare, is very small, hardly as big as a Millet seed. Although named the Os Orbiculare, its figure is oval. It may be considered as an inter-articular bone, between the Incus and Stapes, connected with both, but more firmly with the former, to which it generally adheres, when the bones are separated.

The fourth bone is the Stapes. It consists of a base and two Crura, that coalesce to form the head, which is of an oval figure. To this the Os Orbiculare is attached.

The two Crura are bent, and that which is nearest to the Mastoid process is more incurvated than the other. They are grooved on the inside, and a Membrane occupying the area of the Stapes is fixed in the grooves.

The base of the Stapes exactly fits the Fenestra Ovata, which it closes. It is kept in this opening by the membranous lining of the Tympanum, and the membrane of the Vestibule, but enjoys a certain degree of motion. The Stapes passes from the extremity of the Incus to the Fenestra Ovata, in an oblique direction, so that the base is a little higher than its head, and the sides are between the vertical and horizontal line.

These bones are articulated with each other by capsular ligaments, of a degree of tenuity proportioned to their minuteness,

They are covered with a fine vascular membrane, from which numerous little vessels proceed, that penetrate their substance. They are the nutritious vessels of the bones, and the membrane may be considered as their Periosteum.

The mechanism of these bones is regulated by the action of two muscles, the Tensor Membranæ Tympani and the Musculus Stapedeus.

The Tensor Membranæ Tympani is contained in a small bony canal, parallel with the Eustachian Tube, from the cartilage of which its fibres are derived. These fibres are collected into a long round muscle, that passes through this canal and enters the Tympanum by a slender round tendon. The tendon issuing through a small aperture, at an obtuse angle to the line of the muscle, is gently deflected towards the Manubrium of the Malleus, and is inserted into its upper part.

The action of this muscle retracts the tendon into the aperture of the bony canal.

By this the Manubrium of the Malleus is drawn inwards, and the Membrana Tympani, which is attached to it, put upon the stretch.

A similar effect is produced on the membrane of the Vestibule by the contraction of the Musculus Stapedeus, the fleshy belly of which is contained in a canal of bone contiguous to the Stylo-mastoid canal. It sends a small round tendon through an aperture of the bone, which is directed obliquely upwards to the head of the Stapes, into which it is inserted.

What remains to be described of the middle part of the Ear is the little nerve of the Tympanum, well known by the name of the Chorda Tympani. As the Portio Dura of the Auditory nerve passes through the Stylomastoid canal between the Tympanum and Mastoid process, it detaches a small branch through a particular canal, which opens in the back of the Tympanum, near the groove, that contains the Membrana Tympani.

The Chorda Tympani traverses the Tympanum, lying between the Manubrium of the Malleus and longer Crus of the Incus, and enters another little canal nearly opposite to the former. It then continues its course forwards and downwards between the Pterygoid Muscles, and joins the Lingual branch of the Inferior Maxillary nerve. This extremity of the Chorda Tympani is larger than that which is joined to the Portio Dura, whence some have considered it as a branch of the Lingual nerve. It is, in a word, a nerve of communication, equally belongs to both, and is connected with the trunk of each at an acute angle.

CHAPTER III.

A description of the Internal Part of the Ear, which contains the expansion of the Auditory Nerve, and may therefore be considered the Seat of Hearing.

THE Internal part of the Ear, which I am now about to describe, has, on account of the intricacy of the canals and cavities which compose it been generally denominated the Labyrinth. It comprehends the Vestibule, semicircular canals, and the Cochlea, which are incased in the Petrous portion of the Os Temporis.

The Vestibule is the central cavity, and communicates both with the semicircular canals and the Cochlea; the latter lying in the extreme point of the Petrous portion of the Os Temporis, the former towards the Mastoid cells. The shape of the Vestibule is irregularly spherical. However,

on examination, when it is properly laid open, two distinct depressions are observable, one semi-elliptical, and situated above, the other hemispherical, and situated below. Both are opposite to the Meatus Internus, a canal soon to be described, and the bony partition is thin and perforated with numerous small holes to transmit fibres of the Auditory Nerve.

In the prepared bone, the Vestibule is open towards the Tympanum, but as we have already seen, the Fenestra Ovata is, in the recent state, closed by the base of the Stapes. Six other apertures present themselves in the Vestibule, five of which belong to the semi-circular canals, and the sixth is the beginning of one of the Scalæ of the Cochlea.

The semicircular canals, although universally so called, are all larger than semi-circles. They make at least three-fourths of a circle. Their calibre is small, about the size of a common pin, and of an elliptical figure. The smallest part of each canal is about the middle of its curve. They

enlarge as they enter the Vestibule, but one extremity of each canal is particularly dilated, and is called Ampulla.

The semicircular canals are three, and are distinguished from each other by names given them from their position or direction. I shall call them the Vertical, the Oblique, and the Horizontal.

The Vertical canal describes its curve in the summit of the Petrous portion of the Os Temporis, and crosses it with its convex side above.

The Oblique, on the contrary, describes its curve in the occipital side of the Os Temporis, and its convexity is placed below.

The Horizontal canal is bent with its convexity towards the Mastoid process, and is directly above a portion of the Stylo-mastoid canal.

The three semicircular canals enter the Vestibule only by five apertures, for the

smaller extremity of the Vertical canal joins the smaller extremity of the Oblique, and their orifice is common.

The Cochlea has received its name from its resemblance to the shell of a common snail. The resemblance is merely external, and is only discernible in the Cochlea of the Fœtus during the first months; for as ossification advances, the bony substance of the Cochlea is blended with the rest of the Petrous portion of the Os Temporis. However, the proper substance of the Cochlea may be discovered even in the adult, by its greater brittleness and yellow colour.

The Cochlea is constructed with a Modiolus or central pillar, on which a Spiral Tube is wound, and a spiral Lamina wound on the same Modiolus, lying within the Spiral Tube and dividing it into two. Its figure is conical, and position oblique. It is placed in the anterior part of the Petrous portion of the Os Temporis, contiguous to the canal that lodges the internal Carotid

Artery, with its base towards the Meatus Internus and the apex, which is lower than the base, towards the Tympanum.

To facilitate the description of the Cochlea, it will be advisable separately to consider the three parts which form it, that is to say, the Modiolis, the Spiral Tube, and Spiral Lamina.

The Modiolus commences from the bottom of the Meatus Internus by a concave plate, perforated with numerous Foramina, the extremities of small bony tubes that freely communicate with one another, and run from the base towards the apex.

The Modiolus itself consists of these little bony tubes, blended into a mass of a conical figure. The interior fasciculi of tubes are the shortest, and they lengthen towards the centre, in which the longest and largest, which reaches the apex of the Cochlea, is placed. They terminate on the sides of the Modiolus at different distances. At their terminations they bend at right angles towards the Spiral Tube, and their orifices

describe about the Modiolus, a spiral tract, corresponding with the tube in direction. In proportion as they terminate the Modiolus diminishes, and its apex is exceedingly slender.

The Spiral Tube is wound on the Modiolus, and adheres to its sides. As it runs towards the apex, the curve which it makes is constantly diminishing. It makes two turns and a half from the base to the apex, and gradually decreases in its capacity.

The Spiral Lamina arises from the Vestibule, and winds round the Modiolus within the Spiral Tube. Its greatest breadth is at its origin, whence it gradually becomes narrower, as it approaches the apex of the Cochlea. Two thin plates of bone compose it, and appear to unite at their margin, from which a membranous substance, which is reflected on each side, proceeds.

The Spiral Lamina with the aid of this Membrane, makes a complete septum, and divides the Spiral Tube into two canals, one of which is called the Scala Tympani,

from its having an aspect towards the Tympanum, the other the Scala Vestibuli, from its arising in the Vestibule.

The Scala Tympani is nearest the base of the Cochlea, and begins from the Fenestra Rotunda, but is prevented from communicating with the Tympanum by the Membrane which closes this aperture.

The Scala Vestibuli begins by an oval orifice between the Fenestra Ovata and the Ampulla of the Vertical canal.

The two Scalæ run parallel with each other, but have no communication except at the apex of the Cochlea.

When the Cochlea is cut obliquely from the base to the apex at a proper distance from the Modiolus, the section exhibits the appearance of three successive compartments, each containing a portion of the septum of the Scalæ. The half turn of the septum occupies the last compartment, and as it joins the extremity of the Spiral Tube, a

little hole is left. This is the hole by which the Scalæ communicate.

To obtain a view of this aperture of communication, it is necessary to preserve the membranous part of the septum, for the Spiral Lamina itself does not reach the extremity of the Spiral Tube. This may be ascertained by examination of the macerated Cochlea, in which, when a similar section is made, the extreme point of the Spiral Lamina may be perceived just rising into the last compartment and perfectly detached; but in the recent state, the Membrane, which goes off from the Spiral Lamina to complete the septum, passes also from its point to the extremity of the Spiral tube, where it is so attached, as to leave the little hole already mentioned.

In the occipital side of the Os Temporis, contiguous to the Vestibule and Cochlea, is the canal through which the Auditory Nerve passes. It is named Meatus Internus, is oval, and about the third of an inch in length. The extremity towards the

labyrinth is closed except at the upper part, where a small foramen, which is the beginning of the Stylo-mastoid canal, appears.

Immediately below this foramen, two cribriform plates are placed, the upper opposite to a portion of the semi-elliptical cavity of the Vestibule, the lower to the hemispherical.

A little lower, and separated by a slight ridge, a cribriform sulcus is continued to a round concave cribriform plate, the base of the Modiolus of the Cochlea.

The Vestibule, semicircular Canals, and the Cochlea, are lined with a delicate Periosteum. They contain also a membranous texture, formed into sacs and tubes, and filled with a transparent fluid, similar to the aqueous humour of the Eye.

The membranous sacs and tubes are smaller than the osseous cavities which contain them, but exactly correspond in shape. They adhere very slightly to the

Periosteum of the osseous cavities by an exceedingly fine cellular membrane.

The Vestibule contains two membranous sacs, one seated in the hemispherical depression, the other in the semi-elliptical. I shall call them by the names of the depressions, in which they are lodged.

The semi-elliptical sac is larger than the hemispherical, and is that in which the membranous semicircular canals and Scala Vestibuli centre. Although the cavities of these sacs are distinct, the sacs themselves cannot be separated, because their sides are in contact with each other, adhere, and are too delicate to admit of division by dissection.

The membranous semicircular canals exactly resemble the osseous tubes in which they are placed, and, therefore, require no farther description. They open in the semi-elliptical sac.

The Membranous Tubes of the Cochlea correspond with the Scalæ. One arises

from the semi-elliptical sac of the Vestibule, the other from the membrane of the Fenestra Rotunda, to which it adheres. They communicate, as the two Scalæ do, in the apex of the Cochlea.

The fluid contained in the cavities of these membranes is secreted by their interior surface, in the same manner as the Liquor Pericardii is secreted by the Pericardium. A considerable degree of vascularity seems the necessary consequence of their secretory functions. The vessels which supply them, pass from the Periosteum in a serpentine direction, and so far are easily discovered; but when dispersed on the peculiar structure of the Membranes, they are too minute to admit the red globules of the blood.

The Membranous Texture, just described, is destined to receive the ultimate distribution of the Auditory nerve or Portio Mollis of the seventh pair. It arises from the Tuberculum Annulare in the Ventricle of the Cerebellum, and the Crus Cerebelli. As it turns round the Medulla Oblongata, it is

joined by the Portio Dura, which it partially receives in a species of groove, and both enter the Meatus Internus, being connected by a fine cellular membrane.

The Portio Dura quits the Portio Mollis at the bottom of the Meatus Internus, and continues its course through the Stylo-mastoid canal, and is no otherwise connected with the Organ of Hearing, than as it receives the Chorda Tympani.

The Portio Mollis consists of two Fasciculi nearly of equal size, one of which supplies the Vestibule and semicircular canals, the other the Cochlea.

The nerve of the Vestibule and semicircular canals subdivides into three branches after forming a gangliform swelling. The largest branch sends its fibrils through the cribriform plate opposite to the semi-elliptical sac of the Vestibule. They pass in a distinct plexus upon the Sac, and are lost in a pulpy substance, which vanishes in the Ampulla of the Vertical and Horizontal membranous canals.

The second branch passing through the inferior cribriform plate is dispersed in a similar substance on the Hemispherical sac.

The last branch also passes through a small cribriform plate, and is lost on the Ampulla of the Oblique membranous canal.

The Fasciculus of the Cochlea is twisted, an appearance which arises from the mode in which its fibres enter the Modiolus. As they pass through its substance, they form plexuses through the communicating holes of the bony tubes. Some of the fibres issue from the Modiolus through the Foraminula of the Spiral Lamina, but the greater number and the largest issue through the Foraminula, between the Spiral Lamina, and the junction of the Spiral tube to the Modiolus.

As the nerve detaches its fibres along the spiral tract of the Foraminula, it lessens towards the apex, as the Modiolus itself does, but its central filament passes straight through the central foramen of the Modi-

olus, and ramifies on the half turn of the Spiral Lamina.

The fibrillæ of the nerve may be distinctly seen as they enter the Scalæ of the Cochlea, making a distinct plexus on the Spiral Lamina in the edge of which a perfect network is formed. This network appears to be continued in a semi-pellucid pulpy substance, which goes from the edge of the spiral Lamina on the membranes of the Scalæ, and is said to resemble the Retina; but a structure, so minute and intricate as this, must for ever elude perfect investigation.

CHAPTER IV.

On the Diseases of the Ear.

THE causes of Loss or Imperfection of Hearing are very numerous, as may easily be conceived by those who have contemplated the complexity of the Ear. They are involved in the greatest obscurity, and I am fully sensible that all which I shall offer on this subject is to be considered only in the light of an Essay.

Few attempts have hitherto been made by Anatomists to investigate the morbid changes to which the Ear is liable. On this head we are almost destitute of information, at a period when by their labours the diseases of the other Organs of the body have been ascertained, and the symptoms which accompany them recorded. But our Ignorance will soon cease to be

the cause of astonishment, if we reflect on the obstacles which oppose our inquiries. These are almost insuperable. Nature has placed the greater part of the Ear in a situation absolutely beyond the reach of examination in the living body, and as its diseases are rarely, if ever, mortal, morbid Ears are seldom dissected in the dead. Such observations as are related have mostly been made on subjects that have casually fallen into the hands of the Dissector, and the history of the cases is unknown.

But it would not suffice if Anatomy were able to develop every morbid alteration of structure of which this Organ is susceptible. A great object would indeed be gained, but a greater would still remain unaccomplished. Before the mind of the practitioner can be directed to any determinate object; a history of symptoms must be annexed to each specific change, and these symptoms must be sufficiently distinct. This demands a multitude of dissections and a series of attentive observations. A clear and distinct recital of symptoms is rarely obtained from the deaf.

They are conscious of their infirmity, but very few are impressed with a notion that Hearing may be impaired by a variety of causes. The approach of Deafness is insidious and often unattended with pain. Few strong impressions are made on the mind of the patient, and he loses his faculty of hearing so imperceptibly, that in general his friends sooner discover his misfortune than himself.

Here then the labour and the difficulty commence; but the field is open. Anatomists have, to the present day, avoided this subject, some doubtless convinced of the impracticability, and others disgusted at the difficulty of the enquiry. As Anatomists have neglected the investigation of these diseases, so practitioners have either abandoned such patients to Quacks, or consigned them to the care of Providence.

But although I admit the difficulty in all instances, and in many our total inability to obtain an adequate knowledge, yet I must differ from those who think that such cases should be abandoned. I am convinced that

the subject may be very much elucidated, if many individuals, having great opportunities of examining dead bodies, and animated with proper zeal in the inquiry, would employ some portion of their time in the dissection of such diseased Ears as chance may subject to their inspection. By this proceeding many facts respecting defects or diseased changes of structure in the Ear may soon be obtained. In many instances, where a previous acquaintance with the patient affords the opportunity, the attendant symptoms may be ascertained. Thus the observer, combining in one view the cause and effect, may be capable in many instances of inventing means of relief.

But it must be admitted that such perfect researches into the cause and seat of the diseases of the Ear, however they may enlarge our knowledge, will not in an equal degree augment our ability to remedy them. The maladies of the interior parts of the Ear constitute a very numerous class, amounting at least to one third of the causes of deafness. As these are seated in

the Labyrinth, a part of the Ear inaccessible in the living subject, operative Surgery is excluded from all chance of relieving them.

The impossibility of curing the defects of the Internal part of the Ear by manual operations is therefore manifest, but it by no means follows that such cases are irremediable. Many morbid changes of the vital organs of the body, equally inscrutable as the Ear, in the living subject, are, when we know the symptoms indicating their existence, successfully treated by the operation of internal remedies; and I have no doubt that deafness in various instances depends on morbid changes which are curable by the general treatment of the constitution. I trust I shall be able to prove, in the course of the following pages, that the assemblage of symptoms which practitioners, for want of a more appropriate term, have conspired to call Nervous Deafness, not only admits of relief, but may be completely cured in the incipient state.

These preliminary observations have been

made purposely to display to the reader the difficulty of treating successfully many of the diseases of the Ear, and not with a view to discourage him from the attempt. I know the character of the profession too well to suppose that its members can be deterred by difficulties, or that there are not many who would think no time mis-spent, that is employed in endeavours to heal the infirmities of the species.

I have necessarily exhibited the dark side of the picture, as my intention in making these reflections has been directed to the most abstruse and inscrutable diseases of the organ. The prospect will brighten as we enter more into the detail. We shall then find that some are very simple, and attended with too little difficulty in practice, to be introduced in the general outline.

Of those too which occupy the more complicated parts, all are not equally unknown and remediless. Mr. Cooper has proposed and executed the happy and successful expedient of perforating the Membrana Tym-

pani, in that species of deafness which an obstructed Eustachian Tube produces.

It has been my humble endeavour to investigate another disease of the Tympanum, the puriform discharge, to ascertain its origin and progressive stages, and to point out a proper mode of treatment.

OF THE DISEASES OF THE MEATUS EXTERNUS.

THE diseases which attack the Meatus Externus are the most simple to which the Ear is liable. They admit of examination by inspection and the touch, and are therefore generally well understood.

The Meatus Externus is subject to inflammation. An inflammation of this part in consequence of the hard and unyielding materials which compose it, is accompanied with the most acute pain, and a great degree of general excitement. Its cure should

be attempted by resolution. It is enough to say that the most active antiphlogistic plan is necessary to accomplish this intention.

When the means employed to reduce the inflammation have not succeeded, and matter has formed, it is generally evacuated, as far as I have observed, between the Auricle and Mastoid process, or into the Meatus. If it has been evacuated into the Meatus, the opening is most commonly small, and the spongy granulations, squeezed through a small aperture, assume the appearance of a Polypus. Sometimes the small aperture by which the matter is evacuated, is in this manner even closed and the patient suffers the inconvenience of frequent returns of pain from the retention of the discharge. When the parts have fallen into this state, it will be expedient to hasten the cure by making an incision into the sinus between the Auricle and Mastoid process.

It occasionally happens that the bone itself dies, in consequence of the sinus

being neglected, or the original extent of the suppuration. The exfoliating parts are the Meatus Externus of the Os Temporis, or the external lamina of the Mastoid process.

A short time ago I was consulted by a patient, according to whose account, and as far as I could judge from the examination of parts that were healed, the whole Meatus Externus must have exfoliated; and I saw a child a few weeks ago, in whom the outer part of the Mastoid process was in a state of exfoliation.

The Meatus Externus and Auricle are sometimes affected with an herpetic ulcerous eruption. It always produces a great thickening of the integuments, and the passage is often so much closed that a great degree of deafness ensues. The ichor which exudes from the pores of the ulcerated surface, inspissates in the Meatus, and not only obstructs the entrance of sound, but is accompanied with a great degree of foetor. This disease is not unfrequent. I have never seen it resist the effect of alter-

ative medicines, and the use of the applications employed in the following cases.

CASE I.

Miss S. F. applied for a complaint in her Ear, that had for many months greatly diminished the power of hearing. It proved on examination to be an Herpetic ulceration of the Meatus Externus and Auricle. The orifice of the Meatus was almost closed. With difficulty I introduced the nozzle of a syringe, and brought out a considerable quantity of inspissated discharge. The oozing of the ichor was very great.

She was perfectly cured at the end of two months by taking two grains of Calomel every day; and the injection of a lotion of Hydrargyrus Muriatus cum Aqua Calcis, and the application of the Unguentum Hydrargyri Nitrati.

CASE II.

Mr. R. W. applied with similar symptoms, only in an inferior degree. He had

laboured under the complaint above a twelvemonth. His defect of hearing during this time had varied greatly, according, as I suppose, to the degree of thickening in the parts, or the inspissation of the discharge.

He was cured by a similar treatment in the course of three weeks.

Miss C. N. A similar case. The disease had existed in different degrees of force for several months.

She was cured at the end of a month by the exhibition of Calomel, and the injection of a solution of Argentum Nitratum.

The lining of the Meatus Externus, like that of the nostrils, is capable of producing excrescences. They are generally termed Polypi. Such as have fallen under my inspection more nearly resemble syphilitic warts, and appear to be produced in a similar manner, viz. by irritation. I have never observed these excrescences in the Meatus Externus, when the Tympanum is

sound. But a purulent discharge from the Tympanum is complicated with the formation of Funguses and Polypi, as will be seen in the proper place. However, I do not mean to deny the existence of these excrescences when the other parts of the organ are sound. I am certain they are very rare, but when they do arise, are easily treated. They should be extracted with Forceps, and the part from which they are torn, touched with caustic, introduced with proper caution, that it may not extend to the Membrana Tympani.

The passage of the Meatus Externus has occasionally been obstructed by an unnatural septum, originating from an elongation or diseased growth of the Cutis. As we have been informed, this was the state of the Meatus in a case where the Membrana Tympani was perfect, and Hearing was restored by a laceration of the partition. Vide Mons. Maunoir's communication in the Medical Journal for 1800.

I believe these cases are rare, unless the Tympanum be diseased, but are not unfre-

quent after a suppuration and puriform discharge. The following is an instance of its having formed after a puriform discharge.

I. Hallam applied at the Dispensary for a very considerable and sudden increase of a deafness, with which he had been many years afflicted. The deafness had originally been produced by a suppuration of the Tympanum, and he recollected, that during the discharge, air had occasionally passed through the Meatus in the act of blowing his nose. The discharge had ceased to flow outwardly, and he was no longer capable of forcing air through the Meatus. He now spoke of a particular sensation, similar to what people experience when they inflate the Tympanum. By placing the patient in the light of the sun, I perceived a septum, which I pierced and lacerated, after which the patient could perceive at nine inches, the tick of a watch, which he was before obliged to place in contact with his Ear. Some difficulty arose to prevent the reunion of parts. It was at last accomplished, and the patient's hearing improved to the

degree in which it is usually possessed by those who have lost the Membrana Tympani.

But the most common impediment to hearing, that depends on the state of the Meatus Externus, arises from the inspissation of the Cerumen. The quantity which may be collected without impairing the power of hearing, cannot easily be determined. In many persons the quantity is naturally considerable. But unless its proper consistence be altered, the functions of the passage are not much injured, whereas a small portion of hard Cerumen, lodged on the Membrana Tympani, will deprive a person of his hearing.

The symptoms, which are attached to the inspissation of the Cerumen, are pretty well known. The patient, besides his inability to hear, complains of noises, particularly a clash or confused sound in mastication, and of heavy sounds like the ponderous strokes of a hammer.

The practitioner is led by the relation of

such symptoms to suspect the existence of wax; but he may reduce it to a certainty by examination.

Any means capable of removing the inspissated wax, may be adopted, but syringing the Meatus with warm water is the most speedy and effectual, and the only means necessary. As the organ is sound, the patient is instantaneously restored by its removal. A little pleasant distress arises from the violent excitement produced in the Ear, as soon as it is acted upon in this state of accumulated sensibility, by its accustomed stimulus; "but this soon ceases, without leaving any unpleasant effect. This disease, however simple, has been often mistaken or overlooked and the cause supposed to lie deep in the structure of the organ, whilst in fact, it arose merely from the source above pointed out; which shows the necessity, in all cases of deafness, of ascertaining, by an accurate examination, whether such a mechanical cause does exist."

"From its situation the external passage is subject to occasional accidents, or other me-

chanical causes than inspissated Cerumen acting upon it."

"Thus, in cases of children, small bodies as peas, cherry-stones, pins, &c. have got into the Ear, where, exciting inflammation, they often occasion considerable pain before they are removed. A number of remarkable cases of such accidents will be found related by authors, and one in particular, related by Wildanus, where a bead or ball of glass lodged in the passage and produced delirium."

"The great art in extracting them, is to be cautious not to push them deeper; they are best taken out with a pair of small forceps; and a little oil may be dropped into the ear before making the attempt."

"In the same way, insects at times get into the Ear, which produce the most unpleasant feeling in the part, as well as great noise, and often actual pain; the best way of removing them is to drown them, by filling the passage with mild fluids, as water or oil, by means of a syringe, and thus washing them

out. Acrid liquors are improper; for, in the endeavour to avoid them, the insect gets deeper. The motion is often so severely felt by children, as to produce a state little short of delirium; after the removal, a little oil of sweet almonds is the best application, to soothe the irritated part. Even a little oil, in the first instance, will destroy the insect."

OF THE DISEASES OF THE TYMPANUM.

THE first disease of the middle part of the Ear, which I shall endeavour to investigate, is the puriform discharge from the Tympanum. The discharge is ichorous, sometimes tinged with blood, and imparts a yellow colour to a silver instrument. This disease is attended with a loss of hearing proportionate to the injury which the machinery of the Tympanum has sustained, and the sense is variously impaired from the slightest degree up to total deafness.

In general, when the patient blows strongly with the nose and mouth closed, air will be expelled at the Meatus Externus. Whenever this circumstance is observed, it is clear that the discharge proceeds from, or is connected with an injury or destruction of the Membrana Tympani. But the reverse by no means proves that the Membrana Tympani is sound, and the discharge therefore confined to the Meatus. It often occurs that the same inflammation, which terminates in a suppuration of the Tympanum, previously obliterates the Eustachian Tube, which remains permanently closed after the cessation of the inflammation which occasioned it. I have ascertained this fact by dissection, and I possess a preparation taken from a subject in whom a puriform discharge from the Tympanum had ceased. In this person half the membrana Tympani had been destroyed, but the remnant had healed, and the Eustachian Tube was impervious.

Although air cannot be made to issue at the Meatus Externus, we are not therefore

authorized to draw the conclusion that the *Membrana Tympani* is sound. It probably is so, but it must be ascertained by actual examination. The Ear must be inspected in a strong light. For this purpose the patient should be set in such a position that the rays of the Sun may fall into the Meatus, and illuminate it sufficiently to make the bottom visible; or the Ear may be sounded with a blunt probe, and any person acquainted with the particular feel of the *Membrana Tympani*, may easily distinguish it by the touch. If the membrane be defective, the instrument will pass into the Tympanum, the bony superficies of which is still more readily distinguishable.

He therefore, who will institute a proper examination, cannot fail of arriving at a certain knowledge of this disease, and will not confound it with the Herpetic ulcerous state of the Meatus Externus. In the latter, success is certain, and as soon as the ulceration is cured, hearing is perfectly restored: in the former, however perfectly the discharge may be suppressed, the event is very dubious. It is therefore a point on which

a practitioner, who wishes to determine *a priore* what benefit can be rendered in any given case, cannot be indifferent.

This state of the Tympanum is produced by various causes. In the Scarlatina Maligna, inflammation of the Tympanum attacks the patient, and advances to Gangrene. If he survives the fever, the machinery of the Tympanum often sloughs so extensively, that the membrana Tympani and whole chain of bones is evacuated, and the patient is perfectly deaf.

Most commonly this disease succeeds the Ear-ache, which is in fact an acute inflammation of the Tympanum. If the inflammation should not subside spontaneously, or be assuaged by art, the Tympanum and Mastoid cells form a large quantity of pus. After the patient has suffered the most intense pain, the Membrana Tympani ulcerates, and the pus is discharged at once in a large quantity. He is then greatly relieved, but the disease ceases not, the parts supply fresh matter, which continually oozes at the Meatus.

The symptoms produced by inflammation of the Tympanum, are most intense pain in the Ear and Head, a great degree of symptomatic fever, and sometimes slight delirium. The pain fluctuates, and its paroxysms resemble the Tooth-ache. This resemblance has unfortunately caused it to be wholly neglected, or very improperly treated. The case obviously requires the most active antiphlogistic treatment, and the absence of every thing stimulative. But the opposite system prevails. The most acrid applications and spirituous liquors are the general means employed for the relief of the patient, an error that unquestionably tends to produce the worst catastrophe which can happen, viz: the suppuration of the parts.

What part the practitioner ought to take on the attack of this inflammation, is quite manifest. If he should be consulted sufficiently early, it will most probably be in his power to stop the inflammation. Then all the symptoms subside. The deafness, which is very great during the paroxysm, will

gradually lessen, as the deposited lymph, its necessary effect, is absorbed.

Not always, however, will the patient recover his perfect hearing, even when the inflammation has terminated in resolution. But as I am now speaking from observation on cases abandoned to the natural process, I am incapable of deciding how far proper treatment immediately subsequent to the paroxysm can obviate the defect which the inflammatory state has left. Few will doubt the efficacy of such remedies as promote absorption. If in parts which are visible, we have ascertained that large quantities of lymph are absorbed before the completion of its organization, what reason have we to doubt that the same thing is accomplished in parts similarly affected which are not visible? We cannot resist the conclusion, that the Deafness which remains after an inflammation of the Tympanum is not an inevitable consequence, but arises from neglect, and allowing the deposited lymph to become organized; and if the lining of the Tympanum remain permanently thickened, or organized adhesions be

formed about the chain of bones, a certain defect must be the result.

But let it be admitted, that the Tympanum has suppurated. Ought the Membrana Tympani to be abandoned to a casual ulceration, or is it better to open it by art? I am inclined to prefer the latter; and if I could be assured by any symptom that suppuration has taken place, I should not hesitate to make a small perforation of the Membrana Tympani, and to repeat it, if necessary, taking at the same time every precaution to suppress the fresh collection of matter.

If this mode of treatment were followed, it would be practicable to evacuate the matter, and cure the complaint with trifling injury to the Membrana Tympani, which is generally sacrificed in a spontaneous discharge.

Most frequently the establishment of this disease is slower and more insidious. Slight paroxysms of pain attack the patient, and

are relieved by slight discharges. These recur at intervals, until at last the puriform discharge is fully confirmed.

Some practitioners are disposed to regard this as a trivial disease, others as one too dangerous to allow the interference of art. Both are in an error. It is without doubt a disease, destructive in its tendency to the faculty of hearing. It rarely stops until it has so much disorganized the Tympanum and its contents as to occasion total deafness. On this account, it demands the most judicious attempts to arrest its progress, and these attempts are free from danger. How the contrary opinion should have prevailed, is unaccountable; yet many modern practitioners condemn all attempts to cure it. But what argument can be adduced against the cure of this disease, that is not equally conclusive against all others. Is any one an abettor of the obsolete Humoral Pathology? He will contend that the stoppage of a drain which nature has established is pernicious, and the morbid matter will be determined on the internal parts; but how can such a person venture

on the treatment of any disease, even the healing of a common ulcer. Some years ago I thought this absurd doctrine had been totally exploded, and yet I constantly hear it adduced to deter patients from interfering with this disease. Is a child the subject of it? The parent is told, it is best to leave it to nature, and the child will outgrow it. Is it an adult? Some other subterfuge equally futile is employed. The truth is, the disease is always tedious and difficult, and not always curable, and many are disinclined to embarrass themselves with the case, who have not candour to make the true statement. Thus patients are induced to refrain from all attempts, until the disease, in its first stages often curable, becomes absolutely impracticable.

The celebrated Heberden, in his commentaries on the causes of diseases and their cure, says “*Frequens puerorum vitium est, interdum quoque adutorum, in quo Humor mali odoris post aures exit, unde tument auriculæ et loca vicina et cuticula in furfures decedit. Quod si humor acrior fuerit cutis altius exulcera-*

“ tur. *Auris autem intus malo simili inter-*
 “ *dum afficitur, ex quo æger fit surdaster.*
 “ *Medicamenta exsiccantia nocent vertendo*
 “ *humorem in partes interiores.* Nulla alia
 “ curatione opus est, nisi ut loca affecta
 “ sæpe abluentur aqua tepida, et ut pannus
 “ unguento aliquo leni delibutus inter-
 “ ponatur, ne partes vel sibi invicem ag-
 “ glutinentur, vel hæreant vestibus.” It is
 evident, that the writer applies this obser-
 vation principally to that cutaneous affec-
 tion of the auricle to which new-born in-
 fants and very young children are subject,
 a trivial complaint, almost unworthy of a
 place in so grave a book. But when he
 says, “ *Auris autem intus malo simili in-*
 “ *terdum afficitur, ex quo æger fit sur-*
 “ *daster,*” it is equally clear, that he al-
 ludes to discharges from the Meatus Ex-
 ternus. Now I contend, that discharges,
 capable of making the patient deaf, must
 originate from the Herpetic ulceration of the
 Meatus Externus, or a suppuration of the
 Tympanum. In the former, healing me-
 dicines. “ *medicamenta exsiccantia,*” are the
 only medicines which ought to be employed,
 and I have ample proof that these applica-

tions will cure the disease, and not translate it to the internal parts. In the latter, the parts affected are too essential to perfect hearing to be neglected, and I shall prove by the event of cases, that these may be healed without detriment to the constitution.

But the impropriety of attempting the cure of this disease is not only inculcated in books; many eminent practitioners are tinctured with the same notion. A short time ago I was consulted for a case of puriform discharge in a young lady, who, having heard frequent observations from a practitioner of the old school on the translation of morbid humours, was dubious as to the safety of suppressing it. The case was referred to one of the first surgeons and anatomists in this metropolis, who decided against all attempts. And truly for what reason? For fear of injuring the Brain! The brain can only be injured by the exposure and ulceration of the Dura Mater, and the application of substances capable of destroying the bone and Dura Mater can only be an act of madness or

the grossest ignorance. But injury of the brain is more likely to result from the continuance of this disease, than the judicious interference of art. For the puriform discharge naturally advances to ulceration, and ulceration to denudation and caries of the bone and separation of the chain of bones. A caries of the Tympanum is therefore ultimately produced. But this will destroy the bone, and expose the Dura Mater; and if it were not for that principle, by which membranes that line cavities thicken as the neighbouring parts are ulcerating, and thus preserve their integrity, the brain would perhaps always suffer in the ultimate stage of the puriform discharge from the Tympanum.*

* The following cases from Dr. Duncan Junior's "Contributions to Morbid Anatomy," contained in the 68th No. of the Edinburgh Medical and Surgical Journal, illustrate very happily the above opinions; the brain having become affected in both instances by the continuance of the disease, without the use of remedial measures.

"D. S. ætat. 19, was admitted on the 31st August, 1820, into Queensberry-House, complaining of intense headache, tenderness of abdomen, and great prostration of strength, pulse 60. These were treated with blisters and purgatives,

But the fact is, the puriform discharge from the Tympanum often exists without

but suffered no abatement, and terminated fatally on the morning of the 5th of September.—On dissection, a considerable portion of the small intestines were found to be inflamed, which accounted for the pain referred to that region. In other respects the abdominal and thoracic cavities and cerebrum were sound. Nearly all the right lobe of the cerebellum was occupied by an abscess containing about $\bar{3}$ ij. of thick pus. No traces were found either of the membranes or bones of the Tympanum; its cavity was filled with pus, and a bunch of little red bags containing fluid, and adhering by a stalk to the side.—There was a cylindrical absorption of bone in the petrous portion of the Temporal bone, which was softer than usual, extending from the transverse sinus across to near the Cochlea.—His sister informed, that two years ago his right ear was pulled. Ever since he has had severe headache and deafness of that side, occasionally there was a thick yellow discharge from that ear, and then he enjoyed better health; latterly his judgment became impaired.

J. A. ætat. 21, admitted into Queensberry Fever Hospital, 14th November, 1820. When between six and seven years of age, his right ear began to discharge thick yellow pus, in consequence, it was thought of cold, and has continued to run ever since, with occasional intermissions of weeks or months. His health has been generally good and not affected by the state of the discharge, which sometimes changed from thick and yellow to a thin and watery fluid; occasionally a little blood was observed to flow. Five weeks ago he complained of violent shooting pains in the affected ear; this led to the use of poultices and tepid injections. The pain

a caries of the bone, and antecedently to this is most commonly curable. I have so

soon remitted, but the jaw of that side quickly became affected, as his friends thought with rheumatism. When the pain of his ear remitted some blood flowed, and the purulent discharge became much increased in quantity. His complaints for nearly three weeks continued to be the fixed pain of the jaw, together with great constipation of his bowels, having had but one stool in twelve days, notwithstanding purgatives.—About ten days ago, after being exposed to cold, he suddenly complained of intense headache; his head was bent forwards upon his knees; he lost his voice; in about seven hours the pain went off, and his voice returned. After this he complained of oppression only, but, as his father expressed it, was not himself again. Two days after this last attack, he was brought into the Hospital. His complaints were obstinate constipation, slight headache, pain of back and body, stiffness and slight curvature of neck backwards, also delirium of a mild kind. Purgatives, venesection, and antispasmodics were freely used; frictions and stimulants were applied to the spine, but all in vain. Bowels were freely opened, but his other complaints increased. His neck was obstinately drawn back; his delirium became violent, sighing almost incessantly, and upon the fifth day from admission he died.

Dissection —In the thorax and abdominal cavities were found lb. iv. of bloody extravasated fluid, with effusion of serum below the peritoneal coat of the bladder. The first turn of the duodenum contained about lbss. of dark coloured fluid. At this part, both externally and internally the coats of the intestines were thick and black. The pericardium contained about \bar{z} ij. of serum. The posterior mediastinum was

frequently observed this disease, that I have no hesitation in saying, that there are three stages of it:

much infarcted with black blood.—The spinal marrow from the medulla oblongata to the second or third dorsal vertebra was softer than usual. The meningeal linings from this place downwards were much distended, and on slitting them freely open $\frac{3}{4}$ ij. of pus gushed out. This had dissected and separated to some distance the fibres of the cauda equina. The base of the brain presented an astonishing appearance of disease. All the nerves at their origin were encircled with pus; a part of the right anterior lobe was discoloured, opposite to the dura mater, which was absorbed: a large abscess was found in this lobe, containing thin pus, and portions of cortical substance; the lateral, third, and fourth ventricles all contained pus. The petrous portion of the temporal bone was filled with pus.

Mr. Swan, of Lincoln, in the same number of the Edinburgh Journal, after relating a very interesting case of purulent discharge from the Tympanum of the Ear, in which astringent injections appeared to be the principle exciting cause of a very alarming vertiginous affection, but which terminated favourably; makes the following important remarks. “Whenever a purulent discharge from the ear is attended with much complaint of the head, suspicions ought always to be entertained that the dura mater is irritated in consequence; and on any increase of the headache, effectual measures should be taken to arrest the progress of the mischief by bleeding, and a strict antiphlogistic regimen. In such cases we ought not to wait until there are decided symptoms of inflammation of the brain or its membranes, because then, as cases on regard

First, a simple puriform discharge.

Secondly, a puriform discharge, complicated with Funguses and Polypi.

show, suppuration, extending some way on the base of the organ can hardly ever be prevented; but the remedies I have mentioned ought to be used immediately on the increase of pain in the head and ear.

To those who have not much considered the case, these symptoms may not seem to require such active treatment; but if both the patient and practitioner's fears are suffered to be lulled into security for many hours after their approach by palliatives, the disease will have made such progress as probably to resist the employment of every thing that can be done. I consider, therefore, that when there is a discharge from the ear, and the head is complained of, all that ought to be done is an attention to the general health, and an attempt by counter-irritation, as blisters behind the ears or on the back of the neck, to remove the disease from the ear. The Meatus ought not to be stopped up with cotton or any other substance to prevent the free escape of the matter, as I am convinced, that when the discharge is great, such a practice is very wrong, and probably not only adds to the irritation by its confinement, but may lead nature to attempt some other outlet, and thus cause an absorption of the bone, and consequent exposure of the dura mater. And, upon the whole, I think that on no account, in the case where the discharge is accompanied by pain in the head, ought astringent injections to be used to put a stop to the discharge, as, when it has been stopped, by a perseverance in this mode of treatment, the brain has always appeared to suffer, and the consequences have been fatal."

Thirdly, a puriform discharge with a caries of the Tympanum.

The time necessary to accomplish the transition from one stage to another is uncertain. Years do not effect it in some instances, and in others it seems to advance almost at once to a carious state of the bone.

The puriform discharge from the Tympanum is a local disease, and does not depend on any vice of the constitution. General remedies are therefore very inefficacious. But as a bad state of health is unfavourable to the healing of any parts, so in this particular complaint, any disordered state of the system should be corrected. The chief dependence is to be placed on direct applications to the parts affected.

Blisters and setons have been recommended by some, with a view to effect a derivation of the humour. If they are beneficial, this explanation of their mode of action is not grounded on just reasoning. Some time ago I was averse to their use.

But I now think they may be advantageously employed in aid of topical applications. They never can be injurious, but if indiscriminately adopted, the patient will often suffer the pain and inconvenience which they occasion, without reaping any benefit.

As it has been stated that the degree of deafness produced by this complaint is various; so when it is cured, the sense is restored in different degrees. For the deafness during its continuance is sometimes very considerable when the real injury which the organ has sustained is trivial. In the first stage the mere thickening of parts, or the collection of the discharge, must impede the action of the intervening machinery between the external and internal parts of the Ear; and in the second, the mechanical obstruction of the Funguses or Polypi excludes the pulses of the air. On this account there is often a notable increase of the power of hearing, when the discharge is suppressed in the first and second stage. But as the parts are invisible, it is difficult, if not impracticable, to decide

a priore how far the power of hearing can be restored. Now this is no valid objection to undertaking the cure. The sense will not be rendered worse by a failure, and if the discharge should be stopped, the disease, which caused it, is removed, the organ safe from farther injury, and the patient freed from an offensive malady. This argument is conclusive in favour of treating all stages of the disease, but in the last, the sense is almost, if not totally, destroyed; and although the discharge be stopped, the patient's hearing will be very little, if at all improved.

In having stated above that the sense of hearing is often greatly improved by a cessation of the discharge, it must be understood that I confine the observation to cases of the first and second stage, in which a great part of the machinery of the Tympanum still remains. In the third stage, the chain of bones is nearly destroyed, and the pus seems in a certain degree to transmit sounds. I have two or three patients at present, who are in the habit of syringing their Ears. They can distinctly

perceive light sounds whilst the injected fluid remains, but, on its escape, again become deaf.

These are examples of caries, and although desirable in many respects to stop the discharge, I am inclined to think that in this stage hearing would not be improved. It would more probably be diminished; as the fluid discharge is I think, a medium by which the pulses of the air affect the seat of the nerve.

It must be admitted, that the event of these cases is not always gratifying to the practitioner. Often, when he has done his utmost, no great degree of hearing is acquired; nor can the discharge always be suppressed. But this is chiefly attributable to the error committed in allowing the disease to become confirmed. From the success which has attended the cure of many very old cases, I have every reason to suppose that those which are recent would be still more successful. From the popular prejudice, encouraged by the reluctance of medical men, few patients apply in the

earlier periods of the disease. They wait until their patience is exhausted, in expectation of a natural cure, and when they do apply, the opportunity is passed.

Nor, according to my observations, are the means which I have seen employed such as are likely to succeed; because the treatment corresponds with some preconception of its nature without any regard to the different stages of the disease. One thinks it a caries of the Tympanum. He has recourse to Tinct. Myrrhæ, and the whole tribe of antiseptics. A second imagines it consists in an ulceration of parts, and treats it with as little delicacy as a common ulcer. A third, hearing that Vinum Opii and Calomel are beneficial in certain diseases of the Eye, employs them here on a forlorn hope.

If a person acts from the impression that this disease exists only under one form, he will, consistently with this opinion, employ one general remedy; but although that remedy should not be improper, he cannot often succeed. The different stages of the

disease require very different practice. He only can be successful who will give the greatest attention to individual cases, and vary his means agreeably to the state of each.*

When the disease is cured, the healing process is effected by the extension of the

“ * The first stage of the disease” says Mr. Curtis “ will often yield to an injection of the sulphate of zinc, used night and morning, which will frequently effect a cure in the space of three weeks or a month. It is apt, however, to leave a morbid sensibility of the ear, which occasions pain on the entrance of loud sounds. The plumbi superacetate, or sugar of lead, is equally useful as an injection.

In some cases the continuance of these injections has been necessary for a considerable length of time; which it may be proper to state, in order, first, that the patient may not look for a speedy cure; and, secondly, that he may be induced to persevere a reasonable length of time.

In the second stage of the disease, the point is to extract the fungus or polypus, with a pair of small forceps; and, if these excrescences do not come entirely away, to endeavour to pinch the roots till the whole is removed. They may then be touched with the argenti nitratum as before mentioned.

On the removal of the fungus, or polypus, the injection of zinc is to be used; and in a great number of cases the hearing will be restored, and the discharge suppressed.”

Cutis of the Meatus into the Tympanum, and its becoming continuous with its Membranous lining. I have a preparation, a dissection of the Ear, in which half the Membrana Tympani had been destroyed as far as the Manubrium of the Malleus, around which the Cutis of the Meatus had grown, and joined the lining of the Tympanum.

After the cure of this disease, the Tympanum is exposed to the free ingress and egress of the air, and the mucilaginous discharge inspissates as the mucus of the nose by the exhalation of its watery parts. By this accident the patient's deafness increases at intervals, for which he often seeks relief. The practitioner, on sounding the Ear, perceives this hardened matter, and conceiving, as is really the case, that it produces the augmentation of deafness, is tempted to remove it. Nothing stimulative can be safe, nor any rude attempts, for there is great danger of reproducing the discharge. Having learned that a discharge has pre-existed, it will be expedient to leave it to a spontaneous separation.

CASES OF THE FIRST STAGE.

I.

Mrs. S. had been afflicted with a puriform discharge from the Tympanum for five years. On blowing, with the nose and mouth closed, air occasionally issued at the Meatus, as if it escaped at a narrow orifice. The discharge was very great. I could never in this instance render the bottom of the meatus sufficiently visible to ascertain the degree of injury which the Membrana Tympani had sustained. The escape of air was a sufficient demonstration of its imperfect state, a symptom which still continues although she is now quite well. Notwithstanding the length of time, the disease had not advanced beyond the first stage. It yielded in the space of a month to an injection, night and morning, of a solution of Zincum Vitriolatum. The degree of deafness in this instance was trivial, and she hears perfectly, after the lapse of two years and three quarters since the sup-

pression of the discharge, nor does there appear the slightest disposition to a relapse. The only remaining defect is a morbid sensibility, which subjects her to pain when exposed to loud sounds. This, perhaps, arises from the inability of the muscles to regulate the tension of the chain of bones and the remnant of the Membrana Tympani.

II.

Master B. had laboured under a very great degree of deafness, occasioned by a puriform discharge. The membrana Tympani in this instance was injured, as air could be blown out at the Meatus. This case also yielded in two months to the use of a solution of Zincum Vitriolatum, and the patient at present enjoys nearly perfect hearing.

III.

Mr. S. had been afflicted with a puriform discharge from the Tympanum, proved, as in the former instances, by the expulsion of air at the Meatus. The deafness was so great, that the tick of a watch was

scarcely perceptible at the distance of three or four inches. He was cured in three months by a solution of Zincum Vitriolatum, when he was able to distinguish the tick of a watch at rather greater distance than a yard.

IV.

Mary Webb applied at the dispensary, afflicted with a very great degree of deafness. Examining the Ears, I found a great discharge from each, and air passed out at the Meatus. She informed me that it had been caused by the Ear-ache, that one Ear had been attacked nine months before, the other only two. As a certain degree of inflammatory action still remained, I ordered the Ears to be fomented, and gave the patient laxative medicines for a few days. She then commenced the use of a solution of Zincum Vitriolatum, and was cured at the end of seven weeks. One Ear regained its perfect functions, the other was considerably inferior; but even this was capable of distinguishing conversation with readiness.

V.

Mrs. B. applied for the same disease, with symptoms as in the preceding cases. The deafness was very great. After the use of a solution of *Zincum Vitriolatum* for four months, the discharge was stopped, and her hearing almost completely restored.

VI.

Ann Thompson, a child was brought to the dispensary, after a suppuration of the Tympanum in one Ear. The pus had been discharged a few days preceding. I purged the child briskly, and ordered the Ear to be fomented for a few days. I then caused a solution of *Cerussa Acetata* to be injected three times a day. At the end of five weeks the discharge ceased. I could not perceive any difference between this and the sound Ear. But the patient being a child, only six years old, I did not make all the trials I could have wished.

VII.

Mr. T. applied two months after a suppuration of the Tympanum. The deafness

was considerable. Air passed out at the Meatus. He was cured at the end of two months, by an injection of Cerussa Acetata. I ascertained that this Ear was inferior one-fourth to the other.

VIII.

Miss B. applied on account of a puriform discharge from both Ears, which had succeeded frequent attacks of the Ear-ache. One Ear had been diseased a long time, the other only a few months. The Ear last attacked was cured in three weeks, and the power of hearing restored. The other is considerably improved, but the discharge is not yet suppressed, although astringent injections have been used a long time.

CASES OF THE SECOND STAGE.

I.

Mr. G. applied in consequence of deafness. I learned from the history which he gave me, that he had been afflicted for

many years with a puriform discharge, and air had passed out at the Tympanum. At this time it did not pass, and on examination I perceived Funguses at the bottom of the Meatus. I attempted to extract them with a small Forceps, but they would not sustain the pressure. As they bled freely, I destroyed them by pinches. For some days I used a strong solution of Alum. Finding that the Funguses did not reappear under this treatment, I employed the solution of Zincum Vitriolatum, as in the former cases, when the discharge ceased, and the patient's hearing was remarkably improved.

II.

Mr. F. Surgeon, came under my care, being afflicted with two large Polypi, which protruded at the Meatus. He informed me, that long before their appearance he had had a puriform discharge, which was very profuse. Some time before he noticed the Polypi, the deafness had become total. I extracted both with the Forceps; one came out entire, the other was torn, and the root remained. I pinched

and tore the root at the end of twenty-four hours, and forty-eight hours after, when the congealed blood had separated, touched it with the *Argentum Nitratum*. He left me with direction to inject a solution of *Argentum Nitratum*, and under this management the discharge stopped, and hearing was restored.

III.

Mr. H. sought to be relieved from a large Polypus, which came out at the Meatus. It had appeared after a puriform discharge, which had continued during eight years. For a long time air passed out at the Meatus in blowing his nose. This symptom had ceased about the time the excrescence was first observed. The Polypus was extracted and brought out entire. A few days after he was again able to force air out of the Tympanum. He used night and morning an aluminous injection. At the end of three months the discharge has ceased; the part where the Polypus grew is cicatrized, and hearing greatly restored. Still this Ear is much inferior in accuracy of perception to the other. He could not,

at the time of his application, distinguish a single word with this Ear, with which he can now hear a person converse in a moderate tone of voice, at the distance of twelve feet.

IV.

Master B. applied in consequence of a puriform discharge from the Tympanum, which was extremely offensive, and was often mixed with blood. Such was its acrimony, that the auricle and neck were excoriated by it. Air had formerly passed out at the Meatus, as it would even now, in the course of repeated efforts. I examined the Ears, and found Funguses at the bottom of the Meatus. The deafness was so great, that I had no expectation of affording any relief in respect to hearing. However, I undertook the suppression of the discharge. On account of the Funguses, I used the *Argentum Nitratum*. He was of a weak habit, and I therefore administered the *Cinchona* as an auxiliary. He applied three months ago, the discharge is greatly diminished, and his hearing improved in a remarkable degree. He can

hear clearly what is said to him in a moderate tone of voice at the distance of eight or ten feet.

We are justified by the event of these cases in drawing the conclusion, that the first and second stages are both curable, and that the ultimate advantage which hearing derives from the cure of the second, is nearly equal to that of the first. The apparent advantage is much greater. The mechanical obstacle which these excrescences oppose to the entrance of sound nearly deprives the afflicted person of his hearing. The patient is therefore most agreeably surprised at the success attending their extirpation. But in the eye of the practitioner, Polypi and Funguses are only incidental occurrences, and their removal reduces the disease to the first stage. The equality of success cannot therefore excite his astonishment.

Of the Obstruction of the Eustachian Tube.

A very great degree of deafness is produced by an obstruction of the Eustachian Tube. When this has happened, air can no longer be admitted into the cavity of the Tympanum, and either the included portion is absorbed, or else remains. In the latter case, the included air, incapable of yielding in any other way than by condensation, counterbalances the pulses excited by sounding bodies. In the former, the pressure of the atmosphere will carry the Membrana Tympani into the Tympanum as far as it can go, in which state it will rest, and cannot vibrate in any considerable degree. Each hypothesis accounts for the phenomenon. But I am inclined to think, that subsequently to the obliteration of the Eustachian Tube, the included air is absorbed, and the Tympanum filled with Mucous. I have found the cavity in this state in two instances of dissection in which the Eustachian Tube was closed.

The obstruction of the Tube most frequently arises from syphilitic ulcers in the throat, or sloughing in the Cynanche Maligna. The deafness ensues on the healing of the ulcers, that is, when the obstruction is complete. The descent of a nasal Polypus into the Pharynx and enlarged Tonsils have also been known to close the tube.

If the patient blows, with his nose and mouth stopped, he does not experience that peculiar sensation which arises from the inflation of the Tympanum. He speaks only of the loss of the sense, and complains of no particular symptom. The deafness differs in this respect from all other species, in which the patient is harassed with most distressing noises which are false perceptions, arising from a diseased state of the auditory nerves, or proceeding from real impressions on the nerves produced by morbid causes in the organ.

Generally the obstruction comes on in consequence of some notable disease in the

throat, and the cartilaginous extremity is most commonly the seat of it. Yet it occasionally takes place in the bony portion of the Tube. It is then slower in its progress, proceeds from no obvious cause, and consists in an inordinate ossification filling up the canal.

We are destitute of a perfect diagnostic symptom, by which we can be assured when deafness is produced by an obstructed Eustachian Tube. The incapability of inflating the Tympanum only renders it probable. Many people who hear perfectly are incapable of producing this sensation, at least in a great many trials. We are, therefore, compelled to trust to the patient's account. This will be sufficient when the obstruction has been preceded by an ulceration or disease of the throat. Otherwise, the patient's history will not always conduct to the discovery.

The world is indebted to the observation and penetration of Mr. Astley Cooper, for restoring the hearing which this obstruction destroys. He had observed in sup-

purations of the Tympanum, which had injured and even destroyed the Membrana Tympani, that the sense of hearing was only impaired, not totally lost; and that the degree of deafness, when the Membrana Tympani was only injured, by no means equalled that produced by the obstructed tube. Reflecting on this, he was induced to consider that a small puncture of the Membrana Tympani would be of trivial detriment even to a sound Ear, and in this instance would be the means of restoring to the Organ the exercise of its functions. This happy expedient he himself executed with great success, a success fully confirmed by a similar result of the operation in other hands.

The operation is performed by passing an instrument into the Meatus, and pushing it through the anterior and inferior part of the Membrana Tympani. It is unnecessary to state the reason for making the puncture in this place. The position of the Manubrium of the Malleus evidently demands this precaution. A little crack will immediately be perceived similar to what

is occasioned by the puncture of parchment, more particularly if the tube be closed, as the sound will then be more acute, from the rapid entrance of the air through a narrow aperture.

The instrument ought not to penetrate far into the Tympanum, lest it should puncture its vascular lining, as the escape of blood into the cavity would for a short time frustrate the operation, even if it should ultimately be successful.

When the puncture has been successfully made, the patient is instantaneously restored to perfect hearing. The effect of the operation is the immediate substitution of the small hole in the Membrana Tympani for the Eustachian Tube; and the air being admitted into the Tympanum, the mobility of the Membrana Tympani returns, and the action of the machinery of the Tympanum is re-established.

The only obstacle to the complete success of this puncture is its tendency to close. For this reason it is often necessary to

make rather a large hole in the membrane before you can insure the patient against the recurrence of the deafness. But a large hole diminishes the perfection of the sense. Tension is the state essential to the Membrana Tympani. This tension is not diminished by a small perforation. But if the Membrana Tympani be much lacerated or detached at its circumference, the tension will be lessened; yet even then the patient receives a striking benefit. To this imperfection we must however submit, and I am inclined to think a larger opening expedient than what can be made by a simple perforation with the instrument proposed by Mr. Cooper.

It has already been observed, that a perfect diagnostic symptom is a desideratum in this species of deafness. If a deafness be accompanied with noise, it is highly improbable that an obstructed Eustachian Tube is the cause of it. It certainly is not, if the Tympanum can be inflated.

But there are some dubious cases of deafness in which a surgeon would re-

luctantly refrain from taking the chance of this operation. In such he cannot do wrong by piercing the Membrana Tympani. It has been found that its disposition to close is very great, even when the Eustachian Tube is impervious, and this is still greater when the tube is open. It is generally reunited in three or four days, but if the opening should remain fistulous, no injury results from it.

It would be superfluous to introduce the particular cases of success which are related by Mr. Cooper. They may be found in his paper published in the Philosophical Transactions for 1802. But I am authorized by him to say, that Mr. Round, whose case is there mentioned, continues to enjoy the relief he at first experienced.

The following case, which came under my own care, will illustrate what has been advanced respecting the closing of the puncture.

Mr. G. K. had been deaf for thirty years. I could scarcely make him sensible of what

I addressed to him, even when I spoke directly into his Ear, in the loudest tone of voice. The deafness had succeeded the loss of a part of the Palate by Syphilis. I had no doubt from the manner in which he had become deaf, that this was a case of obstructed Eustachian Tube.

I placed him in the sun, and passing a probe to the anterior part of the Membrana Tympani, made a small perforation. A crack immediately ensued, and in the space of a few seconds he heard distinctly the chirping of sparrows on a tree at a great distance. In a word, his hearing was perfectly restored.

In the space of three days his deafness recurred, and at the end of a week I again punctured the Membrana Tympani with the same result. Before the end of a week the deafness again recurred, and at the end of a fortnight, I pierced the Membrana Tympani a third time with equal success.

The opening was now somewhat larger; but the deafness relapsed in a fortnight. I

did nothing for a few weeks. Seeing no amendment, I passed a probe through the Membrana Tympani, and extended the opening to the circumference. He was again restored, but not so perfectly as before. This opening I believe remains perfect at the present time.

ON THE DISEASES OF THE INTERNAL PART OF THE EAR.

THE nature of the deafness which arises from the Diseases of the Internal part of the Ear, is at present completely obscure, from our great ignorance of the morbid changes, which are the immediate cause of the defect. If we reflect on the component parts of the Labyrinth, we cannot refrain from coming to the conclusion, that it originates in a want of sensibility in the nerve, some alteration in the structure of the Membranes on which the nerve is expanded, or change in the properties of that fluid which is contained in the Membranes, and is the immediate agent in impressing the sentient extremities

of the nerve. On the latter head, as we are informed by Mr. Cline, he found in the dissection of the Ear of a person born deaf, that the labyrinth, instead of its aqueous fluid, contained a thick caseous substance. This must have been incapable of undulating in the cavities of the labyrinth, and is fully adequate to account for the total absence of the sense.

That a total deafness may exist without any defect in the mechanism of the exterior parts of the Ear, without any defect in the membranous structure on which the nerve is expanded, in the water which it contains, or in the nerve itself, at least as far as can be traced by the eye, I have myself ascertained by dissection.

The first instance was the Ear of a child, from the Asylum for the deaf and dumb, which died at Guy's Hospital. The disease was such as caused the inspection of the head after death. Mr. Swift, of Oxford, a student at Guy's, cut out for me the Os Temporis. I dissected the Ear with the minutest attention, and could not perceive the slight-

est defect in the structure of the parts. The nerve was apparently perfect, and I think we must admit that the deafness arose from an original want of power in the nerve, caused by a deviation from its natural structure too minute for our means of inspection, or a deficiency of that inscrutable principle on which its functions depend.

The second was a dissection of a man's Ear, who died of a cancer in Guy's Hospital. He was a patient of Mr. Cooper's, and had been deaf for many years. I was equally unable to detect in these ears any organic disease, and as I knew the symptoms were such as are called nervous deafness, I paid the utmost attention to the condition of the labyrinth.

The whole class of the diseases to which the internal part of the Ear is subject may be denominated nervous deafness. In this sense it is a generic term, and signifies every disease the seat of which is in the nerve or parts containing the nerve. But in its general acceptance the term is more specific.

The general character of this class is great changeableness. The symptoms are noises in the head of various kinds, the murmuring of water, the hissing of a boiling tea-kettle, rustling of leaves, blowing of wind, &c. Other patients speak of a beating noise corresponding with the pulse, and increasing by bodily exertion in the same degree as the action of the heart. The cause of this impression is certainly the pulsation of the Arterial system, but I confess myself at a loss to explain what the change is which renders the organ susceptible of this impression. Nor can I at all determine whether the small arteries which ramify in the interior of the labyrinth are the immediate agent, or the internal Carotid, which passes close beneath the Cochlea. Whatever be the cause, the species is distinct, nor is the patient who has this symptom, affected with the various noises mentioned before.

All these confused and harassing sounds are false perceptions in the organ, but they arise less frequently (if I may so say) in the

nerve itself, than from the condition of the parts about the nerve. I formed this conclusion from observations on syphilitic deafness, of which the following is a striking instance, and it evidently depended on some change in the labyrinth.

Mr. B. applied to me, in a case of extreme deafness. He complained of various sounds, as the blowing of wind, rustling of leaves, &c. which were so loud, that he often could with difficulty disbelieve their reality. I examined the Ear, and there was no wax, and on blowing his nose, he inflated the Tympanum. I considered it a case of nervous deafness, and despaired of rendering him any service. But as it was not of long standing, and he laboured under a great heaviness and dejection of countenance, and had a white tongue, I was tempted to try how far the deafness might be relieved by the mitigation of the constitutional disorder. I therefore prescribed. In about three weeks he complained of having a cold and sore throat. I found a syphilitic ulcer. On putting him under a course of mercury, the ulcer

healed in a fortnight. But the patient had taken mercury five weeks before his hearing was much improved. In fine, he recovered his hearing completely, and all the symptoms subsided.

In two or three other cases of syphilitic deafness the symptoms have been precisely the same, and the event a cessation of the symptoms and recovery of hearing.

When I reflected on the event of these cases, I could not but consider that some change had been produced in the structure of parts adjacent to the nerve, and had been the proximate cause of the symptoms, rather than that the nerve itself had been affected. It is the most reasonable inference, as the mercury, which cured it, is more calculated to exhaust than impart energy to the nerves.

Being forcibly struck with the congruity between deafness produced by Syphilis and the concomitant symptoms of nervous deafness, I could not avoid concluding, that although the remote cause be different, the

proximate cause is the same in each. Analogous to this is defective vision, arising from opacity, which may result from common inflammation or specific. In this case the immediate cause is the deposition of Lymph.

The change from the specific cause in either instance is most manageable, because we are furnished with a remedy, which, as soon as its action is produced, arrests the progress of the disease. But as the opacity in a syphilitic ophthalmia is often too far organized to be absorbed, so in syphilitic deafness, when the syphilis is cured, the effect is often irremovable, and the injury to the function of the affected organ permanent. There is a period, therefore, at which syphilitic deafness is irremediable, and this is more remarkably the case with nervous deafness.

Having satisfied myself that the proximate cause of syphilitic and nervous deafness was the same, I was determined to try the success of an analogous treatment in a recent case of nervous deafness. I was soon



furnished with an opportunity of bringing this to the test.

CASES OF INCIPIENT NERVOUS DEAFNESS,

SUCCESSFULLY TREATED.

I.

J. Waiton applied at the dispensary for relief. He had been extremely deaf for two months. The Meatus contained little wax, and he could inflate the Tympanum. He complained of noises in his head, such as I have described above. His deafness was so great, that I could scarcely make him hear what I said. He was a robust man, and plethoric.—I put him on a most rigid diet, and gave active cathartics three times a week. For the first fortnight the doses were Calomel *Gr. viij.* at night, and Natron Vitriolat. *Oz. iss.* in the morning. Blisters were also applied behind the Ears three times successively at intervals of a

week. He continued on this plan for six weeks, the cathartics being regulated according to circumstances. His hearing was now restored, but slight noises still remained. He was much reduced, and I gave him small doses of Calomel every night, and Sarsaparilla twice a day for a fortnight. The noises had now left him, he was put on his usual diet, and took Cinchona. At the end of ten weeks he was perfectly well.

II.

J. Clinch, a lad, applied at the dispensary, afflicted with a very great degree of deafness. The noises in his head were trivial, compared with the other case. He had little wax, and could inflate the Tympanum. He could hear a watch tick at only three inches from his Ear. I applied blisters behind the Ears four times successively, at intervals of a week. He took every night Calomel *Gr. ij.* twice a week a solution of Magnesia Vitriolata. At the end of five weeks he heard a watch tick at the distance of a yard. He was a good deal reduced, and I changed the plan to the Cinchona. He left me at the end of two months, when

he could distinguish the tick of a watch at rather greater distance than a yard.

III.

Wm. Higgins, a boy, applied at the dispensary. He had been very deaf six weeks. He had little wax, could inflate the Tympanum, and had no catarrhal symptoms. He was always complaining to his mother of singing and noise in his Ears. He was treated with three blisters in succession, at intervals of a week; took Calomel *Gr. iss.* every night, and a solution of Magnesia Vitriolata twice a week. He was perfectly cured at the end of five weeks.

IV.

Wm. Bygrave had been deaf for two months with singing and noise in his Ears. The symptoms were the same as in the other instances. His health was in other respects very good. The diminution of hearing was much less than in the other cases, and yielded to the use of two blisters, brisk cathartics, and rigid diet, in a little more than three weeks.

V.

Wm. Harvey applied at the dispensary. He had been exceedingly deaf for six months; otherwise in perfect health. In blowing his nose, air passed into the Tympanum, &c. The noises in his head were perpetual, and harassed him much. He was treated very much in the same manner as the other cases. He experienced but a trifling relief at the end of three weeks. I almost despaired of success, and was principally induced to persevere by his anxiety to be cured. He continued the blisters for two months, gradually growing better in that time, so as to hear a watch tick at about two yards, although when he first applied he was obliged to place it in contact with his Ear.

VI.

J. Kirwan, a lad, applied at the dispensary on account of a deafness of some months. His symptoms were precisely as those mentioned in the former cases. His general health perfect. He was cured on the same plan as the others, in three weeks.

I shall not weary the reader with the recital of any more cases. These are sufficient to establish the point that the incipient state of these symptoms may be relieved, and that a strict antiphlogistic treatment and means of promoting absorption ought to be employed.

Confirmed nervous deafness is, without doubt, hopeless, but I know not *a priori* how to determine, when attempts are vain. This does not altogether depend on the time but the degree of mischief done to the organ, and the periods at which it becomes incurable must be various. The case of longest standing is that of Wm. Harvey. This did not yield until the plan had been carried to an extreme, to which few patients would be inclined to submit. Beyond this time I should think irremediable.

My object is to direct the attention of the practitioner to the commencement of this species of deafness. When early application is made, it behoves him to take the case seriously in hand, for no time is to be lost

and active means in the beginning will often succeed.

It is far from my inclination to excite a hope that old cases of this species of deafness admit of cure. I have never seen or heard of any cured by any plan of treatment whatsoever, and as to the various vaunted remedies with which the public prints are daily teeming, I know them to be absolutely inefficacious, and often prejudicial.

* * * * *

Mr. Curtis divides the Diseases of the Internal Ear into the constitutional and local, or such as influence it from a morbid condition of the brain or other parts of the body, and such as arise from a change in its own particular structure.

“Of all the causes of deafness,” he observes, “that which proceeds from an organic affection of the brain is the most dangerous. In apoplectic cases, with faltering of speech and blindness, we find deafness also produced by the general affection of the head. But worst of all is the case where a tumour of the brain compresses the origin

of the nerves; for here the deafness is complete, and no impression can be conveyed through the organ to the mind."

"A tumour, however, in the vicinity of the organs of hearing, though it runs its course, and proves fatal in the end, has rather a contrary effect: and even while the pupils are dilated, and there is every appearance of pressure on the brain, a morbid acuteness takes place, in consequence of the surrounding inflammation. Indeed, the auditory nerve often becomes acutely sensible in disease, or the patient suffers from acuteness of perception, or has a tinitus aurium, or singing of the ears, analagous to the flashes of light which sometimes affect the eyes in total blindness, and which those experience who are blind of cataract. So morbidly acute does sensation become in some persons under disease, that the least motion of the head will excite a feeling like the ringing of a great bell close to the ear."

"In delirium also, in vertigo, in apoplexy, and in hysteria, the increased sensibility of the organ becomes a painful sensation. In

paralytic affections of the face, we find there is deafness of the corresponding ear, if the affection of the nerve be near the brain; which is explained by the intimate connexion between the auditory nerve and the communicating one of the face. From observing the course of the latter nerve through the temporal bone, and its connexion in the Tympanum, we know why, in violent tooth-ache, and in tic douloureux, we find the Eustachian Tube and the root of the tongue affected."

"The Ear is also sometimes affected by sympathy, from foulness of stomach and bowels; and the same reason may be assigned for the symptom of Hypochondriasis—that they are affected with strange sounds, and in the case of intestinal worms, we find murmuring, and ringing of the Ears a symptom."

"Deafness in acute fever is considered a favourable sign; as it argues, according to the old theory, a metastasis or translation of the morbid matter; or rather, according to modern opinion, it shews a diminution of

morbid sensibility of the brain. The accumulation of blood in the vessels of the brain, or those surrounding the auditory nerve, will also produce deafness, and unusual sensations of the Ear. This we find instanced in suppression of the menses, and in hæmorrhoids, indigestions, &c. in which cases it is found preceded by vertigo and headache."

"In comparing the diseases of the Ear and the Eye, we find a considerable analogy subsisting between them; but in those of the eyes there is one advantage, that the transparency of its humours is a leading mark to direct us, which we do not possess in the case of the Ear; but in judging of the diseases of the Internal Ear, we should always endeavour to determine, whether it is in the seat of sense or in the brain that the real affection lies; otherwise our attempts to relieve will be ineffectual."

"All the forms of nervous deafness may be considered as peculiar modifications of constitutional disease, affecting the nervous system in general, and connected with that

state which constitutes the hypochondriac and hysterical habit. The general morbid disposition is here extended to a particular sense, and by viewing it in this light the change of the constitutional affection must form the basis of the cure. It is by considering it in this just point of view that proper principles of treatment can only be adopted, and that much may be done to remove this species of the complaint. The hysterical spasm of the throat and *primæ viæ* becomes naturally, from the connexion and sympathy of nerves, communicated to those of the Ear, and deafness in most cases is a never failing symptom with hysterical patients. In the same manner that torpor of the stomach and *primæ viæ*, so characteristic of hypochondriasis, occasions a dull sensation and torpor of the auditory nerve, and produces that noise and confused impression so often complained of in hypochondriasis."

"A wide field therefore, opens here for new principles of treatment, by attacking the constitutional cause, and that much relief may be obtained by the administration of

constitutional means, experience daily evinces. It is from not keeping that analogy in view that nervous deafness is so formidable to most Surgeons."

"These cases of nervous deafness, when our Ear only is affected, are in general rendered worse by the conduct of the patients themselves; for when the organ of one side is injured, we hear so much better with the other, that we only attend to the sensation conveyed by it, and neglect the duller sensation. The effect of this is, that the diseased ear becomes worse, and the same consequence arises as that which takes place in the Eyes by squinting."

"In attending to the treatment of nervous deafness, if the practitioner is early applied to, and the disease is still in its first stage, it may be considered in general as curable; and even cases of long-standing, when properly treated, admit of considerable relief."

"A strict antiphlogistic course, if the patient be able to bear it, will often prove suc-

cessful; namely, powerful saline cathartics, of which the best is the vitriolated magnesia: the doses should be repeated as often as the strength of the patient will admit; and in the intermediate time small doses of the submuriate of mercury are to be administered to promote absorption, by taking off any thickening of the parts, which is apt to impede the due performance of the functions of the organ."

"This practice will in incipient cases succeed; and, if not completely, will at least palliate the predominant symptom and in all cases it ought to have a fair trial, for deafness should never *a priori* be considered as incurable."

"With respect to the application of topical remedies to the Ear, gentle stimulants, in form of linament, as a portion of the essential oils mixed with oil of almonds, may be beneficially introduced into the Ear, where, being retained, they will serve as a substitute for the natural secretion, and at the same time increase the sensibility of the passage. All the advertised nostrums are

preparations of this kind; and, so far as they supply the secretion, and gently stimulate the passage, in some cases they may be useful: but as to the notion that they are to remove an organic affection of the part, the various species of which have been described, it only shows the complete ignorance of those who expect success from such inadequate means of relief."

As so little can be done by medicine in confirmed cases of deafness of long standing, arising from imperfect organization of the Ear, Mr. Curtis has with much pains collected a variety of contrivances to assist hearing, many of which he has obtained from the Continent, in order to give all possible relief in such distressing cases.

"The newest inventions of this kind, are the artificial Ears lately introduced from France, where they were originally manufactured. By being closely adapted to the Ear, they increase the collection of sound; but besides that, there is an additional force wanted to transmit it through the passage. In this respect, the French invention is de-

ficient; to remedy its defect Mr. Curtis has added a small tube, which, by contracting the passage, will occasion the sound to enter with greater impetus. This invention is found very convenient, in consequence of the substitutes being applied over the natural Ear, which they are made to resemble.

The Spanish Ears also, made of shells answer very well: but, at the same time, it is worthy of remark, that these mechanical contrivances, although found to be more serviceable than any thing of the kind in general use, yet do not apply with equal success in all cases; and there are, in fact, cases in which no mechanical contrivance can be of use.

With some patients the German Silver Ears answer better than any others; but are objected to by many, on account of their weight, and being more conspicuous than the French Ears; it also being necessary that they should be fixed by a spring, which goes over the head.

The French Ears, being made of a light substance, where they answer the purpose, are generally preferred.

Mr. Curtis has also invented a hearing-trumpet, forming a parabolic conoid, on the same principle as the speaking trumpet used at sea, which is so well known to answer the purpose in extending the impression of sound. It has this convenience, that it shuts up in a small case for the pocket.

Cases extracted from Mr. Curtis' work, illustrative of the Treatment of Constitutional or Sympathetic Deafness.

"SARAH GREEN, five years of age, was brought by her mother to the Royal Dispensary on the 3rd day of May. The child appeared very deaf, and of a listless aspect; by her mother's account she passed restless nights, gnashed her teeth during sleep; appetite various, at one time indifferent, at another voracious. The child's appearance was sickly, the eye languid and heavy, countenance pale, and the upper lip somewhat tumefied; the bowels were irregular, and the stools dark and offensive."

“Suspecting from the deranged state of the digestive functions, that the deafness might be sympathetic of this affection, I felt inclined to try the effects of gentle emetics, repeated twice a week, with calomel intervening. I shortly had the satisfaction to find the stools less fœtid, the appetite more natural, and the general health and appearance of the child to improve; as these changes for the better took place, a corresponding alteration in the local affection of the Ear accompanied these salutary and flattering changes in the constitution. In short, with a restoration to good health, there was also a complete recovery of the sense of hearing. No worms were observed to pass by stool, and the child remains perfectly well.”

“In about a week after the last case was dismissed cured, Master Macnamara, a fine boy, about nine years of age, was brought to my house labouring under similar symptoms. From the efficacy of emetics in the case of Sarah Green I had recourse to them in this; and without detailing the symptoms at length, and the progressive and simulta-

neous disappearance of the disorder of the system and the sympathetic affection of the Ear, suffice it that their use appeared equally appropriate, and their effect was equally beneficial."

"Master ———, the son of a worthy Baronet, was exceedingly deaf when brought to me. He too was of a pale complexion and languid appearance, ground his teeth when asleep, and often when awake picked his nose; his bowels and appetite were irregular; stools foetid and dark-coloured, belly hard and tumid, and frequently he complained of griping pains about the umbilicus."

"Emetics were had recourse to without effect, but as the symptoms of worms were unequivocal, he was put on a course of strong anthelmintics, and vermes of the lumbrici kind were passed in abundance. The general health shortly after this improved daily, and what proves that the hearing was affected sympathetically, was the restoration of this sense on the other complaints, being got rid of."

"No topical means were applied in these cases, but the cure was wholly effected by having detected and remedied the remote, yet indubitable source of the deafness."

EXPLANATION
OF
THE PLATES.

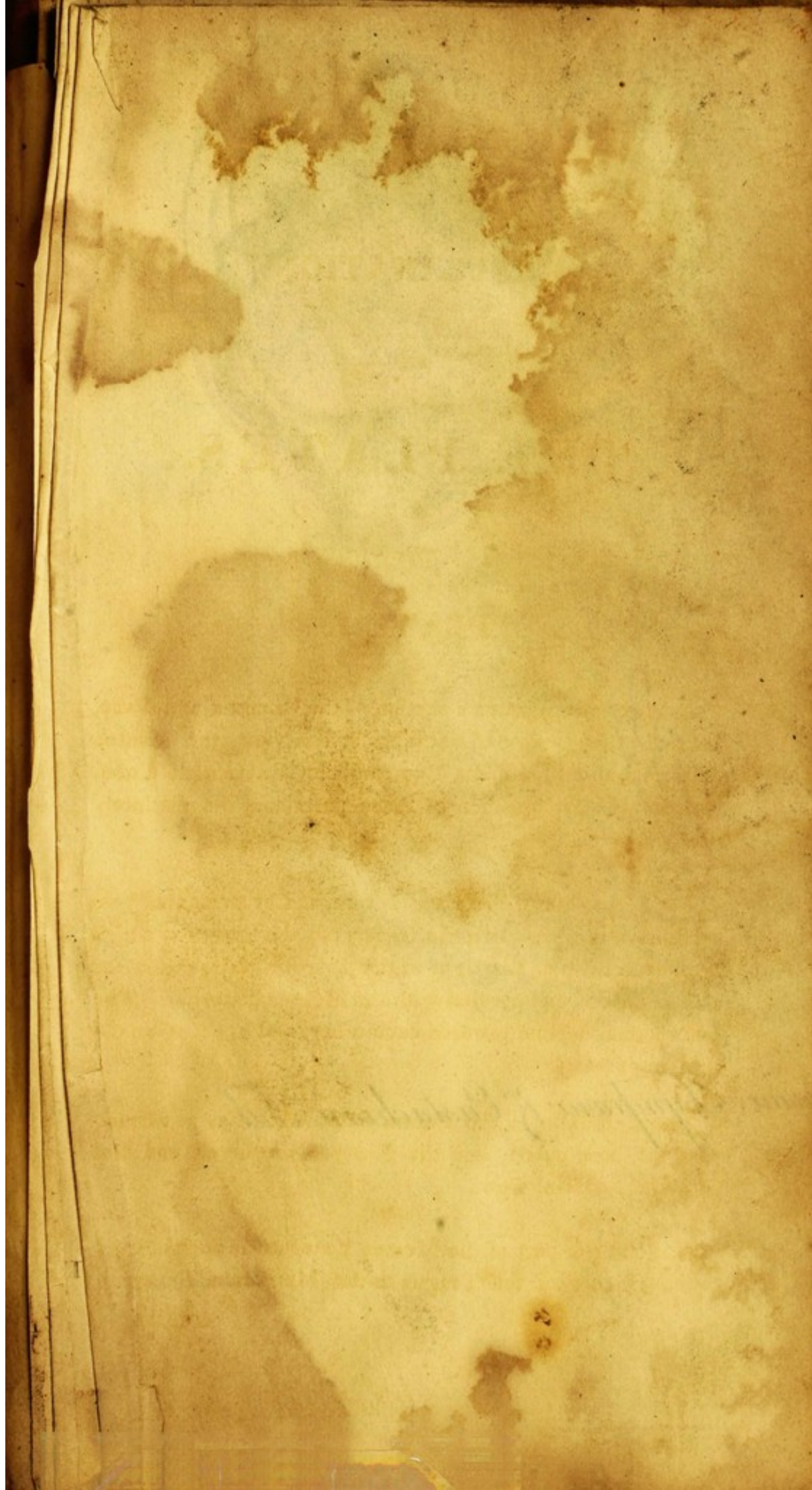
PLATE I.

THIS Figure represents a section of the Cranium and Face, made for the pupose of shewing, in one view, the Meatus Externus, the Membrana Tympani, and Eustachian Tube, that the relative position of these parts may be distinctly comprehended.

The right side of the Face is removed by means of two sections, a longitudinal and a transverse, the former of which is made a little on the right of the Septum Nasi, the latter a little before, and parallel with the Meatus Externus. The two sections incline towards each other, and meet at an obtuse angle.

The right side of the Velum Palati Mollis is separated from the bony palate, and the Pharynx preserved and displayed in a lateral view.

The anterior part of the Meatus Externus is opened from the beginning of the Tragus to the Membrana Tympani,





View of the Meatus, Externus Membrana. Tympani & Eustachian Tube.

which lies at the bottom, and separates it from the Tympanum. The anterior part of the Eustachian Tube is also opened, and a probe lies in it, and passes from its orifice in the upper and lateral part of the Pharynx into the Tympanum, which is left unopened.

a. The Meatus Externus. The letter is placed exactly at the junction of the bone and cartilage which compose this Canal.

b. The Membrana Tympani.

c. The Eustachian Tube, with a probe in it. The head of the probe serves to mark the aperture of the right nostril in the Pharynx.

PLATE II.

FIG. I.

This Figure represents an interior view of the Membrana Tympani and Eustachian Tube, which have been divided from the petrous portion of the Os Temporis by a transverse section, and of the lateral part of the nostril divided from the Septum Nasi, with a portion of the Velum Palati Mollis and Pharynx annexed. It is given with the design of shewing the relative position of the aperture of the Eustachian Tube to the Membrana Tympani, and its oblique course from the Tympanum to the spot where the Nostril and Pharynx communicate.

a. The Eustachian Tube.

b. The Membrana Tympani.

- c. The Malleus attached to the Membrana Tympani.
- d. The Chorda Tympani passing over the Malleus and Membrana Tympani.
- e. The section of the Pharynx.
- f. The section of the Velum Palati Mollis.

FIG. II.

This Figure represents a dissection of the Os Temporis to shew the chain of bones between the Membrana Tympani and Vestibule, precisely in their proper situation; for the bone is so cut that the Stapes rests on the lower part of the Fenestra Ovata, the Malleus is attached to the Membrana Tympani, and the Incus is in its articulation near the aperture of the Mastoid cells.

- a. The Malleus.
- b. The Incus.
- c. The Stapes.

FIG. III.

This Figure represents a dissection of the Ear, in which the anterior part of the Meatus Externus is cut off, and the Tympanum opened. The Eustachian Tube is also opened, and the view of it is the same as in Plate I. This Figure shews the Membrana Tympani, the Malleus, and Tensor Membranæ Tympani attached to it. As the Tympanum is opened, the size of this cavity may be judged of, as well as the degree of convexity which is proper to the Membrana Tympani, circumstance best observed in a lateral view.

- a. The Meatus Externus.

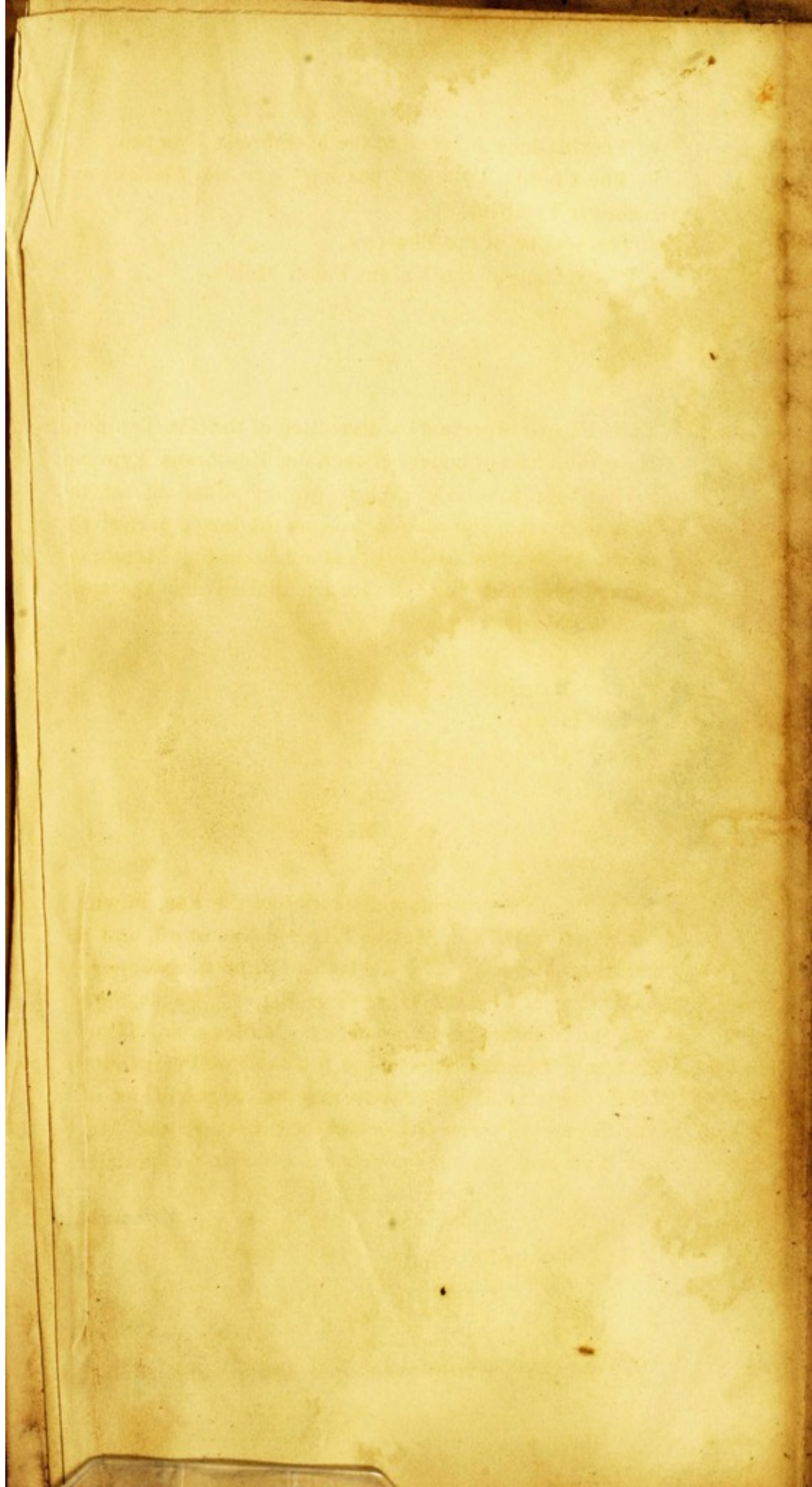


Fig. 1.



Fig. 2.



Fig. 3.



- b.* The Membrana Tympani.
- c.* The Eustachian Tube.
- d.* The Malleus.
- e.* The Tensor Membranæ Tympani, sending its tendon through a little foramen of bone, and inserted into the Manubrium of the Malleus.

PLATE III.

FIG. I.

This Figure represents the Fœtal Os Temporis; to shew the slender bony ring that contains the Membrana Tympani. This ring is elongated by subsequent ossification into that considerable process of the adult bone, called by Osteologists the Meatus Auditorius Externus.

- a.* The Ring of bone.
- b.* The Membrana Tympani.

FIG. II.

This Figure represents in different positions the individual bones, which form the chain of connexion between the Membrana Tympani and the Membrane of the Vestibule.

1. A view of the Malleus, as seen within the Tympanum.

- a.* The Manubrium.
- b.* The Head.
- c.* The Processus Gracilis.

2. A View of the Malleus, as seen from the Meatus Externus.

a. The concave portion of the Manubrium, the extremity of which reaches the centre of the Membrana Tympani. The whole of this surface is attached to the Membrana Tympani.

b. The articular surface on the head for its junction with the Incus.

3. A view of the Side of the Incus, that faces the Membrana Tympani.

a. The longer Crus.

b. The shorter Crus.

c. The articular surface for its junction with the Malleus.

4. A View of the Side of the Incus, that faces the Labyrinth.

a. The longer Crus, having the Os Orbiculare on its extremity.

b. The shorter Crus, which articulates in a depression close to the aperture of the Mastoid Cells.

5. A View of the Stapes, as seen by a person who holds it with the base towards him, and the straight part of the base lowermost, and looks at the same time into the hollow of its Crura.

a. The Head.

b. The Base.

c. The two Crura, of which the most incurvated lies towards the Mastoid process.

6. A View of the Incus and Stapes articulated to shew the intervening Os Orbiculare.

a. The Os Orbiculare.

7. A View of the whole chain of bones, articulated, with the Tensor Membranæ Tympani, adhering to the Manubrium of the Malleus.

FIG. III.

This Figure represents the exterior portion of the Mastoid process and Tympanum, both having been divided by a vertical section, to exhibit the Mastoidal cells, the internal surface of the Membrana Tympani, and the Portio Dura of the Auditory Nerve, turned out of the Stylo-mastoid canal. The section is continued beyond the Tympanum, and cuts the Os Sphenoides in such a manner as to make a section of the Foramen Spinosum, the Foramen Ovatum, and to separate the Ala Minor from the body of the Os Sphenoides directly within the Foramen Opticum. By the section of the Os Sphenoides the Inferior Maxillary nerve is laid bare, and the angle of the lower jaw remains to shew one of the branches of this nerve, viz. the Dental, entering the Dental canal. The object is to shew the Chorda Tympani, and its connexion with the sublingual branch of the Inferior Maxillary and the Portio Dura of the Auditory Nerve. On this account both these nerves are dissected and displayed. The precise course of the Chorda Tympani through the Tympanum is demonstrated by the preservation of the Malleus and Incus in their proper situation.. It lies on the Membrana Tympani, passing over the Manubrium of the Malleus, between it and the longer Crus of the Incus.

a. The Mastoidal cells.

b. The Membrana Tympani.

c. The Portio Dura of the Auditory Nerve, turned out of its canal; and the little twig of the Chorda Tympani going off through the bone to enter the Tympanum is marked a.

- d. The Inferior Maxillary Nerve.
- e. The Dental branch.
- f. The Sublingual branch.
- g. The Chorda Tympani.

FIG. IV.

This Figure represents the interior portion of the Mastoid Process, the interior part of the Tympanum, viz. that part which is opposite to the Membrana Tympani, and the Eustachian Tube, connected with the Tympanum. This View is given by a section similar to that of the last Figure; and allowing for the variation of different subjects, and a slight deviation of the Saw, the two portions laid together would compose a complete Ear. The Stapes remains *in situ*, fixed in the Fenestra Ovata, and the Tendon of the Stapedus Muscle is seen inserted into its head. Its base is concealed in the hollow of bone that bounds the Fenestra Ovata. The Fenestra Rotunda is visible, situated a little below the Stapes. This section also exposes the Portio Dura of the Auditory Nerve, which winds between the Tympanum and Mastoid cells. At one part, the Horizontal Canal is close to it, and is here opened, that the proximity may be observed. The Internal Carotid Artery is also dissected and introduced. Its course behind the part of the Tympanum which is elongated into the Eustachian Tube, and its contiguity to the Cochlea, appear in this Figure.

- a. The interior superficies of the Tympanum. The line which marks it is drawn from the elevation of the surface that covers the apex of the Cochlea.
- b. The Eustachian Tube slit open.
- c. The Stapes.
- d. The Tendon of the Musculus Stapedeus, issuing through a little foramen in the bone.
- e. The Fenestra Rotunda.
- f. The Portio Dura of the Auditory Nerve.

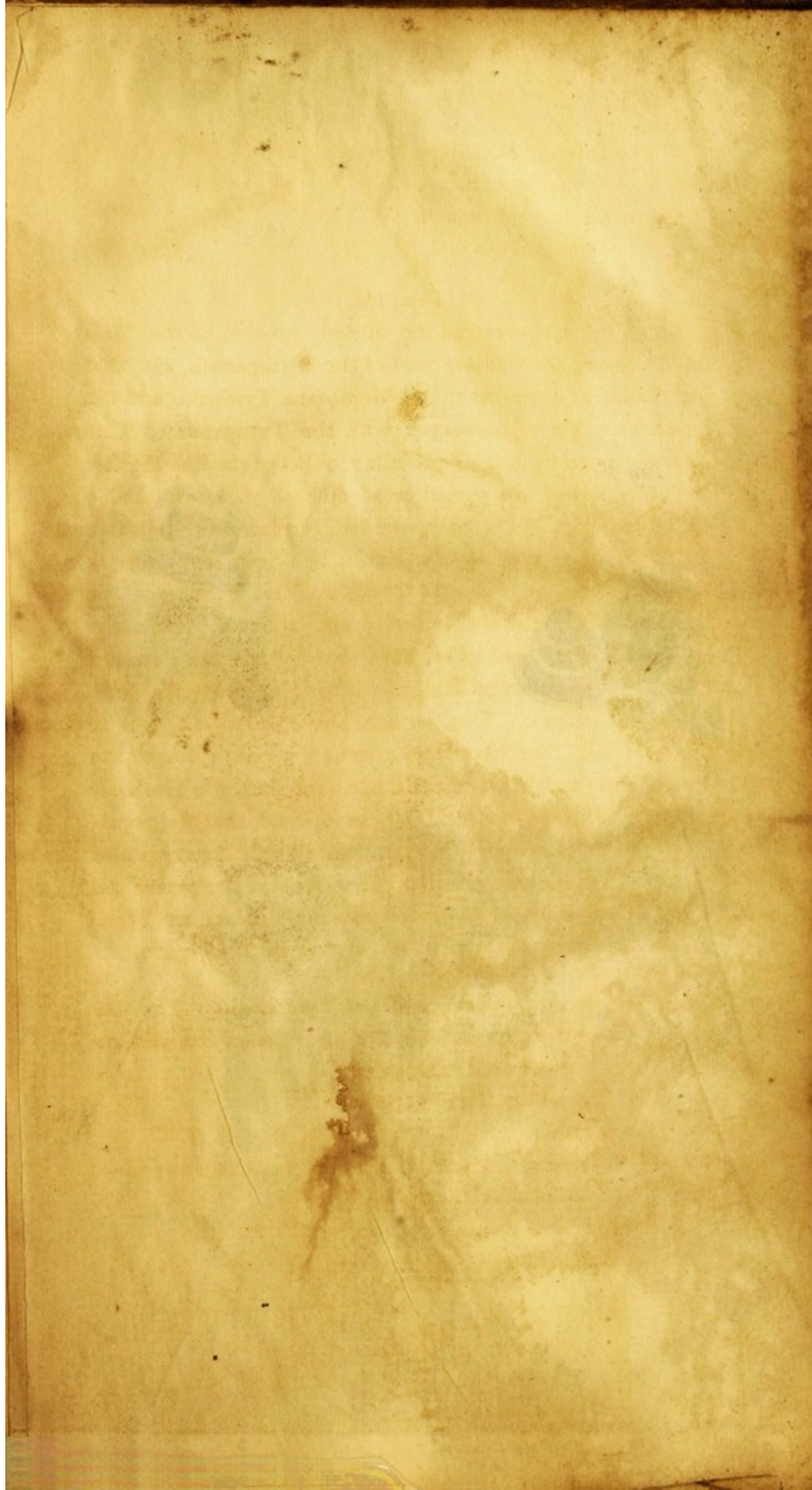


Fig. 1.



Fig. 3.



Fig. 4.



Fig. 6.



Fig. 2.



Fig. 5.



- g. The Horizontal Canal.
- h. The Internal Carotid Artery.

FIG. V.

This Figure represents a portion of the interior 'Superficies of the Tympanum dissected to shew the Stapedeus Muscle and the Canal of bone, which lodges the Tensor Membranæ Tympani.

- a. The Musculus Stapedeus, dissected by opening the bone which contains it.
- b. The Stapes, receiving the Tendon of the Musculus Stapedeus.
- c. The Canal of the Tensor Membranæ Tympani.
- d. The little hole through which the tendon of the Tensor Membranæ Tympani is deflected.

FIG. VI.

This Figure represents the Skeleton of the interior superficies of the Tympanum (the Mastoidal Cells being in outline) that the Fenestra Ovata and Fenestra Rotunda may be seen.

- a. Fenestra Ovata.
- b. Fenestra Rotunda.

PLATE IV.

FIG. I.

This Figure represents a dissection of that part of the Labyrinth which forms the interior superficies of the Tympanum. The position of the central cavity, the Vestibule, may be known by the Fenestra Ovata. The Cochlea is placed before the Vestibule, with its apex inclined towards

the Tympanum, and below the horizontal line. The two turns and half of the Spiral Tube (the Spiral Lamina being removed) are shewn, and the communication of this Tube with the Vestibule. A portion of the Vertical and Horizontal semi-circular Canals are opened and traced, as far as they can be seen in this view.

- a.* The Meatus Internus.
- b.* The Cochlea: the line is drawn from its apex;
- c.* The Vertical semi-circular Canal.
- d.* The Horizontal semi-circular Canal.

FIG. II.

This Figure represents a dissection of the Occipital side of the Os Temporis, to shew the Meatus Internus; the Oblique semi-circular canal, and the junction of its smaller extremity with that of the Vertical.

- a.* The Meatus Internus.
- b.* The Oblique Canal.
- c.* The Vertical Canal.
- d.* The common part of the two Canals.

FIG. III.

This Figure is copied from Professor Scarpa. It is a magnified view of the larger Membranous Sac of the Vestibule, and the Membranous semi-circular Canals, and is intended to illustrate the distribution of the Portio Mollis upon them.

- a.* The Sac in which the semi-circular Canals and Scala Vestibuli terminate.
- b.* The Vertical Canal.
- c.* The Oblique Canal.
- d.* The common termination of the Vertical and Oblique Canals.
- e.c.* The Termination of the Horizontal Canal.

- f.* The Portio Mollis.
- g.g.* The Portio Dura.
- h.* The Branch of the Portio Mollis supplying the Sac of the semi-circular Canals.
- i.* The Branch of the Hemispherical Sac.
- k.* The Twig supplying the Ampulla of the Oblique Canal.
- l.* The Fasciculus of the Cochlea.

FIG. IV.

This Figure represents a dissection of the Cochlea, in which the Scala Vestibuli is cut open through its whole extent, and the Cochlea is set upon its base, that the observer may be able to judge of its height. This dissection is designed to shew the Spiral Lamina, with its Membrane, that makes the Septum between the Scala Vestibuli and Scala Tympani, which remains closed.

- a.a.a.* The turns of the Spiral Lamina, or Septum.
- b.* The Fenestra Ovata.
- c.* The Fenestra Rotunda.
- d.* The Apex of the Cochlea.

FIG. V.

This Figure represents a dissection of the Cochlea, in which the Cochlea rests on its base, and one side of the Scala Vestibuli is opened. The section exhibits the appearance of three compartments, and a portion of the Septum of the Scala is seen in each. Its principal object is to shew the little hole by which the two Scalæ of the Cochlea communicate. To understand this Figure, the reader must observe that the Scala Tympani is not touched, that it begins under the Septum, at the Fenestra Rotunda, makes parallel turns with the Scala Vestibuli, and terminates at the common Foramen of the Apex.

- a.a.a.* The turns of the Spiral Septum.
- b.* The Fenestra Ovata.
- c.* The Fenestra Rotunda.

d. The Hole of communication between the Scalæ.

FIG. VI.

This Figure represents an oblique section of the Cochlea on the side of the Meatus Internus. It lays open both the Scalæ, the portion of the Canal below the Spiral Lamina being the Scala Tympani, that above, the Scala Vestibuli.

1.2.3.4. The edges of bone, made by the section of the Spiral Tube: 1. 2. the cut edges of the first turn.— 2. 3. ditto of the second turn:—3 and 4. ditto of the third or half turn.

a. The first turn of the Spiral Lamina.

b. The second turn.

c. The third or half turn.

FIG. VII.

This Figure represents a dissection in which the Spiral Lamina is left in connexion with the Modiolus and the Vestibule, from which it derives its origin. The Fenestra Ovalis and the aperture of the Scala Vestibuli are laid into one, by breaking down the partition between them.

a. a. a. The turns of the Spiral Lamina and the Modiolus.

b. The cavity of the Vestibule.

c. The hole of communication between the Scalæ.

FIG. VIII.

This is a magnified view of Fig. 7, to shew the Plexus of the Portio Mollis in the Spiral Lamina, on the side of the Scala Vestibuli.

FIG. IX.

A magnified view of a similar section to that of Fig. 6, with the exception, that the third turn of the Spiral Tube is not opened. It is left closed, because the half turn of the Spiral Lamina is too minute to admit of the nerves being seen in this view. It is meant to shew the Plexus of the Portio Mollis in the Spiral Lamina on the side of the Scala Tympani.

FINIS.

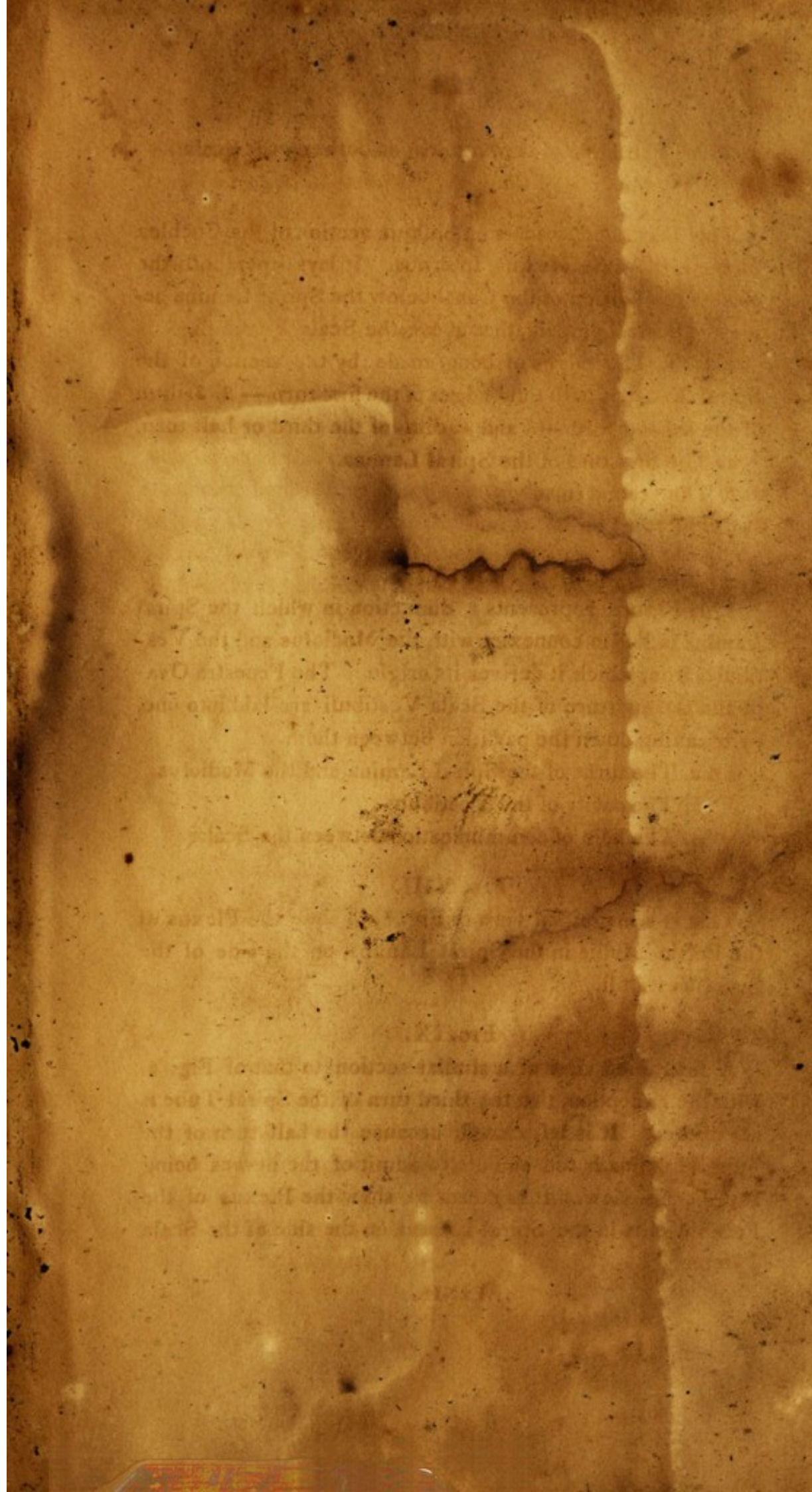


Fig. 8.



Fig. 9.



Fig. 1.



Fig. 3.



PLIV

Fig. 2.



Fig. 6.



Fig. 7.



Fig. 4.



Fig. 5.



18296A 9-12 03 5M

This book may be kept

FOURTEEN DAYS.

Please notice the dates below. A fine of TW
CENTS per day will be imposed for every book
kept over time.

[illegible]

617

43

Saunders

Class

617

Book

43

CARNEGIE LIBRARY OF ATLANTA.

Any resident of Atlanta shall be entitled to draw books from the Library by signing the proper application and agreement.

Books labeled "Seven-day Book" may be kept seven days, and can not be renewed.

Other books may be kept two weeks, and may be once renewed for the same time.

A fine of two cents a day must be paid on each volume kept over time. A book kept one week after it is due, will be sent for at the expense of the borrower.

Each borrower is responsible for all books drawn on his card, and no books can be drawn until fines and claims for damages are paid.

Books can not be exchanged the day they are drawn.

No claim can be established because of the failure of any notice to or from the Library, through the mail.

Intentional injury of books or other property of the Library will be punished by fine.

CONS

9/04

KEEP YOUR CARD IN THIS POCKET.



