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Robert Troup Paine
to Harvard College

A
TREATISE

ON

VERMINOUS DISEASES,

PRECEDED BY THE

NATURAL HISTORY OF INTESTINAL WORMS,

AND THEIR

ORIGIN IN THE HUMAN BODY.

BY VALERIANO LEWIS BRERA,

PROFESSOR OF CLINICAL MEDICINE IN THE UNIVERSITY OF PAVIA.

ORNAMENTED WITH FIVE PLATES.

TRANSLATED FROM THE ITALIAN, WITH NOTES,

BY MESSRS.

J. BARTOLI, M. D.

CORRESPONDING MEMBER OF THE MEDICAL SOCIETY OF EMULATION
OF PARIS, ETC. ETC. ETC.

AND **CALVET**, NEPHEW,

EX-SECRETARY OF THE MEDICAL SOCIETY OF EMULATION, MEMBER OF THE
SOCIETY OF CLINICAL MEDICINE, ETC. ETC. ETC.

Que de jeunes Médecins eussent mieux servi leur Art en s'occupant à traduire, au lieu de risquer leur gloire par des productions irréfléchies et prématurées! J. L. ALBERT, p. 4.

Traduction du Traité des Pertes du sang, par Pasta.

PARIS, 1804.

TRANSLATED FROM THE FRENCH, WITH ADDITIONS,

BY JOHN G. COFFIN, M. D.

1816.

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CAMBRIDGE.....HILLIARD AND METCALF.

1817.

DISTRICT OF MASSACHUSETTS, TO WIT.

District Clerk's Office.

Be it remembered, that on the eighteenth day of October, A. D. 1816, and in the forty first year of the independence of the United States of America, JOAN G. COFFIN, of the said district, has deposited in this office the title of a book, the right whereof he claims as proprietor, in the words following, namely—

“A Treatise on Verminous Diseases, preceded by the natural history of intestinal worms, and their origin in the human body. By Valerian Lewis Brera, Professor of Clinical Medicine in the University of Pavia. Ornamented with five plates. Translated from the Italian, with notes, by Messrs. J. Bartoli, M. D. corresponding member of the Medical Society of Emulation of Paris. etc. etc. etc. and Calvet, nephew, Ex-secretary of the Medical Society of Emulation, member of the society of Clinical Medicine, etc. etc. etc. Que de jeunes médecins eussent mieux servi leur art en s'occupant à traduire, au lieu de risquer leur gloire par des productions irréflechies et prématurées! J. L. Alibert, p. 4. Traduction du Traité des pertes du sang, par Pasta. Paris, 1804. Translated from the French, with additions, by JOAN G. COFFIN, M. D. 1816.”

In conformity to the act of the Congress of the United States, entitled, “An act for the encouragement of learning, by securing the copies of maps, charts, and books, to the authors and proprietors of such copies, during the terms therein mentioned;” and also to an act, entitled, “An act supplementary to an act, entitled, an act for the encouragement of learning, by securing the copies of maps, charts, and books, to the authors and proprietors of such copies, during the terms therein mentioned; and extending the benefits thereof to the arts of designing, engraving, and etching, historical and other prints.”

JOHN W. DAVIS, { Clerk of the district
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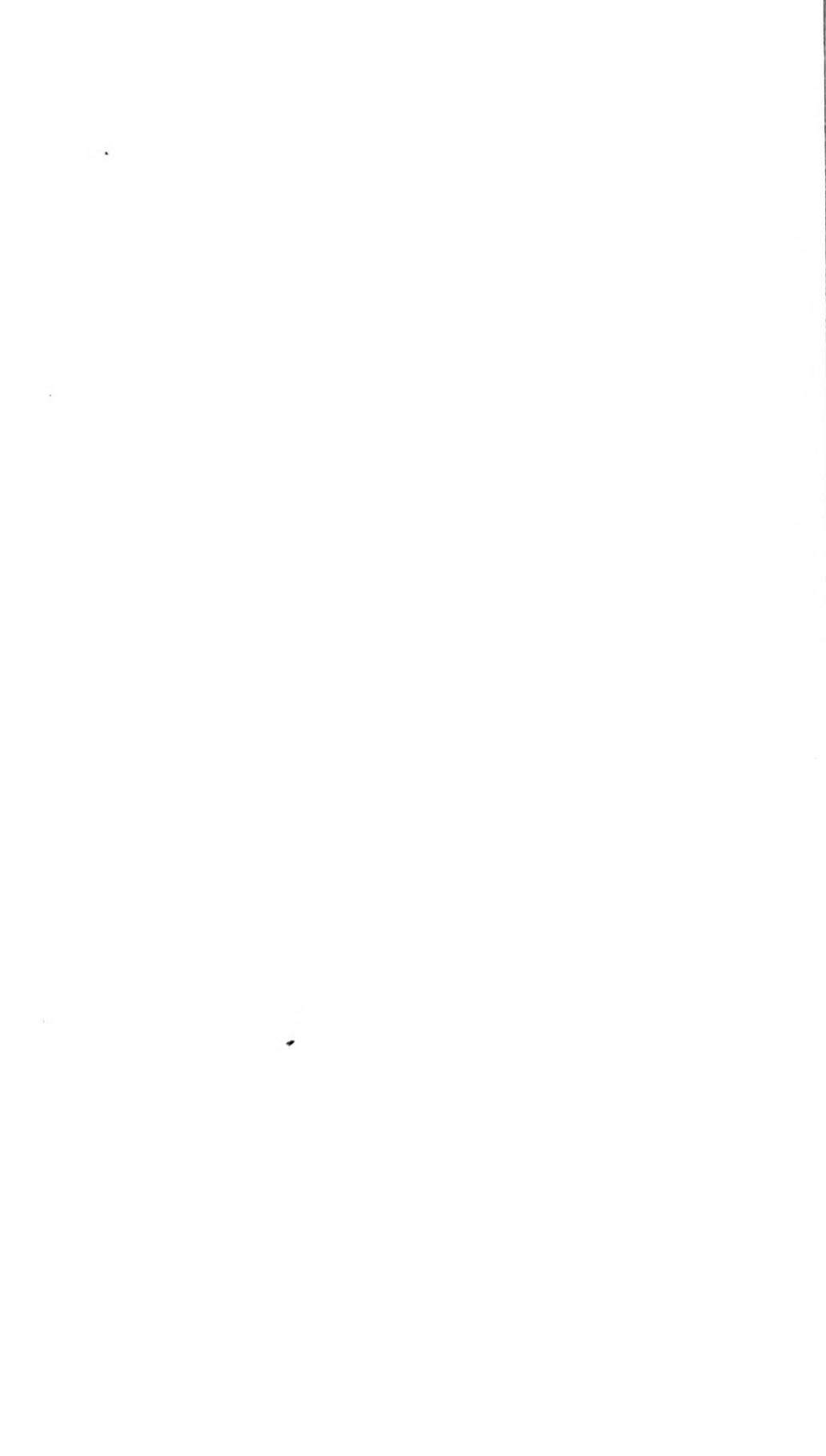
1816

TO

M. ANTHELME RICHERAND,

Professor of Anatomy and Physiology, Ad-
junct Surgeon in Chief of the Hospital Saint
Lewis, Surgeon Major in the Guard of Paris,
Member of the Medical Society of Emula-
tion, of that of the School of Medicine of Pa-
ris, etc.

THE GRATEFUL TRANSLATORS.



TO THE
STUDENTS OF MEDICINE
OF
HARVARD UNIVERSITY.

GENTLEMEN,

WHEN you come to be engaged in the responsible duty of conducting the sick to health, or of alleviating their descent to the grave, it will then appear to you how important it is that you should well understand the profession you embrace.

To know less than can be known, where knowledge is power, and where power can never equal the impulse of benevolence, is to be unjust both to ourselves and our patients. When you shall have obtained this information and faithfully applied it, you will then feel that consolation which alone remains in those cases where the healing art, with all its improvements, still falls so far below our wishes and efforts.

To decide the uncertainty where worms are *suspected*, and effectually to expel them

where they are known to exist in the human body, is not the least embarrassment of the physician's occupation.

If you shall be able in all these instances to surmount this uncertainty, or to cure the patient, you will be more fortunate than your predecessors.

That this work will materially aid you in such an attempt, I cannot doubt.

For twenty years I have been seeking information relative to human worms, but have never before found, in any single publication, what is at all suited to satisfy a medical inquirer whose purpose is to keep pace with the progression of his art. For though we have a number of good papers and communications on this branch of medicine, there is no systematic treatise on this subject in the English language.

In our country, this chasm has been sensibly felt and much regretted.

I contemplate the work of Professor *Berra* as well calculated to supply this deficiency, and so far as I know, it is the only one, accessible to us, that has any claim to be so considered.

If it should not contain all we need, it is

because medicine is not yet a perfect science. I have endeavoured, by some additions, to render it yet more full and instructive.

Having witnessed and shared the advantages you now enjoy, permit me to congratulate you on the improved state of medical education in New England.

We have multiplied means, and increasing facilities for the acquisition of every species of knowledge, necessary to form intelligent and accomplished physicians and surgeons. In return for these privileges, in a great measure peculiar to this period, every individual, connected with the profession, should be ambitious to contribute something for its further advancement.

Any man of common industry and capacity, can observe facts and record them, and in due time give them to the public. Or, if the habit of thus noticing the many phenomena and events, which are constantly presenting themselves to the attentive physician, and which without it are too often suffered to escape him, should not increase the number of our useful publications, it would at least improve the practice of individuals. That you may attain eminence in the science you

cultivate, and long and successfully apply and extend its resources, is, Gentlemen, the sincere wish of

Your friend and servant,

THE AMERICAN TRANSLATOR.

ADVERTISEMENT.

In the five plates of worms, some of the figures are represented as viewed with the microscope, and their increase as to the diameter, the surface, and the whole body, relates to the glasses, that were used. The proportion noted below has been settled by *Goeze*, in conformity to the calculations of *Hoffmann*, a celebrated optician of Leipsic.

By the tube A they are magnified ;

	In diameter.	In superficies.	In the entire body.
No. 6. —	16 times	. 25 times . . .	4,096 times.
5. —	31 . . .	961	29,791
4. —	52 . . .	2,734	140,608
3. —	78 . . .	6,084	487,552
2. —	154 . . .	25,716	3,632,254
1. —	189 . . .	35,721	6,731,269
0. —	300 . . .	90,000	27,000,000



[This work has already appeared in the Italian, German, and French languages. The following recommendation of it is from the Medical Professors of Harvard University.

“ This book appears to us highly valuable on account of the numerous facts it contains, and as comprising the information which is scattered through many voluminous works. The subject which it embraces is such as to entitle it to the attention of every medical practitioner. It seems to us to fill a space, which is not occupied by any single work in the English language.

“The accurate plates annexed to it must be considered as adding greatly to its value.

AARON DEXTER.
JAMES JACKSON.
JOHN C. WARREN.
JOHN GORHAM.”

The Notes of the French Translators are marked *F. Trs.* The additions to this edition of Brera will be included between [] brackets, and the Notes of the American Translator will be marked *A. T.*]

PREFACE

OF THE FRENCH TRANSLATORS.

PERHAPS on no subject has there been so much written as on the diseases arising from worms. *Bloch*, in his treatise, which is one of the best, merely describes as a naturalist, the worms of the human body, and he has multiplied their species without end.

Andry is lost in a labyrinth of hypotheses ; and others seem to have written merely to proclaim their success, and to make known their specifics. The celebrated *Brera*, professor of clinical medicine in the University of Pavia, known by several excellent medical publications, which have placed him among the first physicians who have done honour to Europe, has recently analyzed the diseases from worms in a work entitled, *Lezioni medico pratiche sopra i principali vermi del corpo umano vivente, e le così dette malattie verminose*. Having no good distinct treatise in our language on verminous diseases, we have thought ourselves usefully employed in translating his work into French. This treatise, to which the author gives the modest title of Lectures, claims the attention of physicians and naturalists. The first part contains the natural history of worms ; in the second, the author treats of their origin in the human system ; in the third, he speaks of verminous affections, both local and sympathetic. Lastly, the fourth Lecture is devoted to the different methods of cure.

This, in a few words, is the plan of the author. Further, Professor *Brera* gives us, in his preface, an account of the method he has adopted ; little then is left for us to

add; we hope however to be indulged in saying a few words in order to justify an undertaking, which is perhaps beyond our ability.

In translating from the Italian, we find it difficult to render the text without disfiguring the ideas of our author. This language, like all others, has peculiar turns, not easily adapted to the genius of our own.

We have however preferred monotony to elegance of style, where the former seemed necessary to express clearly the ideas of the writer. We have added some notes, which we hope will be pardoned from the interest they excite.

END OF THE FRENCH TRANSLATORS' PREFACE.

THE AUTHOR'S PREFACE.

CALLED by the government, in the years 1797 and 1798, to the honourable office of professor extraordinary of practical medicine, in the celebrated University of Pavia, I found myself obliged to read and explain, in the short space of two scholastic years, all those theoretical and practical treatises, which furnished the best methods of treating the various diseases that afflict the human race.

The doctrine of general sthenic and asthenic diseases, as well as of local morbid affections, was then expounded with all the elucidations which the short period allowed by the academic regulations would permit. As the practical school established in the civil hospital of Pavia, presented me an opportunity of treating and examining, I will not say all, but at least most of the principal diseases, I am to this day very happy in having been able to lead in practical medicine, by the light of experience, a great number of pupils, who under my direction, have assiduously applied themselves to this useful science, and thus to have contributed to the medical education of a multitude of young men, among whom not a few, in relieving suffering humanity, already exercise, to the satisfaction of the public, their useful but difficult profession.

It is not for me to apologize in this work for the medical observations which were made and compiled by my pupils in the clinical Institute confided to my direction.

They are already published, and ornamented with six beautiful plates, (*Annotazioni Medico-prattiche sulle diverse*

malattie trattate nelle clinica medica di Pavia negl' anni 1797 e 1798, III vol.) I refer them entirely to the impartial judgment of the public.

Translations of them appeared in several foreign languages, and the satisfactory manner in which they have been noticed, and extracts made from them, both in the journals of medicine and of literature, as well as the honorary diplomas which have been awarded to me by several illustrious academies, so soon as the first volume appeared, encourage me to hope that the public will favourably receive the result of my other literary occupations.

To reflections analogous to the cases observed, drawn from the study of the best works of the most esteemed writers, I was desirous of adding my clinical observations, that the pupils in surveying them, at the same time they observed the diseases I described, might perceive the sources whence I derived the precepts that guided me in the practice of medicine. A young practitioner, I was also devoting myself with ardour and confidence to the examination of those works, ancient and modern, to which medicine owes so much of its present reputation, when my duty called me to initiate others in the healing art.

I think I have thus sufficiently justified the method I have followed in the order of my Lectures, by explaining difficulties as they rose, and by publishing the *Annotazioni medico-pratiche*, in which my pupils might find a summary of the leading precepts which should confirm the arguments of our daily pursuits; and as, agreeably to the immortal axiom of *Hippocrates*, art is long, life short, and practice difficult, I still approve the method adopted to conduct the pupils to a practical acquaintance with the resources which medicine offers to assist nature in triumphing over many diseases that oppress her.

The Treatise on the worms which inhabit the human body, in conformity to the program of my observations on practical medicine, should form a part of this work; but on reflection I thought it better to publish it separately,

because the theoretical part of it being extensive, it did not seem proper to connect it with a series of observations which so intimately relate to the practice of medicine.

For though I have had occasion to notice diseases arising from worms, both in the clinical institute and in my private practice; yet perceiving no great importance in bringing together observations thus collected, I judged it proper not to communicate them to the public, nor to speak of them in this work.

Many of my pupils however who recollected the Treatise on the principal worms of the living human body, as well as on some diseases called verminous, which I had composed for their instruction, and publicly exhibited in the scholastic year of 1798, have frequently expressed to me the pleasure they should derive from having it in their own hands. It is not therefore an unbecoming ambition, nor the desire of useless applause, that prompts me to publish the four Lectures which compose this Treatise, but merely the obligation of yielding to the solicitations of those who are to be instructed in so essential a part of practical medicine, and who have not the means of consulting the prodigious number of books in different languages, which treat of human worms, and which are not obtained without much difficulty. I now resolve the more willingly to publish these Lectures, as the late examination of the works of the Italian physicians has convinced me of the deficiency of medico-practical instruction relative to the principal human worms, and the diseases they excite, and which should be directed in conformity to principles which the philosophical physician knows how to appreciate, because they are solid and incontestable.

Though the reader may approve my efforts, I am far from flattering myself that I have obtained the end in view.

I have merely the pleasure of being able once more to make known my zeal for the good of humanity, and my desire to contribute as much as possible to the advancement of the healing art.

I have endeavoured to arrange these Lectures with clearness and precision, in order to make myself intelligible, and to avoid all confusion and uncertainty.

I have laboured to comprise in four Lectures, a number of very extensive subjects which are connected with many branches of natural history and medicine.

I have written them for practitioners and not for naturalists; I have in consequence, but slightly announced the articles pertaining to the natural history of worms, and have uniformly aimed to speak only of those which are immediately related to practical medicine. An exact view of the internal and external parts, composing the body of worms; the knowledge of the systematic characters in order to distinguish the principal worms which inhabit the living human body; some reflections on their origin, so far as they relate to medicine; the history of the morbid phenomena, which at once originate from their birth, as well as certain diseases which are often the cause of their development; and lastly a careful examination of the remedies proper for their expulsion from the body, and suited to prevent their reproduction; these are the subjects I have treated in these Lectures, which offer matter, for the physician who reasons, sufficiently vast to enable him to multiply their number as far as he pleases.

I have not failed to avail myself of all that the most celebrated writers, naturalists and physicians, have published on human worms. To render these Lectures more instructive to my pupils, I have appropriated all the knowledge of others, and have printed it without alteration. I have thought proper to subjoin to each Lecture a number of citations, as it will thence appear from what sources I have derived the most exact information.

The reader will then be enabled to consult the best publications on the topics I have treated.

I have annexed to these Lectures five superb plates, engraved with all possible skill and exactness by one of the

most excellent artists. In this manner the reader will the more easily recognise the parts which characterize the worms here described.

I can guaranty the fidelity of the plates; they exactly resemble the originals, having compared them with the samples, still visible in the celebrated collection of the illustrious *Goeze*, and which is preserved in the museum of natural history of the University of Pavia.

Estimating with impartiality the merit of those naturalists and physicians who have devoted themselves to the productions of nature, I have made it a sacred duty to re-exhibit in my plates, such human worms as they have examined and described with great fidelity.

The plates in the works of *Bonnet*, *Marx*, *Pallas*, *Goeze*, and *Werner*, are the most valuable and instructive of any which have yet appeared relative to human worms.

Of these plates, I have selected the most interesting, and uniting them with the engravings of other worms which I have found described, and which still remain in the pathological Museum of the University of Pavia, I flatter myself that I have presented in these five plates a representation of the principal worms of the living human body, in conformity to the Lectures, and which will be very advantageous, particularly to those physicians who do not possess the interesting works of the naturalists and physicians already cited.

A TREATISE
ON
VERMINOUS DISEASES.

LECTURE FIRST.

AN EXAMINATION OF THE PRINCIPAL HUMAN WORMS.

§ I. THE subject we propose to examine is doubtless very extensive, if we would form an exact idea of all the worms which are occasionally found in the living human body.(1) If we admit all that has been said by a number of distinguished and faithful observers, worms of various sizes are met with in almost every part of the human body, even the most hidden,(2) and which physicians have described in a manner too satisfactory not to secure attention.

If we reflect however that most of these worms do not preserve at all times the same form, that they do not always occupy the same parts of the body, and that we are not acquainted with any peculiar phenomena arising from their presence in any particular organ, their history seems rather interesting to the curiosity of the naturalist, than important to the physician, whose chief attention is devoted to what may be immediately useful to suffering humanity.(3)

1 See the Notes at the end of this Lecture.

I omit therefore what would be a useless examination of those worms which may be called anomalous, and proceed to the description of those which are constantly found in the human body, and which are sometimes the cause, and sometimes the effect of severe and long continued diseases.

An acquaintance with the history of those worms which I call principal, is the more important, because experience has clearly proved that each genus of these worms, requires for its expulsion, some peculiar modifications of the general treatment.

§ II. Till the time of *Linnaeus*, physicians knew only three sorts of intestinal worms.(4) Naturalists since the new discoveries have increased their genera.

Latterly, several well informed writers have multiplied the number of human worms, but have classed them obscurely.(5)

If, admitting the conclusion of the most accurate observations of the best naturalists, consulting the classifications they have given of worms in general, and in particular, I compare them with the models preserved in our museums, and with those I have found in the examination of dead bodies, or have seen expelled alive by my patients, I think I have sufficient motives for presenting to physicians the principal worms of the human body reduced to a single class.

For, besides their presenting a multitude of objects worthy of contemplation, such as their singular origin, and their prodigious multiplication, they

moreover authorize the method I have adopted to separate them from other worms, and to form them into one particular class which comprehends ;

1. *Taenia.*
2. *Vermis Vesicularis.*
3. *Tricocephalus.*
4. *The Ascaris Vermicularis.*
5. *The Lumbricoïdes.*

§ III. Our worms, like other animals, have red blood, which, according to the observations of Müller,(6) circulates in an artery, and a whitish serum flowing in a vein. Their external texture is admirably organized.(7) The construction of the interior organs is surprising to human imagination.(8) It is proper to remark in this place, that we should not trust to an examination of these worms when dead, stiff from cold, and hardened by the spirit of wine, or injured by hot water, if we would ascertain the singularity of their internal or external structure: under these circumstances the parts of the worm are changed, irregularly contracted, and of a size larger than natural. Immersed in tepid water, they are better preserved, altered less, and are more conveniently submitted to observation.

FIRST GENUS.

TAENIA.(9)

§ IV. This is a very long worm which seems to be formed by a chain of flat articulations, united together by means of a border or edge, varying

in breadth and thickness. The joints of the *taenia* when united, present at first sight, remarkable peculiarities both as to their width, bigness and tenuity, and also in regard to the perforated papillae on the lateral border of some of them, as well as the longitudinal lines which traverse the centre of their bodies.(10) I am however confident that all these pretended peculiarities do not always exist in the same species, but that they are mere signs of the age of the worm, and of the richness and abundance or poorness of the nourishment which it receives at the expense of the animal machine.

§ V. The length of the *taenia* is sometimes so considerable as to appear incredible. In mammiferous animals it is ordinarily from nine to twelve Paris feet (four metres*), and in man from twenty-five to thirty (from eight to ten metres.) *Rosenstein*(11) once saw a *taenia* voided, which surpassed in length one hundred and twenty eight metres.

Vun-Doeveren(12) relates the history of a peasant, who, after taking an emetic, evacuated sixty metres of *taenia*, and who probably would have voided more if he had not broken the worm from an apprehension that he was discharging all his intestines.

If *Baldinger* does not exaggerate in his work,(13) he speaks of a *taenia* which was more than two hundred metres long.

* The *metre* of France is equal to 39,3702 inches, or three feet and nearly a third of a foot, of American long measure. *A.T.*

In the cabinet of the University, one is preserved exceeding the length of seventy metres.

§ VI. This worm is divided into head, neck, body and tail.

The head is sometimes so small, that it cannot be distinguished without the microscope. It resembles a small tubercle,(14) which rises on the anterior extremity of its body, called neck.(15)

It is furnished with four apertures,(16) which are eminences in some worms and depressions in others. From each of these four openings proceeds a canal for nourishment, which extends to all the articulations.

Bloch has remarked that the head of some taeniae is armed with a sort of tube, which it can elongate or retract.(17) If we examine very carefully the head of the taenia of man and of animals, we shall see in some of them very small hooks;(18) if these are viewed with the microscope, they are seen to be arranged in form of a double crown;(19) while others inspected with the same instrument are found to be quite destitute of this peculiarity, and appear on the contrary to be furnished with a mouth and a number of filaments all around the neck.(20) The neck is formed by the assemblage of small articulations which become broader, longer and larger as they approach the body of the worm. It may be said that in this way, the joints of the taenia diminish in size as they recede from the centre to either extremity of the animal.(21) I regard this fact as very important information, since the

neck of a very long taenia, compared with its body does not seem to pertain to the same animal;(22) in this manner several naturalists have been deceived, and subdivided the same worm into two particular species. The body of the taenia is formed by entire articulations, which we call perfect,(23) in which the papillae are clearly visible and open at their summit, whether they are symmetrical,(24) or irregularly situated in the lateral edges of the taenia.(25) Finally the tail terminates by a piece quite truncated, or cut off and raised on its sides in form of two hooks, rounded at their summit. Both the hooks or crotchets have the same small holes or apertures, which are observed in the papillae we have mentioned.

The border or edge of each, which connects the articulations, is slightly concave towards the tail, and a little convex toward the head.

In this manner the diameter of the body of the taenia gradually lessens as it approximates either extremity of the worm.

§ VII. The bigness and external form of the taenia of the same species also vary. A patient in the Clinical Institute of Pavia, voided in several pieces, in the winter of 1797, the taenia represented, Pl. I. fig. 1, 2.

In these pieces we discovered the head, with the fangs or hooks above named, as well as the posterior extremity of its body, which we have considered as the tail.

These pieces taken together were from fifteen to sixteen metres in length.

The same patient, in the following summer, discharged a taenia represented also in Pl. I. fig. 3. In this collection of pieces, we also found the head armed with fangs, as well as the tail: its length was about thirty eight metres. We cannot suppose two taeniae of different species to have lived together in the same individual. It is more credible that both were developed at the same time, that the former was evacuated when young, and that the second grew larger merely because it was about four months older. This admitted, we cannot doubt that if the worm had remained some months longer in the intestines, it would have become longer and larger, like that represented Pl. II. fig. 1, and that it would have acquired the form of the large *Taenia cucurbitina* seen in the plates of *Andry*,(27) of *Clerici*,(28) and of *Vallisneri*,(29) the joints of which exceed half an inch in width. If animals, and even vegetables in infancy, at puberty, in adolescence and old age, exhibit great variety in their forms which are peculiar to these several periods of their life, how can it be pretended that taeniae must preserve the same forms at the moment of their development, and after the full growth of their body? The human taeniae do not generally remain in the intestines a sufficient time to come to their perfection; seeing that before this epoch they are expelled by art or are accidentally killed and evacuated.

For this reason the large taenia cucurbitina is rarely obtained, such as *Vallisneri*(30) particular-

ly describes, and which, from their large size, have by some been considered as a different species.(31)

The diversity of the external structure of the taenia of the same species, does not depend solely on the difference of age.

The nature of the soil, climate and food, varying in different countries, explains the great influence which produces the changes and varieties of form of all living beings.

It is thus, as I believe, that the natural constitution of the animal structure, which we see altered in a thousand ways, contributes much more than is commonly supposed, to the variation of the exterior forms of the taeniae of the same species.

In fact, the inhabitants of the north are much more subject than other people to the gray taenia;(32) the Swiss to the flat taenia; the Italians and the inhabitants of Lower Saxony to the taenia cucurbitina, etc. The feebleness or strength of the patient, the soundness or diseased state of the worm itself, are circumstances which affect the size, softness or firmness of the worm, and its development.

The winding of the intestinal canal, the pressure of the contiguous viscera, and other similar accidental causes, obviously affect the growth of some portion of the taenia.

§ VIII. We have no exact description of the interior organs of this worm.(33)

We only know that it belongs to the class of oviparous animals, because in every joint there is an ovary of a peculiar nature, sometimes having

the form of a tubercle, and sometimes that of a small cluster of grapes, or entirely dendroid or arborescent. If these ovaries are examined with a microscope, they are seen to contain a prodigious quantity of eggs,(34) of divers sizes and different contour or outline, and perfectly dark when near their period of maturity.(35)

The articulations of the taenia, in some instances, are long or narrow, in others, short and broad; we sometimes see them almost square, slightly flattened,—these ovaries expel their eggs through the perforated papillae observed on the lateral parts, and which, according to *Bloch*, communicate by means of two canals with the ovaries. Certain naturalists assure us that the seminal vessels open near the ovaries, and that the worm bedews the ova with the seminal fluid the instant it deposits them.

It has from this been concluded that these worms are hermaphrodite, and this idea has been the more readily adopted, because among these worms the distinction of the two sexes has never been discovered.(36)

Bloch has often observed two of these eggs so closely united that they seemed to be but one; he could not separate them till he had steeped them sometime in tepid water.(37) This sagacious author has however remarked, that this adhesion of these eggs, might arise from an abundance of viscid humour. This observation is not therefore sufficient to prove the existence of two sexes in the

taenia, and an argument like this, not yet freed from doubt, presents to our modern naturalists a vast field for consideration.

§ IX. Some learned writers have pretended that the taenia, like the *Sertularia* (*zoophytes*) grows longer by means of the apposition of new rings. This opinion however is proved to be unfounded, and it may be affirmed with certainty, that the taenia, like all other living beings, increases in length and size by the addition of a homogeneous matter received into its viscera and prepared or animalized by them. The various parts of the taenia existing in miniature in the egg, begin to be developed from their leaving the ovum and continue to grow till they acquire their natural bigness. *Bloch* having examined several small taeniae, with an excellent microscope, discovered in them a prodigious number of very minute articulations, which could not be seen by the naked eye.(38)

§ X. The taenia is very tenacious of life. *Coulet*(39) asserts, that they can live more than twelve hours in boiling veal broth, and come out as brisk and active as they went in. *Dr. Fax*(40) caused a taenia to simmer over a slow fire, and observed that he died so soon as some common salt, muriate of soda, was added.

In general, these worms, like others, sustain a very high degree of temperature before life is destroyed;(41) this is not much in favour of that perfection of the senses which some writers have ascribed to them.(42)

§ XI. This worm usually occupies the small intestines ; some few are occasionally found in the stomach. Most frequently the head is turned upward, while the posterior part of the body and tail extend along the interior portion of the intestinal tube. It is said that the head is insinuated in a surprising manner, into the mucous membrane of the intestines, and that the worm remains firmly attached to them.

Dr. *Tyson* relates his having seen a living taenia in an opened dog, whose tail was pendent from the rectum, while the head of the worm was so deeply fixed in the small intestines, that he could scarcely detach it with his nail.(43) We should hence conclude with *Rosenstein* and all practitioners, that no one can be freed from the taenia till its head is evacuated.

§ XII. The motion of this worm is singular and spiral. The posterior articulations are separated from the anterior, they stretch out and contract by turns, in such a manner that the worm becomes sometimes narrow and sometimes broad : in a word, in its movement it rolls as by undulation, and from this cause it at times appears longer than it really is.

This worm sometimes passes out from the rectum without producing any sensation ; more commonly, the head being attached to the mucous membrane of the intestines, the motions of the body in different directions excite those peculiar morbid phenomena which shall be pointed out in the third

Lecture. It is from these irregular motions of the body of the taenia, here and there compressed by the duplicatures of the intestines, that those knots are formed in the course of its body, which are seen when the worm is voided, and which have the appearance of being artificially produced. These knots are sometimes single, sometimes double. (44)

§ XIII. All the taeniae found in the intestines of man, are not of the same species.

I cannot however embrace the opinion of those physicians and naturalists, who, admitting as the distinctive character of the taenia, several vague and uncertain marks, have multiplied their species without end, and thus exceeded the bounds of provident nature.

Hippocrates speaks of one sort of taenia only, (45) and asserts that the maladies he produces are not always mortal. Physicians since his day have admitted but one species, till the time of *Plater*, who, without distinguishing them, has announced two species. (46)

Andry, after having examined the two human taeniae, adopted as the specific character of one, the small knots (*noeuds*) which traverse the whole length of its body, and which he denominated *the taenia without thorns*, and the other *the taenia with thorns*, (*taenia epineux*). (47)

Bonnet considered this distinction as too general; without augmenting their number, but having regard to the length and smallness of the ar-

ticulations, he called one species *the taenia with long articulations*, the taenia without thorns, and that with thorns, *the taenia with short articulations.*(18)

Linnaeus, presuming he saw a peculiar character in the position and number of the papillae, has described three species,(19) calling the first of them *Taenia solium osculis marginalibus solitariis*,(50) the second *Taenia vulgaris osculis lateralibus geminis*,(51) and the third *Taenia lata osculis lateralibus solitariis.*(52)

Pallas, not wishing to deviate from the characters of *Andry*, of *Bonnet* and of *Linnaeus*, has adopted six species(53) of them, the two last of which, according to the celebrated *Bloch*, can by no means be included in the genus of the taenia. *Goeze* having ascertained the fifth and sixth species of taenia described by *Pallas* to be incorrect, he admits only the four first,(54) announcing at the same time some uncertainty as to the fourth species (*Taenia tanella*,) which he believes to be rather a variety of the flat taenia,(55) and to constitute the third species.

Without detracting from the merit of three great naturalists, such as *Linnaeus*, *Pallas* and *Goeze*, in reflecting on their writings, and contemplating their figures of the taenia, we perceive that the characters they have drawn of the diversity of the species, are liable to weighty objections. The broadest articulations may, in certain circumstances, contract, shrink, and again possess a width and size

which vary in the different periods of the life of the worm.

The same may be said of the lateral papillae and of the borders, as well as of the knots, parts which are not seen in the joints of the young taenia without a good microscope; they become visible only as the worm grows. It is equally true that those who would establish systematic divisions, on characters not less vague and uncertain, have cast a shade over those questions which they ought to have elucidated.

Thus several celebrated naturalists reposing too much confidence in certain vague characters, have confounded the species, and that they might follow the order of nature, they have been anxious to make these characters too distinct.(56)

If there are in the taenia certain fixed characters, immutable in every age of the worm, visible to the naked eye, we see them in the head of some armed with fangs or crotchets, as we have noticed above.(57)

On these characters, which may be called specific, *Bloch* formed the division of all the intestinal taeniae, into the armed and unarmed taeniae, a division still more appropriate for the human taeniae. This division, besides that it is not subject to uncertain changes, is much more beneficial to physicians. Practitioners are not ignorant that the armed taenia, by insinuating itself into the mucous membrane of the intestines, with greater force than the unarmed taenia, produces in parts thus sensible sharp

prickings, and sometimes occasions alarming symptoms, requiring the most efficient remedies to expel the worm from the intestinal canal.

I proceed therefore to the examination of those two species, which are the only ones found in the human intestines.(58)

FIRST SPECIES.

THE HUMAN ARMED TAENIA.

§ XIV. The worm known by the name of taenia cucurbitina, or solitary worm,(59) though described and figured in several classical works of natural history,(60) has nevertheless been the cause of much uncertainty from the writings of several men really illustrious, and which, in the opinion of *Bloch*, must be sufficient to humble the pride of the human understanding. This worm is common with us,(61) since the taenia most usually discharged by our patients pertains to this species.

This taenia, altogether peculiar to man,(62) varies according to its age, food, length of its whole body, and the bigness and dimensions of the articulations or internodes, as *Werner* chooses to call them.

We see that these internodes are very slender and delicate in the neck ;(63) almost square in the body of the younger, and next below the neck in those more advanced in age ;(64) in form of a parallelogram in the oldest worms ;(65) of the same form and very broad in the largest taenia ;(66) oval and oblong in some ;(67) and lastly in others

half an inch in length,(68) etc. We perceive that the external form of the young worms thus differs from that of the more aged, and that the external appearance of the latter seems quite different from that of the taenia when arrived at its full size and perfect growth.

This accidental diversity has therefore been very improperly regarded as a characteristic index of particular species, as we have already remarked;(69) and naturalists have fallen into a great error, especially those, who, blinded by the authority of the Arabian physicians, have believed that they saw in each great articulation of this taenia, a particular worm.(70)

§ XV. The head of this taenia has been the subject of many inquiries.

Welchius(71) and *Linnaeus*(72) have regarded this worm as being *acephalous*.

Rhodius(73) and *Forestus*(74) are the first who mentioned, described and figured the head of this worm as altogether monstrous and remote from truth. *Malpighi* afterward presented it to us as having eyes, nostrils, a mouth, and teeth, as may be seen in a truly grotesque figure, cited by *Leclerc*.(75) We are indebted to *Andry*, *Tyson*, *Bonnet*, and to *Roederer*,(76) for a more careful and elaborate description of the head of this worm, still further improved by *Leske*, *Pallas*, *Müller*, *Bloch*, *Goeze* and *Werner*. With the naked eye, we see this head armed with two pointed and protuberant appendages, which, by analogy, are called crotch-

cis or fangs,(77) and which constitute the specific character of this species, as the other species is without them. If the anterior part of the head of this taenia is examined with the microscope, stretching it a little, the fangs, which are seen by the naked eye, are extended into a small crown perfectly circular and stellated, in the centre of which is the tube.(78)

§ XVI. Laterally into a square, open the four lateral canals(79) which traverse the whole length of the worm.(80) The centre of the taenia is also traversed by a canal called the middle canal,(81) which begins near the tube of the head and reaches quite to the tail, sending branches to each articulation very much resembling in figure the horns of the stag, and which anastomose in a wonderful manner, as may be seen by the naked eye in fully formed articulations.(82)

It is not yet clearly decided by naturalists, whether the middle canal of a ring communicates with the other, though *Winslow*,(83) *Fandelio*(84) and *Pallas*,(85) affirm that they have injected it through the whole length of the worm.(86) We only know with certainty that the canal contains a humour composed of a globular and albuminous substance: the former has great resemblance to the yolk,(87) and the latter to the white of an egg.(88)

Goeze describes the eggs as enveloped in a yellowish substance, which, macerated in water, is separated into small grains.(89)

We farther know with certainty that in the ar-

tifications which contain the ovaries, full of eggs, the most mature are those which, from the middle of the body of the worm, extend toward its tail.(90)

§ XVII The lateral edges or margins of each articulation of the armed taenia, are provided with a papilla at the extremity of which is observed an oblong opening.(91) which *Goeze* represents as separated by a line.(92)

These papillae, with their small mouth, occupy only one of the margins of each ring; their disposition is however such, that we sometimes see them in the right lateral part of a ring, and in the next in the left lateral part,(93) and at other times they rise in two, three, four, five, and even six rings on the same side, and immediately after in one or two articulations on the opposite side.(94)

It is probable that the internal structure of these papillae results from a tissue of fibres, since, if we are to credit *Rosenstein*,(95) the living worm has the power of thrusting them forward and of retracting them.

The small apertures of the papillae communicate with the ovaria, and on this account they are to be regarded as the last extremity of the egg-ducts.(96)

Goeze, though persuaded that the taenia sucks up its nourishment by means of the four openings situated in the head, nevertheless believes that the lateral papillae absorb the nutrition requisite to support the posterior division of this very long worm.(97)

If this is true, their orifices must be double, for we have remarked that the eggs of the taenia may be pressed from them,(98) as all naturalists agree.(99)

§ XVIII. That these worms originate directly from eggs, deposited by the same species, can no longer be doubted.(100) *Pallas*(101) introduced into the belly of a small dog some ova of a *taenia canina*; a month after he laid open the belly of the animal, and in his viscera found several small taeniae, having very short rings, which were not above an inch in length.

We are indebted to *Werner* for the discovery of the parts of generation of this taenia.

He has demonstrated that the organs constituting the two sexes exist in each ring,(102) and he has thus verified the doubt of some naturalists in relation to the hermaphrodite species of this worm.(103)

According to his observations, two canals open into the marginal papillae of each ring; the superior terminates in a round tubercle, which seems to be the male; the inferior is tortuous and filled with eggs, and whose lower extremity, enlarged in form of a cul-de-sac, seems to form the female. There is nothing therefore wonderful if the eggs of the taenia are fecundated at the instant of their being deposited.(104)

SECOND SPECIES.

THE UNARMED HUMAN TAENIA.

§ XIX. The greater number of physicians and naturalists have given to this worm the name of *Taenia lata*; (105) we owe to *Bonnet* (106) the first accurate description of it. I therefore deem it proper to present in this place his own figure of it, (107) because I find it the best of all those which modern times have produced.

It possesses also the further advantage of being true to life.

§ XX. The external form of the unarmed taenia is flat, resembling a riband: its colour is white, which *Pallas* regards as one of its specific characters; (108) its ordinary structure is rather coarse, dense or membranous. Its articulations are disposed in so peculiar a manner, that it may be clearly distinguished with the naked eye from the armed taenia. From the neck, the body is sometimes regularly intersected by transverse margins, not differing from those which unite the joints of the taenia cucurbitina; from this cause it might at first sight be confounded with the latter, if it were not flat and slender. Such is the flat taenia described by *Marx*, and which on account of this singularity I submit to the examination of my readers. (109) In general the joints of the neck are very thin and delicate, being almost imperceptible: those that follow approximate the figure of a square, gradually increasing in width in the body, and be-

coming a little longer, they thus continue to the tail, which resembles a truncated piece. The lateral margins become irregular and are said by naturalists to be closed.

This worm varies in length. The longest human taeniae which *Pallas* ever saw were from eighteen to twenty Paris feet, (from six to seven metres.)

Bloch sent one of these worms in several pieces to *Goeze*, discharged by a woman of Berlin, whose entire length was eighty two metres. The bigness, length and breadth of this worm vary with, or are in proportion to its age and nutrition, as we have said of the first species.(110)

§ XXI. The head of this taenia is very minute; like the other species, the head of this is also furnished with four lateral papillae, and with a single papilla, in the centre of which *Werner* has likewise seen the tube.(111)

This central papilla has not the crown of fangs which encircles the tube of the armed taenia.

These four papillae are also in this taenia, the orifices of the four lateral canals which pervade the margin of all the joints of the worm to the tail. The middle canal also passes through the centre of each articulation, but it is not known to communicate with that of the next rings, since neither *Pallas* nor *Goeze* was able to push an injection through its whole length, as *Winslow* assures us he has done.(112)

The neck is quite covered with whitish fila-

ments,(113) which render it lanuginous, or downy. Beginning with the narrowest part of its body and proceeding to the tail, the surface of each ring is made distinct by furrowed lines(114) which, if examined with the microscope, present a cord of three lines.(115.)

Both lateral margins of each ring are provided with a perforated papilla leading to the ovaria, inclosed within the substance of the above mentioned rings.(116)

§ XXII. In the centre of each ring we discover the ovaria, uniting in a nodus of an oval figure,(117) and pointed at one extremity. These ovaries, grouped together, were taken by *Bonnet* for so many glands, to which he gave the name of blossomed fields.(118)

On the superior part of each ring opens a small round canal corresponding with the centre of the ovaries.

Pallas asserts that the worm deposits its eggs through this canal.(119) It is possible that the opening of the marginal papillae may serve as the male sex of the worm, as well as to suck in nutriment, as we said of the armed taenia. From the great difficulty of procuring this worm among us, either living, or in a fresh state, we have not yet been able to pursue the various researches necessary to obtain an exact knowledge of its internal structure.

SECOND GENUS.

VESICULAR WORMS.

§ XXIII. *Joseph Ricci*, of Pavia, about fifty five years old, of a feeble temperament, and poorly fed, having been for three months subject to attacks of intermittent fever, and tormented by violent affections of the mind, was seized in the road, on the morning of November 26, 1797, with great torpor of the lower extremities. Dragging himself along with a reeling and uncertain step, he was suddenly taken with a severe pain of the upper part of his head, and at the instant he cried for help, he fell senseless to the ground. He was immediately conveyed to the clinical hospital, where I found him in an apoplectic fit, of a character altogether asthenic or nervous, as most physicians call it. Excitants were applied both externally and internally without effect, as the man died the following midnight.

On examining the body and finding nothing remarkable in the external substance of the brain, we attempted to open the two lateral ventricles, and found them filled with a bloody serum. Here an unexpected phenomenon presented itself; two large clusters of hydatids extended along the branches of the plexus choroides to which they were intimately attached, so closely that to separate them I was obliged to tear the substance of the plexus. (120) Each cluster of hydatids was about two inches in length, large and extended at its in-

terior extremity, which floated at the bottom of the ventricles; the summit terminated by a long cord folded in various directions,(121) and was strongly attached to the partition which separates anteriorly the two ventricles.

This double collection of hydatids so regularly disposed, being removed from the brain and attentively examined, we saw that each little bladder contained a real worm, of a structure quite singular.

§ XXIV. It was composed of a head similar to that of the taeniae, and of a vesicle full of water, and organized in a wonderful manner.(122)

The vesicle seemed to be formed of three different membranes; the first external, thin, transparent, and very shiny or glistening; beneath this was seen an arrangement of very slender circular fibres,—these were extended over another velvet membrane, which lined the inner surface of the vesicle or little bladder. Each small bladder was therefore one of those worms to which *Bloch* gives the name of hermits,(123) to distinguish them from the *vesicular social* worm, which is also a bladder filled with three hundred or even four hundred small worms.(124) The internal part of the bladder contained nothing but some water, and notwithstanding every examination we could make, we could not discover the least sign of any organ which might serve for the natural functions of this animal.

A very singular species of worm truly! The

figure of the small bladder is sometimes round, sometimes oblong, sometimes angular, etc.

While the worm is living, by slightly compressing the end of its long neck, the head seems to be furnished with fangs, and a little mouth like that of the armed taeniae.

§ XXV. Among authors we find our *vesicular worm* confusedly described under various names. It was called *Hydatis animata* by *Peyer*,(125) *Ova in porcis* by *Bartholin*,(126) *Lumbricus hydropicus* by *Tyson*,(127) *Hydra hydatula* by *Linnaeus*,(128) *Taenia hydatoïde* by *Pallas*,(129) *Taenia vesicularis* by *Goeze*,(130) *Taenia hidatigena* by *Fischer*(131) and by *Werner*.(132) I have called it vesicular worm, because this name seems to me most appropriate and convenient.(133)

§ XXVI. This worm has been several times found, not only in the brain, but also in various other parts of our body, by a number of illustrious physicians.(134) According to the observations of *Koelpin*(135) and of *Walther*,(136) the greater part of hydatids may be reduced to real vesicular worms.(137) *Pallas* is induced to believe that encysted dropsy may be produced by a cluster of vesicular worms.(138)

§ XXVII. It seems probable from observations already made, that this worm commonly resides in those parts of the body which abound in lymphatic vessels; its head is attached to their branches, absorbs the lymph they contain, and thus fills the small bladder that constitutes its body. Its eleva-

tions resemble crotchets or fangs, like the armed taenia; the head has these fangs imitating a coronet of wrinkles which serves firmly to secure the papillae which opens in the centre of its head, toward the parts of our body, and which draws its nourishment at our expense. This worm is therefore a very singular animal; it is only found in the most concealed parts of our body, that are entirely secluded from external substances. Not the slightest trace of its eggs have yet been discovered.

May they not be developed in the interior of the lymphatic vessels? (139)

§ XXVIII. Our vesicular worm differs from those seen in the liver of hares, of mice, and in the brain of sheep, though the latter resembles it very nearly.

In man, a single worm is contained in each little bladder, while in the vesicular worms of other animals, there are several small worms in each vesicle. The head of the human vesicular worm is without the bladder, to which it is united by its neck; in the vesicular worms of other animals, these small worms live within the parietes of the common bladder.

Lastly, the small bladder of the human vesicular worm seems to form the body of the worm, while in the vesicular worms of animals, it is merely the common recipient to contain the worms.

The figures of the vesicular worms of hares and sheep, as given by *Goeze*, are very exact; they merit attention, (140) in order to notice the

particular diversity between the latter and the human vesicular worm.

Bloch only has been capable of distinguishing them accurately.(141)

THIRD GENUS.

THE TRICOEPHALUS.

§ XXIX. Dr. *Wagler* was the first writer who described this worm;(142) it was found by professor *Roederer* and himself in the intestinum coecum of some French soldiers, who in the year 1760, were attacked at Gottingen with a contagious epidemic. The celebrated *Blumenbach* found it several times afterward in the dead bodies of some miserable and half starved subjects.(143)

Among us it may be said to be very rare, since so far as my information extends, no practitioner has had occasion to notice it.(144) *Wagner* and *Bloch* inform us that they have uniformly seen it in the coecum: others have seen it in the course of the large intestines, and *Werner*(145) says he has found it in the lower portion of the ilium.

§ XXX. We find the tricocephalus described by various authors, under the names of *Tricuris*,(146) *Ascaris tricuiria*,(147) of *Taenia spirille*,(148) and of *Fuseragnelo codi setola*,(149) or worm with a tail. The name of tricocephalus is the most appropriate.(150)

§ XXXI. Several naturalists, among whom we may count *Linnaeus*, *Leske* and *Werner*, have improperly classed it with the genus of the asca-

rides, though its figure has little resemblance to them. Still less can it pertain to the class of the taeniae, among which it is ranked by *Pallas*. *Bloch* and *Goeze* afterwards formed a particular genus of these worms, immediately following that of the ascarides.(151.)

§ XXXII. The form of our tricocephalus is that of a spiral line,(152) and its largest part does not surpass half a line in diameter. The external surface presents an assemblage of small transverse lines, like rings.

Its length is from an inch and a quarter to two inches. One part of the body terminates in a filamentous elongation, as fine as a hair, and coiled round in a very surprising manner. The other part, turning in a spiral form, most commonly terminates in a hook, broad and obtuse, and similar to the pistil of the liliaceous flowers. From this extremity the worm can put forth a sort of tube, enveloped in a sheath.(153)

Its extremity, terminating in this very fine filamentous elongation, and one half longer than its body, has been taken for the tail of the worm by *Roederer*, *Wagler* and *Wrisberg*,(154) and for this cause has been called *trichuris*. On the other hand *Pallas*,(155) *Müller*,(156) and *Goeze*(157) have demonstrated that this part is the real head of the tricocephalus.(158) *Werner* has also controverted the opinion of these three naturalists, but his arguments are too weak to prove it incorrect :(159) and we have reason to admit the head

of the worm to be at its anterior filamentous extremity, which serves as a neck.

In the opposite extremity terminates the intestinal tube, and for this reason, it should be regarded as the tail of the tricocephalus.

§ XXXIII. The tricocephali which are found in the intestines of men are of different sexes.

The tail of the male is turned round in a spiral form; while that of the female, on the contrary, is oblong and flat, like that of the beaver, larger than the body and bent.(160)

We discover the internal organization of the male of this worm by opening it and subjecting it to the microscope. It is provided with an alimentary and intestinal tube, and with spermatic vessels.(161) The tube of this worm, according to naturalists, may appear externally;(162) may it not constitute one of the parts of generation?

The female tricocephalus has not in fact this tube, or cylindrical invaginated body, which some authors have given it; it is the end of its tail which is quite obtuse.(163) Besides the intestinal canal, its ovaries, so well described by Müller,(164) may be easily seen; they are filled with a great quantity of eggs, which Wagler has observed(165) to be deposited by means of a particular canal.

These eggs, deposited by the female,(166) are of an oval figure, and pointed at both extremities. In the male not the least trace of them is seen.

§ XXXIV. Pallas has described a tricocephalus which he found in the intestines of the *Lacerta*

apoda.(167) It has been pretended that this was the same worm as that found in men by *Wagler* and by *Roederer*; but the last examination has evinced that the head of the tricocephalus of the *lacerta apoda* was crowned with small fangs, besides other peculiarities of structure,(168) never observed in the human tricocephalus.

On this subject *Goeze* says that the tricocephalus of *Pallas* should be regarded as a link, which, in the series of intestinal worms, unites the tricocephali with the *Gratteurs*,(169) or *Echinorynchi*.

FOURTH GENUS.

THE ASCARIS VERMICULARIS.

§ XXXV. This worm, like the *lumbricoïdes*, of which we shall presently speak, belongs, according to naturalists, to the same genus; they ought consequently to be described under the same article. If we however inspect these two worms, when brought together, we shall perceive material differences between the size and length of the body of the *ascaris vermicularis* and of the *lumbricoïdes*, and in the place these worms occupy in the intestines, which is not common to both, as well as in relation to the symptoms which they severally produce;(170) it seems to me that physicians should examine them separately, as has been done by most practitioners who have spoken of worms.(171)

§ XXXVI. The *ascaris vermicularis*, which has received divers names by authors,(172) is a

round, filiform worm, fine and slender at both ends, from four or five lines to an inch in length. The vivacity with which it moves, skips and bounds, is singular. If touched with a finger, or brought near the flame of a candle, its body contracts some lines in a surprising manner. It is perhaps to this contractility that we are to attribute those enormous irritations of the intestines, and particularly of the anus, which torment the sick, especially children, who are most subject to them.

The surface of this worm is full of wrinkles, which seem to be formed by a multitude of rings. Its anterior extremity is obtuse, its posterior end, or tail, is shiny and slender.

§ XXXVII. This worm resides in the large intestines, commonly in the cavernous cells of the colon and rectum. *Wulf* discovered an infinite number of them in a small sack between the coats of the stomach.(173)

I remember to have found several masses of *ascarides vermiculares* in the oesophagus of a woman, who died of a slow nervous fever. This worm is often found in the vagina of women.

It is remarkable that the *ascaris vermicularis* is never found alone, but in conglobate masses of other worms of the same genus. It may be said that they love to dwell in groups.

§ XXXVIII. This worm lives longer than any other in the human body; it can exist an almost incredible space of time. *Fabricius* re-

lates(171) the case of a man who was tormented for ten years by the *ascarides vermiculares*.

§ XXXIX. The nature of the aliment which supports this worm has been the subject of various opinions.(175) But it has at length been observed, that the mucous matter which lubricates the intestines and the vagina of women, is the substance for which it has the strongest predilection. Agreeably to this, it is not wonderful that we find the *ascaris vermicularis* in other parts of the body, in which the mucous fluid abounds, as those of the bladder, stomach, oesophagus, etc.

§ XL. Though *Van-Phelsum*(176) has treated at large of this worm, but *Goeze* has all the merit of teaching us its internal structure.(177)

This animal is very small ;(178) seen through the microscope, it clearly appears that its obtuse extremity is its real head.

It is furnished with two lateral oval protuberances, and divided in the middle, which is the mouth.(179) Its body gradually enlarges one third of its length from the head, and proceeding toward the tail, it becomes more slender and delicate, till it terminates in a cetaceous point.

A small canal opens into the mouth, which by dilating and contracting is connected with the stomach and intestinal tube. The opening of this canal is seen at that part of the body where it begins to diminish, in order to terminate in a very fine point, forming the tail.

This point is considerable in the female *ascaris*

vermicularis; it is considered by some naturalists as a characteristic sign of the female sex.(180)

§ XLI. In the male *ascaris vermicularis* we observe under the intestinal tube, a very small and very white canal, which extends quite to the end of the tail.(181) There is no doubt that the organs of generation, which characterize the male are situated in this part, and that it passes out in common with the posterior extremity of the intestinal tube.(182) *Van-Phelsum* found it filled with a whitish albuminous substance. He is however deceived when he pretended to have observed that the course of this canal was spiral, and that the tail of this worm terminated in a broad sack, distended with eggs.

Werner has also fallen into the same error,(183) for confiding in the remark of *Van-Phelsum*, he has given the figure of it without subjecting this worm to that rigorous examination, which he has bestowed on all the other worms, which he has drawn and described with exactness.

The figure of the male and female vermicular worms, given by *Goeze*, is the most perfect, and on this figure rests our description of them.

§ XLII. The intestinal tube of the female *ascaris vermicularis* is surrounded by a membranous canal containing nothing but fetuses, and which by pressure merely, can in great part be expelled through an aperture situated at about one third of the length of the body.(184) If a small portion of this membranous canal is subjected to the micro-

scope, we see it filled with innumerable embryos distended in various forms.(185) The figure of these embryos seems to be oval.(186)

The extraordinary quantity of fetuses in the female *ascaris vermicularis* need not be at all surprising, since these worms, according to the observations of *Goeze*, are *viviparous*;(187) the female expelling very small ascarides in a living state, after which she dies.(188)

Thus the opinion of *Kratzenstein* is equally refuted,(189) who pretended that the flies, habituated to draw food from excrements, deposited their eggs in the anus of children, and in this manner gave rise to these worms.

FIFTH GENUS.

.LUMBRICOÏDES.

§ XLIII. Naturalists are no where so much divided in their opinions as on this worm.

Linnaeus(190) reduced to the same species the *lumbricus terrestris* with that which inhabits our intestines, and for this reason *Vallisneri* called this worm *lumbricus humanus*, and we more conveniently have called it *lumbricoïdes*.(191) It has been sufficiently demonstrated that these two worms are strikingly different, in regard to the external structure of their bodies,(192) as well as in relation to their internal organs.(193)

The opinion of *Linnaeus* and of the writers who have copied him is greatly erroneous, as is that

of those who pretend that the human lumbricoïdes is different from the lumbricus that inhabits the intestines of other animals, notably those of the horse and dog.(194) The length and the extraordinary size of this worm are regarded by some as an essential mark of different species ; but this may depend on its different nourishment. And have we not every day examples of animals, which, abundantly fed on highly nutritious substances, become inordinately large above their natural state ?

Vallisneri found a very large one in the intestines of a calf ;(195) *Baglivi* describes another of these worms, thirty feet long, vomited up by one of his patients by smelling garlic ;(196) and *Rosenstein*, in the space of eight days, expelled nearly ninety of them, quarter of an arm (*bras**) long, from a little girl of eight years.

This question does not therefore seem to be solved, since analogy and observation can furnish several arguments sufficiently satisfactory, whichever of these opinions we embrace.

§ XLIV. The lumbricoïdes is perfectly round, commonly about the size of a writing quill ; most frequently it is from six, seven and eight to ten fingers' breadth in length.(197) In each individ-

* The French word *bras* is probably here a translation of the Italian *braccio* both from the Latin *brachium* arm ; but in neither of these languages any more than in our own, does the word seem to import a definite measure length. The French translators sometimes use it for one and a half metre precisely, and sometimes for rather less. *A. T.*

ual the sex is distinct: the male is smaller and shorter than the female.

Its colour is white, sometimes resembling flesh colour. The canal, which passes through the abdomen of the worm, is yellow and transparent. *Goeze* (193) regards this as a characteristic sign of this species. But this circumstance can be nothing more than accidental, because this canal being the alimentary tube, its colour must change with that of the substances it contains. Hence its appearance is sometimes white, black, yellow, ect.*

The whole surface of the body is wrinkled and annular, and tapers to both extremities. Most naturalists have supposed that the circular fibres embraced the whole circumference of the body. *Werner* has however demonstrated that the four longitudinal fibres are the only ones which pervade the whole superficies of the worm, and that those reputed circular are mere fragments of transverse fibres, which inclose the longitudinal fibres. (199)

This arrangement of fibres in the lumbricoïdes is precisely like that of the human intestine colon: for this reason, *Werner* considers all the fibres which form the surface of this worm, as true longitudinal and lateral muscles; (200) and, in this way, he very well explains the serpentine motions of its body.

* In some lately examined, the colour of this tube was purplish. These were expelled without life, and exhibited this appearance twelve hours after being discharged. *A. T.*

The transverse fibres are connected together by means of an abundant cellular tissue, which being moistened is greatly relaxed, and lengthens the body very considerably. *Goeze* asserts, that a piece of this worm one line long, after being macerated, acquired the length of an arm. What an extraordinary length may not this worm attain in the living human body!

§ XLV. It is to be remarked, that the external structure of the head and tail of the lumbricoïdes, is peculiar.

If we observe the head with the naked eye, we see three beautiful hemispherical eminences,(201) which insensibly terminate in a very sharp point.

Under the microscope we perceive that these three eminences are perfectly hemispherical,(202) and that *Vallisneri* described them with accuracy, when he compared them to three small hills.(203)

To a triangular aperture in the centre of these eminences, *Pallas* has given the name of a mouth with three lips, *trilabiata*.

We cannot perceive all these appearances in the dead worm, because every part of the body is then relaxed. In the living lumbricoïdes, these three hemispherical eminences change their aspect, as *Goeze* informs us,(204) who had the good fortune to see one of these worms at the instant it was sucking. In the living worm, on the contrary, we see that these three hemispherical protuberances are pyramidal, with a convex base truncated exte-

riorly with a very sharp piercing point, in such fashion as to be compared to the divisions or claws of common pincers. With these protuberances the lumbricoïdes attaches itself to the membrane of the intestines, and even penetrates it, and when sucking up the mucous secretions, it moves these eminences alternately like three jaws; thus the worm opens and shuts its triangular mouth, furnished with a tube which it can put out or draw in. A mechanism so well understood proves that these protuberances are tissues or textures of muscular fibres.

When the mouth of the worm is closed, these eminences approximate and form together a cone hard and firm at its summit, terminating in a sharp nipping point, and with this instrument it can even perforate the intestines, and make its way to other parts of the body, as into the gall-bladder,(205) into the cavity of the abdomen.(206) into the kidneys, the urinary bladder,(207) the brain,(208) as well as into other viscera.(209)

§ XLVI. This worm lives in the intestines, with other worms. *Rosenstein* mentions(210) an infant of four years, feeble and emaciated, who voided several ascarides vermiculares, four arms of a taenia, and ten lumbricoïdes. A similar case is related by *Montin*,(211) and practioners have frequent opportunities of noticing the lumbricoïdes associated with other worms.

§ XLVII. Children are much disposed to this worm, and adults are not always free from them.

In general they prevail most in persons poorly nourished and full of viscous humours, or attacked by some severe asthenic disease.

It has been observed that the more numerous these worms are, the smaller is their body.

These worms are generally found collected together in great numbers; some sick persons have discharged a hundred and fifty of them at once,(212) a hundred and seventy,(213) and a thousand in the space of some days.(214)

§ XLVIII. *Tyson*, *Redi*, and *Vallisneri* have been distinguished by their description of the organization of the lumbricoïdes.

Werner has latterly given us a more exact description of this worm, ornamented with excellent and perfect plates of it. The reader may consult them in plate V, here subjoined, and thus ascertain the organs serving for nourishment, and those destined to the propagation of the species.

§ XLIX. On opening the body of the female lumbricoïdes,(215) we immediately discover the intestinal tube, commencing at the head, and enveloped with other parts by cellular tissue.

It is thin and slender at its origia; afterward it gradually increases in order to contract and dilate into a sack, which may be called stomach; this terminates in an intestine, which adheres, like the oesophagus and stomach, to the abdominal line, extending quite to the tail, where is seen a very small aperture, which forms the anus of the worm.(216) Its colour is ordinarily dark and yel-

lowish, and in some places greenish. It is formed of wrinkles and valves similar to those of the human intestines.

The white line, reaching from the head to the tail, along the direction of the intestinal tube which is situated above it, is, according to *Werner*, the great artery, which he has observed,(217) as well as *Willis*,(218) to be full of red blood in the *lumbricus terrestris*.

§ L. About two inches from the head, in the abdominal line, is a small hole which is the aperture of the vagina, or egg-duct.(219) This hole opens into a canal (the vagina) nearly at a right angle, which, bending in form of an arch, dilates into two small sacks, forming the two horns of the uterus, the structure of which is truly wonderful,(220) with regard to the extremely delicate slender productions, turned and folded in various ways, in which each horn of the uterus terminates.

Here a white tenacious fluid is contained, similar to human semen, in which are suspended many granulated particles.

Werner imagines (221) that the uterine processes of the female *lumbricoïdes* communicate with the small vessels filled with a whitish fluid surrounding the intestinal tube, as has been observed in frogs by *Swammerdam*,(222) and by *Camper*.(223)

§ LI. The quantity of eggs enclosed in the horns of the uterus is immense.

Their external surface seems to be bristly and

villous : very shining on their inner part, they present to the eye of the observer a spiral circumflex line in the centre of them.(224)

Werner calls this line spiral, and regards it as the germ of the future worm.(225) The existence of real eggs in the female lumbricoïdes being proved, is no equivocal refutation of the opinion of *Frisch*, who, supposing that these worms were transformed like insects, considered them as so many larvae of the taenia.(226)

§ LII. The internal structure of the male lumbricoïdes, differs only from that of the female in the sexual organs.(227)

At the distance of some lines from the tip of the tail, commences a small canal of a conical figure, named penis by *Tyson*, which, tortuous and large, reaches a third way up the length of the worm, where, contracting and dilating, it forms a vesicle, (compared by *Werner* to the seminal vesicle,) and again narrowing like the horns of the uterus of the female, and tapering like a hair, interlaces with the intestinal tube, folded in a surprising manner, and terminates in several loose and floating filaments.(228)

The fluid, which fills this system of spermatic vessels, is not so glistening as the fluid of the uterus, nor, as in the latter, do we see any granulated particles swimming in it.

§ LIII. Several distinguished naturalists have maintained, by observations altogether illusory, that the lumbricoïdes was viviparous.(229) *Pereboom*

even believed that he saw a small lumbricoïdes come forth from the body of the female already dead.(230)

Tyson, Vallisneri, Van-Svieten, Van-den-Bosch, Goetze, and several other naturalists of merit, have proved that this opinion was without foundation, and they have demonstrated that the viscera, and particularly the very slender spermatic vessels, having passed out by some accident from the belly of the female lumbricoïdes, and turned in form of an arch, in consequence of the natural elasticity of these parts, have been erroneously taken for fetuses of the same species.

APPENDIX

TO THE

PRINCIPAL HUMAN WORMS.

§ LIV. Several eminent naturalists(231) have spoken, in their writings, of some other worms which are rarely found in the human body, and they have described them as particular species.

Though the history of these worms does not pertain directly to medicine, yet I deem it very important that physicians should know all the varieties of the worms of the human body, besides those which are peculiar to it, and may prove hurtful, agreeably to the observations which have been already collected.

In my opinion all these worms may be considered as varieties of those we have described, or as accessory worms,(232) which are not indigenous to the human system, but which sometimes introduced there, occasion peculiar and severe diseases.

§ LV. We should regard as varieties of the worms indigenous and peculiar to the human body, the membranous taenia,(233) the ascarides vermiculares, discovered by *Brugnatelli*(234) in the vagina of a woman, the ascaris lumbricoïdes of *Rosenstein*,(235) the stomach worm of *Pereboom*,(236) etc.

§ LVI. Among the accessory worms, or those not native to the human body, but which are sometimes found in it, we may reckon as chief the *Douve* of the intestines (*fasciola intestinalis*), (237) the ascarides of the stomach, (238) the ascaris of the nipple, the biting or pricking ascaris, (239) the Gordius or *Cri-no*, (240) the vena medinensis, dracunculus, or Guinea-worm, * (241) the exatiridion of *Treuilier*, (242)

* M. Larrey has had occasion several times to observe, in Egypt, inflammatory tumors, which are generally attributed in Africa to the presence of a worm which had penetrated the skin, the ulceration of which cannot be cured till the extraction of this pretended worm is completely effected.

Accordingly the mode of curing this singular malady consists in twisting about a small piece of wood a tender whitish filament, which is regarded as the body of the worm.

The greatest precaution is always taken not to break this thread or worm, for if unfortunately it should break, it is believed to produce such distressing symptoms, by penetrating deeper, as to require the amputation of the limb to save the life of the patient.

M. Larrey supposes that the morbid symptoms which attend these tumors, which he considers as mere furuncles (biles) or mild enthraces, arise in fact from the operation of extracting the Guinea-worm (*dragonneau*), and that these symptoms are aggravated when the operation fails.

He has very attentively examined this whitish filament, but did not find in it the smallest resemblance of a worm.

He was convinced, by dissection, that this thread is dead cellular substance, which they succeed to spin, as it were, through a hole in the skin, when a small portion of it is taken hold of and rolled round a piece of wood. M. Larrey believes that it is by this ill-judged manoeuvre that certain cylindrical portions of the cellular tissue are obtained, long enough to be confounded with a real worm.

and also the insect scolopendra, *scolopendre*.(243) It should be remarked that men, by swallowing the eggs of worms, which inhabit the viscera of animals, are exposed, in certain circumstances, to have these eggs developed in their own intestines.

In this way we are liable to be preyed on by worms, which are not proper to our species.

Afterward he had an opportunity of convincing himself of the truth of this persuasion by pinching the cellular scar of simple biles, as he thereby obtained the same result.

M. Larrey has acknowledged that without knowing it at the time, he found himself in opinion with Dr. Laborde, who being at Cayenne, had expressed the same sentiment, after a great number of observations.

See Le Bulletin des sciences de la Société Philomatique de Paris, pluviöse an 12. *F. Trs.*

NOTES

TO THE FIRST LECTURE.

(1) Among the great number of publications of naturalists and physicians of all periods and nations, on human worms, the following deserve to be consulted, and it may be added that they are truly classical.

1 Salandi, Ferdin. *Trattato sopra li vermi; Verona, 1607, 4°.*

2 Redi, Franc. *Osservazioni intorno agli animali viventi che si trovano negli animali viventi; Firenze, 1684, fol.*

3. Vallisneri, Ant. *Opere fisico-mediche; Venezia, 1733, fol. tom. 1, p. 113.*

4. Leclerc, Dan. *Historia naturalis et medicinalium lumbricorum intra hominem, et alia animalia nascentium, ex variis auctoribus, et propriis observationibus, etc.; Genevae, 1715, 4°.*

5. Andry. *De la Génération des vers dans le corps de l'homme, ect.; third edition, Paris; 1741, tom. 11, 8°.*

6. Van-Doeveren. *Dissert. de vermibus intestinalibus hominum; Lugduni-Batavorum, 1753, 4°.*

7. Pallas. *Dessert. de insectis viventibus intra viventia; Lugduni-Batavorum, 1760, 4°.*

8. Bloch. *Traité de la Génération des vers des intestins, et des vermifuges*; Strasbourg, 1788, 8°.

9. Werner, D. E. F. *Vermium intestinalium, praesertim Taeniae humanae brevis expositio*; Leipsiae, 1782, 8°.

Continuatio prima, secunda, et tertia, curante,
J. L. Fischer: Leipsiae, 1782, 1786, 1788, 8°.

10. Goeze, J. A. E. *Versuche einer Naturgeschichte der Eingeweidewürmer thierischer Körper*; Leipzig, 1787, 4°.

11. Retzius, And. Jo. *Lectiones publicae de vermibus intestinalibus, imprimis humanis*; Stockholmiae, 1788, 8°.

12. Zeder, J. G. K. *Erster Nachtrag zur Naturgeschichte der Eingeweidewürmer von J. A. E. Goeze*; Leipzig, 1800, 4°.

13. Joerdens, J. H. *Entomologie und Helminthologie des menschlichen Körpers*; III tom.; Hof, 1801, 1802, fol.

This magnificent and expensive work, which comprehends the description of all the human worms, I have not yet been able to obtain, though I have desired it, that I might make it known to my readers.

[To this catalogue may be added the following work in 3 vols. 8vo.

14. *Eutozoorum, sive Vermium Intestinalium Historia naturalis*; Auctore CAROLO ASMUNDO RUDOLPHI, Philos. et Med. Doct. Hujus in Universitate Litt. Gryphiswald, &c. &c. &c. Cum Tab. Æneis. Parisiis et Argentorati, et Amstelodami, 1810.]

(2) In looking over the observations of physicians, we see that worms have sometimes been found in the ventricles of the brain (*see p. 41, vesicular worms*), and even in the substance of the brain, *Bartholinus, Histor. anatom. rar. cent. i. Histor. 64*; in the tissue of the conjunctiva of the eye, *Mongin; dans la Journal de Medicine, T. XXXII*; in the angle of the eye, *actu natur. curiosor. V. II. observ. 116*; in the nostrils, *Angelini, de verme admirando per nares egresso; Ravenn. 1670, 4^o*; in the sinuses of the jaw-bone, *Bordenave, dans les memoires de l'Ac. de Chirurgie, tom. v*; in the ears, *Morgagni, de sedibus et causis morborum, etc. Epist. XIV. art. 7*; in the breasts, *Baldinger, Neues magazin für practische Aertze, Leipzig; V. B*; in the cavity of the thorax, *Burserius, Instit. Medicin. practic. vol. iv. p. 421*; in the lungs, *Redi, osservazioni intorno agli animali viventi, etc.*; in the heart, *Senac, Traité de la structure du coeur, de son action, et de ses maladies, Paris, 1774, tom. II. p. 137*; in the glands of the trachea, *Treutler, Observationes pathologico-anatomicae, etc.* in the tunics of the intestines, *Stoerck, Annus medicus, II, p. 228*; in the epiploon, *Wegelin, Observationes circa vermes; Argentorati, 1779, 8^o*; in the liver, *Acta naturae curiosorum, vol. v. obs. 112; vol. VIII. obs. 10*; in the pancreas, *Mauchart, Lumbrici teretis in ductu pancreatico reperti historia et examen; Tubingae, 1738*; in the kidneys, *Schacher, Pr. de Lumbricis in renibus repertis; Leipsiae, 1719.—Blasii, observat. medicæ, rarior.*

Observ. xxii; in the urinary bladder, *Brera, Sylloge opusculorum selectorum, etc.*; *Ticini, 1799, vol. iv. p. 1. Comm. Auct. Kühn*; in the uterus, *Mercurialis, de morbis mulierum lib. iv. cap. 2.*; in the vagina, *Brugnatelli, Giornale Fisico-medico, Pavia, 1795, tome iv. p. 71*; in abscesses of the abdominal muscles, *Acta Helvetica, vol. i. p. 73*; in those of the arms and other parts, *Bartholinus, Histor. anatom. cent. v. Hist. 43*; and even in the marrow of the bones, *Commercium Litterarium, Norimbergense, ann. 1741, p. 71.*

(3) Some writers have made mention of several worms peculiar to the human body, of an external structure so extravagant, that they have been questioned by other observers. Such for example are the rough bristly macrocephalous worm of *Borel, Observationum medico-physicarum, cent. ii. obs. 70*; the worm (*Gammarus**) of *Fabricius Hildanus, opera omnia, cent. iii. obs. 53*; the villous and cruciform worms of *Paré, Œuvres, lib. xxiv. cap. 19*; the shaggy worm of *Gallo, Dell' use del latte, tome ii. p. 133*; the worm with feet, of *Doleus, Adfectuum totius corporis humani præcipuorum Theoria et Praxis, Francofurti. 1664, 4^o, p. 219*; the worm of several feet, of *Heister, Medicinische und chirurgische und anatomische Wahrnehmungen; Rostock, 1753, 4^o, ii, B*; the serpents

* It is doubtless by mistake that Dr. Brera makes this citation here; for in the observation of Fabricius Hildanus he alludes only to the fatal symptoms occasioned by swallowing a living lobster. *F. Vrs.*

and lizards of *Gesner, Historia animal., de quadruped. ovipar. p. 41*; the horned worm of *Salmuth, observat. medic., cent. II. obs. 7*; and many others like them too numerous to relate in this place.

(4) Before the time of *Linnaeus*, physicians were only acquainted with the *lumbricus longus*, *lumbricus latus*, and *ascaris vermicularis*.

(5) In the classification of the human worms, we should include those only which constantly inhabit the human system, the varieties of the species, such as those of the *taenia*, of the *lumbri-coides*, as well as the worms which, by some accident, have found their way into the human body, such as the viviparous *gordius*, or *crino*, the insect known to naturalists under the name of *scolopondre*, the *fasciola intestinalis (douve)*, the *gordius medinensis (la veine de médecine)* the *ascarus psoricus*, (see the appendix of the principal human worms,) and other similar worms cannot be said to be peculiar to the human species, and therefore cannot make a part of the order of real human worms.

(6) *Vermium terrestrium et fluviatilium Historia, vol. II. p. 23.*

(7) Cast your eye over the collection of the principal worms in the annexed plates, and observe their external structure which is truly admirable in each species.

(8) There have been many disputes among naturalists respecting the existence of the brain of worms; but they have established nothing with certainty on

this subject, unless we consider as a brain, that protuberant mass analogous to the substance of the spinal marrow, which is seen on the head of some worms. It is nevertheless certain that these animals are endowed with sense or feeling, and there is sufficient reason to believe that they have nerves, especially since Professor *Mangili* has proved the existence of a nervous system in the Leech, in the *Lumbricus terrestris*, and in other worms of a nature like that of the human worms.

See *Brugnatelli, Giornale fisico-medico, anno 1795; tom. ii. p. 249: "De systemate nerveo hirudinis, Lumbrici terrestris, aliorumque vermium; celeberr. viro A. Scarpa, Joseph Mangili."*

(9) The word *Taenia* signifies a band; this worm is also thus named because of its flatness, length and breadth. Latterly *Zeder* has changed the name of *Taenia* to that of *Alyselmenthus*.

See *Zeder, Erster Nachtrag zur Naturgeschichte der Eingeweidewürmer, von Goeze, p. 221. (Alyselmenthus, id est Taenia auctorum.)*

(10) Those naturalists, who have admitted these accidental signs as characteristic marks, and have founded on them their systematic division of the species of the taenia, have fallen into an error. See sections VI and VII.

(11) *Traité des Maladies des enfans.*

It is probable that this worm may acquire such a size as not to be contained in the intestines, and may thus in part be expelled from the body. It dies, or some portion of it putrefies, and is evacu-

ated with the excrements. This is the real cause of the expulsion of certain pieces of the taenia, without the use of any remedy.

(12) *Dissert. de vermibus intestinalibus hominum; etc.*

(13) *Arzneyen*, II. B., *Langensalza*, 1767.

(14) See pl. I, fig. 1, v. vi.

(15) See pl. I. fig. 1, a c c d. fig. v. AB, fig. vi. a b.

(16) See pl. I. fig. viii.

(17) *Traité de la génération des vers des intestins, etc.* p. 15.

(18) See pl. I. fig. i. a b.

(19) See pl. I. fig. vii, f e.

(20) See pl. I. fig. vii. ix.

(21) See pl. I. fig. i. a c c d. fig. iv. a b. fig. v. A B.

(22) Let us consider for example the taenia which *Baldinger* says he saw, seven hundred feet in length (§ V). Admitting the neck to be fifty feet long, its head being cut off, and the rest of the body observed apart, it would have been taken for the entire body of a taenia by every observer. The same uncertainty would arise from the other part of the body separated from the neck. The length might lead one into a mistake; and the same worm examined superficially, would be described as two different species. We find this conjecture realized in a number of naturalists who have divided the same species into several.

(23) See pl. I. fig. iii. fig. iv. c e. fig. v. C D. and pl. II. fig. i.

(24) See pl. I. fig. iii. fig. x.

(25) See pl. I. fig. xi. and pl. II. fig. i.

(26) See pl. I. fig. v.

(27) *De la génération des vers dans le corps de l'homme, etc.* T. I. p. 198, 268.

(28) *Historia naturalis et medica latorum lumbricorum intra hominem, etc. tab. prima, A, B.*

(29) *Opere fisico-mediche* T. I. tav. 18.

. (30) The work cited, pl. XIX.

(31) We are accustomed to attach to things uncommon an idea of singularity which does not exist; we even forget all delicacy in order to induce belief. It has accordingly been imagined that each joint of a large taenia could live when separated from its contiguous joint. From this idea has originated the name of *taenia cucurbitina*, by which some have chosen to distinguish one species of the taenia, since it has been thought that this worm was formed by the union of a number of *vermes cucurbitinae*, or worms resembling gourd seeds.

This error, which for a long time prevailed in the classification of worms, is now acknowledged to be incorrect, though it has been countenanced by some excellent naturalists.

If we consider that taeniae, like other animals, must gradually obtain their full size, it necessarily follows that their external form must vary with their age: thus a young taenia must differ from a middle aged taenia, and from one of full age or of

the largest size, though all pertain to the same species.

(32) The Swiss, as has been said, are principally subject to this taenia, which has been described as composed of a delicate, lax, and membranous substance. *Linné, Amoenitates aedemicae, vol. ii. p. 7, tab. 1, fig. ii.*; and *Pallas, Elenchus Zoophytorum, p. 408, no. 3*, call this *taenia vulgaris*.

The same *Pallas* in another of his writings, *Neve Nordische Beytrag. I B, I S, p. 54*, calls it *taenia grysea*.

Goeze, Versucheiner Naturgeschichte, etc. p. 296, gives to it the name of *taenia membranacea*.

The head of this taenia has not yet been described, because it has not been seen. Its length does not exceed eight arms. Its body is narrower than that of the flat taenia (unarmed taenia). Each of the rings has marginal papillae at the sides, enclosing an ovary in the centre. These are the principal characters of this pretended new species of taenia. I think however with *Werner, Vermium intestinalium, praesertim taeniae humanae brevis expositio, etc. p. 49*, that it should be regarded as fallacious, or as described from badly preserved subjects.

Or may we not again suppose that it was a flat taenia, young or poorly nourished, or not yet developed?

(33) Authors in their turns have frequently contradicted themselves while describing its internal parts.

In truth, the generative organs are but very little known. The others have not been clearly exhibited, and are in fact but very imperfectly understood.

(34) The time requisite for the fecundation of the eggs has never yet been determined. *Bloch, Traité de la génération des vers etc. p. 17*, assures us that taeniae have eggs before they are four months old.

(35) See pl. II. fig. iv, v, vi, vii. *Bonnet* views them as particles of fat. *Andry* was the first who recognised them as genuine eggs.

(36) § XVIII.

(37) The work cited, p. 17.

(38) The work cited, *idem*.

(39) *De Ascaride et Lumbrico lato; Lugduni-Batarorum, 1729, 8°.*

(40) *Osservazioni de' medici provinciali di Svezia, p. 283.*

(41) They bear also cold with indifference. *Rosenstein, Maladies des enfans, etc. p. 301*, after having left a taenia in a plate for twenty four hours, put it into a vessel, pouring hot water upon it. The taenia began to move and to wind about; he then bathed it with fresh water; the worm seemed to die. In this manner he saw it die and revive alternately.

(42) Besides the sense of taste, of touch, and of sight, which have been attributed to these worms by various writers, *Konig, Acta Helvetica, T. 1*, is led to believe that taeniae possess also the sense of smell.

(43) *Phylosophical Trans. of the Royal Society of London, anno 1683, no. 146.*

(44) *See pl. I. fig. iii, c c, iv, c d d, XVI.*

(45) *See Haller, Artis medecae principes tomus III, Hippocratis de morbis, lib. IV, cap. 16; "De Lumbricis latis ac teretibus, Lumbricos teretes parere, latos non parere, sed abrumpi; Lumbricorum latorum ortus, species et signa diagnostica, et prognostica."*

(46) *Observationum, lib. III, Basil, 1641, p. 883.*

(47) *De la génération des vers, etc. tome 1, p. 195.*

(48) Bonnet also called that taenia with lateral marks or points, which had long joints, and taenia with umbilical marks, that which had short joints. *See his Traité d'insectologie, as well as his Mémoire sur le ver soletaire inséré à la page, 478 des Mémoires Mathématiques et Physiques présentés à l'academie royale des sciences par divers savaans, et lus dans ses assemblées, tome 1, Paris, 1750, 4^o.*

(49) Linnaeus admits four species of them; but one does not belong to man, and this we have not mentioned, in order not to confound human worms with those of other animals.

(50) *Systema Naturae, edit. xii, p. 1323, spec. 4.; "Articuli huic speciei longissimi." Amoenitat. academicae, vol. ii. p. 7, tab. 1, fig. i.*

(51) *Systema natur., p. 1323; "Articuli huic speciei, ex oblongo quadrate:" Amoen. academ. vol. ii, p. 7, tab. 1, fig. ii.*

(52) *Systema nat.*, p. 3324, "Articuli huic speciei brevissimi sextuplo;" *Amoen. acad. vol. ii. p. 81, tab. 1, fig. iii.*

(53) *Elenchus Zoophytor.*, etc. The three first species are the same as those described by *Linnaeus*; his fourth species is the *taenia tenella*; the fifth and sixth species by no means belong to the genus *taenia*.

(54) *Versuchiner Naturgeschichte der Eingeweidewürmer.* The taeniae constitute the tenth genus of the worms of the viscera. The species of human taeniae, which he has admitted are four;

1. *Taenia cucurbitina*;
2. *Taenia vulgaris, grysea Auctorum*;
3. *T. lata*; and 4. *T. tenella, Pallas.*

(55) *Goeze*, the work cited, p. 302, thus expresses himself: "The *taenia tenella*, which *Pallas* saw discharged from several sick persons at Petersburg, has great resemblance to the flat taenia, except that it is more slender, and in some of its parts more transparent; I therefore regard it as a variety of the broad taenia, or as a small flat taenia, not yet fully developed, or arrived at its natural size and growth."

(56) Other writers, for example, consider the long rings as characteristic of the broad taenia. *Vogel* admits them in the *taenia solium*. No naturalist has yet found the head of the *taenia vulgaris*. We cannot think with those who have believed that provident nature has refused to this taenia

a part so essential as the head; this is repugnant to good sense.

Vogel notwithstanding regarded this privation of the head as the distinct and specific character of the taenia vulgaris.

The existence of the head was on the contrary, according to him, the characteristic mark of the broad taenia.

For this reason, *Roederer* felt himself compelled very publicly to remark, that the taenia solium had a head. Certainly *Vogel* was not a fool; but sometimes the errors of great men seem to rise in proportion to their celebrity!

(57) See § VI.

(58) *Plater*, *Andry*, and *Bonnet* were assuredly not deceived in admitting but two species of intestinal taenae.

As to the taenia, called *common* by *Linnaeus*, *gray* by *Pallas*, and *membranous* by *Goeze*, we must agree with *Werner*, p. 49 of the work cited, that it is also a variety of the flat taenia, or a taenia described from subjects badly preserved. The following reflections of this distinguished observer are worthy of notice; I here use his own words: "Quae enim illi (taeniae vulgari) optimi Auctores duplicia in alterutra superficiei orificia tribuunt, ex quodam errore huc convenisse videntur, si quidem ego gemina tubercula quidem, ad latera posita, nunquam vero in superficiei, deprehendi. Quamvis ego autem is nullo modo sim, qui meas observationes horum optimorum virorum auctoritati opponere au-

derem, potui tamen ea propter cum iis non consentire, quoniam uti in multis veris opinionibus, ita etiam in erroneis Linnaeum nimis presso pede sequi videbantur, quapropter exinde illos optimos viros, Linnaei auctoritatem etiam in hoc propriae experientiae anteposuisse verebar. Non nego duobus tuberculis instructas Taeniarum species, quae tamen non ita, uti Linnaeus posuit, mediam superficiem occupant, verum potius ad latera, in utroque nimirum unum, collocata sunt.

“Possit ne igitur quadam observantis festinatione factum esse, ut ex aliquo exemplo, qui vel casu unius lateris tuberculorum series abrupta erat, illud solitarium tuberculum, quod in aliis duplex et oppositum observaverat, in mediam superficiem collocaret, novamque speciem latam, videlicet osculis solitariis, inde conderet? Quae mea qualis cumque conjectura effecit ut latam cum vulgari conjungens, hanc tantum ceu unicam veram speciem describendam esse existimarem.” The same *Goeze*, *Versucheiner Naturgeschichte der Eingeweidewürmer*, etc., p. 296, affirms, that he has no knowledge of this common or membranous taenia.

Supported by the authority of *Linnaeus* and of *Pallas*, he admits it into the class of human taeniae published in his work. It is proved then that the taenia tenella, see § XIII, *Note 35*, and the taenia vulgaris pertain to the flat taenia. There are but two real species which can be regarded as distinct

and characteristic among the taeniae observed in the living human body.

(59) This has been described by authors under different names; they have called it, 1. *Vermis cucurbitinus*, Plater, *Praxis medica*, p. 992; *Chaîne de cucurbitains*, Vallisneri, *Opere fisico-mediche*, tome 1. p. 177; Cocchi, *dei Vermi cocurbitini dell' uomo*; Pisa, 1758, 8°.

2. *Taenia* without thorns, (*epines*) Andry, *de la génération des vers*, etc. tome 1, chap. 3.

3. *Taenia* with long rings, Bonnet; see *Journal de Physique*, an 1777, avril, p. 257; Goeze, *Versucheiner Naturgesch.*, etc., p. 269.

4. *Taenia cucurbitina*, Pallas, *Elenchus Zoophytor.*, p. 269, no. 1, *Dissert. de infestis*, etc. p. 38, no. 4; Goeze, the work cited, p. 169.

5. *Taenia solium*. Linnaeus, *Systema Naturae*, edit. xii, p. 1323. sp. 1, Werner, *Vermium intestinalium praesertim taeniae humanae*, etc. p. 18; *Taenia solitaire*, Leske, *Elementi di Storia Naturale*, vol. 11; Milano, 1785, p. 233; solitary worm, Bloch, *Traité de la Génération des vers*, etc., p. 45.

6. *Taenia articulosa dimittens*, Dionis, *Dissertation sur le Taenia ou le Ver plat*; Paris, 1749, 8°.

7. *Lumbricus latus*, Tyson in *Philosophical Transactions*, etc., no. 146; *De Haen ratio mendendi*, p. xii., cap. 5, p. 210; Leclerc, *Historia naturalis, et medica Lumbricorum latorum*, etc.; Marx, *observata quaedam medica*; Berolini, 1772, 8°. p. 13.

(60) See *Heyde, Experimenta circa sanguinis missionem; Amstelodami, 1686, 8^o. p. 47*; *Tyson in Philos. Trans. 1663, tab. 1*; *Vallisneri, the work cited, tab. 18, 19*; *Leclerc, the work cited, tab. 1, a, tab. 2, b*; *Linnaeus, Amoenitates academ. tome II, tab. 1, fig. i.*; *Andry, the work cited*; *Limburg, in Philos. Transactions, 1766, p. 128, tab. 6*; *Marx, the work cited, fig. A.*

(61) See § VII, p. 9.

(62) *Linnaeus, Amoen. Academ., etc.*; and *Dr. Unzer*; see *Tentamen herpetologie, auctore, J. T. Klein, accessit J. A. Unzeri Observatio de Taeniis; Leidae et Gottinguae, 1755, 4^o. p. 67*, declare that they have found this same species out of the human body. These observations excited animated debates among the naturalists, to decide whether human worms were innate in man, or whether their eggs were introduced into the human system with our food. See the second Lecture. The taeniae which are nourished in the human body acquire so great a size, that they are never seen of like magnitude in other animals; it is for this reason that the human taeniae are peculiar to our race.

(63) The articulations or internodes of the neck of this taenia have great resemblance to very small folds. See Pl. I, fig. i.

(64) Plate I, fig. ii, xvi.

(65) Plate I, fig. iii. The largest articulations have this peculiarity, that their figure no longer presents a parallelogram. but rather a trapezium

with a truncated extremity in the lateral part toward the head.

(66) Pl. I, fig. xi.

(67) Pl. I, fig. x.

(68) As they are seen in aged taeniae. *See Vallisneri, Opere Fisico-mediche, T. 1, tav. 19, p. 177.*

(69) *See § IV, Goetze, Versucheiner Natur. der Eingeweidewürmer, etc., p. 278, remains in some measure in doubt on the vague and inconstant appearances of the articulations of this taenia, as he has subdivided his taenia cucurbitina into two species; he called the first taenia cucurbitina grandis saginata; and the second, taenia cucurbitina, plana, pellucida.*

After a deliberate examination of these two taeniae, for they are preserved in the museum of natural history of the university of Pavia, with the collection of other worms made by this illustrious naturalist; I believe the first species to be a taenia cucurbitina more advanced in age and better fed than the second.

(70) *See § VIII.* The articulations of the widest extremity of these taeniae may be easily separated from each other.

It was from this circumstance that *Dionis* named them *taeniae articulos demittentes*.

According to *Bloch*, this separation has been the source of numberless errors. The Arabian physicians, and after them several moderns, among whom we find *Vallisneri* and *Rosenstein*, recog-

nised in the articulations a particular life, and afterward distinguished by the name of *Vermes Cucurbitinae*, on account of their resemblance to the seeds of the cucumber.

(71) *De venamedinensi; Augusta Vindel. 1674, p. 230.*

(72) *Amoenitates academ., vol. II, p. 85.*

(73) *Observat. medic. cent. 1, observ. 59.*

(74) *Observat. lib. XXVI, cap. 32.*

(75) The work cited, pl. III. fig. iv.

(76) *Program. de Taenia, Goettingae, 1760, 4°.*

(77) See pl. I. fig. i. a, b. It is preserved in the Museum of the University of Pavia, where the two appendages of the head, in form of fangs or crotchets, are still clearly visible with the naked eye. I notice these appendages, because *Werner, Vermium intestinalium praesertim Taeniae humanae, etc. p. 25* asserts, that these crotchets are real blisters (*ampoules*) situated laterally on the central papilla, still called the middle canal of the head.

(78) We follow the central papilla within which the tube is concealed. See pl. I. fig. viii, c, f; See *Werner* in the work cited, p. 26—31.

(79) See pl. I. fig. viii, a b c d.

(80) These canals are not interrupted at each ring, as has been believed. If a taenia is macerated in a coloured fluid, the whole extent of the canals is coloured in proportion as the fluid has filled them.

(81) See pl. I. fig. xi, d e.

(82) See pl. I, fig. iii, xi.

(83) *Epistola ad Andryum*: in the *Journal des Savans*, an. 1731, p. 446.

(84) *Dissert. de Taenia canis, Patavii, 1758, 8^o.*

(85) *Nordische Beytrage, 1 Band, p. 52.*

(86) *Werner* supposes the contrary, the *work cited*, p. 33.

(87) These parts are, according to *Goeze*, so many ovaries full of eggs. See pl. II, fig. vii.

(88) We may view, says *Bloch*, *Traité de la génération des vers, etc.*, p. 46, as a peculiarity of this species, the ovaries resembling the form of a trunk, from whose sides issue branches, which are the more visible, as the skin is white, thin and transparent.

The same observer is convinced that these ramifications are real ovaries, because if we compare them, the eggs advance toward the marginal papillae.

These observations, related by *Werner* in his work which we have quoted, are worthy of attention. See p. 34 und following.

(89) *Versucheiner Naturgeschichte der Eingeweid., etc.*, p. 279.

(90) The articulations of about half the body rise toward the head; and besides that they have no visible marginal papillae in their internal substance, they present an immensity of very small atoms, which are, according to the conjectures of

Pallas, Nordische Beytrage, 2 Band. p. 77, must probably be so many of the future embryos of the ovaries.

(91) *See pl. II, fig. ii, a b.*

(92) *See pl. II, fig. iii.*

(93) Alternate papillae. *See pl. I. fig. iii.*

(94) Irregular papillae. *See pl. II, fig. i.*

(95) *Maladies des enfans, etc. p. 500.*

(96) *See note 88.*

(97) *Versucheiner Naturgeschichte, etc. p. 274.*

This celebrated observer affirms, that he found a taenia sucking, and was thus assured that the lateral papillae of this worm serve also for nutrition. *Rosenstein, Traité des maladies des enfans, p. 302*, had already remarked, that this taenia attaches itself firmly to the parietes of the intestines with its papillae, which he considered as absorbing vessels.

(98) *See note 88.*

(99) *Except Vallisneri and Linnaeus*, they took the ovaries of the taeniae for so many chylous vessels, their eggs for large and small globules of fat.

(100) *See § VIII.*

(101) *Neve Nordische Beytrage, 1 Band, § I, p. 58.*

(102) *Vermium intestinalium, etc. p. 123, tab. 2, fig. 37.*

(103) *See § VIII, Bianchi, de generatione vermium, p. 258*, was one of the first to assert, that each articulation of the taenia was hermaphrodite.

(104) This manner of fecundating the eggs, though it seems extravagant, is not beyond nature, since we know, from the beautiful experiments of *Spallanzani*, that frogs are thus fecundated, etc.

(105) *Linnaeus*, *System. natur. edit. xii*, p. 3324, spec. 4; *Pallas*, *Elenchus Zoophytor.*, p. 450; *Dissertatio de infestis viventibus, etc.* p. 35, no. 4; *Bloch*, *Traité de la génération, etc.*, xvi. species de l'ordr. 1, p. 38; *Goeze*, *Versucheiner Naturgeschichte, etc.* no. 3, p. 293. *Plater*, *Praxis medica*, cap. 14, names it *Taenia prima*.

Andry, *de la génération des vers*, T. 1, chap. iii. art. 2, called it *Taenia with thorns*, (*Taenia à épines*.)

Bonnet in the *Memoires de Mathematiques et de Physique présentés à l'académie royale des sciences, etc.*, T. 1, p. 418, gave it the name of *Taenia with short articulations*.

Dionis, *Dissert. de Taenia*, called it, *Taenia articulos demittens*.

Leske, *Elementi di Storia naturale, etc.* vol. II, p. 233, *Werner*, *Vermium intestinalium, etc.* p. 49, have described it under the name of *Taenia vulgaris*.

Bonnet, in another memoir inserted in the *Journal de Physique*, anno 1777, p. 262, again gave it the name of *common taenia*.

(106) *Memoires Mathematiques, etc.*, tom. I. p. 478.

(107) See pl. I, fig. v, vii, ix, xii, xiii, xiv, xv.

(108) “*Taenia lata, candida, articulis brevissimis, medio-nodosis, uniosculatis. Corpus longis-*

simum. Articuli multoties breviores latitudine corporis transversim striati, medio glandula tumidi. Oscula ab altero latere corporis, in media glandula in idem latus tumidiore, solitaria." See *Pallas*, the work cited.

(109) See pl. I. fig. iv. The rings seem to be circumscribed and long, as in the taenia cucurbitina. We cannot deny this even with the naked eye, but if one of these articulations is subjected to the microscope, as *Marx* did, *Observata quaedam medica, etc.*, fig. D. we shall perceive that it results from other short rings, not differing from those of the true flat taenia. It is possible that this taenia is very young, badly nourished, or not yet developed. "I must remark," says *Bloch*, *Traité de la génération*, p. 39, "that the articulations of this taenia sometimes acquired the length of an inch, etc."

(110) See § VII.

(111) *Vermium intestinalium*, tab. 3, fig. 47, p. 125.

(112) *Epistola ad Andryum jam cit.*

(113) See pl. I. fig. ix.

(114) See pl. I. fig. v. c c c c c.

(115) See pl. I. fig. xii.

(116) The difference of the taenia cucurbitina is, in some papillae, situated on one side only of the rings.

(117) See pl. II. fig. iv.

(118) *Memoir. de Mathemat. etc. T. 1.*

- (119) *Neve Nordische Beytrag.*, 1 Band. 1 st. p. 64, no. 4.
- (120) See pl. III.
- (121) See pl. II. fig. viii.
- (122) See pl. III. fig. ix.
- (123) *Traité de la génération des vers des intestins, etc.* 2 species, p. 52.
- (124) *Bloch*, the work cited, p. 56.
- (125) *Miscellan. natur. curiosor.*, dec. 4, ann. vii. observ. 206.
- (126) *Histor. anatom. rarior.*, cent. II, observ. 87, p. 293.
- (127) *Philos. Trans. of the Royal Society of London*, S. V. XVII. no. 193, p. 506.
- (128) *Systema naturae*, edit. xii. p. 1320, no. 5.
- (129) *Elenchus Zoophytor.*, etc., no. 413.
- (130) *Versucheiner Naturg.* etc. p. 248.
- (131) *Taeniae hydatigenae in plexu choroideae inventae historia, etc.*; *Lipsiae*, 1780, 8°.
- (132) *Vermium intestinalium, etc.*, p. 66.
- (133) This being the only worm found in the human body, (at least we know no other at present,) I leave it the name of *hermit*, given by *Bloch*, *Traité de la génération, etc.* p. 52, merely to distinguish it from the other vesicular worms which are noticed in the body of animals.
- I have not adopted the name of *taenia hydatidis*, given to it by *Pallas*, nor those of *taenia hydatigena* and *taenia vesicularis*, used by *Werner*, *Fischer* and *Goeze*, because all these are more proper to designate the vesicular worm, resembling

the taenia which is sometimes found in the liver of field mice, and the domestic mouse. See *Bloch*, the work cited, p. 51, the first species, the taenia-form vesicular worm, the name of *cysticerci*, lately given by *Zeder*, *Erster nachtrag zur naturg. der eingeweidewürmer*, etc. p. 303, is equivalent to that I have retained.

(134) In the brain, *Ludwig de hydrope cerebri puerorum, Lipsiae, 1774. Hufeland ueber die natur, erkenntrissmittel und Heilart der skroffelkrankheit, Jena, 1795, p. 339. Weikard Vermischte med. che Schriften v st., p. 74, 76. Medical facts and observations, London, 1792, vol. iii. In the liver, Baillie's Morbid Anatomy, London, 1793, no. 9. Under the pectoral muscles, Werner, Vermium intestin. brevis expositionis continuatio secunda, curante Fischer, p. 7. In suppurated abscesses, Hunter, in the Transaction of a Society for the improvement of Medicine and Chirurgical knowledge, London, 1793.*

(135) *Melanges, par le société des Curieux de la nature, à Berlin, vol. i. p. 350.*

(136) *Bloch, Traité de la génération des vers, p. 54.*

Zeder, the work cited p. 310, Professor *Walter* assured *Bloch*, the work cited, p. 54, that in examining some dead bodies, he saw a number of hydatids and vesicular worms pass out of them. *Werner*, however, in the work cited, p. 68. having examined the membrane of the hydatids, did

not find it organized, as I found it in the vesicular worm which I had occasion to observe.

(138) *Nordische Beytrage*, 1 band, p. 84, de *Haenratio medendi*. p. 3, vol. ii. cap. 16, § II; *Morraud*, in the *Memoires de l'académie de Paris*, 1722, p. 158; *Wagler*, lib. de *Morbo mucoso*, *Goettingae*, 1762, p. 190.

(139) Sometimes hydatids are true varices of the lymphatic vessels. *Sommering de morbis vasorum absorbentium corporis humani*. *Trajecti ad Moenum*, 1795, § XXII.

(140) It is well to have them before our eyes to form exact ideas of the structure of the vesicular human worm. See pl. II, fig. x, xi, xii, xiii, xiv, xv, xvi, xvii.

(141) See § XXIV.

(142) *Dissert. de morbo mucoso praesidae*, 1 g. *Roederero*, *Goettingae*, 1762, 4^o.

(143) *Handbuch der Naturg.*, etc., p. 410.

(144) It has been pretended that *Aldrovando* had given the description of this worm under the name of small lumbricus. A minute examination of his figure of this worm, clearly proves that he did not intend to speak of the tricocephalus, but of the *ascaris vermicularis*.

(145) *Vermium intestin. etc.* p. 84; *ascaris trichuira*.

(146) *Wagler*, *Dissert. de morbo mucoso*, etc.

(147) *Linnaei*, *Mantiss.* p. 543. *Werner*, *vermium intestinal. etc.* p. 84.

(148) *Pallas, Neue nordische, Beytrage 1, Band 1, srück, p. 3, no. 21.*

(149) *Leske, Elementi di storia nat. parte prima, vol. ii. p. 231, no. 3.*

(150) *Tricocephalos* or *capillary head.*

(151) This worm constitutes the seventh genus of *Bloch, Traité de la gén. etc. p. 72*, and the second genus of *Goeze, in the work cited, p. 112.* The former speaks of one species only, that is—of the human; the second describes a tricocephalus with the simple head (others reckon three species of them besides the human,) and one other having the head with fangs, see § XXXIV.

(152) I say more frequently, because *Bloch* has sometimes found it extended in a spiral line in the human *coecum*, as may be seen in his work already quoted, pl. IX, fig. viii. The form of this worm is very clearly represented in pl. IV. fig. i, ii.

(153) See pl. IV, fig. iii. 1 m.

(154) *Satura observationum de animalculis infusoriis, Gottingue, 1765, 8°, p. 6.*

(155) *Commentaria Petropolit. etc. vol. xix, p. 449.*

(156) *In the 12th part of his Natur forscher, p. 182.*

(157) *Versuch. Naturg. etc. p. 115.*

(158) See pl. IV. fig. iii, a.

(159) *Vermium intestin. etc. p. 85.*

(160) See pl. IV, and compare it with fig. i. and ii.

(161) *See* pl. IV, fig. iii.

(162) *See* pl. IV, fig. iii, l m.

(163) *See* pl. IV, fig. iv.

(164) “Ovarium magnum, elongatum, globulis minimis (ova enim exprimere haud potui,) perfusum, tubo ab utraque extremitate instructum est. Anterior varie flexa, et inter intestina contorsta: posterior vero spiralis sub initium partis filiformis perditur.” *See* Goeze, *Versuch. etc.* p. 115.

(165) *See* Goeze, the work cited, p. 116. “Fragment of a letter of Dr. Wagler to Counselor Wichmann, de Hannover.”

(166) *See* pl. IV, fig. v.

(167) *Comment. Petropolit. vol. xix. tab. 10, fig. vi.*

(168) *See* pl. IV, fig. vi.

(169) *Versuch. etc.* p. 123.

(170) Werner, *Vermium intestinalium, etc.* p. 72, says that the symptoms produced, whether by the ascaris vermicularis or lumbricoïdes, are nearly the same.

I pray the reader however to bear in mind all that has been said in the third Lecture on the variety of the symptoms occasioned by these different worms.

(171) It is however to be observed, that the ascarides vermiculares being viviperous, and the lumbricoïdes oviparous, have by naturalists been improperly ranked under the same genus.

(172) *Ascaris vermicularis*, Linnaeus, *System. Natur.* p. 1076; Bloch, *Traité de la génération*

des vers, etc., p. 69, 3^d espèce. Werner, *Vermium intestinal. etc.* p. 72: *Ascaris pollicaris*, Linnaeus, *Fauna suecica*, no. 1269; *Ascaride*, Vallisneri, *opere Fisico-medice, etc.* tom. 1, tav. 20, p. 178; *Vermis Ascaris*, Clerici *historia Lumbricorum latorum, etc.* fig. x.; *Ascaris graecorum*, Pallas, *Dissert. de infectis viventibus, etc.*: xiv, p. 12; *Ascaris cauda setacea*, Müller, *historia verm. fluviatil., etc.* no. 165; *Ascaris vermic. cauda subulata*, Goeze; *Versucheiner, Naturges., etc.*, p. 97; *Fuseragnolo vermicolare*. Lecke, *Elementi de Storia naturale, etc. parte prima, vol. ii. p. 230.*

(173) *Observationes chirurgico-medicae Quedlimburg, 1764, 4^o. lib. 2, obs. iv.*

(174) *Dissert. de Ascaridibus et Lumbricis latis, etc.*

(175) *Vandoeveren, Dissert. de vermibus intestinalibus, etc.*, is desirous of proving that the *Ascaris vermicularis* is nourished by the chyle which is not absorbed by the lymphatic vessels, but blended with the excrements.

But as this worm is found in the vagina of women, and in other parts moistened by the mucous fluids, we must rather believe that our worm is more closely connected with the mucus, etc.

(176) *Historia physiologica Ascaridum, Leonardini, 1762, 8^o. c. tab.*

(177) *Versucheiner Naturges. etc. p. 102.*

(178) See pl. IV, fig. vii.

(179) See pl. IV, fig. viii. ix.

(180) See pl. IV, fig. ix. i.

- (181) See pl. IV, fig. viii, k l.
- (182) See pl. IV, fig. viii, h i.
- (183) *Vermium intestinal. etc.* p. 74, tab. 5, fig. 136.
- (184) See pl. IV, fig. ix, k.
- (185) See pl. IV, fig. x.
- (186) See pl. IV, fig. xi.
- (187) *Versucheiner Naturges. etc.* p. 105, 108.
- (188) *Goeze, the work cited, p. 109, Fünste anmerkung.*
- (189) *Abhandlung nouders Erzung, der Würmer in menschlichen Corper, Halle, 1748, 8°. p. 28.*
- (190) *Systema Naturae, edit. xii, p. 1076.*
- (191) In order to possess a figure of the lumbricoides similar to the lumbricus terrestris, see *Tyson in the Philos. Trans. vol. xiii, anno 1683, no. 147*, this worm has been called *ascaris lumbricoides*, *Linnaeus*, the work cited; *Bloch, Traité de la génération, etc. p. 63. Müller vermium terrestrium et fluviatilium historia, etc. p. 35, no. 166; Werner, vermium intest. etc. p. 75. Lumbricus intestinalis; Pallus, Dissert. de insutis viventibus, p. 15, no. 4; Lumbricus teres, Clereci, historia nat. et medica latorum lumbricorum, etc. p. 224; Lumbricus intestinalis humanus teres, Klein, tentamen herpetologiae, etc. p. 62. Ascaris gigas hominum; Goeze, Versuch. Naturges. etc. p. 65. Fuseragnolo Lombricoide, Leske, Elementi di storia nat. parte prima, vol. ii. p. 230; Fusaria Lumbricoïdes hominum; Zeder, Erster*

nachtrag zur Naturges. der eingeweidewürmer, etc. p. 26.

(192) *Tyson, in Philos. Transactions, etc.; Pallas, Dissert. cit. p. 13, no. 4.*

(193) *Willis, Exercitationes de anima brutorum, p. 201, edit. gen. Redi, osservazioni intorno agli animali viventi, etc. p. 132.*

Those writers who have maintained that the human lumbricoïdes was exactly like the lumbricus terrestris, have certainly been inattentive to the species of the former, which are male and female, while in the latter the worm is hermaphrodite.

(194) *Zeder, Erster nachtrag., p. 26*, has satisfactorily made it appear that all the signs detailed by writers in order to settle the points of distinction between the human lumbricus and that of horses and hogs, are equivocal.

(195) *Opere fisico-mediche, tome I, p. 281.*

(196) *Epistola cit. ad Andryum, etc.*

(197) See pl. V, fig. i.

(198) *Versuch. Naturgeschichte, etc. p. 67.*

(199) *Vermium intestinalium, etc. p. 76; see pl. V, fig. v.*

(200) See pl. V, fig. i. One of these fibres is longitudinal and dorsal, the other abdominal, and the two others may be called lateral.

Each fibre is composed of smaller filaments. *Vallisneri* thought he discovered several dark points in these, which he called spiral.

Van-Phelsum has fully demonstrated the fallacy of this observation.

- (201) See pl. V, fig. i. a.
- (202) See pl. V, fig. iv.
- (203) *Opere fisico-mediche*, tome 1, tav. 34.
- (204) *Versuch. naturges. etc.*, p. 67.
- (205) This lumbricoides was five inches long. The observation is from Dr. *Maecker*; see *Bloch, Traité de la gén. des vers*, p. 66.
- (206) *Ludwig, Programma de Lumbricis intestinalia perforantibus, Lipsiae, 1762, 4°.*
- (207) *Blasii, Observationes medicae rariores, Amstaelodami, 1677, 12, p. 79, observat. 10, p. 80, obs. 12.*
- (208) In the brain of a sea calf; see *Bloch, Traité, etc.* p. 66.
- (209) *Schultz, Dissert. de Lumbricis effractoribus, Hulae, 1740, 4°.*
- (210) *Traité des maladies des enfans, etc.* p. 306.
- (211) *Vel. Acad. Handl.* 1763, p. 113.
- (212) *Benivenius de abditis, etc. cap. 86.*
- (213) *Mouteti, Theatrum insec.* p. 299.
- (214) *Peredia de curandis morbis, etc. lib. 1, cap. v.*
- (215) See pl. V, fig. viii.
- (216) See pl. V, fig. ii, iii.
- (217) *Tractatus de anima brutorum, etc. lib. 1, cap. iv.*
- (218) *Werner, Vermium intestinalium, etc. p. 79.*
- (219) See pl. V, fig. ix.
- (220) See pl. V, fig. ix.
- (221) *Vermium intest. p. 80.*

(222) *Biblia naturae*, p. 796, 802.

(223) *Opuscula minora*, Lipsiae, 1782, p. 131.

(224) See pl. V, fig. xi.

(225) *Vermium intestinalium*, etc. p. 82.

(226) *Miscell. Berolin*, tom. III, p. 47, tom. VI, p. 129.

(227) See pl. V, fig. vi.

(228) See pl. V, fig. vii.

(229) *Amatus Lusitanus*, *Curation*; *med. cent.* 5, no. 46, p. 513, relates the observation of another physician, his cotemporary, who, by means of a suitable remedy, succeeded in expelling from the body of a patient, a very long lumbricoid worm. Its head was crushed to pieces and other worms came out of it.

Borel, *Observationum medico-physicarum*, cent. 1, obs. 89, speaks of another lumbricoïdes which he observed to be full of an immense quantity of small worms. A similar observation has been sent to us by *Plater*, *Observationum*, lib. 3, p. 657, and by *Panarolo*, *Intrologismorum pentecostae quinque*, Romae, 1652, 4^o. obs. 15.

Thus has the imagination of several observers been sometimes surprised, though they have been enlightened men.

(230) *Descriptio et iconica delineatio novi generis vermium stomachidae dictis in corpore humano hospitantium*; *Accidit observatio medico-practica de Lumbrico per urethram excreto, nec non de Lumbrico alvino ut utmortuo parturiente*; Amstelodami, 1780, 8^o.

(231) We must except the *Ascarus scabiei*, since this, being the special cause of a peculiar disease of the skin, should be particularly considered; see *Bonomo, Osservazioni intorno ai pelli celli del corpo umano. Firenze, 1683*; *Linnaei, Amoenit. acad., vol. v. no. 82*; *Morgagni de sedibus et causis morborum, etc. epist. L. v, art. 4*; *Wichmann Aetiologie vonder Kraze, Hanover, 1786*; *Hartmann, Dissert. sistens quaestiones super Wichmanni aetiologium scabiei, etc. Francofurti, 1789, 4^o.*

(232) *Happii, vermium intestinal. hominis historia, p. 7, § IV.*

(233) See the note, no. 32.

(234) *Giornale Fisico-medico, Pavia, 1795, tome IV, p. 71.*

(235) *Traité des Maladies des enfans, etc. p. 304.*

(236) *Goeze, Versuch. Naturges. etc. p. 71*; *Werner, vermium intestinalium, etc. p. 87*; doctor *Pereboom*, a physician of Amsterdam, pretended that he had discovered a new kind of human worms, *Descriptio et iconica delineatio novi generis vermium stomachidae dicti, etc.*, which according to him inhabits the stomach; this worm is of a darkish colour, and seems to possess a more compact texture than that of the lumbricoïdes.

Goeze and *Werner* have however made it appear that this stomachic worm is a real lumbricoïdes, which may be a little different in some of its parts.

(237) *Fasciola intestinalis Linnaei*, *Systema naturae*, edit. xii, p. 1078; Dr. *Montin* expelled this worm from the body of a woman, and gave a description of it in the *Memoires de l'Academie Royale des sciences de Suède*, in 1763, p. 113, etc. This worm is found in the human body, and *Smezzio* had already spoken of it, *Miscellan.*, p. 563. See *Goeze*, *Versuch. naturges. etc.* p. 186.

(238) *Werner*, *Vermium intestinal. brevis exposit. Contin. etc.* p. 19.

(239) *Bloch*, *Traité de la génération des vers*, etc. p. 68, 71.

(240) We have in the *Traité des Maladies des enfans*, of *Rosenstein*, an excellent description of this worm: see also *Bloch*, *Traité de la gén. etc.* p. 73; *Goeze*, *Versuch, naturg. etc.* p. 123; *Werner*, *Vermium intest. brevis exposit. Contin. etc.* p. 5. When this worm insinuates itself into the stomach it is very dangerous.

(241) *Brera*, *Sylloge Opusculorum, etc.* vol. iii. *Ticini*, 1799, p. 254; opuscul. 5, de morbo Yaws dicto et de vena medinensi, etc.

(242) *Auct. ad Helminthologium corporis humani*, *Lipsiae*, 1793, p. 19, 22, tab. 59; *Zeder* calls it "Polystoma sphincteribus sex, pingucicola, depressum, postice acuminatum sphincteribus sub margine antico retractili lunatim positis, cauda curvata; habitat in adipe pone ovarium humanum;" *Erster, Nachtrag, etc.* p. 203.

(243) *Goeze* saw two of them expelled from an infant who died of atrophy; *Versucheiner Naturgeschichte, etc. p. 102.*

END OF THE NOTES OF THE FIRST LECTURE.

SECOND LECTURE.

THE ORIGIN OF HUMAN WORMS.

§ LVII. THE philosopher, surrounded by a multitude of immense objects, has always sought to raise that mysterious veil, which conceals the cause of the most surprising phenomena of nature. It is thus that the first useful discoveries have arisen; these have opened the way to researches still more wonderful, by the aid of which the fact has been established, that natural things have between them an affinity more or less remote or immediate, direct or indirect.

The continued examination and assiduous study of the great book of nature, have enabled us to establish several primitive laws, and led us to adopt a number of immoveable principles, of which the man of genius avails himself in order to elucidate various phenomena peculiar to living beings.

Guided by this method entirely analytical, and conducted by experiment, we arrive at just relations, unequivocal analogies, and solid points of union.

In conformity to these philosophical principles, I have laboured to investigate the prime origin of those worms which inhabit the human body.

This subject, divested of the hypotheses of naturalists, and treated with the evidence of facts, merits the full attention of physicians, since it directly influences the diagnosis and cure of verminous and other severe asthenic diseases.

§ LVIII. The origin of worms, not only in man, but also in other animals, has been the theme of profound meditations among the greatest naturalists and most eminent physicians.

On this subject there have been many disputes, and much writing, and some have imagined that much had been observed; but little however has been determined, while it has, in fine, been judiciously concluded to hold as doubtful all opinions hitherto adopted(1) by the most fortunate observers, since they rest on suppositions which, though ingenious, are rather slippery than solid.

§ LIX. Excepting only the vesicular worms, the structure of all the other human worms has not yet been sufficiently studied. Hence we have seen some of them furnished with the parts which constitute both sexes; others having both individuals united in one, as the taeniae;(2) while some exhibit these parts distinct in the different individuals, as in the tricocephalus,(3) the ascaris vermicularis,(4) and the lumbricoïdes.(5) This would be saying that our worms, like all other living beings less imperfect than they, proceed from eggs peculiar to the analogous species.(6)

In effect, some multiply by depositing their eggs, to be afterward fecundated by the passing of

the male without any preceding copulation ; others propagate by the union of the two sexes ;(7) while a third kind fecundate themselves like the taeniae.(8) See the *first Lecture*.

These observations which have been many times repeated and verified by approved writers, leave no doubt of their correctness ; they are directly opposed to the equivocal generation admitted by various naturalists as a cause of the origin of our worms.(9)

We readily agree that the simplicity of the structure of worms should exempt them from the ordinary laws, relative to the functions of their life.

It would however be improper to attribute their birth to some more simple combinations, which some persons have supposed they have seen by means of the microscope,(10) in comparison of other more perfect beings, while the organs which serve for their reproduction are visible.

Neither the sex, coition, nor the eggs, nor generation were known to *Aristotle* and the ancient philosophers, as they are known in our time. In those remote ages, no other generation for imperfect beings was acknowledged, than the corruption of substances.(11) Putrefaction must then have been considered as the cause of the existence of these individuals.

At this period there was nothing more ingenious than the doctrine of equivocal generation, in-

vented for the purpose of finding a cause for the creation of animals !

Nevertheless this sublime hypothesis, to which some have pretended to give weight in our day, after the surprising observations of *Needham*, (12) and the metaphysical reasonings of the very ingenious *Reil*, (13) seems by no means applicable here, since, I repeat it, the generative organs of worms, are very evident, as well as in the more perfect animals.

§ LX. The quantity of eggs which worms deposit in our bodies, being prodigious, it must follow, add the anti-ovarists and the partisans of putrefaction, that in every man an immense number of worms must be developed, which is contrary to experience.

This sage reflection, far from overthrowing the system already confirmed respecting the origin of worms, favours it in all its extension ; and, in my opinion, it proves nothing, unless it be that certain determinate circumstances are necessary to facilitate the development of the eggs and the rise of worms. *Rosenstein* has pointed out these circumstances so well that it is proper to give them in his own words :(14) “The eggs which are deposited by human worms in our intestines are developed, 1. when there is a moderate heat ; 2. when they are not carried out of the body, which is often prevented by the agglutinating mucus of the stomach and intestines, especially when they are situated in the folds of this canal, and when they are not displaced by the peristaltic or antiperistaltic motions of

these viscera, nor by the pulsations of the arteries which pervade their texture; 3. when they are not injured by the vapour which is continually diffused through the stomach and intestines by the exhalant vessels. In like manner sown wheat does not vegetate if it is inundated by incessant rains."

§ LXI. Children, women, and persons of soft and weak fibres, are more subject than others, to worms. In asthenic diseases, according to practitioners, worms are frequently voided with the feces, or discharged through the mouth.(15)

Children who have suffered the operation of cutting for the stone, are often tormented with worms, which are developed in great numbers in a few days after the operation.

The fear, occasioned by the sight of the apparatus, seems greatly to favour the increase of these animals, because it contributes to weaken the body.

From these practical observations, we may with certainty infer, that the debility or consumption of the parts of the human body in which the eggs of worms are situated, is an essential condition of their unfolding. This circumstance was fully understood by the estimable *Redi*, who was notwithstanding much embarrassed, when, in order to explain the formation of worms, he had recourse to his famous hypothesis of the sensitive soul, inherent in those parts of the human fabrick, from which the worm was to originate.

This learned opponent of equivocal generation, propagated an hypothesis still more metaphysical;

he has at least the merit of having apprised us that the addition of certain human animal particles, is indispensable to the development of the verminous germ, and for the nourishment of the hatched worm. It is thus that human worms, supported by human nutrition, acquire those differences of structure, which are not noticed in the worms of other animals, though of the same species.

In this manner may be explained those epidemics of verminous complaints, which being ordinarily the effect of uncommon scarcity of food, or of some putrid alteration of the atmosphere, commence with a set of symptoms quite peculiar to a general asthenic affection of the highest degree, and of a local consumption of certain parts of the body attacked with it. In fine, it is thus that certain individuals who are well nourished, are exempt from these attacks, and in whom the blood consequently circulates with force, whose secretions go on with harmony and regularity, the parts of whose bodies are maintained in a state of perfect cohesion; in this respect it may be said that health is general and local. The worms which live at the expense of the human body, though of the same species, reproducing themselves elsewhere, will they not be indigenuous to it?(16) Do the latter deserve to form a peculiar and separate class(17) in the general history of the worms which the naturalist meets, whether within or without the body of other animals?

§ LXII. The *Taenia canina solium*,(18) according to *Werner*, has great resemblance to the

human *Taenia cucurbitina* ; differing from it only in some singularities, by no means characteristic.

The same may be said of the short tailed taenia, found in cats. Its articulations, according to *Bloch's* figure,(20) in the middle of the body, can hardly be distinguished from those of a human taenia cucurbitina, somewhat advanced in age.(21)

In fact, *Pallas*(22) considers both as belonging to the same species, and he attributes to the diversity of food merely, the difference noticeable in their articulations.

In the *anitra clangula* and the *anitra fuligola*, we observe a taenia, which *Bloch* calls *taenia articulis conoideis*,(23) whose external form, excepting the tail, differs in nothing from the young human taenia cucurbitina, particularly from that represented in plate I, figure ii.

Sheep are very subject to worms, because of their feeble and lax fibre, and have a constitutional tendency to diseases of debility ; they are often tormented by a sort of taenia, which has been denominated *Taenia vasis nutritiis distincta*.(24) Its exterior form has great resemblance to the broad human taenia.

§ LXIII. We have already remarked that men and other animals are likewise exposed to vesicular worms.(25) The difference however which exists between the human vesicular worms and those of animals, seems to be essential ;(26) it must however be acknowledged that the history of these

worms is not yet well understood, since their organs of generation have not yet been discovered.

It cannot therefore be ascertained at present, whether the *hermit vesicular worm* belongs exclusively to man, or whether the social vesicular worm pertains exclusively to other animals.(27)

§ LXIV. The *tricocephalus* which *Bloch*(28) says he has found only in the human coecum, has been discovered by *Goeze*,(29) in the intestines of the male mouse; by *Wagler* in the horse,(30) and by *Ruyseh* in the wild boar.(31) Another *tricocephalus*, having fangs at the head in form of a crown, has been found by *Pallas*, in the *Lacerta apoda*, as we have already said elsewhere.(32)

§ LXV. In passing from the *tricocephalus* to the *ascaris vermicularis*, we must recollect that this worm is found in the intestines of the *Rana temporaria*.

Its resemblance to the human *ascaris* is such that *Goeze* pretends that our worms are innate in us.

He could not perceive the least difference between them, and, as an exact and impartial observer, was obliged, perhaps against his opinion, to reduce them to the same species, and to give a description of them together.(33)

This excellent and illustrious naturalist saw, on another occasion, the *ascaris vermicularis*, in the intestines of the pike and of the aquatic salamander.(34) All the *ascarides vermiculares* are viviparous like the human.

§ LXVI. The human lumbricoïdes is not at all distinguishable from that of the horse or hog ; and the distinctive characters which have been adopted by writers, even the most modern,(35) are very faint. If the lumbricoïdes are of but one species, there is certainly no good reason for separating them into three particular species.(36)

§ LXVII. If worms of the same species have been found in the human system and in the body of animals ; if the difference between them, though slight, arises from the difference of their food ; why resort to hypotheses to explain the origin peculiar to the worms of the human body ? If we also admit that *Linnaeus* was deceived, it is by no means surprising that the bishop *Menander*, cited by *Rosenstein*, that *Unzer* and *Tissot* declare they have found in water the same species that are seen in man ; may they not also be found in fishes and other animals ? Our researches respecting this genus, are very limited. Perhaps in time some more fortunate observers may discover the eggs of the principal human worms in those animals which supply our daily food, perhaps it may yet be agreed that there are worms which are peculiar to animals ; but we cannot admit that they are peculiar to each species, as *Bloch*(37) pretended ; they will form a separate class whenever the effects, produced by the quality of the nutriment that is assimilated to their parts shall be duly considered.

§ LXVIII. That a taenia and some lumbricoïdes have been found in infants, not yet come to

full birth, by *Hippocrates*, *Brendel*(38) and by *Selle*;(39) that a *fasciola hepatica* has existed in a lamb still *in utero*;(40) that worms have been found in infants who have died immediately after they were born;(41) and in sucking animals;(42) it seems that all these favourable arguments come in support of the opinion of those who believe that worms are innate in man and in other animals.

If we consider however that the eggs of worms are so small that they are imperceptible even under the tube B, no. 1, of *Hoffman's* microscope(43) (these eggs are real ovaries or masses of small eggs;) 44) nothing is more probable than that these eggs are absorbed by the lymphatic vessels, that they pass into the circulation, pervade the system with the blood, and are deposited in different parts of the body.

We meet in fact with these worms in the deepest and most hidden parts of man and other animals, though they ordinarily inhabit only the intestinal tube.(45)

I think we may conclude with *Dr. Panzani*,(46) that the worms of fetuses are engendered in the womb of the mother by the development of their germs, provided the necessary circumstances which we have pointed out, there concur.(47) Conveyed with the maternal blood 48) into the humors of the fetus, and accidentally deposited in the intestinal cavity abounding in mucus, they are here unfolded, favoured by their position and the viscosity of the meconium. These verminous germs are more

prone to expand and grow(49) in the fetal and infant body, than in older and firmer subjects, on account of their feebler organization. Hence the reason why worms are more frequent in infancy and weak persons, while they are comparatively rare at adult age, and still more so in robust and vigorous constitutions.

§ LXIX. Human worms, accustomed from their origin to live in our viscera, resist their ordinary motions, and grow there in an astonishing manner; and when expelled, they easily die like fishes and other aquatic animals when taken from their native element.

It should be remarked that these intestinal worms, if removed from their usual place of residence, either perish or are evacuated.

Taeniae and lumbricoïdes, having once entered into the stomach, are soon vomited up alive, or killed by the action of the digestive powers.

The lumbricoïdes, once passed beyond the valve of *Bauhin*, we may consider as destroyed, and they are evacuated.(50)

§ LXX. We now see how the eggs of the principal worms are introduced into the human body; since when once transported and absorbed into the mass of fluids, they are diffused through and deposited in the most concealed parts of the body, and there enlarge and unfold when circumstances favour their development.

Vallisneri sought for the origin of all worms in the first man.(51)

This opinion well considered, though afterward adopted by *Van-Phelsum*(52) and by *Andry*,(53) is subject to all the objections advanced by the physiologists and naturalists, who have proved by facts, how destitute of reason is it, particularly when applied to the universal generation of oviparous and viviparous animals. The worms found in fetuses and infants not yet come to the full term of gestation(54) leave no doubt that the seed of the worm is communicated to the fetus from the mother, whether she may have contracted it from her parents, or swallowed it accidentally with the substances taken for her daily food. If, by means of the placenta, the mother transmits to her offspring the matter which nourishes it and causes its growth, why may she not also transmit to it the seeds of the worms which are included in very small germs(55) and which circulate in her fluids?

Are not the personal qualities of the mind, and the peculiarities of the features, or those of her family, in like manner transmitted?(56)

Besides, the worms observed in the umbilical cord of the fetus,(57) in the uterus(58) and even in the placenta,(59) as well as the disposition to worms in the sons, mother and grandmother, remarked by *Rosenstein*,(60) evidently prove that the seeds of worms may be transmitted, not only from the mother to the fetus, but also developed in the parts contiguous to the route of communication.

§ LXXI. The oviparous animals, particularly birds, are very subject to worms; these increase or grow insulated from all communication with their mother.

It consequently seems that worms in them are innate, and that for this reason, they may likewise be so in man, since nature is uniform in her great operations.

This objection would certainly have great weight if all that *Bloch* affirms were true, that is to say,(61) that in most animals, there are worms peculiar to them. We have already observed that we cannot strictly admit that there are worms peculiar to each class of animals;(62) but that there are merely some varieties of them.

On the other hand it may be said that in oviparous animals, birds for instance and fishes, we meet with worms proper to each species. In truth, the fasciola, or small band (*ligula*) is common to fishes and birds;(63) we find in these animals indifferently the *gordius*,(64) the *capuckon*,(65) the *echinorinchus*,(66) the *planaria cylindrica*,(67) the *taeniae*(68) and the worm named *chaos infusorius mucosus*.(69) It is natural therefore that the eggs of these worms should, without distinction, be introduced into the animal body with its food, and that in man they should particularly be insinuated with the mother's milk.(70) *Rosenstein* says,(71) that with impure water we swallow an immense quantity of very small worms, and that it may be from this cause that many miserable peo-

ple are so frequently tormented with them.(72) In Sweden the third part of the sick poor, who are badly fed, and who use the waters of the Soëtra, are very often attacked with verminous diseases.

§ LXXII. Faithful to the maxims established in the beginning of this second Lecture.(73) and remote from all the charms of hypothesis, I have only been solicitous to present such observations as relate to the generation of worms in the living human body, which, if not entirely satisfactory, when philosophically analysed, throw some light on a subject which has always been the object of the most assiduous researches of physicians and naturalists.(74)

If we unite all that has been hitherto said, it seems that we may with reason establish six fundamental principles relating to the origin of human worms; if they should not satisfy naturalists, they at least merit all the regard of practitioners, for whom this work is intended.

We shall conclude, 1. That no worm can strictly be said to be innate in the human body; because the verminous seed or germ is received into our system, either from the mother while the fetus is in utero, or from sucking mercenary nurses,(75) or from the saliva of the nurse by the infant,(76) or finally it may be insinuated into us with our food and drink. In these ways, the eggs of worms are disseminated through our bodies. 2. That these seeds, in whatever manner they may get into the human body, are not developed unless deposited in parts

abounding in mucosity; in fact these worms are found in those parts of the body which are most liberally supplied with mucus; 77) besides, infants who have worms, commonly evacuate them with thick, whitish mucus in form of small globules.

The taeniae are also most frequently discharged in a mucilaginous canal, improperly regarded by *Lancici* as an excrescence of the intestines, (78) and which *Bianchini*, with more reason, has called the verminous receptacle or nidus, (79) made up of a great quantity of mucous matter, tenacious and gluy.

Nature therefore is not so remote from the law common to all oviparous insects, great and small.

These eggs do not become worms except in suitable places.

3. Besides the circumstance pointed out in no. 2, worms do not multiply except when the body is weak, which is particularly manifest in those parts where the worms are situated. The debility of the heart and arteries, and the extreme vessels, the wasting of the body, the torpor of the muscular and vascular systems, the excess of mucus, putrefaction, weakness of the organs of digestion, and diminished cohesion of the parts of the system, are all effects of a prevailing asthenic diathesis. The abundance of mucus being favourable to the development and nutrition of worms, they necessarily increase more rapidly in debilitated systems. (80)

In fact, children are more subject to worms than adults, and women than men; (81) in fevers and

other asthenic diseases, the patient is exempt from them after the recovery of his health.

The mucosities and lymph which abound in weak bodies favour the development of worms by serving to nourish them. These humours do not possess life, as *Hunter* supposed, and which the illustrious *Blumenbach* has so well refuted.(82)

4. Worms once developed in the human body, increase and multiply in the ordinary manner of the other more perfect animals, because they possess the genital organs of the two sexes; and as in each body and at all times, the circumstances which favour their development do not always take place; a great number of eggs are evacuated before they are unfolded; hence it was requisite that the number of female worms of the intestines should exceed the males, and that the quantity of eggs should supply the number lost, otherwise their species might become extinct.

The pike, carp, tench, and other fishes which we daily eat, deposite great numbers of eggs in fresh water; all these eggs do not hatch; many are destroyed by other fishes, and fail from circumstances unfavourable to their multiplication; these species are nevertheless perpetuated, because in the great quantity of eggs deposited, several are developed and grow.

Nature is therefore uniform in her operations, with regard to animals subjected to similar vicissitudes.

5. When worms have once been developed in the human body, they take effect and increase, and are nourished by the elements of our system, (doubtless by the most appropriate,) and they acquire a larger size than those of the same species which remain in the body of other animals, notwithstanding the diversity of figure, since naturalists have not yet been able to affirm a characteristic difference between them.(83)

It seems to be already proved, by an attentive examination of the rudiments, or first forms, of worms, whether human, or those of other animals, and perhaps also those of the earth, that they are formed and organized from the same matter, and that they exhibit a structure more or less uniform.(84) It is therefore natural that if these worms have acquired life in the human body, that they should grow there, and perish when discharged from it; but they can live in places where other beings would be destroyed or digested.

It is however demonstrated that the worms of other animals, introduced into our bodies,(85) if they do not multiply, like those proper to the human system, certainly live there and increase in size.

6. Finally, worms, being foreign to the human body, do not multiply or generate in it, except when it is predisposed to the asthenic diathesis, or when asthenia actually exists. It appears that *Bloch* has advanced a proposition too general in wishing to prove that worms are not always the

cause of disease in the human body ;(86) the presence of worms is at least a certain index of asthenia, which is a state contrary to that of perfect health.(87) Furthermore, the very extraordinary diseases occasioned by worms are either idiopathic or sympathetic, and they clearly admonish us that worms cannot remain with impunity in the human system.

END OF THE SECOND LECTURE.

NOTES

TO THE SECOND LECTURE.

(1) “Ingenuè fateor unam hypothesim non minus obscuram esse quam alteram; fateor etiam me nescire, quae vera sit harum, nec opinari me audere, ob difficultates ab utraque parte mihi impenetrabiles. Dies fortè docebit.”

Thus wrote *Retz*, an excellent Swedish naturalist, after having examined the different hypotheses published by several illustrious authors on the generation of worms in the human body. See *Lectiones publicae de vermibus intestinalibus, imprimis humanis, etc. p. 55.*

(2) See § XVIII.

(3) See § XXXIII.

(4) See § XLI, XLIII.

(5) See § XLIV.

(6) “From the egg of a fly proceeds a fly; from the egg of a hen, a pullet, and not a serpent; from the egg of a goose, a goose, and not a fish. Thus from one worm is produced another worm, and nothing else.” *Rosenstein, Traité des maladies des enfans, etc. ; chap. xxii, p. 293.*

(7) In this manner must the ascarides vermiculares be fecundated, since, as we have remarked, these worms are oviparous. See sect. XLII.

(8) See § VIII and XVIII.

(9) We ascribe to *Aristotle* the origin of equivocal generation. But before him, some ancient philosophers, particularly *Pythagoras* and *Anaxagoras*, counting as nothing the male, female, coition, the eggs, and generation of beings, had already imagined a certain order of nature, by which shapeless matter variously combined, tended to produce an organized being. According to *Aristotle*, there were three worms in the intestines, the broad worm, the earth worm, and the *ascaris*; all of them, agreeably to this philosopher, derived their origin from the excrements contained in the human body.

The theory of *Hippocrates*, on the origin of intestinal worms, seems to reduce itself to equivocal generation; this great man supposed that worms were developed in the fetus only, having remarked that in adults the excrements do not remain so long in the intestines, as the meconium does in the bowels of the fetus.

The system of generation, imagined by the celebrated *Buffon*, does not differ much from that of the ancient philosophers. This eminent writer pretended that the primitive molecules of animals, instead of being inert or dead, were deposited in the bosom of nature, already organized and living, and consequently more disposed to the generation

of different animated beings. The system of the infusory animals, to which some naturalists have had recourse in order to explain the origin of worms in the human body, is essentially contrary to the nature of those animalcules.

In fine the crystallization of salts, another argument of the partizans of equivocal generation, is, in my estimation, something too gross and insignificant to occupy my time in refuting it. For this inorganic production, the concurrence of homogeneous particles is indispensable: before this is applied to animals, it ought at least to be shown how the combination of heterogeneous particles can take place.

(10) The microscopical observations, on which the moderns rest their arguments in favour of the equivocal generation of some less perfect living creatures, ought not, in my opinion, to be regarded as certain proofs, because a subsequent examination has proved them to be false. For example, the infusory worms of *Bonnet*: *Considerations sur les corps organisés*; *Amsterdam, 1762, tome 1, p. 3*, and of *Wrisberg*, *Satura observationum de animalculis infusoriis, p. 95*, strictly compared with polypes, and which it has been thought are reproduced like them, have been found of a different sex by *Goeze*, *Bonnet*, *Und an deverer naturforscher ab handlung aus der Imektologie herausgegeben, von Goeze*; *Halle, 1774, p. 457*, who has observed that all the uteri of the females were filled with living fetuses.

(11) “Alia animalia sponte procreantur, alia in excrementis, aut jam in excretis, aut adhuc intra animantem contentis ut quae Taeniae, sive Lumbrici appellantur, quorum tria genera sunt, latum, teres, et quod Ascarida appellatum est, ex quo nihil procreari aliud potest.” *Aristoteles, Historia animalium, lib. 5, cap. 19*; see *Ar., Opera Graec. et Lat.*; ed. *Gulielm. du Vall., Lutet. Paris, 1729, in fol. p. 849.*

Sic ubi deseruit madidos septemfluus agros
 Nilus, et antiquo sua flumina reddidit alveo,
 Aethereoque recens ex arsit sidere limus;
 Plurima cultores versis animalia glebis
 Inventiant; et in his quaedam modo coepta sub ipsum
 Nascendi spatium: quae lam impersècta; suisque
 Trunca vident numeris: et eodem corpore soepe,
 Altera pars vivit: rudis est pars altera tellus.
 Quippe ubi temperiem sumpsere, humorque, calorque,
 Concipiunt: et ab his oriuntur cuncta duobus.
 Cumque sit ignis aquae pugnax, vapor humidus omnes
 Res creat, discors concordia factibus apta est.”

ORID. Metam. lib. 1, v. 422.

[The American Translator is neither prepared nor disposed to enter at any length into the merits or demerits of an hypothesis, which has already occupied more time than it has rewarded with any advantage. So far as he has examined the subject, or can conceive of it, he finds no reason to adopt the opinion of the equivocal generation of insects or of any other animals. But he would be less wise than presumptuous to imagine that he had any thing to offer which is likely to weaken the

faith of those who can believe without reason. This ever baseless and now declining supposition still enlists on its side, or holds in suspense, some enlightened minds, whose talents and industry he respects,* and this is the only circumstance which leads him to bestow a moment's consideration on the subject. If these friends of the doctrine did not hesitate to follow him, he would consider the production of any animal, however simple or minute, without the aid of animal life, organization, and action, as wholly incredible. The equivocal hypothesis is neither specious nor probable; it derives no support from analogy, no aid from reason, no countenance from facts. All these have another aspect and another tendency. The whole fabric we renounce seems to be nothing better than an unsuccessful effort to conceal that ignorance which its framers wanted magnanimity to acknowledge.

In its operation it has been worse than useless, tending to obscure truth by substituting for its light a senseless conjecture. It ascribes to chemistry, or to "creative warmth," what pertains alone to *animal life*.

In the natural sciences it has been thought a defect sufficiently great to confound the animal with the vegetable kingdom, which do indeed approximate and sometimes seem to run into each

* Among these are several of the writer's medical acquaintance. See *Rudolphi*, Cap. xviii, *De generatione Eutozoorum spontanea*; vol. i. published in 1810.

other. But this error is still more enormous ; with gross blindness, or the most vague and licentious imagination, it disregards the boundaries which nature has set between the animal and mineral divisions of her works.

Till this hypothesis arose, these sacred landmarks had remained inviolate ; but now inert, lifeless matter, mere earth, is at once to be endowed with all the properties and attributes of living, animal bodies,—and all this without an agent or a cause !

Whenever a disciple of the equivocal expedient will show us an ascaris or an elephant, (for though the examples differ, the labour will be the same,) bred without parents, we will hold ourselves bound to receive whatever he may choose to advance on the spontaneous production of animals. Till this exhibition is made, those who reject the idea of an effect without an adequate cause, as absurd and unfounded, must be permitted to believe that the generative system of insects and worms is destined to perform the same office which is assigned to it in other living beings.

It is true that every class of animals have their peculiarities, insects certainly have many, especially in their sexual organs and manner of propagation. The two sexes of the same species are so extremely unlike each other that they would rather be taken for completely different species than for animals that could pair together.

Among the bees and neighbouring species the greater number of individuals have no sex ; they are conceived and born, without being destined, as in the ordinary course, to conceive or produce impregnation. Their copulation is performed in a very extraordinary manner in many instances. The act is performed on the wing, and some are winged only during the short period of copulation. Some copulate only once, and the act is very soon followed by death ; in which cases the life of the animal may be prolonged by deferring the copulation.

It is said the hydatid, or vesicular worm, receives nourishment, like vegetables, from its external surface, having no mouth. The polypus has no organs of generation, as every part of its stomach, or body, is endowed with the generative power ; &c. &c.

But these facts, singular as they are, give no weight to the feeble hypothesis in question ; for here, as every where else, so far as we are acquainted with the natural history of animals, every one, it is immaterial however much the mode may vary, is produced and continued in its successive generations by the properties and actions of animal life.

“When the great Creator first gave being to the natural world, every part of the vegetable and animal systems was brought into existence by an extraordinary exertion of productive power ; they were not moulded and matured by the slow opera-

tion of time, and the cooperation of physical and mechanical forces, but ‘He spake, and it was done.’

“But since that first act of creating power, we see that these creatures are propagated and perfected by processes more gradual, successive, and operative, many of which can be successfully traced by human wisdom, and admit of being regulated, furthered and controlled by the interference of human culture and ability.” *Christian Observer*, vol. xiv. p. 574. But it is said there are hard cases in the natural history of worms and insects; it is true there are, but none of these are so hard as the defence of the device which is set up for their solution.

These cases are already greatly diminished in number, and the remaining difficulties are vanishing exactly in proportion to our increasing acquaintance with the forms, laws and operations of animated nature; and our progress in these sciences will at all times be accelerated by acknowledging the existing limits of our information, rather than by assigning false causes for known phenomena.

It is more fair and promising to admonish the student of nature of his descent into the twilight of doubt, or the darkness of ignorance, than to pretend to direct him where he cannot be guided in safety. Thus placed on his guard, if he cannot open a clear path for others, he will at least be more likely so to feel his way as to be able to retrace his steps to the point whence he started, and thus avoid the risk of being lost himself, as well as the hazard of misleading his followers.

On the whole, there is every reason to believe that the origin of all animals has been the same, and that the laws and conditions which prevail in the economy of other animals, take place also in the reproduction of insects and worms; the only diversity in relation to these animals is, that in these classes of their productions, nature accomplishes her purposes by some peculiarities of structure, and mode of action. I submitted this note to the criticism of a friend, who favoured me with the following observations.

“The doctrine of equivocal generation arose first, I believe, from a want of accurate observation; for the Epicureans were not nice observers. It has since been supported by ignorance and pride which are commonly associates.

This subject is very well treated in the 7th book of Cardinal Polignac’s *Antilucretius*. Some writers on intestinal vermes seem not to be aware that it is necessary carefully to distinguish insects from worms, as they belong to different classes of animals. The former, it is well known, are produced from eggs vivified by the male influence. In some of these the larvae are excluded within the body of the parent, others after the eggs are deposited, and in one genus both these modes occur. If you have an *Encyclopædia* at hand (which I have not) read the article *Aphis*. Many of the vermes, we know, are produced from eggs. I have often found those of the common earth worm.

lumbricus terrestris, with the young rolled up in them.

Among the lower orders the increase is rather by continuation than generation, and that by a division of the body, in some longitudinally into two; in others transversely, in which a portion of the body separates and becomes a perfect worm, and after a while another portion which becomes perfect like its predecessor.

In the polype tribe, both the common fresh water ones and those which form the numerous species of coral, the increase is by germs or buds; in the former protruded from the external surface, which are developed while they adhere; in the latter they are thrown out from the interior, and are developed after they are excluded: but they are not eggs. On this subject you will be gratified with the perusal of Ellis on Corals and Coralines.

I doubt very much whether the authors, from whom Virgil learned the art of making bees, knew that the bee differed from the flesh-fly in having *four* wings, or rationally to account for the appearance of the latter.

Blind philosophers! exclaims Palignae, to maintain that the corruption of matter could produce insects. You were ignorant of the invariable order established in the generation of all beings. Could you believe Nature thus capricious and inconsistent, thus capable of straying from her own

plan, and on this false notion build so monstrous a system !

Learn, that primitive laws are immutable, nothing can withdraw itself from their power; that the impulse first impressed on the machine of the universe by the hand of its Author can never change itself. That chance can neither supplant nor destroy it.

———— veterum stupidissimus error,
 Quasdam bestiolas sine progenitoribus ullis,
 Materiâ ex putri et calefactis sordibus ortas.
 Cocci ! quas latuit rerum immutabilis ordo :
 Siccine, Naturam incertam, morumque suorum
 Immemorem, et tantum potuistis fingere monstrum ?
 Discite primarum legum inviolabile numen,
 Et semel incussos, quibus omnis machinâ mundi
 Dirigitur motus, nullâ vi posse retundi,
 Nullo suppleri, nullo desistere casu.—*Antiluc.* lib. 7.

When we would treat of what we know not, we must call in the assistance of facts, which we do know and are well established. We must walk in the path of analogy by the light of experience and known laws. If we reject this light and stray from this path, we are likely to grope our way to absurdity.”]

(12) *Sommaire des experiences faites denierement sur la génération, la compositione et décomposition des substances des animaux et des végétaux, etc.*

(13) See *Brera, Commentari medici. Pavia, 1797, Tom. i. p. 1, 99, 195 ; Memoria sulla forza vitate di G. C. Reil. D'Outrepoint. Perpetua ma-*

teriei organico-animalis Vicissitudo, Hulae, 1798, 8^o.

(14) *Traité des maladies des enfans, p. 295.*

(15) In the space of six weeks, a lad of twelve years discharged more than a hundred lumbricoides: *Blasii, Observationes medicæ rariores, etc. p. 80.*

(16) See note no. 62 of the first Lecture.

(17) See § II.

(18) *Linnaeus, Amoen. acad. vol. ii. p. 98, tab. 1, fig. i. Pallas, Elenchus Zoophyt. p. 405; Nordische Beytrag, 1 Band, 11, S. I, fig. iii.*

(19) *Verm. Intestinal., Taeniae praesertim humanae, etc. p. 56.*

(20) *Traité de la génération des vers des intestins, etc. p. 43, plan. 6, fig. i.*

(21) See pl. I, fig. ii.

(22) *Neve Nord. Beyt. 1, Band, 1 Stück p. 47.*

(23) *Traité de la gén. des vers, etc. p. 29, pl. III, fig. i.*

(24) *Bloch, the work cited, p. 35, pl. V, fig. i.*

(25) See § XXIV.

(26) See § XXV.

(27) The social vesicular worm has lately been discovered in man by *Zeder, Erster nach. zur Naturges. der Eingew., etc.* He described it under the name of *Polycephalus hominis*. *Goeze*, before his death, having received from Professor *Merkel of Halle*, a group of human hydatids, recognized in them the social worm which he called *Taenia multiceps*; from all that can be collected from his manuscripts, he seems to consider this worm the

same as that found in the brain of sheep, in the liver of hares, of mice, etc. But *Zeder*, having examined them very attentively, found that the crown of fangs (*crotchets*) is single in the social vesicular human worm.

See the work cited, p. 312, pl. II, fig. v, vii; while in the social vesicular worm of animals we see this crown double, as may be observed in the figures published by *Goeze*, and which I have annexed to these Lectures, see pl. II, fig. xv. e, xvi. e f, xvii. f. *Zeder* has characterised the social human worm in the following terms: "Polycephalus corona uncorum simplici, capite imperforato, corporibusque pyriformibus."

(28) *Traité de la génération, etc.* p. 73.

(29) *Versuch. Naturgeschichte, etc.* p. 119.

(30) See *Goeze, the work cited, p. 117.*

(31) *Goeze, the work cited, p. 122.*

(32) See § XXXIV.

(33) *Goeze, the work cited, p. 97 and 102.*

(34) *Goeze, the work cited, p. 108.*

(35) *Zeder, Erster Nachtrag zur Naturg. der Eingew. etc.* p. 25.

(36) See § XLIII.

(37) *Traité de la gén. etc.* p. 89.

(38) See *Pallas, Acta Helvetica, tom. i, p. 59.*

(39) *Medicina clinica; Ticini. 1794, v. i. p. 142.*

(40) *Hartmann, in Miscell. nat. cur.; dec. 1, ann. 6 and 7, observ. 189.*

(41) *Doloeus*, *De morbis infantium*, lib. 5, cap. 10.

(42) *Wepfer*, *de cicuta aquatica*; *Basilae*, 1679, 4^o. p. 383, found the intestinum ileum of a small cat full of very long lumbricoïdes. The same observation has been made by *Vallisneri*, *Opere, fisico-mediche*, tom. i. p. 271, in a sucking calf. A very long taenia was seen by *Goeze*; see *Zeder*, *Erster Nach. zur Naturges.*, p. 317; it had been evacuated by a lamb, still living on his mother's milk. A case of taenia, somewhat similar, is related by *Raubin*, *Observations de médecine*; *Paris*, 1754; a young dog newly born had his intestines filled with a prodigious quantity of taeniae; *Blumenbach*; *Handbuch der Naturges.*, etc. p. 21.

(43) The objects were magnified 519 times in diameter, 312, 481 times in surface, and 174, 676, 879 times in the whole body, see *Goeze*, *Versucheiner Naturges. etc. vorride*, p. 10.

(44) See, for example, pl. II, fig. vi. *Bloch*, the work cited, p. 102.

(45) See note of the first Lecture, no. 2.

(46) *Cistalgia almintica*; see *Giornale per servire alla storia rogiolata della medicina di questo secolo*; *Venesia*, 1783, 4^o. p. 441.

(47) See § LX.

(48) Anatomists, for a long time, have been much divided on the question, whether the blood of the mother passes to the fetus by means of the placenta. Some, supported by observation, have supposed the vessels of the placenta to anastomose

with those of the uterus. A similar opinion has been maintained by *Vieussens*; *Memoires de l'académie de chirurgie de Paris*, an. 1773; by *Haller*, *Elem. physiologiae*, T. viii. lib. 19, sect. iii. § XXXIV; by *Denis*, see *Trewy chylos. foet.*, p. 18; by *Mery*, *Hist. de l'acad. royale des sciences*, 1708, p. 45, by *Bonnet*, *Sepulcretum anatomicum*, tom. iii. lib. 3, sect. XXXIX, observ. 1, no. 5; by *Heister*, *Compend. anatom.*, tom. ii, p. 86.

They relate several cases of pregnant women who died of uterine hemorrhage, and whose fetuses had no blood in their vessels. Mercury injected into the vessels of the uterus penetrates those of the fetus inclosed by this organ.

Cowper has observed the same in his *Anatomy of the human body*; Oxford, 1698, fol. tom. 54; *Dracke*, *Anthropologia*, edit. 3, Londini, 1727, 8°. vol. ii. cap. vii, p. 234; *Vieussens*, *Novum vasorum systema*; Amstelodami, 1705, p. 25; *Verheyen*, *anatomia*, lib. i, cap. xxv, p. 31.

The injections of coloured wax into the vessels of the fetus, when those of the mother were injected, as is related by *Nootwyck*, *Uteri humani anatom.*, p. 11; *Hummel*, see *Stacklin. Thesau. anat. ed. diss. ch.*; *Haller*, p. 751; by *Graaf*, *Opera*, Amsteto. 8°. cap. xxv, p. 296; by *Vogli*, *Anthropogenie*; Bononiae, 1718, 4°. P. II, p. 162; by *Hoelling*, *Dissert. de officio obstetricantium in partu naturali*, Argentorati, 1751, p. 16; by *Albinus*, *Anotat. academ.*; Leidae, 1754, 4°. lib. 1, cap. x, p. 35; by *Mekel*, see *Beaudelocque*, *An-*

leiturg zur Entbindungskunst, 1, B. aus d. franz vbeersets von ; by *F. Meckel, Leipsig, 1782, 8°. p. 165, not. 3 and 4* ; and by *Loder, see Müller, Dissert. genital. sex. seq. ovi. nutrit. foetus, atque nexus inter placentam et uterum histor. Jena 1780, § II, p. 35.*

One could hardly doubt of this intimate connexion between the vessels of the uterus and those of the fetus, if the efforts of anatomists, even less celebrated than these, had been requisite to determine the question with precision and certainty.

Ruisch, Opera anatom. medic. chirurg. ; Amstelod. 4. v. i—iv. Monro, see Med. Essays of a society of physicians at Edinburgh, vol. ii, art. 13, § XVI ; Roederer, de Utero gravido, p. 25 ; Hunter, Gulielmo, anatomia uteri gravidæ tabulis illustrata ; Birminghamiæ et Londini, 1774, fol. tab. xxiv ; Wrisberg, Experim. et observ. anatom. de utero gravido ; Gottingæ, 1782, 4°. p. 40 ; Observat. de structura ovi et secundinarum humanarum in partes matur. etc. ibid. 1783, 4°. § XXI, have in vain attempted to inject and propel the fluids of the vessels of the uterus into those of the placenta, and still less from the placenta into the vessels of the uterus ; the question might not have been yet settled, if *Dessault* and after him *Reuss, Novæ quaedam observationes circa structuram vasorum in placenta humana, et peculiarem hujus cum utero nexum ; Tubingæ, 1784, 4°. p. 44,* had not discovered some valves in the extremity of the

vessels of the placenta and of the uterus, which sometimes oppose the passage of injections.

(49) See § LXI.

(50) *Fragment d' une Lettre du docteur Wagler, sur le Trichuris ou Ver à queue, al conseigle Wickmann de Hannover; see Goeze, the work cited, p. 16, note.*

(51) *Opere fisico-mediche, tom. i. l. c.*

(52) *Historia physiologica Ascaridum; Leonardiae, 1762, p. 77.*

(53) *De la gén. des vers dans le corps de l'homme, etc. troisième édition, tom. i. p. 17.*

(54) See note, no. 48.

(55) See § LXVIII.

(56) *Hofmann, De foetuum in utero morbis, Disquisitio patholog. etc. p. 143. According to Haller, Elem. physiolog. corporis humani, etc. tom. viii; Lausan, 1778, § VIII, p. 97, children resemble their mother more than their father.*

(57) *Vesti, Dissert. de verme umbilicali; Erfordiae, 1710, 4°. Müller, De Verme umbilicali; Tubingae, 1605, 4°. Baldinger, Neues magasin sur praktische Aerzte, vi, Band, p. 54.*

(58) *A Castro, Medicina morborum muliebrium; Hamburgi, 1628, 4°. lib. ii, sect. ii. cap. xxxiii. Mercurialis, de morbis mulieribus proelectiones; Venetiis, 1601, 4°. cap. ii. Zacuti Lusitani, praaxis historiarum; Amstelodami, 1644, lib. iii, cap. xii, observat. 1.*

Schenck, Observationes medicae rarae, novae, etc. : Francfort, 1600, 8°. lib. iv, no. 312.

(59) *Stalpart, Vanderwiel, vol. ii. observat.* 29, speaks of a large lumbricoïdes found in the placenta, and of another which had passed into the umbilical cord.

(60) *Traité des maladies des enfans etc. p. 303.* He met with the taenia in two girls, whose mother and grand-mother had been troubled with this worm. Similar observations have been made in dogs by *Werner, Vermium intest. praesertim humanae, etc p. 102, 103.*

(61) *Traité de la gén., etc. ligula piscium, p. 98,* the seventh proof.

(62) See § LXVII.

(63) *Bloch, Traité de la gén. etc. ligula piscium, p. 2, ligula avium, p. 8.*

(64) *Goeze, the work cited, p. 125, 126.*

(65) *Goeze, ibid, p. 128.*

(66) *Goeze, ibid, p. 158, 162, 250.*

(67) *Goeze, ibid, p. 137.*

(68) *Goeze, ibid, p. 377, 409, 423.*

(69) *Goeze, ibid, p. 429.*

(70) *Werner, Vermium intestinal. etc. p. 104.*

(71) *Traité de maladies des enfans, etc. p. 294.*

(72) The band (*douve*) of the intestines, (*Fasciola intestinalis,*) the crinodes (*Gordii,*) though not human worms, sometimes enter our bodies and live in them, producing various severe symptoms; see *Rosenstein, the work cited, p. 304.*

(73) See § LVI.

(74) See the works of *Bloch*, already cited, and of *Goeze*, honoured by the celebrated Royal

Academy of Sciences of Copenhagen. I am far from adopting the opinion of these two authors, because their arguments intended to support them are in part hypothetical, and in part contrary to observation. The reader is at liberty to examine and compare the sentiment I have expressed in this Lecture, and then pronounce judgment on it.

I have related facts only, and with these for my guide, I have disregarded the opinion of others.

(75) *Werner, Vermium intest., etc. p. 103, 104.*

(76) *Werner, the work cited, p. 101.*

(77) See note of the first Lecture, no. 175, and that of no. 80, of the second Lecture.

(78) *Epistola ad Jo. Dominic Bianciardi.*

(79) *Lettere medico-pratiche intorno all' indole delle Febbri maligne deloro principali rimedi, colla storia d'e vermi dell' corpo umano et dell' uso del mercurio; Venezia, 1750, p. 70.*

(80) “Quaerenti autem, cur in tam larga, facillique communicationes ratione non plura verminosorum hominum exempla obveniant, responderem, id ea propter fieri non posse, quoniam ea ipsa ovula aliquam praedispositionem ad evolutionem requirunt. Absque mucositate nimirum intestinorum parietibus non ita facile ad haerere, nutriri, et evolvi possent. Calor etiam, debilisque intestinorum scybala tardo motu expellentium habitus, procreationem mirum in modum facillabit, quibus morbis viscido nimirum atque intestinorum signitie eae etiam gentes, in quibus plurimi verminosi reperiuntur, max-

imè obnoxii sunt. Sic vix aliter fieri potest, quam ut Helvetiae incolae, quorum maxima victus pars ex lacti ciniis paraetur, viscido Belgae et Rusi vero ob victus atque aëris conditiones intestinorum debilitate atque laxitate laborent ex quibus contitionibus facilimè magna ea Taeniarum atque vermium in regionibus illis obvientium copia explicabitur." *Werner, Verm. intest., etc. p. 104.*

(81) Et vere Taenia in amabili sexu frequentius sese exserere mihi videtur, quippe qui collectis circiter 164 observationibus, 90 ad faeminas, et 74 ad mares pertinere compererim praetereaque in piscibus, quorum esocem, percam, cyprinos, latum rutitumque et asellum nomino, et variis quadrupedibus faemellas saepissimè ni semper Taeniis gravidas mares vero numquam verminosos observaverim." *Pallas, Dissert. de infestis viventibus intra viventia, p. 61.*

(82) *De vivitati sanguini neganda; vita autem propria solidis quibusdam corporis humani partibus adserenda.* See *Brera, Sylloge opusculorum selectorum, etc. vol. i. opusc. 1.*

(83) See § LXVII.

(84) See §§ LXII, LXIII, LXIV, LXV, LXVI.

(85) See the Appendix to the principal human worms, § LIV, and following.

(86) *Traité de la gén. des vers, etc. p. 96, twelfth proof.* If animals sometimes, as well as man, do not perceive the presence of worms in their body, this fortunately proves that they are not nu-

merous, and that they are not situated in irritable and sensible parts. In these instances the worms surely are no cause of disease. This accidental circumstance cannot establish a general rule, and the best practitioners have condemned a proposition so badly applied. They have also demonstrated as extravagant the opinion of those American physicians, who have pretended that a small number of worms might be beneficial to the health of children; according to their opinion, these worms may be intended by provident nature to consume the superabundance of nutritious substances in the body of children. The want of worms, according to these physicians, would be a state of disease; in truth, they have not omitted to speak, in the nosology of that part of the world, of this particular class of complaints. What extravagance of the human understanding! exclaims *Weikard, Elementi di medicina, etc. Pavia, 1800, Tom. ii, Fac. ii. p. 71.*

(87) In fact *Brown, Weikard* and other modern observers have reduced the disorders, occasioned by worms, to the class of asthenic diseases; in the classification of diseases they precede tabes, or if you please, the general consumption of the body. See *Brown, Elem. di Medicina, Roma, 1797, 8^o. vol. ii. p. 280, §§ DLXIX, DLXX.*

THIRD LECTURE.

VERMINOUS DISEASES.

§ LXXIII. When the seeds of worms are once developed in the human body, health is more or less deranged,(1) and the morbid symptoms which then appear, are in proportion to the number and size of the worms, to the sensibility of the parts they occupy, and the general morbid diathesis which takes place at the same time, whether as the cause or effect of the worms.

Hence it is that verminous affections are sometimes local, and sometimes sympathetic and general.

1. LOCAL AFFECTIONS FROM WORMS.

§ LXXIV. These diseases are seated in those parts of the body wherein the worm is developed or to which it is transported.

The physician observes the symptoms in the part affected, and in distant parts of the body with which an immediate relation subsists by means of the communication of nerves, and is able to distinguish the symptoms peculiar to each species of the worms already named.

For this reason we may call the symptoms, produced by the presence of worms, either partial or common.

§ LXXV. Children and persons of a feeble constitution and lax fibre are most predisposed to worms.

Children are most frequently tormented by *ascarides vermiculares* and *lumbricoïdes*; adults, on the contrary, are subject to *taeniae* and vesicular worms.

In nervous fevers and other asthenic diseases, both acute and chronic, the complication of worms is very frequent, especially the *tricocephili*, as we see in the history of verminous epidemics.

[*Verminous epidemic* is incorrect language, because it implies the existence of a morbid cause which is inadequate to produce the effect ascribed to its agency: at least there is no evidence that intestinal worms ever have produced an epidemic malady.

In the first place, we cannot imagine that most of the inhabitants of a populous city, or of an extensive territory, ever had, at any one time, a sufficient number of worms to occasion a sickness of any sort; and secondly, if we could suppose these worms so to exist, they would not produce an epidemic disease, but a considerable number of different diseases, all occurring simultaneously. That certain causes may sometimes arise tending both to generate disease and to increase intestinal worms, cannot indeed be doubted; some of these are the

exhalations from unhealthy grounds, unfavourable seasons of the year, deficient and unsound diet, &c. It is also true that during the continuance of fevers and some other diseases, worms may be unpleasantly affected, and even expelled from the body. These effects may happen either from the influence of the disease on these animals, from a failure of their usual nourishment, or from the operation of remedies used to restore the sick. Under these circumstances worms may, and do, render any prevalent disease more complicate and severe, but that they alone ever produce an epidemic disorder, is a doctrine which it would be equally unphilosophical and unsafe for a physician to admit. *A. T.*]

THE COMMON AND GENERAL SYMPTOMS OF WORMS.

§ LXXVI. The signs of the presence of worms in different parts of the body are certainly very obscure and equivocal.

Among the symptoms common to them, there are some which may arise from a cause very different from a verminous affection.

In the year 1797, a man came to the clinical hospital of Pavia, who was several times examined and always exhibited the symptoms peculiar to tænia; they produced the effect however of flatulent colic, which disappeared after the use of a stimulant regimen. Similar examples are reported by *Tode*,⁽²⁾ and confirmed by daily practice. It also happens, not unfrequently, that the sick evacuate

worms without any previous sign of their existence.* The most sure sign in the local or sympathetic affections arising from worms, is their expulsion by the mouth or per anum.

The human body, however, when deranged by worms, presents some phenomena which may at least admonish the practitioner of the probability of their existence.

§ LXXVII. In persons attacked by worms, the colour of the countenance is changed; it is sometimes red, then pale, or leaden-coloured; a half circle of azure appears under the eyes, they lose their vivacity, and are fixed and motionless with regard to surrounding objects; they are sad and dejected; the lower eyelids swell and the pupils are evidently dilated. At other times the eyelids are yellowish, and the same tint extends over the white of the eye. There are also insupportable itchings in the nostrils, with occasional hemorrhage from the same parts; (3) headache is frequent, especially after taking food; this is sometimes so violent as to produce delirium and phrenitis.

The mouth is full of saliva, and exhales a fetid and verminous odour; there is grinding of the

* We saw in 1801, at the clinical hospital of Prof. *Pinel*, a woman, 50 years old, who had all the symptoms of a gastric fever; three grains of tartrite of antimoniated potass were prescribed; the patient vomited much porraceous matter; the day after she voided with the feces, a piece of flat taenia, about four metres long. The woman never after experienced any symptoms of the presence of worms. *F. Trs.*

teeth; uneasy and agitated sleep, and great thirst. Sometimes somnambulism renders the patient timid. Fainting, vertigo, and tingling of the ears, augment the morbid state of the sufferer. The cough is dry and convulsive, sometimes stertorous and even suffocating, respiration is difficult, and sometimes attended with hiccough; speech is interrupted, and in some instances entirely suppressed. The mouth is frothy, and there is palpitation of the heart; the pulse is hard, frequent, rapid and intermittent.

The belly is tumid and troubled with borborygmi; there are eructations, nausea, reaching to vomit, and vomiting. At one time there is no appetite, at another it is so great that the patient is compelled to take more food than ordinary.(4) The belly swells and is the seat of severe pains, there is a sense of pricking and tearing which is not fixed but wanders over the whole adominal cavity; these sufferings are aggravated when the stomach is empty, and immediately cease on taking food. The bowels are sometimes relaxed, sometimes costive.

The urine is crude and turbid; the excrements fetid; cardialgia afflicts the patient and sometimes destroys him;(5) the body is emaciated, though the patient eats much; and violent itching of the arms sometimes occasions fainting.

At other times tenesmus aggravates the pains of these parts. Languor, anxiety, listlessness and extravagance in conduct, discourse and the intel-

lectual functions, are observed in persons harrassed with worms.

§ LXXVIII. We are not to suppose that the union of all these symptoms is requisite to enable us to judge of the presence of worms ; the principal of them are sufficient, and they are, according to *Mouro*,(6) unusual dilatation of the pupil, salivation, extraordinary appetite, wasting of the body, a pricking sensation at the stomach, tumefaction of the abdomen, anxiety and loathing of food. *Rosenstein*(7) affirms that the surest sign is the comfortable state of the patient after drinking a glass of cold water, and voiding some worms or fragments of worms. I have witnessed pains of the joints similar to those of arthritic rheumatism, accompanied by dilatation of the pupil, an abundance of saliva in the mouth, and an intolerable itching at the end of the nose.

All these are so many almost certain signs, in children and feeble women, of worms in the intestines.(8)

§ LXXIX. We have already proved,(9) that worms of all species and sizes, may live concealed in every part of the human fabric. The symptoms derived from worms have relation to the part affected and injured.

The functions assigned to each part, and the mode of their performance in health and in sickness, are soon made apparent by the morbid phenomena, whether they arise from the affection of a particular part, or from the lesion of some other

viscera which are immediately or sympathetically connected with it ; (10) thus when worms have passed into other parts of the body from the stomach and intestines, the patient will present signs resulting from a local affection, even some which arise from the sympathy of the parts connected with the seat of the disease.

A woman who had fallen into the water, was seized with a violent pain in her head, a spasmodic contraction of the eyes, particularly the right, and vertigo, so that she could not stand ; often after dinner, or in the evening, she was surprised by a giddiness and sort of apoplexy, which deprived her of sense ; she became blind for a few moments, her eyes rolled about, and the whole surface of her body became red. Believing the disorder to originate from nervous weakness, the remedies recommended in vertigo, were ordered, but without success. One day feeling something in her nose, she introduced a long needle, in form of a hook, and extracted first a living lumbricoïdes, then two more, then a third, and afterwards a fourth ; the disease abated but did not entirely disappear. The necessary remedies were directed, seven more worms were brought away, and this woman was perfectly cured of this terrible disease.(11)

A man, about thirty eight years old, of a pale countenance and feeble constitution, had complained for three years of a fixed obtuse pain in the right hypochondriac region. Except a putrid fever ten

years before, no complaint had led him to take any medicine.

Afterward attacked with a slow fever, he died very much emaciated. On opening the body, the right lobe of the liver was found hard and large, introducing the scalpel, a great quantity of yellowish serum passed out, with several hundred hydatids of different bigness. There was every reason to believe they were social vesicular worms.(12)

Even apoplexy may be induced by worms in the brain, and by other local diseases of that viscus. The vesicular worms attached all along the plexus choroides, which I discovered in the brain of an apoplectic(13) doubtless confirm this opinion. A lumbricoïdes in the urinary bladder produced nephritis and a severe and mortal disease of the bladder.(*)

* Dr. *Levacher* of Feuterie, secretary general of the medical society of Paris, was consulted by a country patient, who had a complaint, for which the physicians of the country had not found a remedy. It was a constant erection in a man forty years old; he was married and had children. During several months this man had been much incommoded with this state of erection, which neither yielded to cooling nor antispasmodic remedies, nor was it lessened by the venereal act. The pains were sharp and nothing could calm them, still there was no fever, nor any other appearance of disease. Dr. *Levacher* gave it as his opinion, that worms were the cause of this disorder.

The consultation was ridiculed and neglected; but after some time the patient having spontaneously voided several lumbricoïdes, the advice of *Levacher* was brought to mind, and some anthelmintic medicines were taken. The poor man discharged more worms, and was cured. *F. Trs.*

The most experienced surgeons for several years believed that the pains which the patient suffered were occasioned by large calculi(14) in the bladder.

I would relate several other similar cases, to prove that the symptoms produced by worms are connected with the parts which they occupy, if I did not fear to dwell too long on a subject which every practitioner sees daily confirmed at the bed side of the sick.

§ LXXX. Assured by the above symptoms, of the presence of worms, it remains for the physician to decide what sort of worms occasion or aggravate the disease to be treated, since every particular species of worms is attended by signs in a great measure peculiar, in addition to those that are common and general.

SYMPTOMS OF TAENIA.

§ LXXXI. Persons affected with taeniae complain of a sense of pain in the belly, produced by something alive, with a turning motion and weight in the side.

Occasional prickings, or rather bitings, are felt in the region of the stomach, the abdomen swells at intervals, and then subsides almost by undulation; a sense of cold, from time to time, pervades the abdominal viscera. The appetite is uncommonly great, while the more the patient eats the leaner he is. He is sensible of increasing weakness in all his limbs; his complexion is livid, and he is fre-

quently faint; the pupil is unusually dilated, his eyes are suffused with tears; vertigo confuses the head of the patient and excites vomiting; the legs vacillate, and sometimes the whole body seems to be affected with convulsive trembling. In other cases, according to *Hippocrates*, speech fails; often small substances, resembling the seeds of the lemon or gourd,* are evacuated with the feces of the patient, which are portions of the marginal papillae of these worms.(15)

§ LXXXII. Dr. *Wagler* mentions a young man, troubled with taenia cucurbitina, who became uneasy and impatient whenever he heard music, and was obliged to retire.(16) *Goeze* also speaks of several persons having taenia, on whom music produced disagreeable sensations.(17)

In fine, these patients generally find themselves ill at ease in church, so soon as the organ is touched.

§ LXXXIII. The head of the armed human taenia is furnished with two appendages in form of pointed fangs;(18) sometimes it attaches itself with

* Two years ago (1812) a woman who had long been troubled with taenia, on taking the spirit of turpentine, voided a large quantity of these bodies resembling orange seeds, together with numberless small pieces of a thin skin or membrane. These were supposed to be fragments of the worm, and were the only signs of it that were found in the intestinal evacuations. No symptoms of the worm have since appeared; and her health, which had long suffered from this worm, has, since its expulsion, been good. *A. T.*

such force to the mucous membrane of the intestines, as to produce the most severe, and even deadly symptoms,(19) since the internal surface of the intestines is mangled; inflammation soon follows, and suppuration or even gangrene may be the consequence.(20) At other times fastening themselves on the intestines, like leeches, they cause violent pains of the abdomen, and terrible spasmodic convulsions destroying the sufferer.(21) A singular symptom of this taenia, is a frequent sense of tension or tightness in the nose. I once saw a patient who, every instant, complained of this extraordinary inconvenience.(22) Practitioners have believed that these symptoms continue till the head of these taeniae is evacuated.

SYMPTOMS OF THE VESICULAR WORMS.

§ LXXXIV. The symptoms of these worms have not yet been precisely ascertained, because we have hardly yet begun to make observations on their existence in the different parts of the body. These worms are common, especially in persons of a weak lymphatic system; they adhere to the lymphatics and suck in their contents.(23)

Whether these vessels, being weak, favour the development of these worms, or whether these small animals, by consuming the lymph, procure a more abundant nourishment at the expense of these parts, it is certain that asthenia prevails in this system of vessels, so soon as any disease appears which is believed to be connected with it. Agreeably to the

beautiful experiments of *Mascagni*, *Cruickshank*, and of *Assalini*, as well as since the pathological observations collected by *Soemmering* (24) and by *Wolff*, (25) physicians are more than ever convinced of the influence of the system of lymphatic vessels over the functions of the animal economy. (26)

§ LXXXV. The vesicular worms scattered through the substance of the brain of sheep, render these animals vertiginous, meager and stupid; (27) living in the ventricles of the human brain, we have observed that they are the cause of apoplexy. (28) In these cases we should also consider the mechanical effects they produce on this viscus as depending on the presence of foreign bodies, since they must also contribute to excite all the phenomena which result from the irritation of this organ. Vesicular worms have also been found along the plexus choroïdes of the brain, in a man, who, during his life, was subject to very frequent vertigo, and to tingling of the ears. (29) In the hydrocephalus internus of children, vesicular worms are ordinarily in the substance or ventricles of the brain. (30) In encysted dropsy we also observe an infinite number of these worms, at least if some practitioners of merit are not deceived. (31) With *Pallas*, we regard them as causing this and similar diseases.

§ LXXXVI. Hydatids have been found in the matter of expectoration,* in urine, and in fecal discharges. (32)

* Dr. *Bonafox*, in his *Traité sur la nature et le traitement de la Phthisie Pulmonaire*, admits, from observation, a species

Authors speak of hydatids seen in the cavity of the thorax, in the substance of the heart, in the superficies of the pericardium,(33) in the stomach, in the intestines,(34) in the mesentery,(35) in the liver,(36) in the epiploon,(37) in the vesicula fellis,(38) in the kidneys,(39) in the uterus,(40) in the the placenta,(41) in the umbilical cord,(42) in the testicles,(43) in the ovaries,(44) in the interstices of the muscles,(45) in fine, in almost every part of the human body.(46) Are all these hydatids, truly vesicular? This question is not yet fully elucidated or decided. If *Koelpin* and *Walther* have concluded that for the most part hydatids are a mass of vesicular worms,(47) *Werner*, an accurate observer, has also made it appear,(48) that small bladders of hydatids are formed of inorganic substances, and consequently they cannot constitute a separate animal. In this view of the subject *Soemmering's* idea would be well founded,(49) in regarding hydatids as real varices of the lymphatic vessels. It remains to be proved that the hydatids

of hydatigenous phthisis. He relates p. 24, that on opening the body of a child of 5 years old, who died of this disease, he found three hydatids in the lobes of the lungs: these hydatids were of the solitary species; two were on the left division at some distance from each other; they did not exceed the dimensions of a hemp seed; the third was in the right lobe, and was as big as a large hazel-nut.

We cannot admit with Dr. *Bonafax*, a sort of hydatigenous Phthisis, because hydatids are not produced by consumption; but from general and local asthenia. *F. Trs.*

found in the human body can justly be called vesicular worms, and that these vesicular worms belong to the class of the hermit vesicular worms of *Bloch*,(50) or to the social vesicular worm, as others have pretended,(51) against the observations repeated even by *Bloch*. Before we can confidently decide what morbid symptoms they produce, and which may announce, if not certainly at least with probability, the existence of these worms in any particular part of the body, the researches of physicians must be directed by those of naturalists.

SYMPTOMS OF THE TRICOCEPHALUS.

§ LXXXVII. This worm according to authors, having no biting organ, all the inconveniences it produces must arise from its irritating the intestines, chiefly the large, exciting those diseases which depend on a morbid irritation of the intestinal tube. Collected in great numbers they deprive the system of its requisite nourishment, and contribute to lessen its strength. Inflammation and dilatation of the intestines, occasioned by these worms, though rare, have been noticed by several practitioners.(52)

§ LXXXVIII. They have been found in the bodies of soldiers who have died of a contagious epidemic;(53) among miserable people, poorly fed, who have fallen victims to some slow nervous fever;(54) among infants nursed and detained in orphan houses, who have been attacked with typhus accompanied with petechiae.(55) This worm com-

monly passes from the large(56) to the small intestines.(57)

§ LXXXIX. In mucous diseases which are manifestly asthenic, arising from a defect of nutriment, and which I think might properly be called, general consumption, when symptoms of worms are subjoined,—they are most frequently produced by the tricocephali and lumbricoïdes which live together.

SYMPTOMS OF THE ASCARIS VERMICULARIS.

§ XC. Commonly this worm resides in parts abounding with mucosity,(58) such as the large intestines, the vagina, etc.; they generally inhabit the lower portion of the rectum.(59) By contracting and extending themselves they excite in the large intestines, particularly in the rectum, a dull feeling of irritation, or a tedious and unsupportable itching, and sometimes very acute and cutting pains.(60) It is probable this worm insinuates its mouth into the folds of the intestines, and thus resists the peristaltic motion of these organs.

They are united into conglobate masses with other worms of the same family; the inner surface of the intestines is entirely altered by the irritation produced by thousands of these worms, and the want of mucus, which their eating this fluid occasions, renders these parts more sensible and irritable.

§ XCI. In children and weak persons, the mucous substance is ordinarily more abundant than in

adults and robust constitutions ; hence these worms prevail more in the former than in the latter, because in the first, circumstances favour their growth and reproduction. Infants and enfeebled persons being already irritable, it follows that the ascarides vermiculares must produce in these individuals more serious inconveniences than in adults and firm subjects.

§ XCII. The symptoms derived from these worms are extremely violent in the inflammation of the intestines, principally in the colon and rectum. Though these worms exist here in small quantity, the effects of their presence are very severe. The deficiency of the mucous secretion, and the increase of heat are so many predominant causes of the phlogistic diathesis, which renders these inflamed parts more susceptible of morbid irritation.

§ XCIII. Frequently these worms, situated in the wrinkles of the end of the rectum, are the cause of tenesmus, hemorrhoides, and of swelling and inflammation of the anus.

Those portions of the intestinal canal which are supplied with nerves from the branches of the intercostal nerve being irritated by worms, the effects which hence result and which have often been observed, are convulsive cough, grinding of the teeth, itching of the nose, and various other verminous affections, from sympathy.

SYMPTOMS OF LUMBRICOIDES.

§ XCIV. The head of this worm terminates in a cutting sharp point;(61) it insinuates itself into the mucous membrane of the intestines, causing pungent and rending pains, of which those complain who have these worms, particularly in the umbilical region.

Colic, and a rumbling in the belly, are signs peculiar to this kind of worms. Sometimes the patients experience the same phenomena as those occasioned by the application of leeches.

§ XCV. This worm, according to observations already collected, makes itself a passage through the walls of the intestines,(62) and alone produces the complaints above mentioned wherever they are;(63) these symptoms are more or less severe, according to the greater or less irritability of the affected part.

§ XCVI. This worm possesses great sensibility, which is very fortunate for the human machine; air, and cold water, throw them into a state of asphyxia, and the peristaltic motion of the intestines when quickened, or the use of a drastic purge, is often sufficient to expel them from the body. For this reason, when these worms have once descended into the large intestines, they are easily evacuated.

II. SYMPATHETIC AFFECTIONS FROM WORMS.

§ XCVII. In all anomalous and rare diseases, every intelligent physician begins his investigation of the causes, by inquiring whether the patient has ever noticed any sign of worms.

Experience has often demonstrated that a great number of severe and obstinate diseases may arise from worms, especially when they are lodged in the stomach and bowels.

§ XCVIII. The doctrine of the sympathy between the abdomen and other parts of the body, was known to *Hippocrates* ;(64) it has been elucidated since by the most esteemed practitioners,(65) and they assign sufficient reason for the manner in which the irritation, produced by worms in the stomach and intestines, may derange the whole animal economy, and prove the cause of the most violent spasmodic affections, even in parts of the body most remote from the abdomen, and particularly in the skin.

When the skin contracts, says *Rosenstein*,(66) shivering succeeds, and if this is communicated to the throat, deglutition is impeded ;(67) from this spasmodic contraction arise all the other symptoms which have been observed by physicians in persons troubled with worms, as the intermission of the pulse, palpitation of the heart, syncope, vertigo, loss of speech, blindness, buzzing in the ears, dejection of the mind, stupidity, delirium, contractions in sleep, disturbed thoughts, inquietude, anxiety,

hiccough, convulsions, epilepsy, apoplexy, and an infinite number of other diseases, which we have mentioned only in part.(68)*

* The *Journal général de Médecine*, edited by the learned *Sédillot*, for the month of floreal year 12, contains observations communicated by *M. Houzelot*, surgeon in chief of the civil and military hospitals of Meaux, among which is a case too interesting to be omitted in this place.

Pierre M. . . . , born of sound parents twelve years old, ten of which he had passed in perfect health, which was not at all impaired by the eruption of the small-pox or measles, when in June, 1799, the following symptoms appeared; a continual spitting, whiteness of the tongue, countenance alternately pale and flushed, mouth often full of water, a moving of the alae nasi, contraction of the muscles of the face and eyes, stricture of the chest; constant agitation of the arms and head, and slight convulsions.

November 1, a sudden loss of sense; limbs flexible, mouth somewhat frothy; in the evening at supper, a momentary blindness, though he was perfectly sensible. A physician who was consulted, did not perceive any thing more than a simple nervous disease which he called epilepsy, the consequence of a slight fright which the patient experienced six months before. He prescribed antispasmodics, which produced no effect. A violent anthelmintic purge removed all the symptoms, which returned the following June; then he had a momentary loss of sight, of hearing, and of speech; a sense of oppression of the chest; and at last the strongest nervous symptoms. Some purgatives being administered, they produced the discharge of an enormous quantity of black and very fetid fecal substances. The symptoms subsided in part till the first of ventose year 9. At this period, *M. Houzelot* was called in; he made the following notes on the state of the patient; a changing colour of the face, a dark semicircle under the eyes, itching of the nose, pains about the epigastrium, general emaciation, an undulating motion of the stomach, mobility of the wings of the nose, of the mus-

§ XCIX. In the year 1543, an epidemic cephalalgia made its appearance in some provinces of

cles of the face and eyes; white tongue, painful stools. The same evening he lost his speech, respiration short and very painful; the patient intimated by signs that a great weight impeded his speaking and breathing. The symptoms disappeared for a moment to be followed by violent convulsions in the muscles of the arm. After the fit, the lad said that before the attack he felt something move in his stomach, and that a second after he lost his speech. Some calming medicine procured a pretty good night; there was no other crisis.

February 21, in the evening, M. . . . , though perfectly tranquil, lost his sight, which soon returned, and then he became deaf. This deafness declined, and was succeeded by aphonia and difficulty of breathing. The patient was successively for an instant blind, deaf, and dumb, and terrible convulsions followed all these singular symptoms. The muscles of the spine were so contracted as to bend the body backward. These muscles relaxed to obey the contractile force of their antagonists, which in their turn bent the trunk forward. The tongue passed out of the mouth, the eyes were turned up and the arms were stiff, the nates touched the feet; the pulse was small and frequent; and respiration very short; the severity of these symptoms put his life in danger. As this lad threw up every thing he took, *M. Houzelot* caused him to inhale ammonia,—all the symptoms immediately ceased as if by enchantment. A strong opiate procured repose during the next night. The remission of these complaints after the use of anthelmintics, led *M. H.* to believe that they arose from worms; this opinion however was not well received. In the morning of Feb. 22, the symptoms returned with extreme violence, the head being most affected.

His eyes were rolled up, he understood nothing, his ideas disconnected, and his obstinacy in speaking of nothing but religion, all resembled a fit of mania.

The cerebral affection often abated to be transferred to the muscles of the tongue, which was thrust out of the mouth. This

France which was found to have been occasioned by worms.(69) They are sometimes the cause of ma-

paroxysm had lasted three hours, when he was made to respire ammonia, which afforded relief; the patient said that before this attack, he felt a pricking and something move in his stomach. Notwithstanding the entreaties of *M. Houzelot*, he could not induce the family of the patient to follow the use of antispasmodics, on which the first physicians insisted, with anthelmintics. February 23, the boy's life was in imminent danger; the symptoms were so much aggravated, the blindness, deafness, aphonia, temporary mania, protrusion of the tongue, and the general convulsions, were not the most alarming of them. The contraction of the muscles of the spine continued three hours: the mouth was closely shut, and the masticating muscles were so contracted that it was necessary to use a tube to get down a few spoonfuls of a composing draught. The volatile alkali was now used without success; the sufferer had taken nothing for four days, and was ready to expire.

On the 24th, a consultation was agreed on; that the disease arose from worms, appeared so evidently that a strong decoction of *artemisia semen contra*, of the *fucus helminthocorton*, Linn. and of *absinthium*, with the addition of orange flower water, an infusion of the flowers of tilia or linden tree, and pills made of submuriate of mercury and semen-contra, were immediately prescribed. No remission of symptoms on the 25th; 26th, symptoms less violent; two stools, with two lumbrici—general and partial convulsions.

On the 27th, fifteen very large living lumbrici were discharged. There is a marked diminution of the symptoms, and an obvious improvement; in seven days, fifty-five living and twenty-eight dead worms were voided. On the 7th of March, a new order of symptoms took place. The belly became the seat of the disease, the muscles of the abdomen were so violently convulsed that they rose and fell alternately at least six inches. This state continued three hours. On feeling the abdomen, a pretty large tumour, hard and moveable, was discovered in the left iliac

nia,* (70) of dysentery, (71) of St. Vitus's dance, (72) of catalepsy, (73) of tetanus, (74) of epilepsy, (75)

region. A cataplasm of garlic, wormwood and fansy was applied over all the abdomen. These symptoms reappeared for three hours in the night of the 8th and 9th.

The patient evacuated with his feces fifteen lumbrici, and a considerable quantity of blackish matters. A brisk cathartic, procured the next day, copious dark, fetid evacuations, loaded with an enormous quantity of putrid worms, among which forty lumbrici were counted.† From this epoch to April 11th, the anthelmintics were continued; the patient was six times purged, and again discharged fifteen worms, and a quantity of matter containing the fragments of many more.

From the last date M. seemed radically well, till the beginning of August, when he experienced some slight indications of worms. On the 13th and 14th, convulsions, itching of the nose, and spasmodic twitchings of the abdominal muscles, took place. The 23d and 24th, he had loss of sight, hearing, and speech; a ptisan and anthelmintic pills were administered. The presence of taenia was suspected, and *M. de Nouffer's* remedy was prescribed. Pronounced better from the first dose; the symptoms abated almost instantly. This remedy taken three times more, produced the discharge of thirty lumbrici. The patient has been six times purged; he continued the anthelmintics, and the treatment was terminated by the use of cinchona and preparations of iron, with so much success that on the 22d of October, 1804, the patient had complained no more after the month of August, 1803. Vermifuges however, combined with purgatives, were still occasionally administered.

* Our colleague *Esquirol*, physician of the Lunatic Hospital opposite la Salpêtrière, has just published in the *Recueil*

† Of this number, one was found ten inches long, as large as the ring finger of an adult person, covered with very short hairs, visible with the glass, and appearing black.

convulsive asthma,(76) amaurosis,(77) pleurisy,(78) as well as other convulsive affections, 79) and in women the suppression of the menses.(80)

pérenique de la Société de Médecine de Paris, edited by Dr. Sédillot, a case which deserves a place in this work. A young man of 18 years, of middle size, frizzled hair, large and black eyes, devoted to the study of surgery, led a very retired life. During the heats of last summer this young man went often to bathe in the Seine, in the warmth of mid-day. In the beginning of June, he gave signs of alienation, to which phrenzy was soon added. Two copious bleedings restored him to tranquillity ; some days after the delirium reappeared with the same fury ; two new bleedings gave no relief ; purgatives did no good ; at length the patient was conveyed to the hospital August 10, 1803.

His face was pale, his eyes fixed, the features of his countenance were sunk, and his memory weakened. He was calm at the moment, and dined with a good appetite ; immediately he tears and breaks every thing in his way, he sings, dances, hollows, and threatens with a strong and hoarse voice ; he utters the most obscene language. With the most dissimilar ideas and disconnected phrases, he blends the names of his relations, his friends, his professors, and the officers of government. He speaks of love, infidelity, courtship, etc. His countenance is by turns red or yellow ; his tongue thick, dry, and covered with a yellow coat ; his breath is fetid, and his skin burning ; in the evening he ate and drank voraciously. During the night he converses quietly, or flies into a passion with those he believes to be near him ; he swears and runs about his chamber *to extract the nails, with which he imagines the pavement of his chamber is studded.* His cries are horribly painful ; if one approaches him, he loads him with abuse, he spits in his face ; if any one reproves him, he threatens, or remains motionless, his eyes shut, leaving his head and limbs to their own weight, or as they are placed, provided the position is that of easy flexion ; copious, fetid, brown urine, belly constituted.

These disease did not cease till the worms were evacuated, or the physicians were deceived in the indication of cure, when the patient became the victim of the mistake.

August 12. Beside the symptoms of the preceding evening, a syncope came on and lasted two hours. He refers his pains to the larynx and epigastric region. Frontal cephalalgia, voracious appetite. Frightful shrieks at intervals; he seems suddenly to fall into syncope; he dreams in the night, dreams of snakes and of contending with them.

13. He sleeps six hours in the day; an hour after he is furious.

14. An enema procures a copious discharge, at first hard, then liquid and yellow. Abundant brown urine.

15. A return of reason, he is however dejected, has some sleep; he always has acidulated, nitrated drink.

16. Delirium returns in the night; he breaks every thing; the strait jacket is put on him, which occasions much sweating, but has no moral influence over him, nor has entreaty any effect.

17. A tepid bath for an hour, followed by the shower bath; the patient at first braves the shower bath, but soon falls into a syncope, though he had taken no food.

18. Tepid bath during two hours, laxative drink. Frequent nasal hemorrhagy; more calm, but incoherent in his ideas.

20. Bath; another shower bath suspended after two minutes, for fear of syncope, though the diameter of the column of water was but five millimetres.* Bleeding from the nose. No delirium in the evening; but his eyes were wild, his speech short, and his motions quick and rough.

21. Bath, lotion of oxycrate over the head, less agitation, sleep.

22. After coming from the bath, a profound sleep of some hours. In the evening a clyster, followed by liquid yellow dejections.

* The French *millimetre* is the thousandth part of a *metre*, or '03937 part of an English inch. .J. T.

III. VERMINOUS AFFECTIONS OF THE WHOLE SYSTEM.

§ C. We find in the writings of physicians, various asthenic diseases, both acute and chronic,

23. Agitated in the day, sleep at night; bath, acidulated, nitrated drinks.

24. Delirium and raving return; wakefulness, abundant liquid stools.

26. Face much flushed; abdominal pains, particularly of the epigastrium; frequent stools; syncope with a sense of tightness in the throat.

The patient rubs his nose much, and desires his servant to rub it.

28. A bolus of jalap and submuriate of mercury. Infusion of male fern (*Polypodium filix mas*, *Lim.*;) several liquid discharges mixed with mucus, and a large quantity of lumbricoides and ascarides.

29. The same medicines the same effects; calm in the evening.

30. *Idem*. In the evening a return of reason. Since, several discharges every day, mixed with yellow mucous substances and sometimes worms.

31. Infusion of Roman chamomile; a progressive return to reason; sleeps more, sometimes interrupted by dreams, but oftener by outcries, appetite without voracity; the eyes more closed, complexion less yellow.

September 22. Momentary explosions of fury, slight delirium; tears, followed by immoderate laughter. He recognises every person in the house, speaks of his family, and promises to follow my advice for the complete reestablishment of his health. Visage pale, pulse weak, eyes dejected, slow answers, and enfeebled recollection; boluses of cinchona and canella; infusion of orange tree, more wine with his meals.

Oct. 1. In the night he sends forth frightful shrieks and leaps in his chamber to avoid points in the floor; he dares not rest against

occasioned by worms, and which have thence been called gastric verminous fevers, muscous diseases, and glandular diseases.

the wall for fear of being pressed; he jumps on his bed and then off again, always because he thinks some one is driving points into every part of his body, especially into the soles of the feet and palms of the hands.

For an instant he feels as if strangling, with pains of the epigastrium.

2. *Idem.* The next day he took boluses of jalap and submuriate of mercury. Several liquid stools, the following days, infusion of rhubarb. It was not ascertained that worms had recently passed the bowels.

From this time his countenance was less dejected, there was no incoherence of ideas, nor raging; his memory revived and his strength improved. The patient inquired for some books, attended to his dress, and desired to see his parents. He was rather sad, and walked by himself. There was no vestige of his malady, excepting great debility; a heaviness and confusion of his head: he was restored to his family.

22. In the night he screamed out and had a syncope for two hours; he took a purgative draught which procured a very black discharge; no sign of delirium, some dejection of his spirits remained, with an obscure pain of the liver. A blister was applied to the pained part. The healthy complexion of youth, plumpness, habitual gaiety, the free exercise of all the intellectual faculties, all announce a perfect convalescence, and this young man has since enjoyed very good health. Our colleague *Giraudy*, who is also successfully occupied in treating mental alienation, informs us he has observed several cases of sympathetic mania, caused by worms. We cannot too strongly invite him to enrich the medical art by his observations on the treatment of the diseases of the mind. Dr. *Bosquillon* also speaks of an instance of lunacy produced by an insect lodged in the frontal sinuses. *F. Trs.*

§ CI. Persons inhabiting cold, wet, and unhealthy climates, whose food consists of viscous rather than nutritious substances, who drink impure water, who are daily fatigued by their labour, who have little rest, and are a prey to those passions of the soul which break down the mind, and weaken the body, these persons are found to be subject to those general affections which arise from worms. To the assemblage of these causes more or less active and more or less permanent, are to be attributed the origin of the most famous verminous epidemics described by authors, and particularly those of *Bailou*,(81) *Van Swieten*,(82) *Huxham*,(83) and *Van-den Bosch*,(84) as well as the fevers reputed to be of this kind by a number of celebrated practitioners.

We must ascribe to these causes the intermittent and remittent fevers, named verminous by *Dehaen*,(85) and by other writers of merit. But how can we consider worms alone as the primitive cause of those diseases which have been so mortal? I do not deny that the morbid irritation they produce, since we see it to be the cause of a number of sympathetic verminous affections, may also contribute to increase these asthenic disorders of the whole system. Still however no one can convince me that the mere irritation from worms can be sufficient to produce a fever of the typhous character.

We often see in smallpox and measles symptoms of worms; it would nevertheless be errone-

ous to derive these highly asthenic diseases from worms.

§ CII. We have already shown(86) that the asthenic state of the human body is favourable to the development of the germs of worms, provided there exists in some part a decomposition in the continuity of the organs.

Worms, escaped from the egg, find in the decomposed matter, an aliment which serves to nourish them.

In severe diseases, mucus abounds more in the digestive organs than in other parts ; it thence follows that the development of worms must be more frequent in the intestinal tube than in other parts of the body.

§ CIII. From all that has been hitherto said, we clearly comprehend that verminous fevers, like gastric fevers, so called,(87) are really nervous fevers, during which worms multiply and grow in those parts of the body that are most enfeebled. The same may be said of mucous(88) and of glandular(89) diseases ; they are all the effects of a slow and universal consumption of the body. In these diseases worms are evacuated, and no more are developed ; and under the influence of a stimulating and appropriate regimen, the body begins to regain its lost strength, and to maintain the continuity of the organs, particularly in those destined for the natural functions. I do not therefore speak of the symptoms of these maladies, because those of nervous fever are slow or acute, and accompa-

nied by partial weakness of the stomach and intestines. We have spoken particularly of those diseases,(90) and of the association of symptoms proper to the worms already mentioned.(91) The physician may infer from them the existence of worms, since those that live at the expense of the human body render its diseases more severe and complicated, as they always tend to increase the debility and the solution of the parts of the body.

END OF THE THIRD LECTURE.

NOTES

TO THE THIRD LECTURE.

(1) As *Bloch* has affirmed that worms are not always the cause of diseases in the animal machine, *Traité de la gén. des vers*, p. 59, douzième preuve, he must have said it to prove, as a naturalist, that worms are natural to every animal.

But that a physician of great repute, like the American *Rush*, should maintain that worms are necessary to preserve the health of children, is what every practitioner will oppose: see *Weikard*, *Maladies locales, classe première, etc.* Naturalists have not omitted to notice the complaints, sometimes even fatal, occasioned by worms in animals. *Goeze*, an exact narrator of every thing he had occasion to observe, *Versucheiner, Naturg. etc.* p. 98, says he once took a temporary living frog which could not move, and seemed to be almost dead: this frog, put in a basin of water, immediately sunk to the bottom, and in a few minutes died. In its viscera two *Cucullani* were found and several *ascarides vermiculares* which were swarming in the

whole substance of the lungs. Several observations similar to these, and worthy of attention have been collected and published by *Vallisneri, Op. ii. p. 1.*

(2) *Collectio Societatis medicæ hauniensiae, p. 21.*

(3) *Baglivi, Praxis medica, lib. i.*

(4) We read in the *Ephémérides des Curieux de la Nature, dec. ii, an vi. obs. xxxiii*, the history of a case of insatiable hunger occasioned by lumbricoïdes. The patient, who was incessantly ill, found no relief except in taking food.

(5) *Sauvages* speaks, *Nosologia method. cl. vii. gen. xx, spec. x, obs. cxviii*, of a cardialgia, which in a certain part of the country occasioned the death of several persons. On opening the dead bodies, lumbricoïdes were found so closely attached to the coats of the stomach, that they were even perforated.

From the same cause arose the *volvulus* of the young woman who vomited up every thing; see *Sauvages*.

(6) See *Van Swieten, De Morbis infantum, etc.*

(7) *Traité des maladies des enfans, etc. p. 313.*

(8) A young woman feeble and emaciated came to the Clinical Hospital of Pavia, in the winter of 1797; she had been tormented for more than twenty days with pains of the joints, which rendered her stiff and immoveable.

There was not any swelling of the articulations; both pupils were largely dilated, the mouth innu-

dated with a very viscid mucus; these symptoms made me suspect that the disease might originate from worms, and be kept up by them.

On administering suitable remedies, she evacuated nine large lumbricoïdes, and immediately the appearance of arthritis disappeared. We meet also in *Rosenstein* with two cases very similar to the observation I have just given. Dr. *Lindestolpte* was called to a girl of ten years, who complained of a pain in her left side, with a dry cough, slight heat, strong pulse, great thirst, and sometimes a biting or pricking in the stomach; she often lost her speech, and had spasmodic contractions.

He thought these symptoms arose from worms, and prescribed some anthelmintic powders.

After taking them twice, she was attacked about midday with so violent contractions, that her feet were turned toward her back. The convulsions ceased; she had no more pain, and fell asleep.

Her mother, wishing to raise her from the bed, saw a round living worm fall on the floor, half a metre and three decimetres* long, which turned itself about like a serpent. This worm passed from the body during the convulsive struggles.

After evacuating several pieces of worms, the girl was cured.

The other case is one of Dr. *Darelius*, of a young man who suffered a very sharp pain of the

* The *decimetre* is the tenth part of a metre, or $\frac{1}{10}$ of 3,93710 inches. The close of the note p. 161, on the word *millimetre*, should be thus—*or* ,03937 of an *English inch*, which the reader is desired to correct. A. T.

thigh, and in the right lumbar region, which obliged him to carry the right foot bent forward. His father feared a luxation; but the physician observing that the son had a tension in the epigastric region and frequent pains of the stomach, and also that his mouth was full of saliva, and that he had an itching of the nose, and serous or watery urine, imagined that worms were the sole cause of these symptoms. In fine, he procured their evacuation, and the patient was very soon restored to health.

(9) See § and note II, of the first Lecture.

(10) The organs of the animal body are so connected together, that they cannot continue to act without the concurrence of each other, and the preservation of one depends on the reciprocal influence of others. We cannot however conclude that the proximate cause of the action of an organ exists without itself; in truth, we see its dependence on others, by virtue of the common tie, and of mutual relations. The parts of the human fabrick are thus reciprocally united, and severally concur to the support of the body. For this reason when one part is hurt, others, the most intimately related to it, must consequently partake of the injury.

(11) The observation is from *Weikard*, in his *Traité des maladies locales*, where he speaks of worms.

(12) *Ekardt, Dissertatio sistens observationum hydatidum in hepate inventarum unâ cum prae-missis ad hanc materiam spectantibus. See Brevia, Sylloge opusculorum selectorum ad praxim me-*

dicam spectantium, vol. ix, p. 137. That these hydatids were social vesicular worms, is suspected with reason from the author's recital. Take his own words :

“Hydatidum majoribus illa ovi gallinacei, minoribus vero illa pisi magnitudo inerat. Fluido in iisdem comprehenso, non prorsus fuerunt diductae, atque dilatatae. Majores ovali, minores autem magis circulari forma erant instructae, tam vesicae earundem, quam fluidum, valde clara erant et pellicula. Hydatides sectae et fluidum in poculum vitreum receptum, innumerabilem punctorum minutissimorum in eo circumnatantium, fuscorum speciem referentium copiam ostenderunt, qui humore aëri exposito dein evaporato, et parietibus et poculi vitrei fundo adhaeserunt.

“Quod fluidum neque omnino serosae, neque omnino lymphaticae, fuit indolis, et colore distincto carens.”

(13) See § XXIII.

(14) The observation is reported by Dr. *Pereboom*, in his little work entitled, *Descriptio et iconica delineatio novi generis vermium stomachidae dicti, etc. p. 24.* I shall transcribe it in his own words, because I deem it worthy of the greatest attention of practitioners.

“Oltor, quinquaginta fere aetatis, ante aliquot tempus nephritide laborabat, ita ut periti judicarent calculo vesicam occupatam esse, tum ex mictu doloroso, difficili, impedito, et quocunque modo turbato ; tum ex sensatione oneris in abdomine, titilla-

tione vergae et caeteris hoc symptoma comitantibus ; tum ex gressu varicato et dolore spatico cruris sinistri ; tum ex urina cruenta, purulenta, aequae grumosa, turbida, mucosa, foetida, vel et crassissima ; sed praecipue catheterismo repetito. Ideo variis remediis usus fuit, ut aqua calcis, millefolio, balsamo sulphuris, atque elexirio vitrioli Mynsichti, pro parte proprio motu, pro parte et consilio peritiorum. Tandem et horum usus pertaesus, post longum sat intervallum, iterum meae curae sese committebat. Debilis erat, vehementibus doloribus afflictus noctu dièque, sed praecipue dum mejebat. Urina jam adeo erat purulenta, ut plus puris ac urinae emitteret ; vitra enim, lotio caute recipiendo usitata, dimidium, et quod excedit sedimenti purulenti plena erant, intermixtis frústulis quasi carnis recens mactati. Praeter emollientia precedentur adhuc laudanum in usum vocabam cum levamine adjuncto regimine. Urina vero post aliquot dies, loco sedimenti purulenti, brunneum deponebat, insimul crassior et stercoreum foetorem prodens dum laboriosius faciebatur.

“ Accedebat emissio flatuum sat fortium, ex urethra. Sedimentum dictum accuratius examinatum, inter caetera in eo oryzae granulum intermixtum erat ex reliquiis ciborum hesternae die ingestorum ; et passim varia talia quotidie detegebam, praecipue panis secalinae non bene commanducata. Per quinque fere dies insolita haec secretio miserrime continuabat, alvo penitus obstructa, licet eam manatis et prunis debita in quantitate reserare cona-

bar, donec tandem diarrhaea insequabatur. Faeces sensim sensimque liquidiores, tandem cum foetore urinoso, ipsius stercoris praedominante, prodibant, ac tandem sinceram urinam alvus deponebat, per decem fere dies haec diarrhaea duodecies quandoque vicesies de die, patiens conflictabatur, ut tubus intestinalis inde penitus quidem exoneraretur. Interea dum absolute nihil urinae per urethram emitteret, aliquatenus inde sensit levaminis; et renovatione quasi virium gaudebat, cibi avidus, bene quoque digerens. Licet nec adstringentibus, ne ipso quidem laudano, diarrhaeam compescere potuerim, sensim tamen sponte cessabat, ut in laxitatem alvi degeneraret, faecibus nihilominus adhuc urina facientibus. Tamen ut prius vehementissimo cum cruciatu ibat lotium, cujus sedimentum stercoreum duas partes totius excedebat, continens quaecumque alvus indigesta ex hesternis rejecerat, ut ficuum semina, pomorum volvas, cicerum siliquas, olerum frustulas, et singula ne referam, poni chinensis granum compressum medulla jam semidigesta continebat. Quis hujus scenae non misertus esset, exitum acerbum minitantis? Praedictis solum modo remediis adhibitis, cum animadverti febrem fere abesse, et animo forti dolores subire patientem, ita admonui, ut talia alimenta caperet, quae in faeces pulposas concoqui possent, ut farinacea, lactem, ova, jus carniū, etc., tum et ut ipsi bis de die clyisma injiceretur ex terebinthina mediante vitello ovorum aquae immixta. Primi enematis portionem una cum urina patiens mejabat, post secundum

non tantam, post tertium quartumve clyisma, solummodo odore terebinthinae urina erat praegnans. Ita injectis plus minus decem clysteribus, urinam iterum cum sedimento purulento albo minime vero stercoreo, vel tale peregrinum olente, secernebat.

Nec minus dejectio regularis erat absque urinae putore. Quidquid agerem, clysteres amplius recipere recusabat, derelictus ab omni spe, et cogitationem suscipiens, praeter terrae japonicae solutionem, ab aliorum remediorum usu desistere, observationi solummodo animum submittens. Ita procedens interea sensim ut cumque vires recuperavit, demum egressus, publicos agens conventus, olitoris functiones exercens, licet magno cum dolore urinam mittens, adeo ut languidam duceret vitam.

“Post novem mensis ad me retulit, se hucusque cum praedictis remediis continuasse: addebat vero mictionem lancinantem minime sopitam esse, utpote cum urina purulenta passim magnas frustulas quasi sanguinis grumosi ejiciens, sinceri sanguinis, particulam monstrans mane mictam, cujus longitudo fere sesqui pollicis erat, crassities vero semi pollicis, adhuc renunciabat similia quotidie accidere. Die tertio Novembris, 1771, mane, per urethram lumbricum teretem expulit, quem mihi vivum videre contigit, prout ex virga egressum, patiens ipsum extrahebat et vitro injiciebat. Hic colore gaudet albo et in naturali magnitudine, representatur figura quinta, spiritu juniperi conservatus.

“Posthac membris labefactis, vermum equidem socium nequaquam, sed ingentia frustula, gelatinae

instar sanguinolentae, urinae sedimento intermixta largiter exonerare miser continuavit, febre, praeterea hectica et hujus cohorte vexatus et ad ultimum vitae halitum usque dolore exquisito mactatus, quam aliquantulum quidem compescere laudano potui, ipsemet vero strenue religiosa patientia et pia deditioe sui voluntati divinae sustentare valuit, mente adhuc dum constante ischuria tandem vitae filum abrupit, die 23 Augusti, 1772.

“ Aperto cadaveris abdomine, prout mihi humanissime ante aliquot tempus tentamento aegrotus legaverat, invenimus una cum candida peritia Cl. chirurgo Jano Ruurhof, aliisque amicis anatomicis ;

“ 1°. Intestinum colon cum peritoneo arcte concretum.

“ 2°. Laborasse defunctum hernia epiplocele, omnino in tunica vaginali procidente cum processu valde attenuato, filiformi, intestina vero haud subsecuta fuisse, quoniam inter se validissime et ubivis fere erant concreta.

“ 3°. Fundum vesicae externè totum cartilagineum, contrahi ineptum, induratum et cum intestino colo, caeco et recto, ligamentis cartilagineis, nec minus latissime cum osse pubis, concretum quae ligamenta incisa vel disrupta, pus fundebat, quare et tunica vaginalis dextra puris plena erat.

“ 4°. Catherem vesica recipere renuebat.

“ 5°. Glandulae mesenterii, quotquot offendimus, substantiae ex albo cartilaginae erant, magnitudine fere juglandum.

“ 6°. Plurima ulcera fistulosa ex vesica in au-

nexa monstrosa intestina, vel et in peritonaei cavum exhibant.

“7. Vesica internè omnino infarcta erat materie gelatinosa ejus parieti affixa, pus mentiente ingrassatum, dura, tenaci, glutinosa, parum olente, in aqua valde subsidente, nullum vacuum pro urina recipienda relinquente, nisi quod rivulus serpentinus crassities ureteris urinae transcursum formabat per substantiam dictam, tandem quoque adeo oppletum et deletum, ut sensim sensimque ischuria inde nata vitae filum abruperit. Calculus in vesica haud detectus fuit. Intestinum rectum vix distingui posset, ita cum vesica erat coalitum, quare nec locus suppurationis praecedentis quae communicationi vesicae cum intestino recto ansam praebuerat, ad votum indicari licuit. Erant interea uretheres naturales, nec minus renes, papillis solito minoribus ut cunq̄ue donati. Hepar satis sanum apparebat, et quod notabile, cadaver minime adipe destitutum erat.”

(15) See § VI.

(16) *Goeze, Versucheiner, Naturges. der Eingeweid., etc. p. 278.*

(17) *Goeze, the work cited.*

(18) See § XV.

(19) See § XIII, p. 20.

(20) *Syllogem, Observationum varii argumenti: Hauniae, 1782, 8^o. p. 45.*

(21) See § XI.

(22) The patient was attended by the learned

professor *Borda*, of *Pavia*, who was pleased to communicate to me the accident mentioned.

(23) See § XXVII.

(24) *De morbis vasorum absorbentium corporis humani pars pathologica; Trajecti ad Moenum, 1795, 8°.*

(25) *Arzney kundige abhandlung ueber den Nutzen der Wasser, oder lymphen Gesasse; Lingen, 1795, 8°.*

(26) See *Soemmering*, the work cited.

(27) *Leske, Abhandlung vom drehen, etc.; Leipzig, 1780, 8°.*

(28) See § XXIII.

(29) *Weikard, Vermischte medizinische Schriften, 4°. stück, p. 102.*

(30) *Ludwig, De hydrope cerebri puerorum; Lipsiae, 1774. Ved. Baldinger, Sylloge select. Opusc. argumenti medico-practici, etc.*

(31) *Nordische Beytrage, 1 Band, p. 84.*

(32) *Medical Transactions, vol. ii. p. 486, Philosophical Transactions, etc. vol. xxii, p. 497, vol. xxv, p. 234. Memoirs of the London Medical Society, vol. ii, art. ii.*

(33) *Haller, De corporis humani fabrica, vol. vi, p. 480, not. 6.*

(34) *Soemmering, Baillie anatomie des Krankhaften baues von einigen der wichtigsten Theile im menschlichen Körper, uebersetz. Und mit Zusätzen von Soemmering; Berlin, 1794, p. 134.*

(35) *Baillie*, the work cited, p. 146.

(36) *Eckardt, Dissert. sistens obs. hydatidum in*

hepate invent. etc. Soemmering, *Baillie*, the work cited.

(37) *Acta Natur. curiosor. Berolini, v. i. p. 348.*

(38) *Walther, Annotationes Academ., etc. p. 84, no. 6.*

(39) *Medical Communications, etc. v. i. p. 10.*

(40) *Sandifort, Obs. anatomico-patholog. lib. ii.*

(41) *Soemmering*, the work cited, p. 222.

(42) *Ruyschius, observ. xiv, p. 15.*

(43) *Morgagni, De Sed. et causis morb. etc. Epist. iv, art. xxx.*

(44) *Eckardt, Dissert. cit.*

(45) *Werner, Vermium intest. brevis expos. continuatio secunda, p. 7.*

(46) *Morgagni, De Sedibus et causis morb. etc. Epist. xxxviii.*

(47) See § XXVI.

(48) *Verm intestinalium, Taeniae praesertim humanae, etc. p. 68.*

(49) *De Morbis Vas. absorb. corporis hum. etc. § XXII.*

(50) See §§ XXIV, XXVIII.

(51) See § XLIII. and the annexed note, no. 27.

(52) *Margraff, De morbis a vermibus intestinalibus oriundis ; Vittebergae, 1799, p. 8.*

(53) *Wagler, Dissert. de morbo mucoso, Praeside, 1. G. Roederero, etc. See § XXIX.*

(54) *Blumenbach, Handbuch der Naturges. etc. p. 410.*

(55) *Stoll, Pars septima ratio. medendi ; Vienne, 1790, p. 116.*

(56) See § XXIX.

(57) *Werner, Verm. intest. etc. p. 84, Stoll, Op. et loco cit.*

(58) See §§ XXXVII, XXXVIII, XXXIX.

(59) See § XXXVI.

(60) *Van Phelsum, Hist. Ascarid. pathologica, etc. cap. iv, v, vi, vii.*

(61) See § XLV.

(62) See the end of § XLV.

(63) See the end of § LXXIX.

(64) “*In corpore humano confluxus unus, conspiratio, una, et omnia consentientia.*” *Hippocrates, de alimentis, etc.*

(65) See my *Notes medico-practiques, sur les différentes Maladies traitées dans la Clinique médicale de Pavia pendant les années 1797, 1798, première partie, § XLII.*

(66) *Traité des Maladies des enfans etc. p. 310.*

(67) I have lately seen a young man, otherwise very robust, who was suddenly attacked with a violent convulsion of the throat and chest, which threatened suffocation, and obliged him to cry out with a loud voice. This convulsion lasted three or four hours ; it subsided and afterward returned, in such a manner that in twenty four hours three paroxysms had taken place.

In the intervals the patient complained of a sense of cold in the xiphoid cartilage, and was dejected. After minute examination no assurance

of worms could be found, though he had several symptoms of them, such as dilatation of the pupil, salivation, itching of the nose, pains of the joints, as well as the anomalous character of the disease, which strengthened the suspicion of them. The convulsion commenced, according to the patient, at the region of the stomach, like a flame rising and fixing with violence in the larynx.

The stomach being strengthened by an electuary of cinchona, valerian and opium, and continuing for some days, the convulsive access gradually lessened in force and frequency, and finally disappeared.

(68) See § LXXVI and the following.

(69) *Sauvages ; Nosol. method, etc. cl. iii, gen. xxiii, sp. vii.*

(70) *Ephemerides naturae curios. dec. iii, observ. cxxxv.*

A few days since I was called to visit a girl of nine years, who after surmounting a scarlet fever, exhibited all the signs of an effusion of water in the ventricles of the brain, as they are pointed out by *Ludwig*, in his excellent *Dissertation de hydrope cerebri puerorum*. The disease which had preceded, the certainty that the child had never been affected by worms, the deficiency of urine, the swelling of the abdomen, as well as the oedema of the inferior extremities, all contributed to the belief that this disease was hydrocephalus internus. The wretched sufferer, reduced almost to the grave, presented no hope of recovery, yet being unwilling to leave

her without any resource, I prescribed some diuretic and tonic medicine, which possessed anthelmintic properties, as the sudden appearance of the disease made me suspect it might arise from worms. Submuriate of mercury in powder, and a saturated infusion of valerian, made stronger by the addition of a good dose of camphor, were the remedies I chose to produce these effects.

I obtained no success during the two first days of this treatment; the disease on the contrary was worse, but on the third day she vomited a living lumbricoïdes, and some mucous and bilious matter.

The next day she voided four lumbricoïdes; and in a short time she was fully restored to health.

(71) *Sauvages, Nosol. Method. class. xi, gen. ix, spec. xv*, speaks of a verminous dysentery, which, from August to November, attacked a fourth part of the inhabitants of the country, and destroyed a number of them.

The pains of the abdomen were sudden and severe; a sense of heat became violent in the viscera, and a vomiting of mucous matter, resembling the spawn of a frog, aggravated this complaint. It gave way to the use of anthelmintic remedies, after the worms were expelled from the body.

(72) In the *Ephemerides nat. curiosor, ann. iv, observ. clxxxvii*, we meet with a case of St. Vitus's dance, occasioned by worms. A similar case is reported by *Siblot* in the *Journal de Médecine de juillet ann. 1783, tom. ii, p. 22*. A

taenia and several lumbricoïdes were the cause of this malady.

While practising medicine in the hospital of Berlin, in the autumn of 1795, under the direction of the illustrious *Selle*, I saw a child about twelve years old, affected with St. Vitus's dance, which had been produced by worms, though the patient did not exhibit the least sign of any verminous affection.

(73) *Sauvages, Nosol. Method. etc. cl. ix, gen. xxiv, species ii.*

(74) *Commercium litterarium Norimbergense, tom. i, p. 385; tom. xv, p. 124. Sauvages, Nosolog. method. tom. ii, tit. tetanus. Heister, Medicinische chirurg., und anatom. warnehmungen, 1. Band, p. 170. Brera, Sylloge, opuscul. selector, vol. iv. p. 18.*

(75) *Acta naturae curiosor. vol. vii. observ. cxxvii, vol. vii, observ. xix. Van den Bosch, Historia constitutionis epidemica verminosae, etc. p. 132.*

Ackerman, Dissert. de epilepsiae motuumque convulsivorum infantum causis praecepis; Gryphiae, 1765. Medical Observations and Enquiries by a Society of physicians in London, vol. vi. observ. of Fothergill. Gordak geschichte der frauen Zimmers; Königsburg. 1770, 8°. Journal de Médecine, tom. xxx, p. 51.

(76) *Ephemerides Naturae curiosorum, dec. iii, an. iv, observ. xix, an. vii, viii, obs. clxxxiii, Acta Helvetica, vol. vi, p. 216.*

(77) *Ephem. Nat. curiosor. dec. ii, an. v. obs. clxx. Journal de Médecine, tome xxxiv, p. 135. Richter, Elementi di Chirurgia, tom. iii, cap. amaurosi.*

(78) *Bonnet, Sepulcretum, lib. ii, sect. 4, observ. xxxviii. Riverius, Observat. cent. i, no. 75. Ephemerid. nat. curiosor. dec. ii, an. 5, Append. p. 80.*

(79) *Sélecta Medica Francofurtensia, Franc ad Viadr. 1739, tom. i. p. 110. Henneberg, Dissert sistens historiam morbi convulsivi infantis, ejusdemque sanandi methodum; Erford, 1791. Abrégé des Transactions philosophiques de la société royale de Londres, tome xiv, Venise, 1796, p. 219, 272.*

(80) *Spigel* mentions a young woman, of a distinguished family, who had an aversion to food, like a pregnant woman; there was tumefaction of the abdomen, with a total suppression of menstruation. The parents consulted a number of physicians, who said she was with child, and all medicines were abandoned. In the mean time the disease increased, and she died a victim to ignorance and inattention. On opening the body, her innocence was apparent, there was no embryo in the uterus, but a mass of water and mucus was found in the intestines, and a *taenia* as long as the bowels. See *Rosenstein, Traité des maladies des enfans, etc. p. 311.*

(81) *Opera omnia genera, 1562, 4^o. opp. i, p. 25.*

(82) *Commentaria in Hermannii Boerhaave*

aphorismos de cognoscendis et curandis morbis, etc.
tom. iv. p. 720.

(83) *Opere fisico-mediche, tome i, p. 284.*

(84) *Constitutiones epidemiae verminosae, quae, ann. 1760—63 grassata fuit, etc. Norimbergae, 1779. 8°.*

(85) *Ratio medendi in Nosocomio practico. Vindobonensis, tom. xiv, p. 142.*

(86) See §§ LV, LVI.

(87) See my *Notes de Médecine pratique sur les diverses maladies traitées à la Clinique médicale de Pavie dans les années 1792 and 1798, première partie, § 44.* If worms in the stomach and intestines, sometimes become the cause of disease, as of fever for instance, it cannot on this account be called a general disorder, since the cause of it is entirely local. The bilious, gastric, pituitous, and verminous fevers so much in vogue during the last century, ought to be considered as simple local affections, or as complaints wholly chimerical; as accurate and observing physicians have agreed.*

If we are to understand by verminous disease, the verminous affection general in appearance, which is occasioned by the accidental presence of worms in the stomach, disturbing the functions of the system, because they derange the functions of the stomach which is in other respects healthy; we cannot deny this, provided we view it as depending on a local injury, and differing from a general

* Professor *Pinel* does not even mention any febrile verminous disorders in his *Nosographic philosophique.* *F. Trs.*

disease. In fact, a disease of this kind is never preceded by predisposition; it does not originate from increased or diminished general excitement, but from a body which may be regarded as altogether foreign, and which may be either in the stomach or intestinal tube. *Brown*, in his medical writings, says nothing of the gastric affections, nor does he name verminous fevers, though several physicians of the first rank have written of them.

If, however, what we have said of fevers called verminous, be compared with the principles of *Brown's* doctrine, it will be seen that this philosophical physician, when speaking of diseases arising from poisons, (*Elements of Medicine*, vol. i. § LXXVII,) he informs us that these diseases should often be regarded as local, because the poison (and we will say a worm,) by mechanically attacking the stomach and intestines, organs endowed with great excitability, may produce from sympathy, an irritation through the whole system; but as neither the sthenic nor asthenic diathesis is thereby produced, it cannot be considered any thing else than a local malady; this view of the case is confirmed by the treatment, which consists merely in expelling the poison, or the worm, from the body.

If, on the contrary, worms in the first passages are preceded or accompanied by febrile commotion, originating in reality from the irregular excitement of the system, and is evidently occasioned by a power directly or indirectly debilitating, no physician can deny that the development of worms

would be favoured by these circumstances, which, as we have repeatedly observed, appear precisely in this state of the body, and rather from the effect than as the cause of the febrile disease. All the accompanying symptoms indicate a general nervous affection predominating in the organs destined to perform the animal functions.

An inclination then, to found on this basis the chimerical existence of a worm fever, is, in my opinion, a dangerous error in practice.

(88) *Wagler, Diss. de morbo mucoso ; Göttingae, 1762, 4^o.*

(89) *Werner, Verm. intest. brevis exposit. contin. secunda, etc. p. 4.*

(90) See my *Notes médico-pratiques, etc. sec. partie, cap. i, class. ii and iii.*

(91) See §§ **LXXVI, LXXVII, LXXVIII, LXXIX, LXXX.**

FOURTH LECTURE.

THE TREATMENT OF VERMINOUS DISEASES.

§ CIV. THE asthenic diathesis of the human body, especially when it prevails in the gastric system, is one of the chief circumstances which favours the development of the verminous germs,(1) which circulate in the mass of fluids in the form of very small molecules,(2) or remain at rest in different parts, where accident may deposite them.(3)

The effects produced by the use of emetics and cathartics, which many physicians still prescribe and administer to dissolve and expel the mucous substance which we have already considered as the aliment of worms, and which in the opinion of some persons, favours also their adhesion to different parts of the body, must not only be useless, but even dangerous.

If *Monro* and *Rosenstein*(4) have sometimes used emetics with some success, it is to be attributed rather to the general efforts and concussion of the frame, particularly of the stomach and intestines, produced by the sudden and violent action

of this remedy, which detaches and expels them from the stomach.(5) Purgatives act in the same manner, by increasing the peristaltic motion of the intestinal tube; worms are by this means often separated from the intestines and evacuated with the feces. It may soon be seen however that both these remedies must debilitate the system, and consequently predispose it to verminous affections.

§ CV. Worms are common and familiar in those constitutions, in which the lymphatic system predominates.(6) We further know that sheep are subject to the social vesicular worms, when they feed on wet low pastures, especially during autumn and in rainy years. All the debilitating causes which are favourable to the development of the seeds of worms, examined with care, will persuade the philosophical observer, that the multiplication of worms can be easily prevented by means of a tonic and nourishing regimen, such as we shall point out in speaking of the prophylactic method. No one can be said to be completely cured of worms, if after their expulsion, the predisposition to verminous complaints be not also removed.

§ CVI. Guided by these principles, we may with ease and certainty perceive the true indication by which the physician should regulate his plan of treatment in curing the disease occasioned by worms, whether local or sympathetic,(7) slight or severe.

This mode of proceeding is more or less constantly crowned with success, and contributes to

render observations philosophical, as it evinces the extravagance of those remedies which have been invented by superstitious men for the cure of worms, and which have been adopted even by physicians of merit,(8) who have too blindly subscribed to the opinion of the former.

§ CVII. In the treatment of worms and the effects they produce, the physicians ought, in the first place, to be assured of their existence, of their seat, of their quantity and quality, because nature has organized them differently, and experience proves that they do not all yield equally to the same remedies.(9) The medicines which destroy ascarides are sometimes inert with regard to the lumbricoïdes and taenia.

On the contrary, the remedies which are highly recommended against the taenia, administered to patients not having this worm, may occasion very severe derangements of the animal economy.

For this cause, before we commence the treatment of worms, it is incumbent on us to ascertain their species, in order to direct the method of cure.

§ CVIII. In the treatment of verminous complaints in general, such remedies as strengthen the body, at the same time that they diminish the morbid secretion of mucus, and resist the decay and consumption of all the parts, give action to the organs destined to the natural functions, annoy the worms, destroy them, and excite throughout the system that energy which is so necessary to expel them, and to prevent their further increase ; the remedies that

produce all these effects, accomplish the necessary indications.

We are chiefly to regard as such the articles taken from the class of stimulants, which, possessing a bitter and an astringent principle, are well suited to invigorate the nervous power, and augment the cohesion of the solids.(10)

Besides, experience every day proves that these worms are expelled from our bodies by the use of these medicines when administered in quantities adapted to the degree and character of the asthenic diathesis, whether this action takes place in consequence of the subtle and penetrating odour of these substances, or their mechanical agency on these vermin; the former is more probable, by exciting the system, and particularly the parts affected. The verminous nidus is formed by the mucous substance constantly enclosing the worms,(11) which remaining like any foreign matter, are set in motion and expelled by the increased action of the organs.(12)

§ CIX. By reasoning accurately, we easily perceive that the specific property of destroying and expelling worms from the body has been falsely attributed to a certain class of remedies. Before this can be true, anthelmintics must be endowed with the power ascribed to them, and they should constantly produce the desired effect. This cannot be affirmed except by persons who are influenced rather by superstition, than exact and philosophical observation.

The mere catalogue of remedies vaunted against worms would fill whole pages, but it could only serve to open the way to pyrrhonism.

I am not disposed to say much of them, because an analytical exposition of their history would be foreign from my subject. I shall therefore generally confine myself to an enumeration of all those remedies only, which in the opinion of every practitioner, are acknowledged to be the most active and efficient in fulfilling the above indications. I shall then describe those remedies, which experiment and observation have recognized, as well suited to expel from the human body the different species of worms. It is necessary to observe that several medicines are endowed with a drastic power, though stimulant, and that others possess a corroborant power.

The physician should convince himself of the species of verminous affection, whether it is local, sympathetic, or general, before he decides on the remedy which is to be employed.

Drastic purgatives may be proper for robust persons, in whom worms produce local symptoms, though they would occasion serious mischief if given to feeble subjects, especially when the asthenic diathesis greatly prevails in the stomach and bowels. In these cases we should effect the desired end by employing remedies which excite and strengthen the animal frame, without altering the natural secretion of the fluids.

§ CX. Physicians have been in the habit of prescribing their remedies for verminous complaints, both externally and internally.

The internal administration is preferable to the external, because the former is more effectual than the latter; it is followed by more prompt and sure success.

A number of patients however, and particularly children, dislike to swallow the necessary medicines, because they are ordinarily very disagreeable.

Other patients, harrassed by sympathetic verminous affections, can swallow nothing. Others, with great weakness of the stomach, throw up every thing given them. Lastly others, tormented by the hemorrhoids, or some other local disease of the anus, cannot receive enemas, by means of which might be introduced into the body whatever could not be swallowed, or retained on the stomach.

In all these cases, the mere application of the remedies appropriated to the exterior, particularly over the surface corresponding to the part affected, as the region of the stomach, of the small intestines, and all the abdomen, is the only means of conquering or diminishing the disease.

Epithems compounded of the remedies which are directed to be taken internally in similar cases, applied to the region of the stomach, have been regarded as excellent to drive worms from the intestinal tube by *Boj*, *Frank* and *Weikard*. These remedies dissolved in the gastric juice of ani-

mals,* and then applied over the skin, are capable of producing effects scarcely inferior to those obtained, when they are administered internally.(14)

For this reason, when I have wished to apply medicines to the surface of the body for the expulsion of all the worms which torment the inner parts of the body, and at the same time to strengthen the solids, I have advised them to be prepared according to the rules laid down in the anatropsologia.(15)

§ CXL. I ought to remark, that in the sympathetic affections from worms, the nervous system being strongly excited, the most suitable remedies and such as should be preferred in these cases, are those endowed with a diffusively stimulant property, that is, calculated to sooth and calm the derangement and disturbance of the living solids. The class of medicines called antispasmodic, exhibits a long series of them. Valerian, opium, and assafoetida are the most frequently used. But let us pass to the examination of the principal remedies which have been extolled, either against worms in general, or some particular species of them.

* Dr. *Alibert* is convinced by a multitude of experiments, of the nullity of the gastric juice, and the medicines he has applied by friction, without having recourse to this vehicle, have been attended with the same success. See *Memoires de la Société Médicale d' emulation*, 1st year, second edition; *Bulletin des sciences de la Société Philomatique de Paris*, nivose year 6. *F. Trs.*

FIRST SERIES OF VERMIFUGE MEDICINES.

§ CXII. The vegetable and mineral kingdoms furnish most of the remedies which have been prescribed in verminous affections, and which physicians have called vermifuge or anthelmintic.

I shall point out the vegetables under the *Linnaean* name, and the minerals by the new nomenclature introduced by the French chemists.

VEGETABLE VERMIFUGES.

§ CXIII. *Allium cepa.*(16) Onion. The fresh roots, or the expressed juice which has a peculiar very volatile odour and an acrid taste, are frequently used; this is however less efficacious than the common garlick.

§ CXIV. *Allium sativum.*(17) Garlick. Its recent bulb contains an oily volatile principle, which is suited, like assafoetida, camphor, and sublimed sulphur, to strengthen the stomach and bowels, and thence to expel worms. The observations of *Rosenstein*,(18) and of *Tissot*,(19) leave no doubt of its possessing this property, since these two physicians, having continued its use a long time, succeeded in discharging entire taeniae. We also have examples of sympathetic convulsions, occasioned by worms, and cured by garlick.(20) These are prescribed under different forms, and they are combined with other remedies in their exhibition.*(21)

* Our colleague *M. Cadet*, author of the excellent *Dictionnaire de Chimie*, has extracted an essential oil from garlick,

§ CXV. *Artemisia santonica*.(22) Santonicum. The seeds of this vegetable, which is well known to apothecaries by the name of wormseed, of semen-contra, and of zedoary, (*Raempheria rotunda*, Linn.) are very efficacious in expelling worms, particularly the lumbricoïdes. They have a bitter and subacid taste and smell; all their activity depends on a volatile oil that is easily extracted.

They are ordered in substance, in infusion, in decoction, and in form of electuary, combined with other remedies.(23) The confections and pastils made of them(24) answer best for those who are nauseated by the odour of medicines. The dose for children is two grains, and for adults a drachm, in powder or electuary. The infusion is made with milk, and for this, two or three drachms of the pulverized *semen-contra* is requisite.

§ CXVI. *Chenopodium anthelminticum*.(25) Jerusalem oak. The seeds of this vegetable, which grows in Pennsylvania, have an agreeable, pretty strong odour, and an aromatic taste; it is said to be much used in America against worms, especially against the lumbricoïdes. *Chalmers*, who gives the description of it,(26) affirms that with the powder of these seeds only is composed that anthelmintic electuary, so famous in North America.

which, applied to the skin, excites an almost insupportable pain and irritation. He thinks it may be used as a vesicatory, and perhaps with the advantage of not affecting the bladder like cantharides. *F. Trs.*

§ CXVII. *Convolvulus Jalappa.*(27) Jalap. The resinous acrid principle of this root, which has a disagreeable smell and nauseous taste, is probably the cause of its anthelmintic virtue. *Wepfer*,(28) after having employed without success the remedies most celebrated against the taenia, successfully prescribed to one of his patients half a drachm of this root in powder. It is commonly directed in combination with other remedies.(29)

§ CXVIII. *Angelicae cortex.*(30) Angelica, the bark. Dr. *Griève*(31) was the first who gave this article as an anthelmintic, particularly against the lumbricoïdes. An ounce of this bark is boiled in three pounds of water, to one pound; of which decoction the patient takes every morning, one or two ounces.

This remedy has sometimes occasioned griping pains; it has however occasionally expelled an extraordinary quantity of worms.

§ CXIX. *Ferula Assa foetida.*(32) The gummi-resinous juice, obtained from incisions of the root of this plant, is what is used in medicine for the cure of several diseases, and particularly for the purpose of relieving the human body from worms, and those spasmodic affections from sympathy, which result from them. The virtues of this substance reside in the volatile oil and resinous principle which it contains.

Its taste is somewhat sharp, aromatic, and nauseous; it diffuses a smell of garlick.

It is given in pills, or in some other manner, in doses from two to ten grains, several times a day; it is sometimes combined with other medicines, as myrrh, the black oxide of iron, submuriate of mercury, etc.(33) Enemas of as-afoetida, and cataplasms, in which this article enters,(34) seem to me better, on account of the repugnance of many sick people to swallow this medicine, whose odour is so disgusting. Frictions of assafoetida dissolved in the gastric juice,(35) are preferable.

§ CXX. *Geoffroya surinamensis*.(36) Cabbage-bark tree, or wormbark tree. The bark of this plant has latterly been recommended against worms. I have many times used, and witnessed its efficacy against *lumbricoïdes* and the *ascarides vermiculares*. I have given it in powder and in extract; I think the decoction however preferable.(37)

§ CXXI. *Juglans regia*.(38) The walnut tree. With the green bark of the nut I have made a decoction, an infusion, an extract, and a rob,(39) which all possess a corroborant, astringent, and a vermifuge property, as the observations of *Andry*.(40) and of *Fisher*.(41) evince. It has long been observed that oil was injurious to insects; those even, which heat revives after submersion in water, die if immersed in oil, or covered with it. *Redi* and *Malpighi* have made many experiments on this subject; the result is that the oil closes all the air vessels, which in these small animals are very numerous, and distributed almost over every

part of the body. Agreeably to these views, oily substances have been recommended as vermifuges, and the oil of walnuts has been particularly extolled by *Andry*,(42) and by other French physicians;(43) they mix it with wine,(44) and believe the compound to be the more active and efficacious.

§ CXXII. *Laurus camphora*.(45) Camphor. The volatile principle of this substance is a diffusive stimulus proper to strengthen the nerves and calm spasms, which renders it very efficacious in verminous affections, as *Pringle* has demonstrated.(46)

The celebrated *Moscatti* generally prefers camphor to other vermifuges, for the expulsion of lumbricoïdes. Half a drachm is dissolved in a pound of water, to which a drachm of gum arabic is added, and this mixture is given in small spoonfuls. Sometimes a larger quantity of camphor is dissolved in an equal quantity of water, and with some ounces of this solution, and a quantity of tepid milk, injections are prepared, which are equally efficacious with children. As it is to be apprehended, says the illustrious *Palleta*,(47) when camphorated enemas are used alone, that the lumbricoïdes may retire to the upper portions of the small intestines, or the stomach, these clysters should only be administered where children have great reluctance to take medicines by the mouth, because the camphor, being highly volatile, soon penetrates to the stomach, and all the viscera are impregnated with its subtle odour. It is also communicated to

the mouth and respiration, so that the *lumbrioides* are nearly asphyxied and intoxicated with it.

The employment of camphor is also attended with this precious advantage, that it counteracts the predisposition to the further development of verminous seeds.

I have always used it with the greatest success; and I cannot too strongly recommend its use to physicians in worm complaints, (48) whether given in the mode already mentioned, or some other, or combined with other remedies. (49)

§ CXXIII. *Polypodium Filix mas.* (50) Male polypody, or fern. The anthelmintic virtue of this plant has at all times been celebrated; its taste is disagreeable, mucilaginous, soft, styptic and bitter.

It is recommended against worms, particularly against taeniae and *lumbrioides*. *Theophrastus*, *Eresius*, (51) *Galen*, (52) *Pliny*, (53) have prescribed its use in doses of a drachm, and even to two or three drachms, in powder, or dissolved in water, as *Windt* (54) advises.

The powder of the root of the filix mas being the principal remedy of the specific of *Nouffer*, proposed as infallible against the taenia; (55) it is necessary to know that this root, kept for a long time, loses its virtue.

§ CXXIV. *Spigelia anthelmia.* (56) Worm-grass, or Indian pink. The herb and root of this plant indigenous in the West Indies, of which *Linnaeus* has left us a very exact description, (57) possess, like opium, a narcotic quality.

Among the Indians it is celebrated as a vermifuge, and *Brown* was the first to make known its utility in Europe ;(58) afterward *Rosenstein*, *Bergius*, and *Dahlberg* brought it into fashion in Russia and Sweden. I have also frequently ordered it with the greatest success. From ten to twelve grains, in powder, are given to children, morning and evening, and from half a drachm to a drachm, to adults. An infusion or decoction is made of the herb ;(59) the extract has not yet been made use of.

Lining, a celebrated physician of Charleston, S. C. in place of the above, substituted the *spigilia marilandica*,(60) or Carolina pink, another plant which grows in South Carolina,(61) which, according to *Bergius*, is more efficacious than the preceding species. *Arnemann* attributes the vermifuge property solely to the root ;(62) and this reduced to powder is prescribed in milk, beginning, for children, with a dose of half a scruple. The use of all these powders generally renders the body costive ; practitioners therefore advise to keep the bowels open, by administering, every third day, one or two grains of submuriate of mercury, mixed with a suitable quantity of rhubarb.

§ CXXV. *Tanacetum vulgare*.(63) Common tansy. *Hoffman* employed the seeds of tansy against worms with good effect. Several other physicians have said much in their favour; and particularly *Rosenstein*,(64) who was in the habit of combining them with other anthelmintics.(65) One.

two, or three drachms as a dose, are prescribed in a pound of water, in infusion.

§ CXXVI. *Valeriana officinalis*(66). The volatile oil, contained in the root of this plant, has a smell of the goat, and a bitter aromatic taste; this article is one of the best stimulants, of which medicine can boast. In all nervous asthenic affections, it produces unequivocal effects, and most generally it acts more powerfully than a number of medicines, which are highly commended in these complaints. Practitioners have esteemed it as equally beneficial in worm complaints, and particularly in sympathetic affections depending on them, such as epilepsy, St. Vitus's dance, etc. In the famous electuary of *Storck*,(67) the powdered root of the official valerian, called *valeriana sylvestris*, or wild valerian in books of pharmacy, is the most active ingredient;(68) the dose should be proportioned to the age, temperament, and degree of weakness of the patient. It is prescribed under different forms, and ordinarily combined with other remedies.

§ CXXVII. *Veratrum Sabadilla*.(69) Cevadilla. Indian caustic barley. This plant grows in Mexico. The seeds and capsules, pulverised together, have been used, time immemorial, among the poor, for the destruction of those insects, which want of cleanliness has permitted to multiply on different exterior parts of their bodies. *Loeser*(70) first admitted this plant into the class of anthelmintics; it was employed with success by *Schmucker*,(71) in epidemic verminous dysenteries, and in

cases of taenia, where *Nouffer's* remedy had failed. These trials, variously multiplied, lead us to conclude, that the seeds of the cevadilla produce the desired effects, and that their use is not followed by any bad consequence.

Schmucker prescribed them in powder, in the dose of half a scruple, blended with a little sugar and a few drops of oil of fennel, taken for four days, directing the patient to drink some decoction of chamomile flowers after it; on the fifteenth day he augmented the dose to fifteen grains, forming it into pills with honey: every five days he subjoined the use of a purgative.

Thus he administered the remedy to adults. He followed the same method with children, excepting that the dose of the powdered seeds was but two, four, or at most six grains, mixed with syrup of rhubarb.

In cases of vermicular ascarides, he rendered this treatment more active by means of enemata of the decoction of the cevadilla seeds, adding to it an equal portion of milk.

Herz(72) has repeated the experiments of *Schmucker*, with equal success.

It however appears from the observations of *Odhelius*,(73) that the virtue of *Schmucker's* vermifuges is rather to be attributed to the combined use of jalap and submuriate of mercury, given together as a cathartic.

In whatever mode this remedy may act, it is well to know that the seeds of the cevadilla con-

taining a poisonous caustic principle, and having an excessively acrid and burning taste, ought to be exhibited internally with great circumspection, because it may readily produce deleterious effects, and even death. (74)

§ CXXVIII. Aloës, rhubarb, the *gratiola officinalis*, gamboge, chamomile, and particularly sulphureted scammony, (*diagrède sulphuré,*) and other similar articles, are also remedies commonly used for the expulsion of worms. I have not spoken of these substances singly, because these drastics being usually combined with vermifuge remedies, vegetable or mineral, cannot in strict reasoning be directly classed with those medicines, which we use to expel worms from the body, and to prevent the development of verminous seeds.*

* We are indebted to M. *Charpentier Cossigni*, member of the Academical Society of Sciences of Paris, for some very interesting details on the juice of the papaya, (*Carica papaya,*) employed by him with the greatest success in the verminous diseases of the isle of France and *Reunion*.

This tree is very common in most hot countries. It springs up without care or cultivation, and grows spontaneously; it is unisexual. Certain male trees are however occasionally seen to bear hermaphrodite flowers and fruit not so large, and less rounded or filled up, and shorter than that of the female tree, equally good however, and affording prolific seeds.

In order to extract the milk from the fruit, this must be green and fresh gathered; they are pricked with a pin or cut longitudinally; it yields a milk which is collected and given while new to the patient fasting. This is the most powerful of all the anthelmintics. It is said even to kill the *taenia cucurbitina*, which is common in the island. It is thought by some to be corrosive,

MINERAL VERMIFUGES.

§ CXXIX. *Sal Ammoniac*. Muriate of ammonia. Among the most efficacious remedies for the ex-

because when first taken it occasions colic, followed by erysipelas; but in these cases it was acknowledged that the dose was too large. Its activity and danger have been diminished by mixing with it boiling water, three or four times as much water as of the juice, and giving this to the patient after stirring it with a spoon; administered in this way I have not heard of its producing any accident. Some of the planters say this remedy may be given, without addition or inconvenience, to persons of every age; they have however remarked, that when taken in great quantities, it may excite a slight inflammation of the anus; but they add that this is removed in one or two days by means of lotions of emollient herbs.

Some have attempted to mix it with sugar or honey; it is pretended however that this addition very much lessens its efficacy.

M. *Cossigni* adds, that the proofs of the powerful property of this remedy are already very numerous, without reference to any unpleasant consequence from its abundant or excessive exhibition. What renders this medicine very important is, that a single dose of it is commonly sufficient to kill all the worms of the patient, however numerous they may be.

To an infant of from six to eight months, and even a year, is given a tea spoonful of the milk of papaya, mixed and beaten with three spoonfuls of boiling water or of boiling milk: this has the property of moderating the action of the remedy. A table spoonful of the milk of the papaya is given to children of five, six, or seven years of age, with three times as much boiling water: and to those of twelve or fourteen years, two table spoonfuls of this milk, mixed with six of boiling water. Three hours after this medicine is swallowed, the patient is to take a quantity of pure oil of Palma Christi, suited to the age,

pulsion of intestinal worms, *Bloch*(75) admits the muriate of ammonia, combined with rhubarb or jalap.*

sex, and strength of the patient, in order to discharge the dead worms, whose continuance in the intestines might prove injurious, etc. The seeds of the papaya dried and pulverized, and given in substance, are anthelmintic; the decoction of these with the roots neither occasions nausea, sickness of the stomach, nor colic; they are rather insipid, but not purgative.

Our colleague *Cossigni* has further remarked, that the milk of papaya, grown on dry ground, and in a warm situation, is more active than that of the papaya, produced in opposite circumstances, and that the milk of the former dries more readily and perfectly, than that from wet and cooler lands. For more ample details, see the work of *M. Cossigni*, entitled, *Moyens d'Amelioration et de Restauration proposés au Gouvernement et aux habitans des colonies*, chez *Delaplace*, libraire, etc.

We ought however further to inform our readers that the trials made in France of the juice of the papaya by professors *Corvisart* and *Leroux*, conjointly with *Dr. Graperon*, had no success. These experiments have been repeated by *Dr. Alibert* and *M. Calvet*, the nephew, at the hospital of Saint Lewis. Five children, from five to six years old, troubled with worms, took, for four successive days, the concrete juice of the papaya in two drachm doses, and in the manner directed above, without producing the expected effect. *Dr. Alibert* gave, on the fifth day, three grains of the oxide of tin, combined with a sufficient quantity of extract of juniper berries, and three of the young patients voided a number of lumbricoïdes.

To render the history of the papaya complete, we want an exact analysis of these different preparations. *M. Cadet Gassicourt*, an eminent chemist, has done us this interesting service.

* Our fellow member *Duval*, equally commendable for his learning and morality, has employed this remedy, against lumbricoïdes, in his practice, with complete success. *F. Trs.*

He advises a scruple of the former with half a scruple of either of the roots every half hour. A like

“*M. Vauquelin*, who has already made this analysis, has found, between the concrete juice and certain animal substances, some very curious analogies. He has not only observed a pretty large quantity of phosphate of lime, but he has separated from it a white substance, quite similar to animal oil, or fat. *Mr. Roch*, a surgeon in the isle of France, has sent me several samples of the evaporated juice, and a bottle of liquid papaya.

“As *M. Vauquelin* has operated only on the concrete juice, I thought it would be interesting to examine this material in its liquid state.

“The bottle containing it was well closed and sealed, but on opening it, it was not full; the stopple was forcibly withdrawn. I examined the gas, which was disengaged from it, which was carbonic acid. The liquid, white and opaque like milk, exhaled an insupportable odour, resembling assafoetida, but more active and nauseous. This smell became gradually weaker. This milk strongly reddened the tincture of turnsole, which the aqueous solution of the concrete juice did not. Its flavour was sickish and acrid, leaving in the mouth a taste of sugar. The concrete juice had not the same sharpness, or acrimony.”

“The milk of the papaya filtrated, passes transparent and greenish like clarified whey; it leaves on the filtre a white matter, curdled, of a suety insipidness, insoluble in cold or hot water, swelling in the air, and puffing up on the coals like caseous matter.”

“The concrete juice, distilled over an open fire in a glass vessel, has given a great quantity of carbonate of crystalized ammonia, a fetid oil, and disengaged much carbonic acid gas and carbonated hydrogen. There remained in the vessel a voluminous mass of coal, shining like that of some animal substance.”

“This coal, reduced to ashes, gave a quantity of lime and phosphate of lime.”

“I have distilled in a sand bath, and over a gentle fire some liquid juice of the papaya; the liquor coagulated; it passed in-

dose should be suited to the age, strength, and state of the stomach of the patient.

to an insipid phlegm, having no acid property. I have stopped the distillation, and filtrated the liquor from the matrass to separate the concrete matter.

“The liquor was much more acid than before. I saturated one portion with potass; I evaporated it; and poured on alkohol, which dissolved a small part of the extractive and saccharine matter, without touching the salt which had formed. The salt exhibited all the characters of malate of potass. Exposed to the air, it readily absorbed moisture, and equally precipitated the nitrate of mercury, from lead and silver. Another portion of the acid liquor from the same distillation, was treated with alkohol, which separated a white substance, entirely soluble in water, precipitating by the acetite, and by the nitrates of lead and of mercury, making a sort of dry and brilliant varnish, when applied to the surface of bodies, acquiring by desiccation, the transparence, aspect and taste of the gums. Treated with the nitric acid, this material gives nothing of oxalic acid; it is malate of lime perfectly similar to that obtained from pouring alkohol on the clarified juice of houseleek. Finally, I have precipitated a third portion of the acid liquor by the acetite of lead; I treated the precipitate with the sulphuric acid, diluted with water, and from this I obtained malic acid. Alkohol poured on the filtrated solution of the concrete juice effects the same precipitation of malate of lime. I confess that I suspected at first that the malic acid, which existed in so great quantity in the milk of papaya, might arise from the beginning of the fermentation which the juice had undergone; but after finding in the concrete juice the same acid united to the lime, I have considered it as one of the constituent principles of this vegetable matter. The white, concrete matter which gives to the juice of the papaya the appearance of milk, has not, as has been supposed, the characters of pure albumen, or fibrine, but those of curd or cheese.”

Hirschel (76) affirms that he thus succeeded in curing a sufferer who had been for a very long time incommoded with a taenia, and who, to obtain relief, had taken, without advantage, several highly extolled remedies. I have employed, with the greatest success, in cases of lumbricoïdes, particularly in children, the anthelmintic drops of *Dr. Hartmann*, in which the liquid aniseted (*anisé*) carbonate of ammonia is combined with assafoetida and a bitter essence. (77)

§ CXXX. *Barytes*. The muriate of barytes, prepared with all the precautions of modern chemists, is a remedy endowed with great exciting power, extending its effects chiefly over the system of lymphatic vessels.

For this reason, this salt has been employed, with the best effects, by *Crawford* (78) and *Clark* (79) in scrophulous diseases, and in chronic elastic tumors; by *Altholf* (80) in scirrhusities, and obstruc-

“It is affected like cheese, by the acids, alkalis, and distillation; the presence of caseous matter in a vegetable is not surprising. *Proust* has already found it in the emulsion of almonds. This concrete matter furnishes by analysis the phosphate of lime and carbonate of ammonia, which brings them very near to animal substances.”

“In like manner the liquid juice of the papaya, or the concrete juice when dissolved, presents also two remarkable substances.”

“The first retained on the filtre is the caseous matter, mixed without doubt with a small portion of albumen; the second is a solution of the malate of lime with excess of malic acid in the natural liquid juice; without excess of acid in the concrete juice.” *F. Trs.*

tions of the mesenteric glands, in tubercles of the lungs, in pituitous asthma, and in dropsies; in other kindred diseases, by the celebrated *Hufeland*,(81) and by myself.

The illustrious *Hufeland*, *Westrumb*,(82) *Bernigan*,(83) and *Kloths* have used the muriate of barytes in verminous complaints with so great benefit, that, according to them, there is no more powerful remedy than this, to expel from the intestines the vermicular ascarides. This medicine* however does not suit in cases where the lymphatic system is irritated, especially if disposed to inflame, as is often noticed even in diseases of the asthenic diatheses, as may be seen in the judicious reflections of *Darwin*.(85) The muriate of barytes is most commonly given dissolved in water; it is also directed in pills and powder.

§ CXXXI. *Ferrum*. This metal, prepared according to pharmaceutical processes, is one of the best tonics for the stomach.

It is on account of this property, that physicians have attributed to the filings of iron, an anthelmintic virtue, and not for the asperity of its particles, as some have pretended. In the works of *Wedel*,(87) of *Welthoff*,(88) and of *Van-Doeveren*,(89) we read of many cases of worms expelled from the stomach and intestines, by means of eight

* Dr. *Elzear Roue* cured two soldiers of taenia, with pills of muriate of barytes. We regret that we cannot subjoin the two cases which this excellent physician has just communicated to us. *F. Trs.*

or ten grains of *limatura ferri*, mixed with an equal part of rhubarb, taken two or three times a day. *Darluc*(90) succeeded even in expelling a taenia with iron filings; he recommends it still more for cases of colic produced by worms. The filings of iron, mixed with cinnamon and magnesia, prevents those belchings and flatulences, which sometimes incommode particular persons, who have taken this preparation of iron.

It seems probable that some of the particles of iron, not yet dissolved in the first passages, pass into the vascular system, which they strongly excite.* It is probably from this cause that the improved complexion of those who take iron but a short time, is derived.

This medicine therefore is equally well suited to prevent the morbid diathesis which favours the development of worms.

The *sulphate of iron* is ranked among the preparations, which, according to *Rosenstein*,(91) are best suited to relieve verminous affections. It possesses a greater astringent force than iron; it is also more useful in moderating excessive excretions of mucus from the intestines, and to give tone to parts relaxed. It is prescribed for children in doses of two, four, or to ten grains, and to adults from half a drachm to a drachm, and better still, if combined with cinchona, valerian, jalap, male fern,

* Is it not owing to the great tendency of iron to unite with oxygen, that we are to attribute its tonic and exciting qualities? *F. Trs.*

semen-contra, assafoetida, or rob of walnuts, etc.(92) To a child seized with spasmodic convulsions occasioned by worms, I prescribed a mass of pills,(93) in a manner analogous to that of *Fuller*: the worms were promptly expelled from the intestinal tube, the convulsions subsided almost immediately, and the patient was well.

Water acidulated with iron,(94) and what are better the martial waters,(95) so much commended by practitioners, as a means of curing verminous complaints, possess this medicinal quality by reason of the iron they hold in solution, and united with other astringent substances which strengthen and invigorate the stomach, the intestines, and the whole animal machine.*

§ CXXXII. *Mercury*. A number of eminent physicians(96) have ascribed to mercury the property of dissolving and attenuating the mucus of the intestines, and of destroying the worms which inhabit them.

Conformably to this idea, they have recommended, without limitation, the decoction of mercury, as a very active remedy in verminous complaints. A similar practice has given rise to discussions, of which it is useless to speak here. I shall merely remark that nonoxidized mercury has no irritating power on our bodies, except what comes from its weight and continual motion, and

* See in the work of Dr. *Marie de Saint-Ursin*, entitled the *Ami des Femmes*, page 238, the manner of using the artificial mineral waters. *F. Trs.*

the facility with which it is oxidized when introduced into the stomach and bowels; this last property tends rather to weaken, than to strengthen and excite the human frame.(97) This being admitted, it clearly appears that the decoction of mercury, and even mercury itself introduced into our body, are of no importance against verminous complaints, though their use has been highly celebrated; 98) still less can they be adopted in the treatment of worms. The people who work in the mercury mines of Almadá, in Spain, are more subject to worms and venereal complaints, than to any other; though these individuals, and particularly those who melt the mercury, absorb so enormous a quantity of it, that small globules of this metal are evacuated with the excrements.(99) The same thing happens to persons employed in the mines of Lydria, and in the laboratories of Chemnitz, in Hungary, and of Freyburg, in Saxony, where the amalgamation with mercury is practised, to purify gold and silver. In these places, I have seen, as it were, verminous complaints to be epidemic.

The labourers are constantly enveloped in humidity, badly fed and poorly clothed; they live indeed in a situation suited to produce asthenic diseases, and consequently conducive to the development of verminous germs. But let us proceed to positive facts.

Monck has performed a series of experiments to determine the quantity of the mercury which was dissolved in the water in which it had been

boiled to make a decoction of it; and in conformity to the results obtained, he asserts with certainty that the water holds in solution only the smallest possible portion of mercury; that the largest portion of the solution is charged with particles of lead and foreign substances usually found in union with mercury.

In addition to this, *Rosenstein* has administered mercury in several cases, even to salivation, without being able to expel a single worm.* Instructed by these observations, and by some of my own, I conclude that nonoxidized mercury is not to be regarded as vermifuge, except when it has been triturated with other appropriate medicines. It is administered to patients tormented with worms under the form of electuary or pills.(100)

Mercury, given in the state of oxide, acts on the solids as a powerful stimulant, since by its use, the pulse acquires great force, and the secretions and excretions are augmented. In this way several of the oxides of mercury have been very efficient in expelling worms, and in curing verminous affections. Among these the submuriate of mercury is to be preferred, then the ammoniacal muriate of mercury; and the sulphate of mercury administered in powders, boluses, or pills(101) etc. Sul-

* Our school-fellow, Dr. *Cusht*, has assured us that he employed the decoction of mercury with two children, troubled with lumbricoïdes, with the greatest success. Professor *Fourcroy* also recommends the use of it in his *Cours de Chimie*, at the school of medicine of Paris. *F. Trs.*

phur blended with mercury, and triturated together, has also been found useful in the cases abovementioned: the black sulphureted mercury (*le mercure sulfuré noir*) has been given from a grain, to ten grains, twice a day.(102) In the administration of the mercurial preparations, it is necessary to take care that they do not readily provoke salivation, which by debilitating the stomach and bowels, might produce effects contrary to those intended.

The dose should be insensibly augmented, and the mercurial preparation suspended so soon as the patient feels a heat in his gums, as I am accustomed to do in the treatment of general venereal diseases.(103)

§ CXXXIII. *Petroleum.* At Montpellier, petroleum is famous against worms; it is commonly called rock oil, red petroleum, and naphtho-petroleum. Dr. *Hasselquist* affirms also that in Egypt* the taenia being common, the inhabitants relieve themselves by means of petroleum taken in water in the dose of twenty or thirty drops each time.(104) A physician having for a long time prescribed various medicines without success, to a man suffering with taenia, at length ordered him half a drachm of petroleum mixed with an equal quantity of oil of turpentine, to be divided into three doses; the patient, already fatigued with remedies,

* Dr. *Larrey*, who has so well described the diseases of Egypt, assures us that the taenia is rarely seen there; and that the inhabitants and physicians do not know the petroleum.

did not take them without the greatest reluctance, and to get rid of the business at once, swallowed the whole quantity as a single dose. He was immediately delivered of the entire taenia.

Some time after the same physician prescribed for a woman, thirty drops of this oil to be taken in the morning, and forty more of them in the afternoon; she was soon delivered of a worm twelve metres long.(105)

The petroleum is a very stimulating and heating remedy: it is given in combination with some syrup, or with other remedies possessing a stimulant antispasmodic power,(106) in the dose of ten, twenty, or thirty drops. *Vicat* has advanced by little and little to the dose of one hundred drops; many practitioners advise the external use of it in cases of pains of the abdomen occasioned by worms. For this purpose the whole region of the abdomen is rubbed with the petroleum alone or mixed with ox's gall, as *Mellin* advises: in this way it is more penetrating and at the same time more active.

§ CXXXIV. *Muriate of Soda*. The stimulating effect of this salt facilitates the digestion of food, dissolves and attenuates the mucus of the stomach and intestines, excites the bowels to discharge their contents, opposes the putrefaction of the animal parts, and gives tone to the cohesion of the fibres.

These properties have not only rendered this salt necessary for the seasoning of our daily food, but also very useful in many asthenic diseases, and

especially in those which attack the system of lymphatic vessels, such as scurvy,(108) costiveness,(109) obstructions of the viscera and glands of the abdomen,(110) scrophula,(111) etc. The muriate of soda must also be injurious to worms, as in fact it has been observed to be by *Heberden*,(112) and by *Rush*,(113) who have administered it on these occasions with success, both by adding it in larger quantity to our daily meals, and by taking it alone, in large doses, fasting.

§ CXXXV. *Stannum*. Ever since the days of *Paracelsus*, the power of expelling worms from the intestines, has been attributed to tin. In the last century, *Alston*(114) of Scotland, began to make use of tin with the greatest success, not only against lumbricoïdes, but also against taeniae. Other physicians of great name(115) recommended it also as one of the strongest and most powerful anthelmintics, as we shall notice in the sequel.*(116)

§ CXXXVI. *Zincum*. In convulsive, epileptic, and hysteric complaints, the sublimed oxide of zinc, has been directed to advantage, as may be seen in the cases and observations of physicians, particularly in the work of *Hart*.(117) This remedy has

* *Dr. J. L. Alibert*, in his excellent *cours de Matière Médicale*, says that the oxide of tin is one of the most potent remedies against the taenia. He gives it to children in doses of three grains, in a convenient quantity of extract of juniper. For adults, he makes use of the muriate of tin in clysters: the latter should not be given without great caution, as it is a violent poison. *P. Trs.*

also been used in convulsive affections arising from worms, and with some success, according to the experiments of Dr. *Martini*,(118) of *Monck*,(119) and of *Storke*.(120)

It is ordered for children in doses of half a grain, to one or two grains, in a little sugar, two or three times a day.

For adults the dose is increased in proportion to the age and irritability of the individual. It is very useful in the treatment of the ascarides vermiculares.(121)

§ CXXXVII. *Sulphur*. The property of sulphur is to destroy the insects which infest different parts of our body. It has been remarked that the combination of sulphur and mercury, is an excellent remedy against worms.(122)

We derive the same advantage from the use of sublimed sulphur, administered in doses of ten, twenty, or even thirty grains, etc. It is also united with camphor, or assafoetida, to form pills. *Tissot*, *Van-Swieten*, and *Van-Doeveren* employed it against worms with the most perfect success. Persons predisposed to worms find themselves well after the use of the cold sulphureted waters,(123) and by this means are secured against the evils which worms produce.

II. TREATMENT OF TAENIAE.

§ CXXXVIII. The difficulty of expelling these worms from the intestinal tube is often very great. The enormous length of these worms,(124) and

particularly their various convolutions in the small intestines, render it impossible to expel them without incommoding the patient.

A specific is still wanting to kill them without disordering the stomach and bowels; if such a remedy should ever be found, they might be easily dissolved and discharged with the fecal matter, because once dead, they no longer adhere to the mucous membrane which lines the alimentary canal.

The armed human taeniae, by insinuating themselves with greater force into the substance of the intestines, are more difficult to expel, than the taenia without arms.(125)

Thus the morbid symptoms they occasion, being consequently more intolerable,(126) demand more prompt and efficient relief.

§ CXXXIX. The principal remedies used by practitioners to expel the taenia are taken from the class of the most powerful evacnants, and from the most active stimulants; the number of these remedies is great because several of them are inefficient.

On this point it is necessary to remark, that the administration of these remedies should be adapted to the age, constitution and morbid predisposition to which the individual tends who is troubled with the taenia; in a word, to the excitement of his system. In an individual of middling strength, affected with this worm, and who has a tendency to asthenia, we can easily expel the worm that torments him by a simple evacuant, or a compound drastic cathartic.

On the contrary, an individual attacked with taenia, of a cachectic constitution, in whom the asthenic diathesis prevails, will be with certainty cured, by means of a stimulant treatment proportioned to his state of weakness. This being granted, we clearly comprehend how some persons have been cured by taking tartrite of antimony,(127) sulphate of soda,(128) nitrate of potass,(129) gambogia,(130) or jalap,(131) and other similar remedies; while these same medicinal substances administered to other patients, also affected with taenia, have been unsuccessful, or even injurious.

This also explains why recourse must sometimes be had to opium,(132) to electricity,(133) and to a stimulant regimen. Besides the variety of constitutions, the different species of taeniae occasion, as we have said, a notable difference in the success of the treatment undertaken with these medicines.

A gentle evacuant or a bracer, though light, are ordinarily sufficient to drive out the unarmed taenia; the armed taeniae, on the contrary, are not commonly detached from the walls of the intestines, till after the exhibition of a drastic purgative, which, by irritating the intestinal tube, occasions a violent and rapid peristaltic motion, which obliges it to give up its hold, or by another remedy which acts on the worm with a force altogether mechanical, for example, like the oxide of tin.(134)

It is from a profound examination of these practical results, that we arrive at the knowledge of

the true cause which frequently renders inert the treatment of taeniae, by those compounds and methods which are so highly commended in the publications of authors, illustrious however, and which have been spread through all the courts of Europe, sometimes as infallible specifics, sometimes as marvellous secrets. From this philosophical source, we can comprehend how it is, that in many cases of taenia, which have been almost without hope, the desired success has been obtained by medicines quite simple and common, such as garlic,(135) the seeds of cevadilla,(136) muriate of ammonia,(137) filings of iron,(138) the oxides of mercury,(139) petroleum,(140) etc. It is, in fine, in this manner, that we shall be able to determine the true value of the different methods which have at various periods been adopted for the expulsion of taeniae from the human body.

I shall mention such of these methods as have been deemed most successful, in order to give a general representation of the means that medicine can employ in triumphing over an enemy so injurious to health, and sometimes so difficult to be driven from his strong holds.

§ CXL. But before we enter on the details of the remedies, employed at different times, by different physicians, and with various success, I should offer some practical precepts, with the view of regulating and favouring the discharge of the worm from the patient under treatment. So soon as a part of the taenia appears from the anus, it seems,

at first, very easy to extract the entire worm. Observers however agree that this is impossible, and I have been several times convinced, when desirous of doing it, that by pulling, even with caution, the portion evacuated, that the patient begins to feel in his belly a twisting and drawing, such as would throw him into convulsions, if the pulling were continued, or the worm not cut off. When, in place of cutting off the worm, a thread of silk is tied round the portion passed out of the anus, it retires into the body about three metres eighteen centimetres: but soon after it is again detached from the intestines, and passes out of the anus.

So soon as the patient begins to find the worm to be passing out, he should immediately repair to the close-stool and remain patiently seated till the whole worm is voided.

The taenia, rolled into a knot, is ordinarily expelled with the feces; but it is discharged with difficulty, either because its head is buried in the mucous membrane or valves of the intestines, or because a mass of mucous matter impedes its exit; then the patient, tranquil on his pierced chair, should drink, in repeated and frequent doses, an infusion of chamomile flowers, or what is better, he should take an ounce of sulphate of magnesia to quicken the peristaltic movement of the intestinal tube.

If after taking proper medicines, the worm is not evacuated, or but partially, it is obvious that suitable remedies must be repeated next day, or

even more active remedies, if the first have been insufficient.

It sometimes happens that the patient, ready to expel the worm, after an abundant alvine evacuation, experiences a strong sensation of heat and anxiety at the praecordia, which ends in vomiting. In this case we need not be uneasy, because this accident soon passes away; the patient has only to snuff up some radical vinegar (acetic acid), to be almost instantly restored.

METHOD OF ROSENSTEIN.

(Cold water, and mineral waters.)

§ CXLI. We have elsewhere noticed, (141) that taeniae, plunged into hot water, move with vivacity, and plunged into cold water, that they are almost asphixied. *Rosenstein*, supported by this observation, judged that these worms could be easily detached, by causing the patient to drink a large quantity of cold water, after taking a purgative, because the cold water depriving them of the power of moving the neck and fixing the head into the folds of the intestines, they would be thrust from the body by the violence of the peristaltic motion, increased by the action of the purgative. (142) He communicated his thoughts on this subject to *Dr. Darelius*, who some weeks after, sent him a taenia expelled in this way; this worm was seventeen metres ninety nine centime-

tres* long, the neck entire, at the end of which was the head with its tube and four lateral holes.

The same *Dr. Darelus* cured several other patients in this manner.

Lindhult and *Sidren* have, in like manner, had the same success.

Rosenstein then remarks, that if water could remain cold half an hour, or an hour in the stomach and intestines, or if taken every moment, it could pass without delay into the stomach and into the bowels, this means would never fail to succeed. But as we cannot always find these circumstances, we should frequently repeat the potions of cold water so as to obtain its effect with certainty.(143)

§ CXLII. We have noticed from the results communicated by *Dr. Soa*, that the muriate of soda kills taeniae with promptitude;(144) besides the vermifuge property of this salt which is confirmed by practitioners,(145) I would advise a strong solution of it in cold water, instead of water simply, to give more efficiency to *Rosenstein's* method; sea water cooled might answer this purpose very well: the same may be said of mineral waters, which hold muriate or sulphate of soda in solution.(146)

* The *centimetre* is the hundredth part of a metre, or nearly four tenths of an inch. *A. T.*

METHOD OF MEIER.

(*Carbonic acid gas.*)

§ CXLIII. A young girl, seized first with epileptic attacks, and by fits of violent colic, exhibited unequivocal signs of the existence of a taenia in the intestinal tube.

Some slight remedies were prescribed, without effect; but after eating freely of strawberries just gathered, and drinking a cup of warm milk, she had four copious alvine evacuations accompanied with pain, and in the last of which she passed a fragment of tape worm three metres eighteen centimetres in length.(147)

Dr. *Meier* of Erfurt, after being informed of the treatment, attributed this effect to the considerable quantity of carbonic acid gas, which is disengaged from fresh strawberries so soon as they are taken into the stomach, since this fruit contains no other material capable of expelling a taenia. To verify his hypothesis, he ordered a patient, having taenia, to take every hour a teaspoonful of carbonate of magnesia, and immediately after, another spoonful of the acidulous tartrate of potass. The patient having continued this treatment two days, evacuated the third day several pieces of taenia. It was observed on this occasion, that by abandoning the remedies mentioned, he voided no more of the taenia, and that so soon as he took them anew

he discharged several more pieces of the worm with the feces.

§ CXLIV. The vermifuge property of carbonic acid gas has already been announced by *Targioni*,(148) by *Hulme*,(149) by *Hartmann*,(150) by *Suenscke*,(151) and lastly determined by a beautiful series of experiments made by the celebrated *Ingenhouz*,(152) The credit however of reducing to practice the trials of physicians, cannot be refused to *Dr. Meier*, to whom we are under great obligations. This method is mild and agreeable, and at the same time seems calculated somewhat to strengthen the system.

This method ought not to be abandoned, and I should prefer the use of the carbonate of magnesia and the acidulous tartrate of potass, as directed by *Meier*.

The cold mineral waters charged with carbonic acid gas,(153) and in want of these, *the aëroform powder of Wagler*(154) or the water of *Seltzer* artificially imitated,(155) may render this method more efficacious than that of *Rosenstein*.

METHOD OF CHABERT.

Essential oil of turpentine and liquid carbonate of ammonia.

§ CXLV. The essential oil of turpentine, combined with petroleum, has already been noticed, as well suited to expel taeniae.(156) The remedy of *Chabert* consists in the distilled oil of turpen-

tine with the liquid carbonate of ammonia; this mixture he assures us 157) is a very powerful and infallible means of expelling the taenia from domestic animals.(158) Repeated observations prove, that though this remedy acts with activity and energy against taeniae, it produces not the least disorder in the system. It is also to be desired that it should be adopted by physicians to expel taeniae from the human body, since we have seen that the essential oil of turpentine, muriate of ammonia, and carbonate of liquid ammonia, are also remedies, which have been advantageously employed both against taeniae and lumbricoïdes.

METHOD OF NOUFFER.

The root of polypodium filix mas.

§ CXLVI. Toward the middle of the last century a great number of persons, troubled with taeniae, went to *Morat* in Switzerland, where madam *Nouffer*, after the death of her husband, continued to cure them with promptitude and success, by means of a secret which she held from her husband. The king of France gave a considerable sum to obtain the formula of this celebrated remedy, and charged the physicians *Lassone*, *Macquer*, *Lamothe*, de *Jussieu* and *Carburi*, to examine it, and make such trials with it as they might think proper. This committee made their report, July 13, 1765, whence it appeared that the remedy of *Nouffer* answered very well in practice, and that it merited

the celebrity it had acquired. The king ordered the publication of it for the benefit of suffering humanity, in the following terms.(159)

Preparation of the patients.

“This treatment requires no preparation, unless it be to take for supper, seven hours after a common dinner, a soup-panada, made in the following manner: take a pound and a half of water, from two to three ounces of fresh butter, and two ounces of bread cut into small pieces; add a sufficient quantity of salt to season it, boil the whole over a good fire, stirring it frequently till it is well mixed and reduced to a panada. Fifteen minutes after, give the patient two middling sized biscuits, and a glass of white wine, or pure water, if he does not commonly drink wine.

“If the patient be costive, give him the following clyster fifteen or thirty minutes after supper: take a good pinch of mallows and of marshmallows, boil them a little in half a pint of water, add to it a little muriate of soda, strain it, and mix with it two ounces of olive oil.

Treatment of the patients.

“The next morning, eight or nine hours after supper, the following specific is administered: take three drachms of the root of the filix mas,(150) reduced to a very fine power, mixed with four or six ounces of the distilled water of the male fern or of the flowers of the tilden or lime tree (*tilleul.*)

the whole to be swallowed by the patient, rinsing the tumbler two or three times with the same water, that none of the powder may remain in the glass or mouth.

“For children, the dose of this powder is lessened to one drachm. If the patient, after taking the powder, should be incommoded with nausea, he must inhale the odour of strong vinegar; if, notwithstanding this, the powder rises and seems ready to be discharged from the mouth, he must swallow and do every thing in his power to keep it down; but if obliged to reject it in whole or in part, he must continue to take it till the nausea ceases, and till what equals the first dose is retained.

“Two hours after the powder is taken, the patient is to swallow the following bolus: take submuriate of mercury, and dry resin of scammony of Aleppo, of each twelve grains, of gamboge five grains; reduce these three articles to a very fine powder, and with a sufficient quantity of hyacinth confection form the whole into a bolus of middling consistence; this is the purgative dose usually given; that of the confection (161) is from two scruples to two scruples and a half for persons of robust constitution, or difficult to purge, or who have previously taken strong purgatives. A bolus compounded of eight and a half grains of submuriate of mercury, and the same quantity of the resin of scammony, is given to weak persons who are sensible to the action of purgatives, and for children the dose should be diminished agreeably to the prudence of the phy-

sician. In a case where all circumstances unite, seven grains of submuriate of mercury and as much of the resin of scammony with a sufficient quantity of hyacinth confection, are sufficient, without the gamboge.

“ This bolus has also been given at two times, that is, one half of it two hours after the powder, and the other part three hours after the first, because the first had operated but slightly. Immediately after the bolus, one or two small cups of green tea; and from the beginning of the evacuations, a cup should be given from time to time till the worm is discharged. After the bowels are opened, but not before, the patient is to take some good broth, and some time after, a second broth or light soup.

“ The patient may afterward dine temperately, but through the day he is to be cautious and rather abstemious; if however the bolus has been partly ejected from the stomach, or if retained, it has not purged sufficiently in four hours, he must then take from two to eight grains of sulphate of magnesia, dissolved in a convenient quantity of boiling water.”

§ CXLVII. The powder of the male fern has been employed with success, as we have elsewhere remarked,(162) for the expulsion of worms from the intestines, and particularly taeniae and lumbricoïdes. Even before madam *Nouffer* had unveiled her secret, Dr. *Herrenschwand* had used this remedy in cases of taeniae, pursuing nearly the same treatment.(163)

The French commissioners however, who were chosen to examine the remedy of *Nouffer*, and other physicians who have often tried the method of *Harrenschwand* and that of *Nouffer*, certify, that this remedy is fatal to the human unarmed taenia, but that it produces no effect against the armed human taenia.(164.) The Russians, the French, and the Swiss have chiefly contributed to the celebrity of these two methods;(165) in fact, the inhabitants of these countries are more subject to the unarmed taenia than to the other species.(166)

It follows that in Russia, in Switzerland, and in France, one of these methods must be more efficient, than in Lower Saxony,(167) and in Italy, where the inhabitants are tormented by the armed human taenia,(168) more than by the unarmed species.

§ CXLVIII. In spite of the fine observations of some celebrated individuals, who testify to the success of *Nouffer's* method in the treatment of taeniae, I must however say, that the maxim of believing it efficacious only against unarmed taeniae is subject to some restrictions. The celebrated *Palletta* relates, that the Milanese physician, *Gallaroli*, drove both species of this worm from the human body with *Nouffer's* remedy.(169)

I have also had several patients attacked by the armed taenia, who were happily cured by the same regimen.(170) Though these observations seem to contradict the maxim announced by the French physicians and other practitioners, I ought

nevertheless to notice the exception to which it is subject; I am led to this by a practical case truly singular. I report it because it seems well calculated to reconcile the two opinions given on the method of *Nouffer*, and to settle with precision the cases in which it may be crowned with success.

Case.

Anthony Arcova, of Pavia, of a tolerably robust constitution, had no particular disease before the age of 23 years, if we except some attacks of an autumnal intermittent fever, epidemic in this city, and from which his health was soon reestablished; he was badly nourished, labouring more than usual, preserving no proportion between his fatigue and repose. On the 9th of February, 1797, being occupied about his domestic affairs, before breakfast, he was suddenly attacked with violent pains in the abdomen, which soon subsided, but afterward returned, accompanied with extraordinary appetite, and an undulation of the belly.

Small pieces of the armed taenia were observed in his excrements. At length, on the 17th of February, toward night, such violent cutting pains took place, that he was obliged to keep his bed, and to have recourse to some bitter spirit of wine and good rum to repair his strength. The pains abated, and the patient had a tranquil night. The following day, he rose with an unusual appetite; during the day he had three discharges, and with each voided a piece of taenia three metres eighteen

centimetres long. Three days after, having again suffered pain, he decided to repair to the Clinical Hospital of Pavia, then under my care. Besides the symptoms already mentioned, I found his pulse very small and feeble. February 22d, I directed him the soup-panada, prescribed by *Nouffer*, and the day following, gave him in the evening a drachm of the pulverized root of the filix mas, and then his purgative agreeably to the precepts of *Nouffer*. The patient followed this regimen exactly, and was again seized with griping pains, during which he discharged, in several pieces, the armed taenia, represented Plate I, fig. i, ii. The same evening he took again the soup-panada, and on the 23d he took, early in the morning, the fern powder, and soon after the usual purgative. The patient had no pain; the remedy produced reaching to vomit, which gave way on sucking a lemon. He voided, without having pain, in his fecal discharges, a lumbricoïdes, and two pieces more of taenia, which, with the preceding, measured ten metres sixty decimetres. The head (Pl. I, fig. i,) and the tail were among these pieces. The same treatment was continued three days longer, but discharging no more taeniae, and the patient being in other respects restored, he returned to his house. Near the end of August of the same year, he came to consult me, because he again felt the pains of the abdomen, and again discharged pieces of taenia, which according to him were larger, broader, and longer than the other pieces. I advised him

to enter the hospital where he arrived August 29th. I treated him for seven days agreeably to the plan of *Nouffer*, as had been done in the month of February; but no effect was produced, as he discharged merely some small fragments of taenia, as happened before he entered on this course of treatment, and the symptoms increasing for two days, I subjected him to the trial of the root of the male fern, according to the mode of *Herrenschwand*, (171) in lieu of that of *Nouffer*; but all was useless. The griping pains returned with augmented violence; the alvine evacuations were more frequent, the patient very weak; frequent fainting fits rendered the disease more severe, and the taenia seemed more and more difficult to be expelled.

In a case to me so singular, I determined to try *Alston's* plan; and accordingly, September 8th, I prescribed for him, to be taken in the morning, a bolus, compounded of ten grains of filings of tin, with a sufficient quantity of conserve of roses, to be repeated every two hours. After the third dose he voided, in several pieces, a very large armed taenia, in length twenty five metres one hundred and fifty decimetres; (172) he recovered his health perfectly, and was no more troubled with taeniae.

§ CXLIX. If we attentively consider this case, it will teach us that the method of *Nouffer* may be successfully adopted even in cases of armed taeniae, if they are small or young, because this worm, before his size and strength are completed, is not yet firmly attached by the fangs of his head,

to the mucous membrane of the intestines. This case also instructs us, that the same method will certainly fail when the armed taenia, at full growth, is strongly fixed to the membranes of the intestines, and consequently occasions more severe symptoms.

I have had occasion to prescribe for these taeniae, when the age of the armed taenia was different from that just mentioned.

This difference has however required an opposite mode of treatment ; if the instance is not rare, it is certainly instructive.

§ CL. Further, the root of the polypodium filix mas, even before the method of *Herrenschwand* was known, and before the secret of *Nouffer* was revealed, had been employed by different physicians in cases of taeniae and other worms, as we have already announced. (174) *Renard*, (175) in these cases, used to prescribe, in the evening, an enema of soap dissolved in water, and during the five following days administered, fasting, a drachm of the pulvis radice filicis maris, dissolved in some purslain, and soon after a bolus, compounded of submuriate of mercury, of jalap, rhubarb and honey ; and for common drink a decoction of the male fern root. *Vogel* affirms, (176) that nothing is more effectual in expelling taeniae than half a scruple of this root, and three grains of gamboge, taken morning and evening, for several days : the same thing has been observed by *Alix*, (177) by *Duncan*, (178) etc.

METHOD OF ODIER.

Oleum Ricini.

§ CLI. The celebrated physician *Odier*, of Geneva, first administered this oil for the purpose of expelling worms from the human body, and particularly taeniae.(179) The experiments of *Redi*, of *Malpighi*, already mentioned,(180) as well as the practice of *Andry* and other French physicians, have confirmed the vermifuge property of oily substances; and among these the fresh oil of the common ricinus(181) has been found the most proper, because from its mildness, the sick take it with ease and without dislike.

This oil both kills the worms and purges the patient. Adults take three ounces for a dose, and children a teaspoonful several times a day. It produces no pain in the abdomen, as is the case with most other purgatives; this oil may also be given without fear, even to ruptured persons. *Goexe* relates(182) the case of a feeble and very irritable old man, who had a double hernia, who soon relieved himself of a taenia, by means of this salutary oil.(183)

§ CLII. The use of the oleum ricini has been confined to cases of the unarmed taenia, because *Odier* and his colleague *Dunant*, have never destroyed the other species, with this remedy. I can however say, that it sometimes serves wonderfully well to expel also the armed taenia.

In my journal, I have two cases of armed taeniae expelled by three ounces of this oil, taken by a patient during three successive days, and by another taken twice a day for a week.

§ CLIII. Some practitioners have calculated to render the root of the polypodium filix mas more active, when administered in doses of two or three drachms, by prescribing, two hours after, an ounce and a half of oleum ricini, instead of the purgative commonly given by *Mouffer*, which is attended with some inconveniences, as vomiting, colicky pains, abundant evacuations, prostration of strength, and other similar symptoms. After this oil has been taken, the patient drinks some broth, and the dose is repeated the second or third time, if the sufferer can bear it, in order to drive the taenia from the intestinal tube.

Selle advises, (184) on the contrary, to take the oleum ricini in the evening, and the next morning ten grains of gamboge, and to repeat it twice more, drinking afterward some broth, provided no unpleasant irritation exists.

METHOD OF DESAULT.

Mercurials.

§ CLIV. Dr. *Desault*, an eminent physician of Bordeaux, having observed that taeniae (principally the armed) sometimes attach themselves to the intestines in such a manner, that it is difficult to separate and expel them, proposed for this purpose

an ingenious and bold expedient, that of administering alternately a mercurial friction and a purgative of calomel in a large dose ;(185) it cannot be denied that worms have often been expelled by the oxides of mercury (186)

The method proposed however may readily occasion diseases more intolerable and dangerous than that of the worms.

Besides, very few persons would willingly submit to a treatment altogether mercurial. In using mercurials therefore, and especially the oxides, which are useful only in certain cases, the practice of *Rathier*,(187) who assures us he prescribed the following remedy with the best success, is preferable: take twenty grains of savine (*sabine*) in powder, fifteen grains of the seeds of rue, ten grains of submuriate of mercury, twelve drops of the oil of tansy, and of syrup of peach flowers sufficient to form the whole into a bolus. The patient should take half of it in the morning and the remainder after dinner, drinking each time a glass of good wine, in which some peach kernels have been macerated.

METHOD OF ALSTON.

Tin.

§ CLV. Tin was regarded, even anciently, as a very efficient remedy for the expulsion of intestinal worms ;(188) it was afterward proposed by *Dr. Alston* to expel taeniae. Several physicians have(189)

obtained from it great success, especially against the armed taenia.

I have already remarked that in cases of old, large armed taeniae, the method of *Nouffer* was insufficient, and that on the contrary, with the filings of tin, regularly administered, the desired effect is promptly and certainly obtained.(190)

§ CLVI. To comprehend clearly the manner in which tin produces these salutary effects, we must reflect on an observation of *Bloch*, relative to the lanciolate taeniae, which are found in great numbers in the intestines of lean geese; in small numbers in fat geese.(191) In the latter, he several times found some of these taeniae included in the rectum and enveloped in the excrements, with which they are commonly expelled.

The reason why the lanciolate taeniae leave the small intestines in fat geese, (the common abode of worms,) is certainly not to be attributed to their fat, but to the change of their nourishment. In villages, geese commonly feed on the simple pasture of barren places, and consequently the lanciolate taeniae accumulate in the small intestines, to be nourished by the juice of the grass they eat. Whereas geese sold in the city are commonly fed on barley and oats to fatten them. The goose digests meal very well, but the capsules of the grain, separated only by the stomach, pass into the intestines. Hence it follows, that these small irregular substances prick the worms and oblige them to descend to the lower portion of the intestines, where,

not being able to support themselves long, they are soon expelled with the feces. From this observation Dr. *Bloch* concludes that it is certainly probable that the filings of tin act on worms by reason of the sharpness and asperity of their particles; and it has been remarked, in fact, that the coarsely filed tin is more efficacious than that which is very fine, because the particles of the former are better suited to irritate the taeniae, and consequently to expel them from the intestines.

§ CLVII. The tin of *Malacca*, or very pure tin, called in England *grain-tin*,(192) is preferable to any other, because it is more free from heterogeneous poisonous particles, which are usually combined with this metal.(193) *Margraff* however prudently admonishes us, that sometimes even in the tin of *Malacca* and England, we meet with a small quantity of arsenic, which may produce fatal accidents.(194)

Unfortunately, the tin sold with us, is more or less blended with lead, and the latter is very frequently combined with arsenical pyrites; physicians should be very careful of its quality, when they employ tin internally, for I can assert from my own experience, that if the tin be not pure, the saturnine or lead colic, and palsy of the inferior extremities, will be the deplorable consequences of its exhibition.(195).

§ CLVIII. Tin, coarsely rasped, is, as we have said,(196) to be preferred to tin in fine grains, as used by the English, according to the observations

of *Bloch*,(197) of *Goeze*,(198) and of *Fothergill*,(199) to which I can subjoin my own.(200)

It is administered in doses from half a scruple to an ounce, according to the constitution of the patient, and the certainty of the purity of the tin. It is ordinarily given in form of bolus, or electuary, using theriaca, the conserve of roses, of absinthium, honey, etc.

By adding some vermifuge, it has been thought that its operation would be more effectual, and with this view, the union of jalap has been recommended,(201) the root of the male fern,(202) the sulphate of iron,(203) semen-*contra* and sugar,(204) etc. I have constantly used, with the greatest advantage, when well prepared, *Guy's* powder of Ethiopia.(205) In general, the use of tin should be continued for several days in succession, if one would realize the desired effect; it should be suspended every fourth, fifth, or sixth day, to interpose a purgative for the expulsion of the worms.(206)

METHOD OF MATHIEU.

Tin, fern, semen santonicae, and drastic purgatives.

§ CLIX. We now come to the last of the various methods, which have been vaunted for the expulsion of taeniae.

M. Mathieu, an apothecary of Berlin, for some years employed, with astonishing success, a med-

icine, which was remarkable for curing those persons who had either species of the taenia.

His method, which begins to prevail, consists in the administration of two electuaries, compounded of the filings of English tin, the powdered root of male fern, semen-contra, scammonia of Aleppo, gamboge and sulphate of potass.

The simultaneous exhibition of so many remedies, which we have noticed as suited to expel both species of taenia, must certainly produce effects, if not constant, at least superiour to what may be hoped from other methods. *Aliz* had already combined, with great advantage, the use of tin filings and the pulverized root of male fern.(207) The remedy proposed by *Mathieu* will, of consequence, be still more active; and physicians may try it with confidence of success.(208)*

* *Dr. Bourdier*, professor of the Special School of Medicine of Paris, used the following remedy with the greatest success, against both species of taenia: Pour a drachm of sulphuric ether into a glass of the decoction of male fern, which the patient is to take fasting; four or five minutes after, an injection of this same decoction, with two drachms of ether, is to be thrown up. One hour after, give two ounces of oleum ricini, and one ounce of the syrup of peach blossoms. This treatment is to be continued for three days. The worm is commonly discharged but half organized.

When the worm is in the stomach, success is certain; when in the intestines, the treatment, after some time, is repeated; then *Dr. Bourdier* prescribes an enema of decoction of fern and two drachms of sulphuric ether, immediately after the patient has swallowed the etherated potion. *F. Trs.*

[Since the French edition of *Brera*, several articles have been used as remedies against the taenia, and with so much success, that they are likely to supersede the further employment of some substances, which formerly acquired, for a time, a reputation, which they have not been able to sustain. The most valuable of the new remedies is *spirit of turpentine*, whose origin, as a vermifuge in England, is given in the following paper from the second volume of the *Medico-Chirurgical Transactions* for 1811.

“ *On the use of oil of turpentine in taeniae, communicated in a letter from John Ralph Fenwick, M. D. of Durham, to Matthew Bailie, M. D. F. R. S. Read January 2, 1810.*

“ *Sir, Durham, Dec. 19, 1809.*

“ Having been informed that you are desirous of a fuller account of the efficacy of oleum terebinthini in expelling the tape-worm, and knowing no one, who, by his influence in the medical world, and his zeal for the improvement of medicine, is more likely to diffuse a knowledge of that remedy, I shall now lay before you a detail of all the information I have received, and of all that my own experience has taught me on the subject.

“ You will make what use you please of the communication, as my only wish is to make the remedy generally known.

“ In the month of August last, I was told that Mr. John Hall, of this city, had been cured of the

tape-worm by the use of oleum terebinthini, and had since administered it with success, in several other cases ; and lost no time to procure a conference with him, when I received the following information.

“ He stated that about five years ago, when suffering severely from the tape-worm, he had met with a seafaring man, who said he had cured himself of the complaint by taking oleum terebinthini. He was induced, as he informed Mr. Hall, to try it, by observing that whenever he drank rather freely of gin, he always passed portions of the worm, and experienced relief ; which led him to hope, that if he could find some substance of the same nature as gin, but stronger, it might effectually cure him.

“ Under this impression, he took, (his ship being at that time in the Baltick,) a wine glass full of oleum terebinthini. The consequence was, that about two hours afterwards he passed, with a purgative stool, an entire tape-worm ; from which time the complaint had not returned.

“ Disappointed in all the remedies employed in regular practices, and encouraged by this statement, Mr. Hall took two or three ounces (for he was not at the trouble to measure it) of undiluted oil of turpentine in the morning, fasting ; and as it did not operate in two hours, he had recourse to a second dose, amounting, as near as he could guess, to three fourths of the first. In about an hour after, he had a purgative stool, and with it passed a

tape-worm, apparently not quite dead. The medicine produced giddiness, like that which follows the use of ardent spirits, a slight headache, and a tendency to sickness, but he felt no other inconvenience, and he has since continued well. Though I had no reason, from Mr. Hall's character, to doubt the truth of his account, yet the extraordinary dose, in which the medicine was said to have been taken, determined me, before I ventured to employ it, to examine carefully, and apart, those inhabitants of this city, to whom he told me it had been successfully administered. As their account entirely confirmed his, I shall now give the outline of their cases.

“1. Greathead, aged 70, had been afflicted with the tape-worm above twenty years, during which time he had taken many remedies; and among others Madam *Nouffer's*, with temporary relief, but with no permanent advantage. He took olei terebinthini two ounces undiluted, fasting; and in two hours after one ounce more. A tape-worm came away soon after in a dead state, and he has since experienced no return.

“This took place near three years ago. The medicine acted as a brisk purgative, and produced considerable sickness, but no other inconvenience.

“2. Edward Dodd, Sergeant Major to the Durham volunteers, also took the oleum terebinthini rather more than two years ago. He had had the disease about fifteen years, and had tried Madam *Nouffer's* and other remedies in vain.

In this case also, a second dose of one ounce was given two hours after the first, as that did not affect the bowels.

This, in less than an hour, was followed by the expulsion of a dead tape-worm, fifteen feet long, which he had preserved and showed me. He has had no return. Edward Dodd stated, that he had given it to a young girl 10 years of age, in the dose of one ounce with complete success.

“ 3. Robson, shoemaker, aged 45, took the oleum terebinthini two years ago, after breakfast, with considerable relief; but his complaint returning in about six weeks, he took it in the usual dose, and fasting. He did not attend to the nature of what passed, except so far as to observe that there were numerous portions of worm; but he has since been free from all complaint.

“ This patient having drunk some malt liquor in the evening, before the action of the medicine had ceased, was seized with such violent vomiting and diarrhoea as greatly alarmed his family. He did not remark that the liquor was hard, stale, or otherwise bad in its quality.

“ Besides these, five other cases were mentioned to me, by Mr. Hali; but as I had not an opportunity to examine the patients, I do not notice them here.

“ Conceiving myself now fully justified in trying the remedy, I recommended it to Francis Howard of this city, butcher. He had laboured under the disease for several years, and was much ema-

ciated. The medicine was administered by Mr. Clifton, surgeon, on the morning of August 8th. The first dose of two ounces not affecting the bowels, in two hours one ounce more was given, and in about half an hour after, an entire tape-worm, measuring fourteen feet and a half, came away dead. Soon after taking the first dose, when I saw him, he complained of giddiness and tendency to sickness. Neither his pulse nor the heat of his skin was affected by it. It operated briskly after the second dose, and produced great sickness in the evening; but he had no strangury or heat in passing urine, or other inconvenience, and was cheerful and at work early the next day. Dr. Southey saw this patient as well as Mr. Clifton and myself. Within the last three weeks the disease has returned, and he will shortly again take the remedy. The second patient, to whom I recommended the oleum terebinthini, was Anne Lunsden, aged twenty. She took two ounces undiluted on the 23d of August, and that dose not operating in two hours, she had one ounce more. Nearly another hour passed before she had a motion, and the first being scanty and nearly natural, and without any portion of worm, she took a third dose, of the same strength as the second. The medicine then operated briskly, bringing away a large quantity of worms, broken into small portions, with what had the appearance of skins and much mucus.

“I saw her on the 13th instant, and she had not since felt any symptom of the disease. The patient was seen by Mr. Clifton also. The third (fourth?) case was that of Welford, shoemaker, aged nineteen. He had before twice taken the oleum terebinthini. After the first trial, he remained free from all complaint for nearly six months; after the second, not quite so long; with both, a great quantity of worm had been passed. He took the medicine August 25th, and passed several portions of worm, the operation of the turpentine being that of a severe purgative, producing considerable sickness; but as he felt quite well the next day, and the effect had not been quite satisfactory, I advised Mr. Clifton again to give it to him on the 27th of August. He accordingly did so; with this dose however no tape-worm passed, but only a very large lumbricus. During the month of November, he again had evidence of the presence of tape-worm, on which he once more had recourse to the oleum terebinthini, which brought away an entire tape-worm, which was dead when it passed. I saw it in Mr. Clifton’s possession. I shall now offer a few observations.

“From the general failure of purgative medicines in this disease, and from the circumstance of all the worms being dead, when passed (except *perhaps* in Mr. Hall’s case,) we may safely conclude, that besides its purgative quality, the oleum terebinthini is really poisonous to the taenia. But though destructive to the worms present, we

have evidence in the cases of Welford and Coward, that it does not remove the tendency to generate these animals. This is yet a desideratum. From Welford's case, there seems reason to hope, that the oleum terebinthini will be found useful against the lumbricus, and I am disposed to try it in the form of injection, against ascarides also.

“ After the evidence adduced, it is unnecessary to dwell on the safety of these large doses of oleum terebinthini; I will therefore only observe that, when exhibited, its quick action on the bowels prevents its being absorbed, and accordingly we find in these cases, no complaint of those affections of the urinary passages which have arisen from much smaller doses. As to the mode of exhibition, my directions have been, to take either no supper, or a very light one the night before; to abstain from all food or liquid till the medicine has operated twice or thrice, or a worm has passed; then to dilute freely, and through the day to avoid spirituous or fermented liquors.

“ I have the honour to be

“ Your obedient servant,

“ J. R. FENWICK.”

We have seen that the *spirit of turpentine* had been used, in combination with some other article, on the continent of Europe, before it was employed as an anthelmintic in England. From England a knowledge of this valuable remedy has extended to North America, where it is frequently and suc-

cessfully administered for the destruction and expulsion of taeniae. It will, we think, be found equally effectual in killing all the species of this worm, and the lumbricoïdes. Further experience of its anthelmintic properties, either when taken into the stomach, or thrown into the rectum, may prove its sufficiency to destroy *all* the intestinal worms.

In two cases, where it was given to expel taeniae, I have seen a large lumbricoïdes discharged, dead and entire.

A year ago, a child six years old, having most of the symptoms of lumbricoïdes, took six drachms of the spirit of turpentine, without the least inconvenience.

No worms were voided; the signs of them however soon completely disappeared, and the little patient has since enjoyed uninterrupted, and unusually good health.

Some years ago a woman took, by direction of her physician, an insufficient dose of this remedy for taenia. Becoming impatient, two days after, she took, without advice, six or seven ounces of it; this proved an effectual remedy, but was attended by a severe inflammation of the rectum; this was soon relieved by a few injections of flax-seed tea, to which a small quantity of tincture of opium was added.

The best mode of giving it seems not yet to have been fully ascertained.

From what I have witnessed of its effects, I should deem it important, before its exhibition, freely to evacuate the alimentary canal. This enables the remedy to act both with more certainty and expedition. Whatever quantity it may be thought proper to give at one trial of the remedy, should usually be given in one dose. Three ounces of the spirit of turpentine taken at once will be more likely to destroy the worm or worms, than the same quantity taken one third at once and repeated after an interval of one, two, or three hours, and will be much less tedious to the patient. In some cases where the stomach or intestines, or both, are diseased, and their sensibility and irritability are greatly increased, the requisite quantity of the remedy may perhaps be better borne, if given in two or three doses, one or two hours apart.

If this idea should be confirmed by a more perfect knowledge of the effects of the turpentine, when variously administered, we think these cases will be found to be rare exceptions to the best mode of giving it in a great majority of cases.

The greatest inconvenience I have noticed from taking this medicine has arisen from the prohibition of drinking—or in other words, the inconvenience has been such as mild, mucilaginous drinks would have relieved. Now if the stomach and bowels be freely evacuated before the spirit of turpentine is directed, and this be taken in sufficient quantity, it will commonly pass through the body in an hour and a half, or in less time than this; and so soon

as this effect has been produced—so soon as any portion of the turpentine has been discharged per anum, whether the worm appear or not, the patient should be permitted to drink freely of any bland, suitable liquid. I have known the patient to be restrained from drinking for six or nine hours, and to suffer much in consequence of this useless restriction.

The larger the dose is, the sooner it passes through the body, and the less is the chance of its being absorbed, and of thus incommoding the urinary organs.

This last effect I have never seen but once; that was not severe, and I believe it very rarely occurs.

In one instance we are credibly informed that the turpentine operated on the bowels, bringing portions of a worm with it, in fifteen minutes; in another instance the remedy was discharged, with an entire taenia, in twenty minutes.

When one dose, properly administered, does not prove curative, it is better to suspend its further use for one or two days, or till the patient has recovered from any inconvenience attending its exhibition, than to give a second or third quantity in the same day.*

Fowler's mineral solution of arsenic.

This medicine I have known to destroy the taenia in several cases.

* If the turpentine should not move the bowels in three hours, it should then be followed by a liberal dose of castor oil.

Dr. Fisher* says of it, "The taenia may be destroyed by Fowler's mineral solution; for this purpose the patient should take it, two or three times every day, in as large doses as the stomach will bear; and continue the use of it till the worms are destroyed. Hitherto this remedy has not disappointed me in a single instance." *Medical communications of the Mass. Med. Society*, vol. i, Boston, 1808.

The following case is taken from the *Edinburgh Medical and Surgical Journal*, vol. x, p. 419.

A case of taenia in an infant, cured by decoction of pomegranate. By W. Pollock, M. D. Communicated by Adam Burt, M. D. Superintending Surgeon, Bengal.

"I would have done myself the pleasure of transcribing for you the case of taenia in an infant, the moment I received your kind letter, but my journal for 1811 had been mislaid, and I have only this morning discovered it.

"I formerly communicated to you some cases of taenia, cured by the pomegranate decoction, which were inserted by Dr. Fleming in his catalogue of Indian Medicinal Plants and Drugs, printed in 1810, and, since that period, I have found the remedy invariably successful, in a very great number of instances. In some of these the taenia had acquired an enormous length, and in some of them

* Joshua Fisher, M. D. President of the Mass. Med. Society.

it was received in tepid water, and lived for several hours after it was passed. The following case occurring in an infant, not two months weaned, appeared to me to be very remarkable, in consequence of which I reported it to you, and also sent a copy of it to Dr. Fleming at the time it happened. That it is a very uncommon occurrence, may be inferred from an observation of Dr. Hamilton, in his most valuable work on purgative medicines, where he says, that the taenia is altogether unknown in infancy and childhood. Peter Daly, aged 14 months, 27th August, 1811, was weaned about two months ago, and has since been gradually drooping, in consequence, as was supposed, of dentition. He is now excessively reduced, refuses all food, and is harassed with a constant diarrhoea. His skin is loose, dry, and shriveled, and he has the whining, fretful cry of a child who has been long sick.

“ Different medicines have been prescribed for this diarrhoea without relief, and for several days his stools have contained small fleshy shreds, some of which considerably resemble half dissolved portions of the tape-worm. Two ounces of water were added to six of a decoction of the pomegranate root, (prepared by boiling two ounces of its fresh bark in a pound of water to nine ounces,) and a table spoonful was ordered to be given the child every half hour, unless sickness and vomiting intervened.

“ 28th. He took the whole of his medicine yesterday, without either sickness or vomiting, and in

the evening he passed a portion of tape-worm alive, upwards of six feet long. The medicine purged him briskly, and today he has vomited almost every thing he has taken. Appearing much exhausted, an anodyne carminative mixture was ordered to be given at intervals, to relieve the sickness.

“29th. Appears more lively; has had no vomiting since yesterday, and the diarrhoea has been much restrained by the anodyne. Quiescat.

“September 1st. Is manifestly better in every respect, but his stools still contain portions of the tape-worm. Eight ounces of the above decoction, without dilution, were ordered to be given in the same manner as before.

“2d. He took the whole of his medicine yesterday, without either sickness or vomiting, and with but little effect on his bowels, till this morning, when it began to purge him briskly, and he passed another portion of the worm, nearly eight feet long. He has been very hungry and has eaten a hearty breakfast.

“23th. No portions of the tape-worm have been observed since the last report, and the diarrhoea gradually left him, without the use of any other medicine. His bowels have become regular, his appetite keen, and he has filled up apace. He has the appearance of a healthy, thriving child, and his strength has improved so rapidly, that he has now begun to walk. From the above period he continued to thrive till August 1812, when he again began to pass pieces of the tape-worm. The

pomegranate decoction was repeated, and he passed an entire taenia alive, fifteen feet long, since which he has been in perfect health, and is at this moment a very fine boy. He is a son of Edward Daly, a private soldier in his majesty's 53d regiment. *Merat, 7th January, 1814.*]

TREATMENT OF THE VESICULAR WORMS.

§. CLX. I doubt very much whether the materia medica can furnish any good remedy for the expulsion of vesicular worms, especially those in the substance of the brain.

Sheep recover from these worms when they feed on elevated mountains, and in a pure and dry atmosphere.

This rural observation teaches us that an invigorating regimen is the only means of destroying and disorganizing these worms. All those remedies which exercise and excite the solids, and at the same time invigorate the lymphatic system, and diminish its mobility, should, in my opinion, be preferred, because by confirming the course of the lymph, and the cohesion of the solids, and by exciting the irritability of the lymphatic vessels, the vesicular worms, which we have said are always attached to this system of vessels, (209) will be deprived of their necessary nourishment, and thus cease to live.

§ CLXI. It would be fortunate if we could settle the diagnosis of those complaints which arise.

from vesicular worms ; but if this is not impossible, it is doubtless very difficult to determine.(210)

The best method of cure, in my opinion, is to use stimulating diuretics, and diaphoretics, combined with the most permanent and efficient stimulants. Squills, digitalis, purpurea,(211) colchicum autumnale, black hellebore, gratiola officinalis, opium, toxicodendrum,(212) muriate of barytes, muriate of soda, the preparations of iron, cantharides, sublimed sulphur, liquid carbonate of ammonia, and other similar remedies, are those from which we may hope, if not the annihilation of vesicular worms, at least for some relief from the diseases they produce.

As conducive to the success of these remedies, a nourishing regimen of easy degestion should be adopted, with good wine, cinchona, moderate exercise of body, an elevated, dry habitation, situated in a temperate, mild and healthful climate. The treatment, in fact, should be that which is practised in dropsy.

[The following account of hydatids, or vesicular worms, though long, is too valuable to be omitted in a treatise on the entozoa, or intestinal worms. It is from *Monro's Morbid Anatomy, Edinburgh, 1811, 8vo.*

“ OF HYDATIDS.

“ By the term hydatid, is to be understood, a round or oval-shaped semi-opaque pulpy bag, possessing a contractile power, without an external

opening, of a pearly or yellowish colour, containing a watery fluid, and often a number of smaller hydatids, included within its proper capsule or cyst.

“Hydatids are of very different sizes ; some are not larger than a millet seed, others are equal in bulk to an ox’s bladder. The coats of hydatids are generally thin and semi-transparent, though sometimes so thick as to be perfectly opaque. The habitat (to make use of the expression of modern naturalists) of hydatids is also different.

“They have been discharged by vomiting, and by stool ;* frequently they are attached to the peritonaeum, and especially to that part of it which covers the liver, or they are imbedded in that organ, or attached to the kidneys or ovaria, or to some part of the alimentary canal.

“Hydatids have also, though more rarely, been found in the cellular membrane, likewise between the muscles, and sometimes, though still more rarely, within the bones.

“There formerly existed a great variety of opinion respecting the nature of hydatids. Naturalists now seem to agree, that they belong to the animal kingdom, and constitute a genus of animals, of which there are several species ; but sufficient observations on recent or living hydatids have not yet been made, to enable us to draw up generic or

* See Philosophical Transactions, vol. xvii.

specific characters.* Hydatids, like intestinal worms, are incapable of independent existence, and therefore exhibit a contractile power, only when examined immediately on being discharged from a living animal.

“The remaining for many hours within the dead body generally deprives them of the principle of life; and hence all specimens of hydatids are not observed to contract; and such as retain the power of contraction, for some time after being expelled, may be considered as unusually tenacious of life.

“Purulent matter, which is sometimes lodged within the same viscus, also proves fatal to hydatids; and in this case, of course, they show no contractile power. The hydatids, found in human bodies, are different from those of quadrupeds. Of the human hydatids, there are the following kinds.

“1. When there is only one large hydatid of a globular form, contained within a cyst.†

“2. Where there are several hydatids within the same cyst, of different sizes and colours, some being of a pearly, and others of a straw or

* The generic name of *hydria* has been proposed, but no character of the genus has been established. It seems not improbable that the hydatids of the human body must form a separate genus, distinct from the hydatids of sheep.

† See Case VII, in which eight English pints of fluid were contained within a large hydatid; there were no small hydatids within it, and the whole of the inner surface of the hydatid was perfectly smooth.

amber colour;* and some of the larger of these are found to contain others.

“ A third kind of hydatid has been also described, but which I have never yet seen, where a number of hydatids have been enclosed one within another, like a nest of chip boxes.

“ The fourth kind may be called the cellular hydatid, as it is peculiar to the cellular substance of the muscles; the cyst of this kind is of considerable thickness, and consists of several distinct layers, which sometimes acquire a cartilaginous hardness.

“ There is a fifth kind of hydatids, which, from being compressed together, and forming a substance about the size of a garden pea, has been mistaken for indurated lymphatic glands. This kind has not, so far as I know, been described.

“ The hydatids are firmly united to each other by a very adhesive mucus, and by a thin membrane, besides which each of them is enveloped by its own proper capsule. These hydatids are very small, being about the size of the ovula in the ovaria of fishes. This kind is often found in the choroid plexus of the lateral ventricles of the brain, in cases of

* See Case IV. The cyst of the hydatid contained four pints of water, and a great many hydatids of different sizes; some were about the size of a nutmeg; others, as large as a billiard ball, floated loose within the largest hydatid; and within several of the larger hydatids, there were clusters of small sperical bodies, grouped together, which adhered to their inner sides.

apoplexy and hydrocephalus. There is a sixth, though very rare sort of hydatid, which also, so far as I know, has not been described.

“ In this, the hydatids are united laterally to each other. I have met with only two examples of this variety of hydatids, and in both, they were connected with the liver. There were, at the same time, a great number of hydatids of different sizes attached to the peritonaeum, and floating about in the general cavity of the abdomen.

“ One of the patients, a boy, was supposed to labour under ascites, his belly being enormously swollen, his breathing much oppressed, and he was not relieved by an erect posture.

“ The superficial veins of the abdomen were greatly enlarged. For about nine months before his death, he had severe pain in the right hypochondrium, and a considerable partial tumour was observed in his belly, which increased with great rapidity for ten days before his death.

“ On dissection, about four pounds of a fluid, like tar, ran out of the abdomen.

“ A large hydatid was found adhering to the convex part of the liver; and six others were found adhering to this. The stomach was much displaced, the pylorus being as low down as the brim of the pelvis, and the greater share of the intestinal canal lodged within its cavity. The watery fluid,*

* According to Dr. John Hunter, this fluid contains very small hydatids of different sizes, the largest being $\frac{1}{100}$ part of

contained in hydatids, is generally transparent and colourless, is to the taste slightly salt, and, in some instances, a part of it is coagulated by heat, or by the addition of acids, or ardent spirits.

“ In some cases, the contents of the cyst are tinged with yellow, which is probably owing to an admixture of bile, exuding after death; for the yellow colour is observed only in hydatids which are connected with the liver and gall-bladder. There are also tumours, the contents of which seem to be coagulable lymph, and a number of hydatids which have burst, and the coats of these are shrunk and inverted. There is a seventh kind of hydatids, with narrow necks, which is frequently attached to the placenta. I have also seen hydatids of the second species, connected with the placenta.

“ Some of the bowels, as the ovaria and kidneys, are said at times to have been converted into hydatids, but it would be more accurate to speak of the conversion of these bowels into watery vesicles; (the genuine hydatid being rarely found within these bowels;) and these vesicles have only one coat, they are not inclosed within firm cysts, and do not produce their like, nor do they possess any degree of contractile power, like the genuine hydatid.”

an inch in diameter, and the smallest being less than a red globe of the blood. See *Trans. for the improvement of Med. and Chirurg. Knowledge*, vol. i. p. 38.

“ Of the Sac of Hydatids.

“The sac of the hydatid seems to be formed of condensed cellular substance, and the thickness of the sac generally bears a ratio to its size and situation. This sac is secured in its place by several bands of cellular substance, which pass between it and the bowels, within which it is lodged, and in the abdomen it is covered by the peritonaeum.

“The thickness of the sac of an hydatid is in proportion to its size; though there is considerable difference in this particular, the sac being thickest where it is most exposed: thus when the greater part of the sac is surrounded by the substance of a bowel, as of the liver for instance, that part only of the sac, which is exposed, is of a considerable thickness, and is sometimes cartilaginous, or covered by layers of bone.

“I have observed that the inner surface of the sac is by no means uniform, but always somewhat irregular, and lined by a very thin layer of fat. A glairy gelatinous liquor is also interposed between the sac and the hydatid, which prevents the hydatids from being injured by friction. The sac of a large hydatid is sometimes divided into compartments, which serve to prevent the smaller hydatids, contained within the opposite ends of the sac, from pressing on each other.”

“ Of the Coats of Hydatids.

“The coats of the hydatid are not of a uniform density, being much thicker in some than in others; and even in the same hydatid, we generally observe some portions of these coats of greater density than others; so that in the same hydatid, there is a difference as to transparency or opacity in the different parts of its coats.

“Hydatids have two coats, an outer and inner, and the outer coat is considerably thicker than the inner. There are no fibres in the outer coat of an hydatid visible to the naked eye; yet the outer coat possesses the distinguishing character of a muscle, the power of contraction on the application of a stimulus. The inner coat is very thin, semi-transparent, soft, pulpy, and very tender, and in very large hydatids possesses a small share of elasticity. The interior surface is lubricated by a fluid, which renders it slippery to the touch. From the inner side of some of the larger hydatids, there are several excrescences, which are made up of a congeries of very small hydatids, and the size of these bears a ratio to the size of the hydatid.

“These excrescences are retained in their situation by a very thin transparent membrane, which covers them. There is still another appearance, which I have remarked, namely—a number of small cells, formed by folds of the inner membrane of the large pregnant hydatid, containing the small ones.

It has not yet been determined, what is the proportion of hydatids, which may be called pregnant.

“In some cases, the greater part of the inner coat is studded over with these small excrescences, but in other instances, there are only two or three such excrescences, from the parent hydatid. On examining the coats of very large hydatids, even without the aid of a magnifying glass, very small hydatids may be seen adhering to the coats of the hydatid, which would seem to show that hydatids are multiplied in the same manner as some of the fungi of the vegetable kingdom.”

“*Blood Vessels of Hydatids.*”

“The coats of hydatids are provided with very small blood vessels, absorbents, and nerves.

“The blood vessels proper to the coats of the hydatid, have no immediate connexion with those of the organ, within which it is lodged; the hydatid, in this respect, resembles a worm lodged within the human body.

“I have, in several instances, filled, with great success, the blood vessels of the organ within which hydatids were lodged; also those on the sac of the hydatid; which, where the hydatid is of considerable bulk, are of a large size, and which, like those in the neighbourhood of other preternatural tumours, acquire an unusual size; but none of the injection got into the vessels of the coats of the hydatid.

But other authors have affirmed, that they had injected the vessels proper to the hydatid. Dr. WALTHERUS, of Berlin, supposed, that he had filled the blood vessels on the outer coat of an hydatid, which was contained within the liver; but it is not improbable, that he had mistaken the vessels on the peritonæum of the liver for those of the hydatid. Watery vesicles, or dropsical cysts, as they have been named by some authors, are very different from hydatids; for in these we observe only a single thin coat, firmly attached to the neighbouring parts, on which several blood vessels, filled by red blood, may be observed. Such cysts frequently adhere to the extremities of the fallopian tubes, to the ligaments of the uterus, to the choroid plexus, to the placenta, kidneys, or are sometimes lodged within the glandular viscera, and are also sometimes imbedded in the mammae and testicle. I have seen them filled by a fluid of the colour of the ink of the cuttle fish, when these organs have been reduced to a scirrhous state. Though the arteries proper to the coats of hydatids be very small, yet the watery liquor which fills the hydatid, is secreted by them, and in some cases even bone.

The hydatid is probably nourished by absorption, and not by continuous vessels from its cyst, and may be compared in structure to the echinus esculentus of *Linnaeus*; that is, absorbent vessels take up its nourishment from the containing cyst; and in like manner, the small hydatids, contained within a larger hydatid, after being separated from

it, or loosened from the ovarium, in which they were formed, suck up their nourishment from the liquor of the hydatid, which contains them. By what vessels the liquor, which has been absorbed, passes into the cavity of the hydatid, or forms young hydatids, we do not know; probably such vessels exist as in the echinus. If hydatids contract, on the application of a stimulus, it must be granted, that these are under the influence of nerves, though these nerves be so small as not to be obvious to our imperfect senses.

“ Of the different states, in which hydatids are found.

“ Hydatids are found in different states. The rudiment of the hydatid is connected to the coats of the pregnant hydatids, and appears with other small hydatids, in the form of small excrescences, which are attached to the large pregnant hydatids. After a time, these small hydatids are detached from the parent hydatid.

“ Hydatids are subject to diseases.

“ Hydatids sometimes burst within their sacs.

“ We sometimes meet with tumours, which are made up entirely of pieces of coagulable lymph and hydatids, the water having been removed by absorption; hence the tumour does not communicate a sense of fluctuation, as when the hydatids were entire.

“ The external coat of hydatids has sometimes been converted into bone.

“I have several preparations, which afford a striking illustration of the manner in which bone is formed on the coats and sac of hydatids. The ossification begins from a few central points on the coats of the hydatid, and by subsequent depositions, the pieces of bone gradually become larger and larger, so that at length a considerable mass of bone is formed.”

“Of the manner in which the cysts of hydatids are formed.”

“The sac, containing the hydatid, seems to be formed in consequence of the irritation of the hydatid. In the same manner, where a large quantity of purulent matter has been contained within the viscera, we generally observe a sac, provided with arteries, veins, nerves, and lymphatics, as is obvious from the very varied contents of these different sacs, and the spontaneous removal or absorption of their contents. There are also similar instances in the vegetable kingdom, as in the production of galls from the oak, &c.”

“Of the effects of hydatids, on the organs which contain them.”

“Hydatids, which attain a considerable bulk, not only mechanically affect the organ within which they are lodged by their pressure, but, by the irritation which pressure gives, produce still further changes upon it. On account of the particu-

lar stimulus, which hydatids, as living animals, give, the organ containing them, or to which they are attached, undergoes still further changes, in consequence of an action excited; which perhaps may not improperly be termed *specific*: in proof of which, the organs, within which hydatids are contained, or to which they are attached, are sooner, and to a much greater degree affected, than by the ordinary fixed dropsical cysts, whether of the natural or preternatural kind. Thus a large quantity of water, accumulated in the ventricles of the brain in hydrocephalus internus, sometimes occasions in an infant a disunion of the bones of the cranium from each other, and the head attains an unnatural bulk. No part of the cranium becomes soft, thin, or is absorbed. But if hydatids are lodged in one of the ventricles of the brain, (which is not uncommon in sheep,) the cranium over that ventricle becomes soft, and may be cut without turning the edge of the knife, and loses considerably of its thickness, and in some cases holes are formed in it, though the dura mater remains entire between the cranium and the brain; and even though the cyst, containing the hydatids, is still covered by a seemingly sound portion of the brain, and pia mater. The same happens in the human body; for in the first case stated, where an hydatid of the size of a goose's egg was found in the right ventricle of the brain of a man, covered by a gelatinous matter, without any fibrous adhesion to the membrane lining the ventricle, the cranium was

found to be much thinner on its right side than on the left, and in particular, the right parietal bone was not thicker than a wafer. In like manner, the pleura, peritonacum, and vaginal coat of the testicle have been greatly extended for a length of time, but the containing membrane continues entire; whereas, when hydatids are collected within these membranes, a slight degree of inflammation is excited; this is followed by adhesions, the cyst containing the hydatids is destroyed, by which the hydatid escapes from its original situation.

“There is a much greater disposition to the destruction of the cysts, which contain the hydatid, and other containing parts, than when water is accumulated within the shut cavities. Cases second, third, fourth, fifth, and ninth, are marked proofs of this fact, and also the case which occurred to *Dr. Home*. The hydatids were in that instance probably generated within the liver, from which they extended to the abdomen, and also upwards towards the thorax; and had the patient lived but for a short time longer, they probably would have gotten into the lungs, as the diaphragm was extremely thin opposite to the sacs of the hydatids: the hydatids might also have gotten into the branches of the trachea, and been discharged by coughing.

“In the same manner, hydatids, formed in the substance of the kidneys, have worked their way out of the pelvis of that organ, and have been discharged with the urine.

“As hydatids seldom prove fatal, when they have found an outlet, and as there is a disposition in nature to discharge from the body, an attempt should be made to assist the efforts of nature by art.

“In the first place, a tumour filled with hydatids, situated in the extremities, or on the external surface of the body, may be with safety removed. Hydatids, lodged within the cavities of the body, may also be extracted, provided the organ containing these has contracted an adhesion with the containing parts, as was done in case seventh, with complete success. *Plater** has related the case of a young woman, who had a tumour in the right hypochondrium, which was very painful, especially when she lay on the left side; it at length burst, and a large quantity of a serous fluid was discharged, besides a number of hydatids, after which the patient obtained a complete cure. *Guatanni's* testimony is equally strong. He has related a case, in which the parietes of the abdomen over a tumour in the region of the liver, became very thin, and the tumour, in consequence of violent coughing, at length burst externally, and three hundred entire hydatids, together with a quantity of serous fluid, were discharged. The opening remained fistulous for some time, but at length closed, and the patient recovered. In the same manner, when hydatids have been accumulated within the uterus, these may be removed from it, as

* See Obs. Select. Mantissa. Obs. xviii. p. 44.

was done by Dr. *Kilgour* of Musselburgh, with perfect success. A lady was supposed to be in labour, and the doctor was sent for to deliver her.

“The pains were at first very slight. After some time, a bleeding came on, which led the doctor to examine the parts.

“He found the os tincae a little dilated, and discovered that the uterus was filled by hydatids. The bleeding continuing, he was induced to endeavour to remove the hydatids, which he accomplished, and brought away a basin full of them. The lady got well in a few days, and afterwards had four very healthy children. Thus the cause of the tumour is removed, which is not effected by opening a fixed dropsical cyst.

“In many cases where there has existed a swelling of the belly, it has suddenly disappeared on the discharge of hydatids, by vomiting and purging.

“After a time, should another such tumour begin to form, as in cases second, fourth, and sixth, in these circumstances, though it is by no means certain that the sac and the containing parts adhere to each other, if the tumour be stationary, it may even, in some such cases, be advisable to puncture the sac with a large trocar, and empty it of some, or of the whole of the hydatids; or if this cannot be accomplished, to inject into it the smoke, or the infusion of tobacco, or a very weak solution of camphor, or to give mercury, or some other substance which may kill the hydatids, but which is not dangerous to the patient.

“Prudence however suggests the propriety of endeavouring to ascertain, by experiments on animals, the effects of those liquors which are to be used as injections. The effect of the smoke of tobacco in case eighth, in which hydatids were lodged in the lungs, is an inducement to the prosecution of such experiments; and there is even reason to suppose, that camphor, turpentine, and some other substances, which are very destructive to worms and insects, and which are readily and safely absorbed in such quantity, as to communicate their taste and smell to the blood in the human body, might in cases of hydatids be of use, when taken into the stomach, or even when applied to the skin of the patient.”

“Of the concomitant symptoms.”

“As the history of the symptoms, occasioned by hydatids, can be collected only from a variety of cases, I have subjoined several of those which have fallen under the observation of my father, and of myself.

“Case 1. A stout man, twenty years of age, complained of constant headach, chiefly on the right side, followed by a dilatation of the pupil, and epileptic fits, which proved fatal to him. On dissection, the cranium was found to be much thinner on the right than on the left side, particularly the right parietal bone, which in many places was not thicker than a wafer. On opening the right ventricle of the brain, a cyst about the size of

a goose's egg was found within it, filled with a watery liquor, and surrounded by a gelatinous matter, which did not adhere to the membrane, lining the ventricle. Dr. *Grieve Mackenzie*, who had attended the patient, was so obliging as to send the cyst to my father, which appeared to me of the same structure as that of hydatids.

“Case 2. A stout man, twenty six years of age, had a large swelling, in which fluctuation could be felt, connected with the concave part and under edge of his liver. As there had been no symptoms of inflammation or suppuration, my father supposed the swelling to be owing to a cyst, filled with hydatids within the liver. Mr. *Andrew Wood*, who also visited the patient, was of the same opinion.

“Soon after this, the patient vomited a great number of hydatids of different sizes. In the course of the four following years, the sac filled again, and discharged itself into the stomach repeatedly. The liver was sensibly enlarged, and had descended about an inch lower than the edges of the ribs, and was somewhat more sensible to the touch than usual. The patient's liver gradually became smaller, and at length retreated within the margin of the chest.

The patient has enjoyed perfect health for these ten or twelve years past.

“Case 3. My father was consulted by a woman, forty years of age, who had a large swelling within the left side of her belly, which resembled

a dropsy of the ovarium ; but as she had suffered more pain in it than is common in that disease, he suspected that it might be owing to a cyst full of hydatids. About a fortnight afterwards, the tumour subsided during the night time, and the patient told him that she had passed several watery stools with skins in them.

“Case 4. Mr. D. C. about thirty years of age, consulted my father, on account of a large tumour within the left side of the belly, in which there was the fluctuation of a liquor, and as there had been no symptoms of inflammation and suppuration, he supposed it to contain hydatids. Several months afterwards, in the year 1775, he was again called to the patient with his surgeon, the late Mr. *John Balfour*.

“A tumour, in a state of inflammation, projected between the twelfth rib and os ilium of the left side, and there was an opening of the skin, at the point of the tumour, through which it seemed probable that the contents of the tumour would soon be discharged.

“It was therefore agreed to enlarge the opening in the skin, and on introducing the finger into the wound, and pressing on the abdomen, the fluctuation of the liquor in the cyst was distinctly perceived. An incision was therefore made into it, and four pounds of hydatids were discharged.

“The orifice closed in a few weeks, and the patient considered himself for several years as cured. But after a time, the patient said he began to feel

another tumour forming within his belly, in nearly the same place as the former; and a tumour actually formed, which gradually increased in size, but did not give much uneasiness, or prevent him from following business. The tumour still continued to grow larger, and in the year 1794, my father was again desired to visit the patient with his surgeon, Mr. *Dewar*.

“ An acute inflammation had occurred, in the same place as formerly, which was followed by suppuration. The tumour soon burst, and discharged several pounds of a turbid milky matter, in which there appeared to be portions of hydatids.

“ Two days after, feculent matter was discharged from a hole, that had been eroded in the left side of the colon. This, notwithstanding the opening, healed in a kindly manner, and the patient enjoyed good health for several years afterwards. He died from a very different disease.

“ Case 5. The abdomen of a man, twenty eight years of age, swelled greatly, owing, as was supposed, to ascites.

“ There was an unnatural opening at the umbilicus. On enlarging, and perforating likewise, the containing parts with a large trocar, about sixty pounds of hydatids were discharged; and the late Dr. *Bate*, physician in Montrose, informed my father by letter, that the swelling was gone, and the patient had recovered.

“ Case 6. About thirty years ago, the late Mr. *W. Anderson*, surgeon in Edinburgh, carried my

father to visit a man forty years of age, who had a swelled liver, which was followed by ascites, jaundice, and the discharge of hydatids by stool, and who died in the course of six weeks. My father expected to find a sac with hydatids attached to the stomach or intestine, and communicating with them; but instead of this, the outer part of the sac, containing the hydatids, was found entire, and did not adhere to the alimentary canal. On opening the cyst, the concave part of the liver was found wasted to a considerable depth, and at the bottom of the cyst, the branches of the biliary ducts were seen without dissection, bare, and greatly enlarged, with a number of holes in their sides, through which the hydatids had passed into the duodenum. The great enlargement of the biliary ducts was probably produced by the irritation of the hydatids, and by the mechanical obstruction caused by the pressure of the hydatids, on the lower ends of the biliary ducts, to which the pressure of an enlarged lymphatic gland, which lay over the common duct, had probably contributed.

“Case 7. In the year 1783, my father was consulted by Mr. ——— twelve years of age, who had a swelling in the upper and right side of his belly. The swelling gradually increased very considerably. In the under part of the swelling, the liver was felt in a sound state. At last the fluctuation of a liquor above the solid part of the tumour became very obvious.

“As the patient had not lost his appetite for food, had no frequency or fulness of pulse, no bilious disorder, no symptoms of inflammation, suppuration, or of scirrhus in the liver, my father imputed the fluctuation, which he perceived on applying one hand to the upper part of the tumour, and striking it with the other, to hydatids, contained in a sac above the liver, between it and the diaphragm, and the gradual descent of the body of the liver to the increase of the sac containing the hydatids. As the tumour continued to increase in size, my father proposed to the late *Mr. W. Inglis* and *Mr. F. Dewar*, surgeons, who were now called to him, to make an incision into the sac, which was agreed to, and performed with much caution.

The peritonaeum lining the containing parts, was found to adhere to the cyst, which, from the long continuance of the swelling, seemed probable.

“On dividing the external coats, a thick, but soft semi-opaque membrane presented itself, and on cutting this, eight pounds of a clear liquor were discharged, but no small hydatids. On examining the soft membrane, within which the liquor had been contained, it proved to be of the same structure as other hydatids, and the coats were somewhat thicker than any of these, owing probably to its greater size.

“My father now laid hold of the large hydatid with his fingers, and by pulling it gently, he detached the whole of it from the tough external coat, formed by the peritonaeum which inclosed it. After the

operation, the wound was carefully covered by pledgets, and thick compresses, over which a broad flannel roller was applied, in order to exclude the air, to support the liver, and to keep the opposite sides of the cyst contiguous.

“ In a few days the patient became feverish ; he suffered much from thirst, his pulse quicker than common, and there was a discharge of purulent matter from the sore, a sufficient proof of previous inflammation in the sides of the cavity.

“ *The cure was completed within ten weeks.* I have seen the patient frequently since he underwent the operation. He has had no return of the complaint. He is now nearly thirty nine years of age, and enjoys perfect health, and is one of the stoutest men in Edinburgh. It may be worth while to observe, that in this case, and in case fourth, no blood vessels were visible on the proper coats of the hydatids, nor in two other such cases, in which the blood vessels of the liver, and particularly the blood vessels of the cysts, which contained the hydatids, and which were of large size, and had been filled with coloured size injection. In all these four cases, no part of the liquor which the hydatids contained *coagulated* ; when ardent spirits were mixed with it, or by boiling it ; from which it appears that the liquor, contained within the hydatid, is materially different from that of a common dropsy of the belly, or that of the ovarium.

“ Case 8. I had occasion to visit a man thirty two years of age, with my father, in 1801, on ac-

count of a pain in the right side of his breast, behind the mamma, which was not removed by bleeding, or the application of a blister. He had no oppression or difficulty in breathing, and could sleep on either side, or on his back, and his pulse was not at all affected. He was relieved on coughing up portions of hydatids, and also some entire hydatids, some of which were of the size of a hazlenut, and others as large as a walnut, and he sometimes coughed up these in such quantity, as would have filled a pint bottle.

“The larger hydatids contained a clear viscid liquor, and the smaller ones a yellow liquor, which he said had a bitter taste. A few days before coughing up the hydatids, the patient suffered very acute pain in his breast, which he compared to that of a pointed instrument entering his breast; and for two or three minutes before the hydatids were discharged, he was seized with violent coughing, and a sense of suffocation, which continued for two or three minutes. For eight months afterwards, he occasionally coughed up hydatids. The disease began when he was fourteen years old.

“We recommended to him the smoking of tobacco, and drawing the smoke as deeply as he could into his chest. He did so, and during the following eight years, he had no return of his disorder.

“Hydatids have frequently been accumulated in considerable quantity within the cavity of the abdomen, and have proved an impediment to the pas-

sage of the feces, and even to delivery; as in the following case.

“ Case 9. I had occasion to examine the body of a woman, who had been for a very long time in labour. The natural efforts being inadequate to expel the child, it became necessary to have recourse to the forceps to extract it. The patient expired three days afterwards. On examining the body, I found a large mass of hydatids of different sizes, connected with the upper part of the rectum, and which had impeded delivery.

“ Case 10. In this case, a man of middle age had been afflicted by a dropsy of the belly, and jaundice for some time, when three or four tumours, of different sizes, appeared in different parts of the parietes of the abdomen. These, when pressed, evidently contained a fluid.

“ The patient lived only for a few months.

“ On dissection, the above mentioned swellings were found to be hydatids, adhering to the peritoneum lining the belly.

“ There were at least one hundred hydatids of different sizes within the cavity of the abdomen, some of which adhered to the liver, the others were floating loose in the large quantity of water which filled the belly.

“ Case 11. This case was treated by Dr. *Home* in the clinical ward of the royal infirmary. I obtained the following from the journals of the hospital.

“November 5, 1807.

“The skin, and the white part of the eyes of a young woman, have a strong yellow tinge. Her abdomen is remarkably enlarged; and on examination, two large, distinct, moveable tumours are perceived, considerably elevated above the surface of the general swelling. One occupies part of the umbilical region, and rises a little above the umbilicus, is circumscribed, hard, unequal, and somewhat moveable. The other is seated in the epigastrium, towards the left side; is uniformly rounded, immoveable, firm, and elastic. The veins of the integuments covering it are tortuous and enlarged. There is also felt a general hardness along the right side of the belly. She does not suffer pain on motion, or on pressing any part of the abdomen. General health and spirits little impaired, though she has become considerably emaciated of late. Pulse ninety; heat and respiration natural; mouth dry; tongue clean; appetite and digestion good; body costive; feces commonly of a natural colour, sometimes black, never whitish. Urine at times rather scanty; very dark coloured, and tinges linen of a deep yellow. Six years and a half ago, she caught a fever, by which she was confined to her bed for weeks. During this illness, she could not lie on her right side without pain, and before her recovery, discovered in the right hypochondrium, a *tumour* of the size of a teacup, which was for about a year and a half stationary. Has had pain of the right hypochondrium, shooting to

the right shoulder, and more lately oedema of the legs. General swelling of belly has come on gradually. She lingered for six weeks under Dr. Home's charge.

“ *Dissection.* The integuments of the abdomen were found to be very thin over the large tumour in the epigastric region, which was filled by a large quantity of yellowish limpid fluid. ‘The sac containing this fluid, being laid open from end to end, was found to consist of two coats, the external of a dense and firm texture, the internal thick but very tender, of a light yellow colour, very elastic, and adhering loosely to the external cyst. ‘From the inner surface of this internal membrane, there were numerous distinct masses of cauliflower appearance, varying much in size, of a beautiful whiteness on the surface, and were yellow and gelatinous internally.’

“ The fluid in this sac appeared to contain numerous very minute hydatids.

“ This tumour was situated within the sac of the peritonaeum, and adhered pretty generally to that membrane. ‘The tumour was entirely connected on one side with the left lobe of the liver. The tumour, which was during life felt at the umbilicus, was found to consist of two lobes, a larger and a smaller, of the same appearance as the former tumour, to which it was connected by a production of the left lobe of the liver, but no communication subsisted between the cavity of the first sac, and this tumour, when cut into.’

“ This sac was found to contain numerous hydatids, some of which were very large, and on their internal surface, there were cauliflower productions ; others were placcid, ruptured, and apparently tending to putrefaction, but containing smaller hydatids, which were entire and spherical, and all of them *tinged with bile*. ‘ The liver was found placed on the right side of the body, its right lobe was low down on the right side, where it had been distinctly felt during life ; it was somewhat hard, but otherwise of natural appearance ; almost the whole of the left lobe was converted into an enormous sac, similar externally to the former, occupying the thorax, adhering to, and pushing up as far as the third rib, especially on the left side of the diaphragm, which was very thin, and with difficulty separated from it. This sac was found, when opened, to be lined with a delicate membrane, similar to that of the *first sac*, but exhibiting no cauliflower protuberances. Within it was contained a large quantity of serous like fluid, and an immense number of hydatids of various magnitudes and colours, and all of a spherical form, some exhibiting on their internal surface, cauliflower like processes, others containing smaller hydatids.

“ The gall-bladder and gall ducts were very much enlarged. The other abdominal viscera were much deranged in situation, but quite natural in structure, excepting the left kidney, which was much enlarged, and very flaccid. An hydatid of some size adhered to the mesentery, and three

small hydatids, like globules, were found within the cervix of the uterus.

“The thoracic viscera were sound, and the heart was remarkably small. No hydatids were found in the brain, which was quite healthy.”

“Case 12. The last case I shall mention, occurred to Dr. *Duncan*, sen. whose account of it is subjoined, with the history of the appearances after death, by himself, which fully explained the most remarkable circumstance in the history of the case, the disappearance of the tumour in the right hypochondrium in the horizontal position.

March 18, 1807.

“*John Brown*, a labourer, aged thirty eight. The whole abdomen is very much enlarged, and affords to the touch a distinct sense of fluctuation. When in the erect posture, there is observed, about the upper part of the hypochondriac, and extending over the greater part of the epigastric region, a large circumscribed tumour, possessing evident fluctuation, which subsides immediately on his assuming the horizontal posture, when a uniform tense swelling occupies the whole abdomen.

“Pressure applied under the margin of the false ribs, on the right side, excites so considerable a degree of pain, as to cause him to wince under it.

“The skin over the whole body, and the tunica adnata of both eyes, are of a deep yellow colour. The urine also is observed to have a very dark yellow appearance; and linen, when immersed in it,

is very deeply tinged. The alvine excretion is said to be of a white colour, and rather thick consistence. ‘He is affected with occasional sickness, and inclination to vomit; but he has never complained of pain in the epigastrium. He complains of great dyspnoea, which is always most severe in the morning, and is induced on stooping forward or making any exertion.

“He is also much affected in the evening, particularly at first lying down, with a severe cough, which, by his account, is extremely urgent, except when lying on the left side; and is accompanied by a different, though copious viscid expectoration, having a bad taste and smell. It excites the dyspnoea to a great degree, which then requires the erect posture. ‘Pulse one hundred; tongue white; great thirst; heat moderate; urine very scanty; belly costive; and he is distressed with frequent tenesmus; appetite much impaired; sleep disturbed by frequent startings.’

“*Dissection.* The dropsical water in the abdomen was as dark coloured as the urine of the patient was on his admission, and gave a deep yellow tint to cloth immersed in it. The impregnation from bile had indeed gone further, than in any case I recollect to have seen; for the cartilages of the ribs were coloured by it to the centre. The surface of the liver had somewhat of a mottled green colour, very like to many marbles, and more especially to the Portsoy serpentine. The substance of the liver had also the same appearance, with the excep-

tion of the centre of the right lobe, which was rather of an olive, or dirty yellow colour. The liver was of an uncommon bulk, and the convex surface was more prominent than usual towards the middle.

“ This was not owing to any disease in the glandular part of the organ, but to a sac of a yellow colour, and of the size of a large orange, though of an oval shape, and irregular in its surface, situated in the region of the portae of the liver.

“ Over this sac, which was filled with hydatids, the vena portarum, the hepatic artery, and its great branches, as also the hepatic nerves, which were much larger and much harder than common, passed; and the branches of the hepatic nerves could lie distinctly along the gall ducts.

“ The hepatic, cystic, and common ducts were so much stretched in their course along the surface of the large sac, as scarcely to admit of air to pass through them.

“ The ductus communis was much enlarged in the portion not compressed next the liver. The gall bladder contained but a small quantity of bile, and, from being contracted in several places, had an irregular figure, and scarcely exceeded in size that of a child's at birth; and over this bowel there was a broad preternatural membrane, uniting the liver to the great arch of the colon. The lymphatics from the liver did not contain bile, and were not coloured by it.

“ The adjacent parts betrayed marks of previous inflammation. The stomach and great arch of

the colon were more intimately united than usual by the omentum; and there was also a strong adhesion between the liver and kidneys. All the parts adjacent to the liver, more especially the kidneys, were tinged of a deep yellow colour."

Conclusion.

"The preceding history of hydatids seems to me to have established the following propositions.

"1. That hydatids are not peculiar to any one part of the human body, and are most commonly connected with the investing membranes of the liver, ovaria, or kidney.

"2. That there is no resemblance between the hydatids, which are peculiar to quadrupeds, and those of the human body, as is obvious, by comparing the preceding description of the hydatid of the human body, with those of the hydatids of quadrupeds, which have been published by *Hartmannus*,* *Tyson*, *Pallas*, *Schroeder*,† *Fontana*, and *E. Home*, *Philos. Trans.* for 1795.

"3. That there is every reason to conclude, that hydatids are animals.

"4. That observation and experiment have not yet determined in what manner hydatids are generated, or deposited within certain bowels.

"5. That as the smaller hydatids adhere to the inner surface of the larger, that larger hydatids may be called pregnant; or that these animals are mul-

* See *Mis. Nat. Cur.* Dec. 2. an. 4to.

† See *Schroeder de Hydatid.*

tiplied like some vegetables, by the adhesion of the smaller hydatids to the coats of the larger hydatids.

“ 6. That the coats of the bowels containing the hydatids are much more frequently destroyed, than when water only has been collected within them; hence the hydatids escape from their original situation, and sometimes find their way by unnatural passages into the intestines, urinary or biliary canals, into the windpipe &c.

“ 7. That many patients recover on the discharge of hydatids.

“ 8. That hydatids may even, when adhering to one of the bowels of the abdomen, be removed by incision, providing there exists an adhesion between that viscus and the parietes of the abdomen.

NOTE.

“ Since the preceding sheets were printed, I accidentally turned up the first volume of the London Medical Communications, and was much gratified to observe, that what I had affirmed might have happened in the case treated by Dr. *Home*, had actually taken place in a case described by Dr. *Foart Simmons*, who had stated, ‘ that on pressing the thorax, hydatids poured out in great quantity from that cavity into the abdomen, and on introducing a finger at the part, from which they issued, we found that it had passed with ease into the thorax, through an opening in the upper and fleshy part of the diaphragm.

“ The sternum being now carefully removed, a most singular appearance presented itself to our view: On the right side the liver was seen extending from the spine of the ilium up to the fourth rib.

“ As the diaphragm was pushed so high up on that side, the right lobe of the lungs was compressed into a very small space, but without being apparently diseased. The heart and pericar-

dium were likewise in a sound state, but the texture of the left lobe of the lungs was in a great degree destroyed by suppuration.

“ In tracing the course of the great cyst, already spoken of as filling the left side of the abdomen, we found it perforating, as it were, the diaphragm, and then expanding again, adhering to the pleura and mediastinum, and filling almost the whole of the left cavity of the thorax. The upper part of this sac communicated in several places with the diseased lungs, and on pressing the latter, matter flowed into the cyst. We introduced a probe into one of these passages, and it passed far enough into the substance of the lungs to account for the expectoration of pus through these channels.

“ If the patient had lived much longer, it is possible she would have coughed up hydatids, as one of the openings from the cyst into the lungs was large enough to admit a goose quill.” This affords an additional, and very strong illustration of a partial absorption taking place in that bowel within which hydatids were lodged, and of the formation of an unnatural passage, through which the hydatids might have escaped into a branch of the wind-pipe. The case recorded by Dr. *Collet* in the second volume of the *Trans. of the college of physicians of London*, forms an important appendix to the former case, for in this instance, the hydatids, which were originally lodged within the liver, were discharged by coughing. It is stated, there was at first observed, “ an irregular tumour, not very large, seated in the lower part of the epigastrium, about four or five fingers in breadth, below the xiphoid cartilage, extending itself towards the right hypochondrium.

“ In the most prominent part of it, a fluid is distinctly perceived, which seems to be immediately under the common integuments.”

“ Dr. *Baker*, who has subjoined his remarks on the case, has observed; ‘ If then a conjecture on a subject, which is at present obscure, and which admits of no demonstration, may be hazarded; is it not possible, that, by the gradual operation of

morbid effects, a communication may have been opened between that tumour, (alluding to the tumour situated above the navel,) and a branch of the trachea ?' From what had occurred in several of the preceding cases, it seems to me *certain*, that such a communication had existed, and that the hydatids which were discharged by coughing, had been generated within the liver."]

"In the second volume of the *Medico Chirurgical Trans.* p. 260, is a case of hydatid in the brain.

"A robust young woman began to complain of pain, and of swimming in her head, about the year 1808.

"These symptoms were always increased by motion, particularly by stooping.

"They continued till April 1810, when she was seized, without any previous warning, with a fit. The surgeon who saw her at this time was struck with the complaint she made of a fixed acute pain of *the head*, and with the ferrety appearance of her eyes. For some time afterwards she had a fit every third or fourth week. On the twentieth of August, she had three fits in one day, accompanied by derangement of the stomach, by screaming, and other indications of great sufferings. These attacks continuing till September, she had then nearly lost her hearing. Shortly afterwards she lost the sight of her *right* eye, and in fourteen days more, that of her left.

"Her smell was completely gone, and the olfactory nerves were insensible to the stimulus of hartshorn ; her speech and power of deglutition

were very much impaired, and her left side became paralytic. Dec. 11th she died.

“*Dissection.* On removing the dura mater, the pia mater was seen elevated over the right hemisphere by a tumour, which was found to be an hydatid, about three inches long and two broad. It was imbedded in the substance of the brain, by which it was very liberally supplied with numerous minute vessels of the size of hairs, which were particularly abundant at the lower part.

“The symptoms were supposed, by the medical attendants, to arise from some organic affection of the head, as was afterwards demonstrated.”]

IV. TREATMENT OF THE TRICOCEPHALUS.

§ CLXII. Consumption, nervous epidemic fevers, slow nervous, and mucous fevers, are the chief diseases which seem at present (213) directly to favour the development of this worm in the intestines. Inflammation and dilaceration of the intestines, occasioned by its presence (214), seem to originate rather from the prevailing atony of the viscera than from the bite of the tricocephalus.

§. CLXIII. So soon as those diseases, during which this worm is developed, are cured, and the tone of the intestines restored by a strengthening diet, it is expelled; because the circumstances which favour the unfolding of the eggs, having ceased, they cannot again multiply in the human intestines.

This being admitted, it follows that nothing more is requisite for the expulsion of the tricocephalus, than to cure the disease with which it is usually associated.

But if these worms being in great numbers, should contribute to reduce the patient, we should prefer the use of those stimulants, which we have noticed as proper for the expulsion of worms, such as camphor, assafoetida, valerian, muriate of ammonia, and others.

V. TREATMENT OF THE ASCARIS VERMICULARIS.

§. CLXIV. We sometimes sooth the itching and irritation excited by these worms, collected in the rectum, by introducing through the anus a piece of bacon tied to a thread, which, after some time, is to be withdrawn, and with it all the ascarides vermiculares attached to it. This method is repeated several times, till the worms are destroyed.

§ CLXV. Clysters of *geoffroya surinamensis*,(215) of *assafoetida*,(216) of *veratrum sabadilla*,(217) of tepid milk well salted, or of simple water salted,(218) are the best remedies to drive these worms from the large intestines. Enemas of oleum ricini, and plugs of soap smeared with this oil, are very useful. Tenesmus, hemorrhoids, swelling, tension and inflammation of the anus, symptoms sometimes occasioned by ascarides vermiculares, particularly when there is inflammation of the intestines, ought to be treated with clysters and

emollient fomentations, and in general, agreeably to the indication of peculiar circumstances.

We should endeavour to supply the loss of the natural mucus, destined to lubricate the inner surface of the intestines, with enemata of mucous and gelatinous substances.(219)

§ CLXVI. The ascarides are certainly feeble worms, but very difficult to destroy; they are capable of exciting, for a long time, a number of morbid phenomena.(220)

Hence it is necessary to continue the treatment, even when these worms seem to have disappeared entirely. The minute embryos of the female ascaris vermicularis, though deposited alive, are not perceptible at the instant,(221) and still less visible; thus the sick, already subject to these worms, if they too suddenly abandon the curative regimen, are again attacked with them when they think themselves well.

§ CLXVII. The use of these injections is not in general sufficient to destroy these worms, which sometimes ascend the intestinal tube, and which have been found not only in the small intestines, but even in the stomach and oesophagus(222); for this reason the treatment should be rendered more active by remedies taken by the mouth, among which are to be preferred camphor,(223) valerian,(224) muriate of barytes,(225) iron,(226) and sublimed zinc,(227) etc. *Rosenstein* says,(228) that these worms may be driven from the body by eating raw carrots, and by drinking a great quantity

of the juice of the beet or beech, to procure a copious discharge. Some persons have highly recommended injections of tobacco; but according to *Herberden's* observations(229) and my own, they have been attended with more inconvenience than advantage. The sulphuric elixir of *Mynsicht*,(230) administered with the remedies already noticed, has often produced wonderful effects, because, with this remedy we give more tone to the first passages, the solids regain their strength, and the superabundant secretion of mucus of the intestines, which is the vehicle and aliment of the ascarides vermiculares, is diminished.(231) The inhabitants of Abyssinia readily relieve themselves from these worms, according to *Bruce's* account,(232) with a spiritous infusion of the flowers of the *Banksia Abyssinica*.(233)

§ CLXVIII. To prevent the generation of the ascarides vermiculares, it is useful to invigorate and strengthen the abdominal viscera, especially the large intestines; conformably to this idea, besides the articles recommended as purgative,(234) the patient, if in a condition to do it, should often mount a horse, locally to strengthen the parts which give rise to the development of this species of worm.

[*Mr. Charles M. Clarke*, in his *Diseases of Females*, p. 167, says, "a strong decoction of the semen santonici is the most efficacious of all the injections in use. With this the rectum should be filled; but the quantity thrown up should never be so great as to produce great distention of its cavity, lest the

coats of the bowel being stimulated, it should contract hastily and expel the glyster, which acts with more certainty, if it remains for some time. This operation, repeated for a few successive days, will seldom fail to remove, for a time, the ascarides and the symptoms they produce.

Purgatives employed alone are of little service ; but during the use of the glysters they ought to be occasionally exhibited."

Of these worms Dr. Fisher says, "they reside principally in the rectum. A brisk cathartic will remove part of them ; but medicines which have to pass through the stomach cannot be depended on. Anthelmintic enemata, such as oil, a solution of sal. marin. or sal. martis, repeated once in a day or two, for five or six times, very seldom fail of destroying them."

A medical friend of mine was lately entirely relieved from a violent irritation of the rectum from these worms, by introducing once only a sort of large bougie into the bowel, smeared with whale oil. In these cases, if other remedies fail, the spirit of turpentine should be tried. If it should produce any considerable pain of the rectum, this inconvenience might be easily removed by some mucilaginous injections ; or by castor oil taken by the mouth. The oil might be previously taken, and the turpentine injected half an hour before the oil would be expected to operate.]

VI. TREATMENT OF THE LUMBRICOÏDES.

§ CLXIX. We do not, says *Rosenstein*,⁽²³⁵⁾ so easily succeed in expelling the lumbricoïdes; for this purpose he prescribes the five following rules, by the aid of which I can affirm, that I have never failed to destroy them.

1. The medicines should be administered in the morning, at the hour of breakfast, because the worms also acquire the habit of taking food at this time, and in this manner they are disposed to eat those substances which destroy them.

2. The medicines about to be taken are first dissolved in tepid milk, hydromel, or mercurial water,⁽²³⁶⁾ and before the patient goes to stool, he should take a clyster of lukewarm milk, in order to bring the worms to the interior portion of the rectum.

3. The patient should take care not to prepare the medicines himself which he is to take, or to smell of them, because these worms secrete themselves in order to avoid their odour.

4. When a physician proposes to expel them by internal means, he should omit the use of external applications, that the worms may not hide themselves. If however the patient, after having swallowed the vermifuge, should experience violent pain in any particular part of the lower belly, and convulsions should occur, this would indicate

that the lumbricoïdes had assembled at this point, and were attempting to perforate the intestines.(237)

The worms should then be expelled immediately, and this may be effected by rubbing the part with petroleum, and applying, between two pieces of linen. a cataplasm, prepared with the tops of absinthium, garlicks, rye meal, and the fresh gall of an ox.(238)

5. For some days before the commencement of this course, the patient should abstain from every article of diet containing milk, using only the grosser, hard, and salted aliments, as onion pottage, and aromatic dishes ; if practicable, he should take, the preceding evening, a piece of herring, without drinking after it.

This sort of life fatigues them, and they retire to the lower intestines, whence they are more easily expelled. The salt herring contributes to make them suck up the medicines with more avidity and in greater quantity.(239)

§ CLXX. The semen contra vermes mixed with jalap,(240) the seeds of the chenopodium anthelminthicum,(241) the bark of angelica,(242) assafoetida,(243) the geoffroya surinamensis,(244) the polypodium filix mas,(245) the spigelia anthelmia,(246) valeriana officinalis,(247) the anthelminthic drops of *Hartmann*,(248) the preparations of iron,(249) mercurials,(250) sulphur,(251) are remedies which experience has demonstrated to be efficacious for the destruction and expulsion of lumbricoïdes.

Rosenstein informs us, that he has often prescribed, with success, the sulphate of iron combined with the seeds of the *artemisia santonica* and *jalap*.(252) He also recommends garlicks as an excellent remedy against worms, and advises them to be eaten fasting, or on bread and butter, or boiled in milk, or to take the expressed juice, combined with an equal quantity of oil of almonds, (*oleum ricini* I think better,) adulterated with lemon juice, or sugar, and then to purge the patient with the elixir of *rhubarb*.(253)

Probably the smell of garlic and *assafoetida* obliges these vermins to descend into the lower portion of the intestines, where they are more easily expelled by purgative medicines.

§ CLXXI. *Bisset* boasts of fetid hellebore,(254) against these worms, which he administers dry and in powder, in the dose of fifteen grains to an adult; he also gives a drachm of syrup prepared with its juice. *Lille* strongly recommends(255) a mixture of a scruple of the extract of black hellebore,(256) and half a scruple of sulphate of iron; he dissolves it in an ounce of *centaurea benedicta*, by adding to them syrup of violet or honey; the dose is a small spoonful in the morning, fasting.

§ CLXXII. The green bark of the fruit of the walnut, prepared in different ways, is a very active and powerful remedy for the expulsion of worms.(257) *Fischer* says much in favour of the extract, which, according to him, will destroy the *lumbricoïdes* in two minutes. He dissolves two

drachms of this extract in four drachms of canella water, and gives fifty drops of this solution to a child from two to three years old ; and after seven or eight days he prescribes a mercurial laxative. I have several times directed, with success, the oil of walnut expressed without heat, particularly when rendered more active by the juice of lemon, and afterward purging with oleum ricini.

§ CLXXIII. But of all the remedies hitherto announced, there is no one of them, according to my observations, which is more active or more certain than camphor.

This substance, administered according to rule, expels lumbricoïdes with facility and promptitude, and at the same time strengthens the intestinal tube and the whole body, as we have already said.(258) This remedy kills these worms in an instant, perhaps because its penetrating and volatile odour acts by restoring in a surprising manner the excitement of the first passages, and those parts which are sympathetically connected with these organs, relieving the convulsions and spasms occasioned by worms, and preventing the cause of them.

§ CLXXIV. Other remedies have of late been recommended against worms and among these *Fordiche*,(259) bestows many praises on the filings of tin and the seeds of the *astemisia santonica*, and *Schewandimann*(260) equally commends the conserve and other pharmacuetic preparations of *helminthochorton*.(261) Having no particular experience of this last remedy, I can only relate what

is said of it by the French physicians, who assure us that they have used it with the greatest success. (262)

[The *Stizolobium*, *Dolichos pruriens* Linn., or *Cowitch*, is one of the most safe and effectual anthelmintics, at present known. It destroys not only taeniae, but also lumbricoïdes and ascarides; and as it acts mechanically by piercing and wounding these animals, it will probably be found a valuable remedy for every species of worms which inhabit the alimentary canal.

“This exotic plant grows in warm climates, especially the West Indies. The pods are about four inches long, round, and as thick as a man’s finger. The outside of the pods is thickly beset with stiff brown hairs, which, when applied to the skin, occasion a most intolerable itching. The ripe pods are dipped in syrup, which is again scraped off with a knife. When the syrup is rendered by the hairs as thick as honey, it is fit for use. It may be safely taken from a teaspoonful, to a tablespoonful, in the morning, fasting. The worms are said to appear with the second or third dose, and by means of a purge, in some cases the stools have consisted entirely of worms.” Mr. *Kerr* has given a botanical description of this plant in the *Medical Commentaries*, vol. ii. It is also described and figured by Dr. *Woodville*, in his *Medical Botany*. Mixed with molasses or treacle, it is better preserved and administered than in any other manner. Mr. *W. Chamberlaine*, in his *Practical Treatise* on this

article, says, "For the tape-worm, long experience has taught me that the cowhage (*cowitch*) does not prove so effectual, as against the other worms, unless the quantity of setae be doubled. In very obstinate cases, I sometimes find it necessary to increase the quantity of setae even to a threefold proportion; for these worms will not easily be made to let go their hold; which they are as tenacious of, as they are of life." A child of Mr. C. five years old, swallowed by stealth, three or four ounces of the syrup of cowitch, "without any other inconvenience than a diarrhoea, which did her more good than harm."

Though this medicine is generally perfectly safe, yet there may be instances in which it would be improper to give it, as in cases of inflammation in any portion of the alimentary canal, and in excessive irritation &c. of this passage.

In Massachusetts it is more used than formerly, and is gaining reputation. It commonly proves more certainly and speedily beneficial, when its use is preceded by an emetic or cathartic, or both; and when a purgative, as castor oil, is occasionally interposed. This should be done every second or third day, during the exhibition of this article, if there is the least costiveness. It has often been regretted among physicians, that no anthelmintic medicine, taken into the stomach, seemed to possess the power of fully destroying the ascaris. There is much reason to believe that the cowitch, as mentioned above, will prove an exception to this

opinion. These bristles, or hairs, are liable to be injured, probably by age, and more certainly by becoming damp and musty. Whatever destroys their strength and elasticity, destroys the properties on which their activity and usefulness depend.

Dr. *Fisher*, as quoted, p. 252, says, "The teretes (*lumbricoïdes*) resemble the common earth-worm generally; but the difference is sufficient to prove them a different species. In some cases they are found to be very numerous; one thousand and nine were discharged from a child in the space of ten or twelve days. In common cases *the amalgam of tin* never fails to kill them. I have combined the tin and quicksilver in various proportions, and added different substances to render the amalgam pulverable. The following formula is considered the best;—to five parts of melted tin, add two parts of quicksilver; mix them, and add one part of testaceous powder; keep the amalgam melted, and rub till the smallest part of it disappears; when the mixture is cold, a little additional livigating will reduce it to an impalpable powder. Let three or four drachms of this powder be divided into twelve doses, two of which are to be given in a day.

This quantity will generally be sufficient for a child; but sometimes six, or even twelve additional doses will be required. If we wish to keep the bowels more open, a little calomel may be added. Should the symptoms be very severe, a large dose

of calomel should be given; otherwise we may lose the patient before the amalgam has time to operate.* Sometimes we find the patient in a lethargic stupor, and the action of the stomach, of course, suspended; at other times, the canal is in a state so debilitated and relaxed, that the powder passes undissolved; in neither of these cases will this preparation produce any effect. Worms, killed by tin, or its amalgam, are never discharged entire, but are either partially or wholly digested. "I had under my care a boy, of about three years, who had the usual symptoms of worms. I gave him tin to no purpose. In the course of six months every kind of anthelmintic was tried in vain. At length I gave him a scruple of calomel, and before it operated, injected the smoke of tobacco, till it passed by his mouth. During the operation of the medicine, which was very severe, he discharged one of the teretes in a spiral coil, like a bean vine, which had twined round a small twig; it was incapable of being extended to a straight line, and had obviously grown in that form.

"I presume that it must have been lodged in the appendix vermiformis. A worm in this situation, sometimes, and I believe generally, proves fatal. This is the only instance, within my knowledge, of its being dislodged."

This amalgam of tin, for which we are indebted to Dr. Fisher, is a safe and valuable remedy.

* And this will more certainly save the patient, if the calomel be accompanied with a decoction of the *spigelia marilandica*. A. T.

I once saw a few doses of it produce a considerable salivation for two or three days.

The symptoms of the lumbricoïdes very generally subside after its exhibition, though the worms, as the doctor remarks, are rarely discharged in a visible form.

In 1782, M. *Chabert* published a work on the verminous diseases of animals, in Paris. He mentions a preparation, which he considers as a perfect remedy for all the worms which inhabit animals. *C. A. Rudolphi*, see p. 65 of this work, notices this article with commendation. It is this, "*Oleum Chaberti*. Olei animalis empyreumatici pars una tribus olei terebinthinae essentialis partibus additur et iiscum quatuor diebus elapsis destillatur. Olei hujus destillati vim nulla vermium species eludere posse videtur, nec solummodo ascarides tam majores quam minores, vel taeniae pellit, sed distomata etiam hepatica innumera ejusdem ope a puella duodecim annos nata dejecta, apud cl. *Chabertum* vidi. Doses satis magnas, bobus nimirum uncias duas ad quatuor usque; equis unam ad tres uncias; equuleis, vitulis, ovibus drachmam; suibus drachmam semis ad scrupulos duos, canibus pro magnitudine diversa, portionem minorem drachmam semis, vel scrupulum, vel hujus partem dimidiam offert. Homines equidem ob gustum ejus nimis ingratum saepius recusant, alias meliori uti non possent antihilminthico." That is,—*Chabert's Oil*; one part of empyreumatic animal oil is added to three parts of essential oil

(*spirit*) of turpentine, and after standing four days, the mixture is distilled. No species of worms can elude the destructive force of this distilled oil.

Under the direction of the celebrated *Chabert*, I have seen it expel not only the large and small ascarides, but taeniae also, and innumerable hepatic distomata. from a girl twelve years old. He considers the following doses sufficiently large; namely, for neat cattle from two to four ounces; for horses from one to three ounces;* for colts, calves, and sheep, one drachm; for swine from half a drachm to two scruples; for dogs, according to their age and size, a drachm, or a scruple, or half of this quantity.

Men indeed, from its unpleasant taste, sometimes refuse it; but excepting this inconvenience, a better anthelmintic cannot be used. *Rudolphi*, vol. i. p. 493.

More reputed remedies for the lumbricoïdes might be enumerated; but with such as are already before the physician, or even with a part of them, properly administered, I think he will have nothing more to wish.

Dr. C. *Whisholm*, of Bristol, England, has published an instructive paper on the *Malis Dracunculus*, or Guinea-worm in the eleventh vol. of the *Edinb. Med. and Surg. Journal* for 1815.

Dr. C. concludes his communication in the following manner.

* Has this medicine ever been given to the horse for bots in the United States? If not, it well deserves a trial. *A. T.*

“It now remains to offer my observations on the prevention and cure of the dracunculus. Never was there a disease, to which the medical precept, *sublata causa, tollitur morbus*, more distinctly applies, than this. The result of the application of this precept at Point Saline, in Grenada, is a manifest exemplification of the means, by which this is to be effected, and precludes the necessity for saying more of the subject here. As to the cure of the disease, that is to be accomplished by the destruction of the insects. I used a variety of means, but none were effectual, till I had recourse to mercury.

“Mildly saturating the system with this medicine, destroyed the insect. I since then find that this medicine has been long used by others for this purpose. At that time, 1794, I knew of no authority for it. Linnaeus says, “*Infuso mercurii sublimati corrosivi Swietenii intra dies 20, qui alias 40 educitur.*” (Syst. Nat. Tom. i. p. 2. 1075.) In phthi-riasis, and other diseases of the exanthemata viva, mercury has been long known, as an effectual remedy, externally applied; but in dracunculus it is not so: the remedy must pervade the system, in order to destroy the insect, or its ova. It is unnecessary to detail the variety of means employed in different countries. They are of doubtful effect, however vaunted of—asafoetida, garlic, the root of angelica, sulphur, &c. &c. Some gentlemen, considering the disease as an inanimate substance, recommend the extraction of it by a painful surgical ope-

ration ; but the opinion is as irrational, as the cure is unnecessarily cruel.

“ *October 31, 1814.*”

The subsequent facts and cases, though not precisely within the scope of *Brera's Treatise*, will be interesting to the medical reader, and not without use to the physician.

Mr. *W. Lawrence*, in the 2d vol. of the *Medico Chirurg. Trans.*, has given the case of a woman, who voided a large number of worms, by the urethra. “ *Mary P.* aged twenty four, a single woman of a healthy and strong constitution, was seized in the winter of 1806, with retention of urine, requiring the daily use of the catheter. She complained of great weight in the bladder, pain about the loins, and numbness of the thighs ; she seldom passed any water, and when she did, only a few drops, much tinged with blood.

“ It was deemed a case of calculus, but nothing of that nature could be detected by the sound.” After remaining a long time without relief, she was, in the summer of 1809, greatly emaciated, and her constitution much deranged.

Her tongue was furred, and frequently assumed a typhoid appearance ; her appetite was lost ; she complained of pains in the loins and bladder, and had passed no water for six months, except by the assistance of the catheter. About this time she was seized with violent fits whenever the use of the instrument was delayed longer than usual, or when the pain and burning heat in the bladder were

particularly great. "As the symptoms, denoting the existence of some mechanical irritation in the bladder, were still unrelieved, Mr. *Barnett*, her medical attendant at the time, sounded without finding any indication of stone; the examination gave great pain, and produced in the patient a sensation as if the instrument had struck against a ball at the top of the bladder. From this time the sense of weight became more considerable, and she felt a fluttering within her, as if something was moving; this was so distressing as to oblige her to continue constantly in bed, to which she has since been almost entirely confined; the quantity of urine had become considerably diminished; it had been necessary at first to use the catheter twice a day; afterwards once a day, once in two days, and lastly once in three days was sufficient. She went on till the beginning of August, using such means as are generally employed in affections of the bladder, without the slightest alteration. In fact, her constitution was daily suffering more and more. She was unable to get up, and was continually tormented with a distressing pain in the head, which she had never felt before. The least noise alarmed her. The appetite was entirely gone, and she took nothing but liquids in very small portions; she could get no sleep without large doses of opium.

"The fluttering in the bladder was more violent, and according to her own account, so strong as to be perceptible to the hand; and the bladder itself much distended, even after the water had been

drawn off, and so tender, that the weight of the bed clothes cou'd not be borne.

“A very careful examination was again made with the sound, and produced the same feeling as before, of its striking against a ball in the bladder. This was followed by an exceedingly violent convulsive fit, in which the patient was so agitated, that five or six persons were required to hold her.”

Soon after this “Mr. *Barnett* was much surprised, on removing the catheter, to find insinuated through its orifices, what appeared to him a roundish worm, about the size of a piece of bobbin, an inch and a half in length, and of a white colour. At this time Mr. *B.* gave me an opportunity of seeing the case; we examined very carefully with the sound, with the same result as before, and agreed that the catheter should be again left in the urethra, as it had been before, in order to throw further light on the cause of the patient's sufferings.

“Three worms were now brought away, two of them most curiously entangled in the orifices of the instrument, and the third coiled round the end. As we had now gained some information concerning the cause of the symptoms, Mr. *Barnett* attempted for its removal, at my suggestion, to dilate the urethra on the plan recommended by Mr. *Thomas*, in the first volume of the *Medico-Chirurg. Transactions*. The sufferings of the patient were so considerable, that this could not be followed to the desired extent. The effects of the spirit of turpentine in cases of taeniac, determined us to try this

remedy. Two drachms were given at bed time in a little warm beer, producing no other sensation than that of a pleasant warmth at the stomach. The influence of the medicine on the urinary secretion was very manifest by its subsequent effects; the bladder was painfully distended on the following morning, though the water had been drawn off the evening before, and at this time the catheter was used only once in three days. A pint and a half of urine was evacuated.

“A double quantity of the medicine was repeated in the evening, producing no other effect than a profuse perspiration during the whole of the night, and a strong inclination to make water in the morning. She made no effort to assist this disposition, as the length of time, for which the catheter had been employed, made her suppose it would be useless. The feeling became at last so urgent that she yielded to it, and passed a pint and a half of water, containing four worms; the only natural evacuation of urine she has had during Mr. *Barnett's* attendance. The continuance of this treatment did not produce success, corresponding to such flattering appearances.

“The medicine, on the fourth time of using it, produced most violent pain in the head, and much fever, which were followed by erisipelas over the whole body, but more particularly in the face. All subsequent attempts to use it, even in diminished doses, were attended with a recurrence of these symptoms. From the first trial of the oleum te-

rebinthini however, to this time, the patient's health was on the whole very considerably amended; she recovered her appetite, rested at night without opium, and was so much relieved from the feelings about the bladder, that she could remain up four or five hours in the day. Mr. *B.* now injected into the bladder equal parts of the oil of turpentine and water, which produced only, according to the patient's expression, an increased fluttering in the worms. On withdrawing the catheter, four worms came away. The repetition of this injection produced the same constitutional irritation and erysipelatious inflammation, as the internal use of the medicine had before done. The fits which had before so much distressed her, were again renewed.

“As these means had failed, Mr. *B.* introduced, on the 22d of February, a very large catheter, opened at the end, and furnished with a stilette, that filled the orifice when it was introduced; on withdrawing the stilette, a free passage was left for the contents of the bladder. In less than half an hour, nine worms came through, with a table-spoonful of sandy matter. Four of these were five inches and a half in length.” In this way the patient continued to discharge worms, till Mr. *Barnett* supposed that as many as six hundred had been voided. Twenty two were discharged at one time. Mr. *B.* tried olive oil as an injection; after its use the fits were less violent. October, 1811; a large abscess formed near the vagina in June last attended with severe constitutional symptoms, and

every appearance of the patient's sinking; when it burst into that cavity, she was greatly relieved.

The whole number of worms discharged to this time, could not be less than eight hundred or one thousand. In figures xii and xiii, plate IV, of this work, is an engraving of a large and a small worm, of the natural size. The latter were only voided on one occasion.

“The large worms are mostly from four to six inches in length, and the largest was eight inches; they are slender in the middle, where they appear uniformly as if broken; they increase gradually in both directions from this middle point, and then decrease again to the two extremities.

“When placed in water, after immersion in spirit, they are bent at this middle point, and lie in the form represented in the drawing.—They are soft when voided, and of a yellowish hue. The numerous figures and descriptions of *Goeze*, do not make us acquainted with any such worms.”

Dr. *Fisher*, as above quoted, says, “worms of various kinds, and their eggs, must be frequently conveyed with our food into the stomach; where they generally perish: in some few instances however they have been known to live and grow; but they have been supposed incapable of propagating, either in the alimentary canal, or any other part of the body.

“Perhaps the following case may furnish an exception to the general rule.

“ A woman of middle age, whose voracity was unquestionable, gave me the following history of her case. Some years before, she had been attacked with a disagreeable, painful sensation in the lumbar region. I presume from her account of the seat of it, that it was in the kidneys: soon afterwards she suspected that she discharged, with the urine, some small worms; a careful attention confirmed her suspicion: the worms, when first voided, kept moving in the urine, and died in about half an hour. A few weeks afterwards she found, that instead of worms, she discharged very small winged insects, all of which, I believe, were dead; these soon disappeared, and with them all her complaints. Subsequent to that period, the same symptoms had recurred, two or three times every year.

“ She gave me one or two of each kind of these little animals, preserved in spirit. They were, I presume, the same species in different states. The worms were about two thirds as long as the largest maggots found in cheese; but probably not half so large in circumference. The flies or gnats appeared to be about twice as large as the winged aphides, or lice found on cabbages; but all of them were so much contracted and changed, by the action of the spirit, that with the naked eye I could obtain but a very imperfect idea of them. I deferred examining them with a microscope, hoping to obtain some in a better state of preservation; but in this I was disappointed; the woman, finding that no

relief was to be expected from medicine, was very unwilling even to think of such a subject, to her so very disagreeable; and, in the mean time, those that I had preserved in a phial, by accident, were thrown away. I regret very much that I could not obtain more particular information respecting them; it might not indeed be of much practical utility, but it would gratify our curiosity to know whether the same species could be found elsewhere; and if it could, its history might enable us to account more satisfactorily for the appearances. These worms probably proceeded, at least in the first instance, from ovula, which had passed the stomach and lacteals to the kidneys.

“The ascarides indeed sometimes enter the urinary passages from without, and may be supposed capable of penetrating as far as the kidneys; but to them the salts of the human body are not disagreeable; to these worms it was otherwise; it is probable that in water, the element natural to the larvae of gnats, they would have lived very well; but in urine they suffered, and in half an hour died.

“Whether the eggs were all taken in at the same time, their hatching being suspended to different periods, by the powers of the living body; or whether they were received at different times; or in fine, whether those discharged at the several successive periods, were successive generations, propagated within the body, I shall not undertake to determine.”

Dr. *Alexander Munro*, in his *Morbid Anatomy*, page 560, after having spoken of intestinal worms, goes on to say, that, "besides the species of worms already treated of, others of a different description have been occasionally discharged by stool. I allude to caterpillars, or the larvae of insects. I sent for examination, several specimens of them to Mr. *Leach*, who favoured me with the subjoined report. 'They are the larvae of insects as follows:

"No. 1. The ova of the *musca vomitoria*.

"My friend *Donovan* informed me, that he had seen the larva of this insect in the intestines of a body in a state of putrefaction. The eggs most probably were deposited at the mouth, or anus, and the larvae had found their way thither on their hatching, which soon happens.

"Nos. 2, 3, and 4 are larvae of three unknown species of coleopterous insects.

"No. III. is figured in the *Medical Journal*, vol. viii, p. 43, fig. viii. I am pretty certain, that it is what the farmer calls the wire-worm. Of what insect it is the larva will soon be made known, as *Sir J. Banks*, at this time, is breeding a great many, in order to ascertain this important fact.

"Nos. 5, and 7, larvae of the *papilio brassicae*, or some species much allied to it.

"No. 6. The pupa of some *musca*. Species unknown to me."

Some years ago, a woman, now living in Biddeford, Maine, had an issue for a long time, in the back of her neck.

At this period, which was in warm weather, she was confined in a dark and dirty apartment. At length the issue healed; soon after which a tumour rose at the part, bust and discharged a great number of maggots or larvae; it is said, a teacupful. For several months these animals seemed to be confined to the part, occasionally crawling out. The sore healed a second time, soon after which the patient felt these larvae to spread from the late ulcer to the head, producing in their course most severe pains, described by her as itching, biting, stinging, and gnawing sensations. Some time after these sufferings, the larvae were discharged, at times, from the ears, eyes, nose, and mouth, varying in number and size, sometimes one hundred in twenty four hours; some as small as a hair, and others almost as large as a pipe-stem, and two thirds of an inch long.

Dr. *Dean*, of Beddeford, who gives me these particulars, adds, "it is about four years since this woman has been tormented with these vermin, which still trouble her, May, 1816." Two of these larvae came to me in good health, after having been some weeks discharged, and travelling more than a hundred miles. To one I offered the refreshment of some new milk, passing it nearly round it on a smooth piece of wood. When it first came to the milk it was apparently tasted with pleasure, but on advancing further and bringing its body into full contact with the milk, the animal soon expired, seeming to suffer pain. The surviving traveller

was shut up in an empty, dry pill box; after some months, I cannot now ascertain the exact time, as the insect was not then in my possession, the box was opened and the inhabitant found to have passed through the intermediate changes to his perfect state. A scientific friend recognized him as the *Tenebrio Molitor* of *Linn.* or the mill beetle. This gentleman observes, "the larvae must have been introduced into the cellular membrane in the state of eggs. It is indeed surprising that larvae, which naturally feed on meal, flour, bran, &c. should be able to exist in such a situation. It was too moist for them to go through their metamorphosis, and the larvae therefore quitted it when about to put on their perfect and ultimate form." This poor woman has never had the consolation of knowing that these troublesome inmates cannot arrive at that state in which they propagate while under her skin. On the contrary, she thinks they are constantly multiplying and growing, and that she can never survive their existence.

Dr. *Frank*, of Vienna, relates the following case of a gardener's wife, near Vienna, who, after being tormented for seven whole years, with an almost uninterrupted and very painful headach, at last had been relieved by a lucky chance. She was twenty four years of age, not subject to any kind of sickness, when she began to be seized with a very troublesome and frequently returning headach, which gradually became more violent, drove her almost to despair, and extended over the whole

head, even to the *maxilla inferior*. This head-ach was intermittent ; sometimes the patient suffered uninterruptedly for two or three months, and at others the pain was but slight. During this period the patient not only felt a dryness in the nostrils, but also a very troublesome sensation of an entire stoppage in these parts.

The physicians being now of opinion that all possible remedies had been exhausted, she was advised by one of them only, to take a pinch of snuff frequently. This soon caused a very moderate secretion of phlegm, for which reason the patient resolved to heighten the irritative power of the snuff, by mixing it with a little marjoram and assafoetida, both of which articles she had in the house.

Soon after the use of this sternutatory, on blowing her nose, a living worm dropped out, which, according to her description, perfectly resembled the common grub. The complaint still continuing with equal violence, she concluded perhaps still more worms might exist, and therefore resolved to increase the portion of assafoetida in the snuff, when, soon after, five more worms, similar in every respect to the above, issued from the nose ; and some days after, three more made their appearance ; and in short, forty eight worms were gradually voided through the nose ; then followed a vast quantity of phlegm, and even several pieces of pseudo-membranes : the headach was, for the most part, gone ; only a painful sensation remained for some time,

which however, some months after, quite disappeared.

Dr. *Frank* is disposed to think these worms had their seat in the sinus frontales, in the two antra highmoreana, and the cavum naricum, which supposition seems to be, in some measure, confirmed, by the patient's feeling much pain in the ossa frontis, which induced her to take the resolution of having several teeth successively extracted. He also thinks the constant irritation of the worms in these parts, might have brought on a chronic inflammation, productive of the pseudo-membranes, voided after the worms. *Med. and Phys. Journal, vol. xxxv, p. 252.*]

VII. TREATMENT OF GENERAL VERMINOUS AFFECTIONS.

§ CLXXV. If we call to mind, that worm fevers, like gastric fevers, are really nervous fevers,(263) and that the worms which appear during their course originate from the asthenia which prevails in the whole body, and particularly in the stomach and intestines,(264) and that in mucous diseases the origin of worms is the same; the practitioner has therefore nothing more to do, than to cure the general asthenic diathesis, whether it be severe or slight, in order to expel the worms, and to remove the tendency to their return.

§ CLXXVI. The use of emetics, so much recommended by writers, and especially *Vanden-Bosch*,(265) is, without doubt, sometimes advanta-

geous in those fevers which have been called verminous, because by this means the stomach is cleared of corrupt materials, which, being there retained, would contribute to the production of worms.

An emetic also, by agitating the whole system, gives energy and force to the organs which perform the natural functions. The abuse however of emetics, as well as purgatives, by producing a greater loss of the fluids, may also produce the opposite effects, as we every day see. The weakening of the solids, the increased secretion of fluids, the augmentation of the asthenic diathesis, and a disposition suited to the propagation of worms, are the consequences of an excessive use of evacuants however given.(266)

§ CLXXVII. Besides, the first indication in the treatment of these affections should be deduced from the general form of the disease; and the whole treatment should be directed to increase the excitement of the whole system; that is, to strengthen the body.

The treatment suited to simple typhoid fevers, whether they are violent, mild, or slow, is the same as that adopted in general verminous complaints, more especially as those remedies are the most efficient,(267) which are used both to conquer these dangerous astheniae, and to expel those worms from the body, which occasion its derangement.

VIII. PRESERVATIVE TREATMENT.

§ CLXXVIII. After expelling from the human body, the worms, by which its organs were injured, either locally, or sympathetically, and consequently its functions deranged, we are not to regard the cure as complete, till the slightest disposition to a new development of them is removed.

We have before remarked, that the atony of the solids, and of the whole body, (268) is one of the most essential circumstances, which favour the production of worms. For this reason a universally stimulant regimen, invigorating particularly the stomach and intestines, by giving activity to the solids, by diminishing the morbid dissolution of the mucous fluids, by opposing the degeneracy and consumption of the parts of the body, and by giving strength to the organs destined to carry on the animal functions, must necessarily incommode the worms, destroy them, and at the same time excite the actions requisite to expel them, and to prevent their reproduction. (269) A stimulant regimen therefore, adapted to the debility of those who have been freed from worms, is of the highest importance.

This mode of treatment corrects the predisposition to worms, by giving vigour and healthy action to the stomach and intestines. (270)

NOTES

TO THE FOURTH LECTURE.

(1) See §§ LX, LXI, LXII, CI, CII, CIII.

(2) See §§ LXVIII, LXX.

(3) See § LXVIII.

(4) *Traité des maladies des enfans, etc. p. 316*; see *Burserius, Institutionum medicinae practicae, vol. iv, P. II, Mediolani, 1789, 8^o, p. 179.*

(5) See *Vogel, de usu vomitoriorum ad ejiciendas vermes, Gottingae, 1764, 4^o.*

(6) See § LXI.

(7) See §§ LXXIV. *Affections vermineuses locales*; XCVII. *Affections vermineuses sympathiques.*

(8) The people imagine, that remedies, taken to expel worms, are more effectual at the new moon, or near the end of the full moon. *Bisset, Phelsum, Mead, Rosenstein,* and other physiciaus of great repute, have also recommended these days as most proper to undertake the treatment of worms. Without doing injustice to names so well entitled to the public estimation, I would say with *Bloch, Traité de la génération des vers des intestins, etc. p. 108,* that if these worms had eyes, or if the light of the moon diffused heat, we might then admit the pos-

sibility of this planet's having some influence on worms, on remedies, or even on diseases.

(9) See § I.

(10) This is the pretended anthelmintic power of bitters, as the professor of the *Decima* judiciously remarks in his *Notes à la Matière médicale de Cullen*; see *tome vi, note no. 83*.

(11) See § LXXII, no. 2.

(12) See § LXXIX.

(13) *Anatripsologia ossia dottrina delle frizioni che comprende il nuovo metodo di agire sul corpo umano, per mezzo di frizioni fatte cogli umori animali, e colle varie sostanze che all'ordinario si somministrano internamente, edizione quarta, vol. ii; Pavia, 1799, 1800, 8°.*

(14) See *Anatripsologia, vol. i, art. v.*

(15) See *Anatripsologia, vol. ii, art. ii, vol. ii, art. iv.* Frictions on the abdomen of children with the two following liniments, are of great utility.

1. Take a drachm of ox gall and of Venice soap, and form them into a liniment with a convenient quantity of oil of tansy.

2. Digest for twenty four hours in a warm place, in a sufficient quantity of gastric juice or purified saliva, two ounces of ox gall, half an ounce of pulverized socotorine aloës, and of prepared cucumis colocythis, and make the whole into a liniment with fat.

(16) *Cepa officin. class. hexand. ord. monogyn. biennis; scapo nudo inferne ventricoso longiore, foliis teretibus.*

(17) *Allium officin.* class. et ord. praeced. perennis, caule planifolio bulbifero, bulbo composito stamin. tricuspидatis.

(18) A woman, tormented with taenia, took, during six months in succession, one or two slices of garlic, and at the close of this period, voided a piece of taenia ten metres sixty decimetres long; see *Rosenstein, Traité des maladies des enfans.*

(19) *Bisset* reports that he expelled an entire taenia, which had resisted all other means, by the use of garlicks boiled in milk.

(20) See *Taube, Geschichte der kriebel-krankheit, p. 207.*

(21) The following are the principal formulæ ;

1. *Garlic, or alliaceous wine.* Put an ounce of bruised garlicks into some good wine and simple essence of absinthium, let them stand ten hours, strain off the liquor and preserve it for use.

2. *Syrup.* Macerate a pound of bruised garlicks, in two pounds of boiling water for one hour, in a close vessel; filtre the liquor, and add two pounds of very pure sugar, and make a syrup.

3. *Spirit for external use.* Take six ounces of sulphuric ether, an ounce of bruised garlicks, and a drachm of grated camphor, mix. This spirit renders more active the liniments, mentioned in no. 15.

(22) *Semen santonicum officin. class. syngen. ord. polygam. superfl. perennis suffructic. ; foliis caulinis linearibus pinnato multifidis, ramis indi-*

visis, spicis secundis reflexis, floribus quinque floris.

(23) 1. *Electuary.* Take two drachms of valeriana offic. and of semen santonicum, thirty grains of jalap root, and of oxymel scillae, sufficient to make an electuary. The dose is a teaspoonful every three hours.

2. *Infusion.* Steep for an hour, in a tepid place, four ounces of mentha, and of gentian, in two ounces of canella water, half an ounce of bruised semen santonicum; strain and add two ounces of syrup of succory with rhubarb, and six drops of oil of nutmeg. Two spoonfuls are given three or four times a day.

3. *Powder.* Take six grains of semen santonicum, of jalap, and of pure sugar for a single dose.

(24) *Confection.* Put any quantity of semen santonicum into a confectioner's vessel; dissolve a small quantity of starch, with a sufficient portion of refined sugar; let the semen santonicum ferment, and add more starch and sugar, till the semen santonicum is covered with them.

Bolus. Take an ounce of pulverized semen santonicum and of black sulphur, (*sulfuretum nigrum mercurii*?) of resinous jalap and of cinnamon bark in powder three scruples, white sugar seven ounces; dissolve these in water and boil to a consistence; mix the whole and form the mass into boluses.

The dose for a child is from one to two drachms.

(25) *Chenopodium anthelminticum offic. class. pentand. ord. digyn, ; perennis in Pennsylvania: foliis ovato-oblongis dentatis, racem. aphyllis.*

(26) *On the weather and diseases of South Carolina, etc. p. 71.*

(27) *Julapa offic. class. pentand. ord. monogyn. foliis difformis cordatis, angulatis, oblongis lanceolatisque, caule volubili, pedunculis unifloris.*

(28) *Historia cicutae aquaticae ; Basileae, 1679, 4^o. cap. xv. p. 224.*

(29) As may be seen in the preceding and subsequent formulæ.

(30) A plant which grows in the island of Grenada.

(31) See *Duncan, Medical Commentaries, vol. ix. p. 365.*

(32) *Assa-foetida offic. succus gummi-resinosus, concretus, obtentus ex incisione radicis ferulae assa-foetidae ex class. pentand. ord. digyn. perennis persiae, foliis alternatim sinuatis obtusis.*

(33) 1. *Bolus.* Take three grains of assa-foetida, and of root of white dittany, and with honey make a bolus.

2. *Milk.* Take a drachm of assa-foetida, and half an ounce of purified sugar, mix them intimately in a mortar, and pour on it six ounces of rue water. It is given by spoonfuls.

3. *Pills.* Two drachms of assa-foetida, half a drachm of sulphate of iron, five grains of prepared squills, are mixed together with some yolk of egg ;

this mass is made into pills of seven grains each, and the patient takes two every two hours.

(34) *Plaster*. Take equal parts of assa-foetida and semi-vitreous oxide of lead, of yellow wax and galbanum melted, half the preceding quantity; heat them and form a plaster.

(35) In this case, it is combined with wax and saffron. See *Anatripsologia*, vol. i, p. 198.

(36) See *Eggert, Commentatio de virtute anthelmintica Geoffroyae surinamensis, adjectis observationibus recentioribus, Marburgi, 1791, 8°*.

(37) Two or three drachms of this bark are boiled in a sufficient quantity of water, to eight ounces. Combined with valerian, it is more efficacious.

(38) *Nuces jaglandis immaturae offic. class. monogyn. ord. polyand. ; arbor, foliolis ovalibus, glabris, subserratis subaequalibus.*

(39) The decoction or infusion is given in doses of one or two drachms. Two drachms of its aqueous extract are also dissolved in half an ounce of cinnamon water. Fifteen, twenty, or thirty drops of this are given to children, twice a day. The rob is less disagreeable to children.

(40) *De la génération des vers dans le corps de l'homme, etc. vol. ii, art. II.*

(41) *Comment. de vermibus in corp. hum. et anthelmintice, Stradae, 1751, p. 14.*

*(43) See *Recueil périodique*, T. VI, p. 305.

(44) *Journal de Médecine*, T. XVIII, p. 416. *Defrancière* administered it in this manner, and

* (No. 42) is omitted in the notes by *Brera. A. T.*

boasted of it as a specific against worms. With each dose of this may be given, two ounces of oil of walnut, and an ounce of sweet wine, well mixed together.

(45) *Camphora offic. ex arbore Indiae orientalis lauro camphora dicto*; class. Enneand. ord. monog., foliis tripolinerviis lanceolato-vatis. From the branches of this tree, a resino-volatile substance is obtained; when sublimed we call it camphor.

(46) *De camphorae vi anthelmintica, Gottingae, 1759, 4^o.*

(47) See *Rosenstein, Traité des maladies des enfans, etc.*

(48) See my case in note 70, of the third lecture.

(49) This remedy may be easily given in an emulsion of gum arabic.

In this way *Vogel* succeeded in expelling a taenia seven metres forty two decimetres in length, in clysters or in pills; it may be advantageously combined with assa-foetida, or mixed with theriacal water; or with an infusion of valerian, etc. It is also administered in powder with *semen contra*, the bark of *geoffroya surinamensis*, etc.

The dose should be adapted to the condition and debility of the patient. It is prescribed in doses from a grain, to a scruple, and even half a drachm.

(50) *Filix mas offic. class. criptogam. order, filices*; frond. bipinnatis, pinnis obtusis; crenulatis, stipite paleaceo, floribus uniformibus.

(51) *Historia plantarum, lib. ix, cap. xxii.*

(52) *De simplicibus Medicina ed. Ricci, lib. viii.*

(53) *Opera, lib. xxviii.*

(54) *Nachricht vom Klinisch—institut zu Erlangen, p. 44, 46.*

(55) See §§ CXLVI, CLXVIII.

(56) *Spigelia anthelmia offic. class. pentand. ord. monog. annua, caule herbaceo, foliis summis quaternis.*

(57) *Amoenit academ. tome v.*

(58) *Gentleman's Magazine for the year 1751, p. 544.*

(59) To make a good decoction of it, take two handfuls of the spigelia anthelmia plant, boil it in two pounds of common filtered water, and add six drachms of lemon juice and two ounces of syrup of peach flowers.

(60) *Spigelia offic. class. et ord. praeced. perennis; caule tetragono, foliis omnibus oppositis.*

(61) See *Essays, and Observations of Physic and Literature, vol. iii, p. 151.*

(62) *Praktische arzneimittellehre, T. i, p. 505.*

(63) *Tanacetum offic. class. syngen. ord. polygam. superflua, foliis bipinnatis incisiss serratis.*

(64) *Traité des maladies des enfans, etc.*

(65) The anthelmintic pills are made of the extract, according to this formula;

1. Take six grains of the extract of tansy, and of semen santonicum, of resin of jalap four grains; distilled oil of tansy one drop; mix and make pills of two grains each, which are given in one dose to

adults. Four grains of sulphate of iron may be added, or what is still better, some sublimed muriate of mercury.

2. Take half a drachm and six grains of the extract of tansy, of assa-foetida, and of santonicum, twelve grains of sulphate of iron and sufficient honey to form the whole into pills of one grain each. Eight or ten of these are given, every two or three hours.

(66) *Valeriana sylvestris officin. class. triand. ord. monogyn. perennis, floribus triandris, foliis omnibus pinnatis.*

(67) *Annus medicus primus, p. 103, 164; secundus, p. 228, 226.*

(68) *Electuary of Stork.* Take three grains of the root of valeriana offic., of jalap root and sulphate of potass; add four ounces of oxymel of squills and make an electuary. It is prescribed in spoonfuls.

(69) *Semen Sabadillae offic. class. polygam. ord. monogyn. Veratrum sabadillae?*

(70) *Ausserl. arzneymittel. Ed. iv, p. 363.*

(71) *Vermischte chirurg. Schriften, Berlin, 1782, ii B. p. 71.*

(72) *Briefe an Aerzte, Berlin, 1784, 8°.*

(73) *Veckoskriff for loekare, Och Natur for-
kare, etc. Stockholm, 1783, 8°.*

(74) A woman having an intermittent fever, instead of taking cinchona, as is common, took, by mistake, in the night, two drachms, and even more, of powdered sabadilla, mixed with the different

doses of Peruvian bark. Two hours after, intolerable pains took place, followed by violent convulsions, restlessness and spasmodic trembling, which threatened the life of the patient. Called to her assistance, I found her cold, without pulse, her eyes turned up, her face covered with cold sweat, and the belly tumid and greatly distended. An emetic was administered, and she discharged from her stomach a considerable part of the poison she had swallowed.

By drinking milk, and the use of repeated clysters, the poisonous force of the *sabadilla*, still remaining in the body, was neutralized, and twelve hours after, the abdominal pains ceased, the swelling of the belly disappeared, the convulsions and spasmodic tumors subsided, the pulse rose, and respiration became natural. It is remarkable, that the patient was restored from this accident, and was cured also of her fever.

(75) *Traité de la génération des vers, etc.* p. 109. Though this article belongs to the animal kingdom, I have nevertheless allowed myself to reduce it to the class of minerals, because the ammoniacal preparation, most frequently used by practitioners for the expulsion of worms, is the muriate of ammonia, which, in the classification of remedies, may pertain equally to the animal and mineral kingdom.

Besides, it was not judged convenient to make a separate article for a single remedy.

(76) *Berlinische Manning saltigkeiten, 1 Band.*

(77) The formula of the anthelmintic drops of *Hartmann*, is this; Take three drachms of the aniseted liquid carbonate, a drachm of the essence of absynthium, and twenty grains of assafoetida dissolved together; twenty, thirty, or forty drops are given two or three times a day.

(78) See *Med. Communications, etc. London, 1798, 1. no. 25.*

(79) See *Duncan's Med. Commentaries for the year 1791, dec. 2, vol. vi. 1792, no. 3.*

(80) *De efficacia terrae ponderosae salitate, etc. Gottingae, 1794, 4°.*

(81) *Erfahrungen ueber die Salzsauern schwererde, etc. Erfurt, 1792, 8°.*

(82) *Chemische Annalen, Hannoverer, 1792, 8°, p. 270.*

(83) *De corticis ulmi, et terrae ponderosae salitate usu medico, Erfordiae, 1793, 4°. p. 2.*

(84) *Medicinische bemerkungen, etc. Zerbst, 1793, 8°.*

(85) *Zoonomia, i. B.*

(86) Solution of muriate of barytes half a drachm, distilled water an ounce, common syrup two drachms.

An adult takes thirty, forty, or sixty drops of this, three or four times a day. It may be combined also with some aromatic water, or stomachic tincture. It is always prudent to begin with a small dose.

It is given in powder with sugar, or valerian, in the dose of four or five grains, two or three times a day.

It may be made into a mass for pills with the extract of conium maculatum, of hyosciamus and of gentian.

(87) *Dissertatio de vermibus, Jenae, 1707, 4^o.*

(88) *Observationes de febribus, Hannov. 1745, p. 142.*

(89) *Dissert. de vermibus intestinalibus hominum, etc. p. 68, 71.*

(90) See *Journal de Medecine etc. tome xii, an 1760, mois de juin, no. 3, p. 506.*

(91) *Traité des Maladies des enfans, etc. p. 303.*

(92) See note 65, the formula for pills; take twenty grains of assa-foetida, seven grains of sulphate of iron, and balsam of Peru, sufficient to make the whole into pills of three grains each; the patient is not to take more than two or three a day.

(93) Take half an ounce of socotorine aloës, a drachm of assafoetida, of myrrh, and of camphor; two drachms of sulphate of iron, six drachms and forty drops of ammoniacal succinum, and sufficient syrup of absynthium to form them into pills of three grains each. Take three or four a day.

(94) Such are in Italy, 1. the waters of Saint Vincent and of Courmayeur, in the dutchy of Aoste; 2. the water of the valley of Sole in the Tyrol; 3. the water of Saint Maurice in Upper Agnedina; 4. the waters of Bogieriane, de Darfio in the Valcamonique; 5. the mineral waters of Recoaro in the Vicentin; 6. the acidulated waters of Brandola in the environs of Modena; 7. the waters

of Chitignano, and the holy water of Chianciano in Tuscany; 8. the acidulous, commonly called red water of the environs of Viterba.

(95) For example, the water of *Coldogno* near Lecco, the waters of *Irmia*, of the river *Mela*, of that commonly called *Busana* in Valtrompia, the water of *Rio* in the island of Elba, etc.

(96) See *Wedel, Amoenitates materiae medicæ, Jenæ, 1704, p. 371. Hoffmann, Medicina rationalis Systematica, tome iv, part V, p. 85. Van-Doeveren, Dissert. de vermibus intest. hominum, etc. Baglivius, Opera, ed. ix, Antwerpiae, 1719, 4^o. p. 60.*

(97) Mercury introduced into the living stomach and intestines of man is oxidized; by taking from the animal substance the oxidizing principle, it certainly renders it less energetic.

This assertion is not made at random, as somebody has imagined, when I mentioned it for the first time in the *Anatripsologia, vol. i. § XXXIII, p. 86.* In a case of *volvulus* (iliac passion) which I treated with mercury in the civil Hospital of Crema, I obtained from the excrements of the patient, a true black oxide of mercury. A young lady of this city, seized with a violent inflammation of the intestines, took four ounces of mercury every day for a fortnight. On examining her excrements, I obtained from them two scruples and a half of black oxide of mercury.

By this remedy we arrested repeated inflammation of the bowels, tending to a general sphacelus

of all the small intestines, and she recovered surprisingly.

But I defer to another opportunity the details of these interesting cases.

(98) *Hunter* recommended the use of wine and a nutritive diet to his patients under mercurial frictions.

The celebrated *Moscatti* assures us that the cure of the lues venerea is also accelerated by a slight mercurial friction and a full diet.

(99) *Weikard*, *prospitto di un sistema piu semplice di medicina, etc. Pav. 1796, 8°, v. ii, p. 76.*

(100) Mercury is oxidized, by rapid and continual motion; and in this state is efficacious against worms.

(101) The oxides of mercury already noticed, are advantageously prescribed, in combination with other active vermifuges; such as *geoffroya sur.*, *valerian*, etc.

(102) The black sulphuret of mercury is also administered with other anthelmintics.

(103) I have already mentioned this method in the first decade, tom. i, p. 70, of my *Commentari medici, Pavia, 1797, 8°*. A more extended description of it is given in my *Notes de médecine pratique*, on the various diseases treated in the *Clinical Hospital of Pavia*, in the years 1795 and 1798, part II. cap. v.

(104) See *Rosenstein, Traité des Maladies des enfans.*

(105) See *Rosenstein, Traité. etc.*

(106) As camphor, oil of turpentine, castor, succinated ammonia, tincture of opium, and assafoetida, suiting the dose to the circumstances of particular cases.

(107) See *Anatripsologia*, vol. i, p. 129.

(108) *A Treatise on the Scurvy* by J. Lind, Edinb. 1753, 8°. p. 86.

(109) See *Med. Transactions*, published by the Col. of Physicians in London, 8°. v. i, no. 4, p. 54.

(110) See *Berlinische, Sammlung zur befoerderung der Arzneywissenschaft*, iv B, part III, 1772, art. 11, p. 234.

(111) *Hunczovsky medicinische chirurg. beobachtungen*, Wien, 1788, 8°.

(112) See *Med. Trans. loc. cit.*

(113) See *Med. Enq. and obs. Phila.* 1789, 8°. art. 11.

(114) See *Med. Essays and Obs. by a Society at Edinb.* vol. v. part I, p. 89.

(115) *P. E. Fothergill.* See *Med. Obs. and Enq. by a society of Physicians in London*, v. vi, 1784. *Mead, Recueil des Oulvres physiques et medicinales*, tom. ii, *Bouillon*, 1774, 8°. p. 264. *Marx, Observata medica, etc. Sibbern in collectan. societatis medicæ, Hauniens.* vol. ii.

(116) See §§ CLV, CLVI, CLVII, CLVIII,

(117) *De Zinco ejusque florum usu medico*, Lugduni Batav. 1772, 4°.

(118) See *Hurlebusch, Dissert. zincum medicum enquiriens*, Helmstadvii, 1776, 4°. p. 40.

(119) *Systematische lehre von den einfachen*

und gebräuchlichsten, zusammengesetzten arzneimittel, Marburg. 1789, 8°. p. 277.

(120) *Einrichtung de klinischen instituts zu Jena, 1782, 4°.*

(121) See § CXXXII.

(123) Among the cold sulphurous waters which abound in Italy, the preference should be given, in my opinion, to the mineral waters of Saxony in the dutchy of Aoste, of Saint Genesio in the environs of Turin, of Retorbido near Pavia on the other side of the Po, of the valley of Imagna, of Saint Pellegrin, and of Truscorio, in the territory of Bergaine, as well as the waters of Milzanello near Brescia.

(124) See § V.

(125) See § XIII, toward the end.

(126) See § LXXXIII.

(127) *Borsieri institutionum medicinae practicae, vol. iv, part II, p. 179.*

(128) Hufeland, *Journal der practischen arzneykundi und Wundarzneykunst, 1 B. Jen. 1795, 8°. p. 439.*

(129) The case is related by Dr. *Vogel*, in the *Journal der Erfandungen, theorien und Widersprüche in der Natur und Arzneywissenschaft, Gotha, 1797, 8°. no. 23, p. 124.*

(130) *Bisset* gave fifteen grains of it at once with the greatest success; see *Borsieri*, the work cited, p. 178. *Ettmueller* expelled a taenia also with gambogia, as may be seen in his case related by *Hufeland*, in his journal already cited, *tome iii, p. 582.* Besides, this substance enters into all the

remedies most commended for the expulsion of taeniae.

(131) See § CXVII; see *Rosenstein, Traité des maladies des enfans, etc.*

(132) Dr. *Fricke*, of Brunswick, has several times succeeded in calming the very severe symptoms occasioned by the presence of taeniae. See *Journal der Erfindungen, etc. Gotha, 1795, no. 12, p. 135.*

(134) See § CLVI.

(135) See § CXIV.

(136) See § CXXVII.

(137) See § CXXIX.

(138) See § CXXXI.

(139) See § CXXXII.

(140) See § CXXXIII.

(141) Notes of the first lecture, no. 41.

(142) *Traité des Maladies des enfans, p. 329.*

(143) *Van-den-Bosch, Historia constitutionis epidemicae verminosae, etc. p. 252.*

(144) See § X.

(145) See § CXXXIV.

(146) Copious draughts of cold water in summer, have frequently contributed, according to *Goeze, Versucheiner Naturges. etc. p. 298*, to expel entire taeniae. In the village of Chat near London, there is an inn with a fine garden, where is a spring called *Blattlebridge-wells*, which contains in solution sulphate of soda. This water is regarded as a powerful remedy against taeniae; in fact, there are kept in an apartment of the house, more

than fifty taeniae of different species, in as many vessels, which have been discharged from the body by the use of this water. I am persuaded that the same good effects, if not better, might be obtained by the bitterish water of Modena, from the salt water of Montezibio in the vicinity of Modena, from the waters of Saint Christopher in Faentin, and from those of Montecatini in the territory of Pistoia.

(147) See *Journal der Erfindungen, Theorien und Widersprüche, etc.* Gotha, 1797, 8^o. no. 22, p. 127.

(148) *Histoire de la société de médecine*, an. 1776, p. 326.

(149) *Nova, tuta, facilisque methodus curandi calculum, scorbutum, etc.* Lugd. Batav. 1778, sect. V, p. 29.

(150) *Dissert. de praestantissima acidorum virtute anthelmintica*, Francof. ad Viad. 1779, 4^o.

(151) *Diss. de vitae determinandâ aëris fixi in corpus humanum salutari efficacîâ*; Gottingae, 1783, 4^o.

(152) *Miscellanea medico physica*, edit. J. A. Scherer, Viennae, 1795, p. 43, 116.

(153) Such are in Italy the acidulous waters of the Tyrol, the baths of Coldiero in the Veronesè, the baths of Saint Martin, and the thermal waters of Bornio in the Valteline, the acidulous water of Asciano, near the baths of Pisa, the bath Montalceto in the Siennese, the acetous of Rome, etc.

(154) Take carbonate of soda two drachms, acidulous tartrate of potass six drachms, and of su-

gar an ounce and a half; the whole to be reduced to a very fine powder.

If this powder is moistened with water, and stirred, bubbles of carbonic acid gas will be disengaged. The dose is a drachm and a half, to two drachms, every four hours, in some ounces of pure water.

(155) To imitate the water of *Seltzer*, I use the following method. Dissolve six drachms of sulphuric acid in thirty six ounces of distilled fountain water. Mix the two solutions at the instant you would use them.

(156) See § CXXXIII.

(157) *Journal encyclopédique ou universel, année 1781, tome viii, part II, p. 332.*

(158) *Goeze, Versucheiner Naturg. etc. p. 373.*

(159) See *Bloch, Traité de la gén. des vers, etc. p. 115.*

(160) See § CXXIII.

(161) Instead of the hyacinth confection, the conserve of violets may be employed.

(162) See § CXXIII.

(163) *Trattato delle principali e piu frequente malattia esterne ed interne di Gian-Frederico Herrenschiwand, Bassano, 1792, 8°, tom. ii, p. 166.*

Herrenschiwand directs his patients, when the stomach is sound, to take two successive mornings, fasting, and two hours after a light supper, two drachms of the male fern root, if they cannot procure the female fern, gathered in the fall, and dried in the shade. This preliminary arrangement

is not attended with any inconvenience. The third day a powder composed of twelve grains of pulverized gamboge, thirty grains of carbonate of potass and two grains of turpentine soap, dissolved together in a cup of tepid water, is to be administered fasting. This powder usually produces two or three vomitings, and as many stools in the space of two or three hours. These evacuations are rendered more easy by drinking, after each vomiting, a cup of luke warm water, or two cups of tea. Three hours after, an ounce of American oleum ricini is to be administered in a cup of broth; the American oil is far preferable to ours, though that will suffice if the other cannot be had. This dose of oil is repeated in an hour; and if the worm should not appear, another ounce of oil is to be again given in two hours after. But if the worm be not discharged, a clyster of equal parts of milk and water, and three ounces of oleum ricini, must be injected toward evening, by which means the worm will come away entire and with ease.

(164) The armed human taenia; *see* § XIV, and pl. I, fig. i, ii, iii. The unarmed human taeniae; *see* § XIX, pl. I, fig. v.

(165) In Russia it made a great noise. Prince Barantinski, treated by *M. Nouffer*, was twice cured of taenia. The Swiss were in a condition, to experience every day the happy effects of these two methods. The repeated success obtained from *Nouffer's* method, published by the French physicians, effectually contributed to its reputation in France.

(166) See § VII.

(167) *Goeze, Versucheiner Naturg. etc. p. 276.*

(168) See § VII.

(169) *Rosenstein, Traité des Maladies des enfans, en note, p. 343.*

(170) The number of patients which I have cured of taeniae by *Nouffer's* method, amounts to seven. The taeniae were all armed and very young.

(171) See note no. 183.

(172) See pl. I, fig. iii.

(173) See § CLXXVIII.

(174) See § CXXIII.

(175) *Histoire de la société royale de Médecine, an. 1776, p. 279.*

(176) *Praelectiones de cognoscendis et curandis praecipuis corporis humani affectibus, etc. p. 652.*

(177) *Observata chirurgica, Altenburgi, 1776, 8°. Fasc. ii, p. 127.*

(178) *Med. Cases and Observations, etc. p. 409.*

(179) *Journal de Médec. etc. vol. xlix, p. 44, 333, 450.*

(180) See § CXXI.

(181) *Catuputia major; ricinus major (oleum ricini; seu ol. palmae Christi; vel ol. de kerna) offic. biennis Indiae utriusque; class. monoeciae ordin. monadelph. foliis peltatis, subpalmatis, serratis.*

(182) *Versucheiner Naturgeschichte, etc. p. 303.*

(183) *Ved Hungerbyler de oleo ricini medicamento pergante, et anthelmintico praestantissimo, Friburgi—Bregov. 1780, 8°.*

(184) *Medicina clinica, Ticini, 1794, 8°.* vol. i, p. 146.

(185) See *Venel, Précis de matiere medicale, augmenté de notes par Carrère, Paris, 1787, tom. ii, p. 337.*

(186) See § CXXXII.

(187) See *Journal de Médecine, an. 1768, tom. xxviii, p. 44.*

(188) See § CXXXV.

(189) See note no. 115.

(190) See § CXLVIII, Case and § CXLIX.

(191) *Traité de la génération des vers, etc. p. 22.*

(192) *The New Dispensatory. iii edit. London, 1770, 8°.* p. 303.

(193) Arsenic and antimony are very often combined with tin.

(194) See *Hagin, Diss. exhibens stannum, Regiomonti, 1775, 4°.* part I, § XXV.

(195) A patient entered the clinical institute of the hospital of Pavia, in the winter of 1797, who was suspected to have taenia; he took six grains of tin filings three or four times a day. Being called by the government to Milan, I committed the patient to the care of an intelligent physician, my colleague, who, after the manner of the English, prescribed, in one day, an ounce of the filings of our tin. Returning two days after to Pavia, I found the patient attacked with a genuine saturnine colic.

and with a beginning paralysis of the lower extremities. In less than a week, we succeeded in curing him of this terrible disease; one singular fact occurred, which was, that his urine deposited a drachm, and even more, of a very white powder, which being attentively examined, was found to be a true white oxide of tin. The tin he had taken was not pure, but contained lead, though in very small quantity.

(196) See § CLIV.

(197) *Traité de la gén. des vers, etc.* p. 110.

(198) *Versuch. Naturges. etc.* p. 277.

(199) See *Med. Observations and Enquiries, by a Society of Physicians, London, vol. iv.*

(200) With this remedy, I have hitherto cured of taeniae, four individuals.

(201) See *Bloch*, the work cited.

(202) *Alix observata chirurgica, Fasc. ii, p. 127.*

(203) *Bilfinger, de Tetano, lib. singul. Lindavae, 1763, 8°.*

(204) *Fordyce, Fragmenta chirurgica et medica, Londini, 1784, 8°.*

(205) *Guy's Powder of Ethiopia.* Take seven ounces of pure rasped tin, an ounce of mercury, a drachm of sublimed sulphur, triturate the whole thoroughly in a mortar, to a very fine powder. The dose is from twenty to thirty grains twice a day. The *aurum musivum*, is one of the most efficacious remedies employed against taeniae, particularly the armed taenia. This preparation, more

active than the powder of *Guy*, ought to be thus compounded.

Melt twelve ounces of very pure tin, and add to it three ounces of mercury; let the mixture cool, triturate it in a mortar to a very fine powder; while triturating the mixture, add seven ounces of sublimed sulphur, and three ounces of muriate of ammonia.

The dose is ten grains, twice a day.

(206) *Fothergill, Med. Observations and Enq. etc. Lindmann; see Salzburg, Medicin. chirurg. Zeil. 1794, 4 B. p. 304*, recommend to give an ounce of tin filings for six days in succession, and direct a purgative the seventh.

(207) *Observata chirurgica, Fasc. ii, etc.*

(208) It is not long since *M. Mathieu*, decorated with the honorable title of Counsellor of the Court, by the present king of Prussia, who granted him besides a handsome pension for life, made public the method, which, for a number of years, he had employed with so much success, against both species of taenia.

Humanity will always be indebted to Frederick William III for having made known, for the benefit of the world, a method which must be more efficacious than any other which has been recommended to this day.

The electuaries which *M. Mathieu* administers to his patients are mild; the first is marked A. the second B.

The First Electuary, A. Take an ounce of very fine English tin filings, six drachms of the root of the polipodium filix mas, half an ounce of semen santonicum, a drachm of the resinous root of jalap, and of sulphate of potass, and of honey sufficient to make an electuary.

Second Electuary, B. Take two scruples of the pulverized resinous root of jalap, and of sulphate of potass, one scruple of scammony from Aleppo, ten grains of gamboge, and of honey sufficient to form an electuary.

Those who may be inclined to adopt this method to expel taeniae, must observe the four following rules :

1. For some days previous, the patient is to be confined to a suitable diet, that is, he is to eat salted substances,—for example, herrings, light porridges and broths, and leguminous articles.

2. The treatment is begun by administering to the patient, every two hours, a teaspoonful of the electuary A. This course to be continued two or three days, till the worm is perceived to be in the intestines, and then,

3. The patient is to take electuary B, and of this he also takes, every two hours, a teaspoonful, till the worm is expelled.

The discharge of the worm is facilitated by taking some spoonfuls of fresh oleum ricini, or by some clysters of the same oil.

4. The age, sex, and temperament of the patient may require a considerable modification of the

dose of these remedies; for this reason the treatment ought to be directed and modified by a well informed physician.

Finally, it is to be borne in mind that the virtue of the electuary A. depends in great part on the root of the polypodium filix mas; hence this root should be fresh, and its internal hard part only should be reduced to powder.

This powder will have a reddish colour; see *Hartenkiel, Medicinisch-chirurgische, Zeitung, 1800, 2 Band, p. 293.*

(209) See §§ XXVII, LXXXIV, et seq.

(210) See §§ LXXXIV, LXXXV, LXXXVI.

(211) I have been the first to use this plant; I have found it very efficacious in asthenic dropsies, in obstructions, scropula, and generally in all cases of languor and inertia of the lymphatic system. The figure of this very useful plant may be seen in the first part of my *Annotazioni medicopratiche sulle diverse malattie trattate nella clinica medica di Pavia negl' anni 1797 and 1798*, and its description; with practical observations, may be found in the first part, cap. iii, of the same work.

(212) *Toxicodendres officinaux*, or the *rhus radicans* and *toxicodendron* of *Linnaeus*. I have employed with the best success these two very poisonous plants in cases of languor of the nervous system, and principally in palsies, following nervous apoplexies.

This is not the place to report the really wonderful cures effected by the leaves of these two plants.

I announce the fact merely to encourage physicians to avail themselves of these remedies, when the indication requires the invigorating of the nervous force, and the powerful excitement of the whole system of vessels.

They are administered in form of powder, the eighth part of a grain in sugar, two or three times a day, augmenting the dose to two grains, administered three or four times a day. If the patient, after commencing their use, feels a degree of cardialgia, or rather, a heat in the stomach, it will then be necessary to lessen the dose. The botanical characters of these two plants are the following. *Rhus radicans* Linn. class. pentand. ord. trigyn., foliis ternatis, foliolis petiolatis ovatis nudis integerrimis, caule radicante. *Rhus Toxicodendron* Linn. class. et ord. praeced., foliis ternatis, foliolis petiolatis angulatis pubescentibus, caule radicante.

(213) See §§ LXXXVII, LXXXVIII, and LXXXIX.

(214) See the note no. 15, Lecture III.

(215) See § CXX.

(216) See § CXIX.

(217) See § CXXVII.

(218) Dr. Heberden says, see *Rosenstein, Traité des Maladies, des enfans, etc.* p. 319, that a man seized with violent pain of the stomach, nausea, vomiting and constipation, lost entirely his appetite and sleep, and soon became emaciated, and was no longer able to walk. The hardened stom-

ach retracted near the spine. His urine resembled serum, and deposited a whitish sediment. After taking a number of medicines without relief, by the advice of some one, he began to drink salt water. He dissolved two pounds of muriate of soda in four pounds of water, which he took in the space of an hour. This drink deranged him much, and at length excited violent pulling, which brought up a quantity of worms, and he evacuated several more in six or seven bloody stools, after an obstinate costiveness of fourteen days.

Recovered from these operations, he again took the same quantity of salt water. The effect was nearly the same, and he evacuated the residue of dead worms. After being thus cured, he habituated himself to take, three or four days after each full moon, half a pound of muriate of soda in a pound of water, to secure himself in his improved state. It is very probable, that if he had diminished the dose of salt, he would have obtained the same good effects, without suffering the derangement and palsy which his treatment induced.

(219) Clysters of emulsion of gum arabic, decoction of rue, and solutions of starch, are also very good, etc.

(220) See § XXXVIII.

(221) See § LXII.

(222) See § XXXVIII.

(223) See § CXXII.

(224) See § CXXVI.

(225) See § CXXX.

(226) See § CXXXI

(227) See § CXXXIV.

(228) *Traité des Maladies des enfans, etc.*

(229) See *Rosenstein*, the work cited.

(230) *The sulphuric (vitriolic) Elixir of Mynsicht.* Take an ounce and a half of the plant mentha piperita, and of salvia offic.; an ounce of calamus root, of galanga minor, and of flowers of cassia fistularis; three drachms of cardamomus minor, two ounces of lemon peel cut and bruised; infuse them in thirty six ounces of rectified spirit of wine; digest three days, filter and express the liquor, and add six ounces of diluted sulphuric acid; the dose is from sixty to a hundred drops.

(231) See § XXXIX.

(232) *Voyage aux sources du Nil, etc.*

(233) A handful of the flowers should be infused in four pounds of wine or beer, for twelve hours. This plant belongs to the *tetrandia monogynia*.

(234) See § CLXXVIII.

(235) *Traité des Maladies des enfans etc. p. 320.*

(236) We have already remarked, that mercury, boiled in water, imparts to it some of its particles. Instead of a solution of mild muriate, we may make use of sublimed mercury (mercurius dulcis) or the decoction of tansy.

(237) See § XCV.

(238) See § CX.

(239) See § CXXXIV.

(240) See §§ CXV, CXVII.

- (241) See § CXVI.
 (242) See § CXVIII.
 (243) See § CXIX.
 (244) See § CXX.
 (245) See § CXXIII.
 (246) See § CXXIV.
 (247) See § CXXVI.
 (248) See § CXXIX.
 (249) See § CXXXI.
 (250) See § CXXXII.
 (251) See § CXXXVII.

(252) *Traité des Maladies des enfans, etc.*
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(253) *The Elixir of Rhubarb.* Take three ounces of rhubarb from Alexandria, an ounce of raisins, half an ounce of the white substance of the orange tree bark, two drachms of liquorice root, four scruples of *cardomomus minor*; the whole being cut and bruised, digest during two days in two pounds of choice wine; strain and add half an ounce of the extract of tansy, and three ounces of white sugar.

(254) *Helleborus foetidus offic. class. polyanthia, ord. polygynia, perennis, caule multifloro folioso, foliis pedatis.* Bisset advises fifteen grains of these leaves dried and pulverized, to be taken in some syrup, prepared with the juice of the same leaves. To this dose may be added a small quantity of the elixir of rhubarb.

(255) *Traité des palpitations du coeur. etc.*

(256) *Helleborus niger, seu melumpodium offic.* class. et ord. praecedent. perennis, alpin., scapo subbifloro subnudo, foliis pedatis.

(257) See § CXXI.

(258) See § CXXII.

(259) *Fragmenta chirurgica, et medica, etc.*

(260) *Helminthochorton historia, natura atque vires; Argentorati, 1780, 4°.*

(261) *Conserva helminthochorton Linn. Fucus helminthochorton seu coralina melitochorton, lemitochorton; coralina Corsiana offic. class. cryptogamia, ord. algae.*

It grows in the island of Corsica, on the borders of the sea; the French physicians have used it, with the greatest advantage, for the expulsion of lumbricoïdes. *Gazette de Santé, 1777.*

(262) The helminthochorton is administered in powder, in the dose of a scruple or half a drachm, combined with the root of the polypodium filix mas, or in decoction,—with any other vermifuge.

(263) See §§ C, CI, CIII.

(264) See § CII.

(265) *Hist. Constitutionis epidemicae verminosae, etc. p. 57.*

(266) See § CIV.

(267) Such are *assafoetida* § CXIX; camphor, § CXXII; valeriana offic. § CXXIV; muriate of ammonia, § CXXIX; muriate of barytes § CXXX; the preparations of iron, § CXXXI; petroleum, § CXXXIII; muriate of soda, § CXXXIV; sublimed zinc, § CXXXVI.

(268) See §§ LX. LXI, CIV.

(269) See § CVIII.

(270) Which is obtained from the use of the cinchona offic., cascarilla, the preparations of iron and other similar articles, and by nourishing diet; in fine, by a treatment truly tonic in its full extent.

[A few words to the general reader shall close the book.

If any one, not having a medical education, should think of prescribing anthelmintic medicines, he is desired to reflect, that this cannot be done either with safety or any prospect of advantage, till he shall acquire the following information,—a knowledge 1. of the structure of the human body; 2. of the vital properties and functions of the various organs of this complex system, in a sound state; 3. of the deviations from this state, which occur in the many diseases to which the body is subject; and 4. of the medicinal virtues of the several articles called anthelmintic, both as they affect the intestinal worms, and the living body they inhabit.

The injunction, rightly to exercise the faculties we possess, is so obviously reasonable, and of so high authority, that it could not receive any new force or extent of application from any thing which could be here said, even if it were proper to dwell on the subject in this place. It is sufficient to remark, that this improvement implies a knowledge of our talents, a cultivation, and a proper direction of them.

Faculties, not understood, cannot be trusted; such as are neglected will not become better, and an effort, not well directed, is more likely to do harm than otherwise. If we could suppose that the several individuals of a society were to relinquish their ordinary and well known occupations, and each to assume a new pursuit with which he had no acquaintance,—we should find that the confusion and wretchedness of this perverted and unhappy community would be in exact proportion to the zeal and activity of its members.]

END OF THE NOTES TO THE FOURTH LECTURE.

EXPLANATION OF THE PLATES.

PLATE FIRST.

- FIG. I. THE head, neck and commencement of the part less advanced in age of a human armed taenia, (*cucurbitina*).—*a*, The head furnished with crotchets or fangs.—*b*, Protuberances of the head in form of crotchets.—*a c c*, Length and gradual enlargement of the neck —*c d*, The neck of the taenia gradually becoming the body. The less complete rings of the neck become broader and longer in proportion as they approximate *a d*.
- FIG. II. The body of a human armed taenia, (*cucurbitina*), not yet developed, but of the same species as that of FIG. III, though the rings are narrower and without visible alternate papillae.
- FIG. III. Pieces of a middling armed taenia, (*cucurbitina*), twenty five metres one hundred and fifty decimetres long.—*a a a a a*, Lateral papillae of one side.—*b b b b b*, Lateral papillae of the other side, as they are both alternately disposed.—*c c*, A double knot found in the body of the taenia.
- FIG. IV. A human taenia unarmed (broad) of *Mar.v*.—*a*, Head without arms.—*a b*, Its neck.—*c c c c*, Single knots.—*d d*, Double knots.—*e*, Rings longer and broader than are found in the body of this taenia.
- FIG. V. An unarmed (broad) human taenia of *Bonnet*.—*A*, The head without arms.—*A B*, The neck —*B C*, The narrowest part of the body.—*C D*, The broadest part of the body, continuing to the end.—*c c c c c*, A longitudinal groove or depression parallel to the length of the worm, and perfectly visible in these points.—*m m*, Small perforated papillae that are observed on the surface of the rings.
- FIG. VI. Another head of an armed (*cucurbitina*) taenia, of the

natural size.—*a*, The anterior part of the head, where the tube is seen naked.—*b*, The neck.

FIG. VII. Head of an unarmed (*lata*) taenia, hardened by *Bonnet* in spirit of wine, in which it remained three years; this is a magnified view.—*F*, The head.—*bb*, Tube of the proboscis. *Bonnet* supposed this dark line to be the mark of union of the lips of its mouth.

FIG. VIII. Anterior part of the head of a human armed (*cucurbitina*) taenia, observed with the microscope.—*abcd*, The four lateral canals, opening in a square; they traverse the whole length of the worm. They are also called papillæ, small mouths, and stigmata.—*ef*, A crown, in form of small crotchets or hooks, circular and stellated, in the centre of which is situated the tube.

FIG. IX. *ar*, The head of a human unarmed (*lata*) taenia, seen through a single lens, having about it whitish filaments *ffffff* *ff*.

FIG. X. Three long rings of a large armed (*cucurbitina*) taenia, situated immediately after the neck, at the beginning of the body.—*abc*, Lateral alternate papillæ.

FIG. XI. Three rings of a large armed (*cucurbitina*) taenia, taken from the widest part of the body.—*abc*, Lateral papillæ.—*de*, The longitudinal central canal, corresponding with the longitudinal groove, which is also observed in the broad taenia (*taenia lata*), as in fig. V, *cccc*. This canal is commonly called the middle canal, and begins with the tube.

FIG. XII. Pieces of a broad taenia, in which we see a knotty line or stroke extending through the body. Its exterior form is not constant. According to *Bonnet* it sometimes resembles a blue or purple thread, as in this fig. *rrr*.

FIG. XIII. The knotty line *rrr*, of fig. XII, which, examined with the microscope, is an assemblage of ovaries, (considered by *Bonnet* as a glandular body,) in form of a flower *cc*.

FIG. XIV. *ggg*, Three clusters of ovaries, shown in fig. XIII, and seen through a larger lens.

FIG. XV. One of these clusters of ovaries insulated and seen through the microscope.

FIG. XVI. Triple knots of a small armed (*cucurbitina*) human taenia, noticed by *Werner*.

PLATE SECOND.

FIG. I. Fragments of a large human armed (*cucurbitina*) taenia, which exhibits the joints or articulations as connected with each other, of the natural size, taken from the largest part of the body of this worm.—*a*, A small mouth opened in one of the lateral papillae.—*b c d*, Other orifices in the opposite lateral part.—*e*, Another little opening in the lateral part.—*f*, Another similar orifice in the opposite lateral part.—*g h*, small alternate mouths.—*1 2 3 4 5 6*, Small successive openings on one side only—*i k*, small openings on the opposite lateral part, and in this way through the whole length of the worm.

FIG. II. Two of the largest knots of the great armed human taenia.—*a b*, Papillae with small open mouths, situated on one side only, as in fig. I.—*c*, Reciprocal connexion of the rings.

FIG. III. One of the papillae with the small open mouth, which are seen on the lateral parts of the large human armed taenia. The aperture is of the natural size, and *Goeze* observes, that it seems to be divided by a central line.

FIG. IV. Three ovaries of the unarmed human taenia (*lata*), magnified by the microscope (no. 1, tube A.) Small eggs enclosed may be seen. These ovaries are more pointed than those of the armed human taenia, (*cucurbitina*.)

FIG. V. Eggs pressed from one of the small mouths that are seen in the large articulations of the great armed human taenia (*cucurbitina*). These ovaries are also magnified by the microscope, (no. 6, tube A.)

FIG. VI. Four eggs of an armed human taenia (*cucurbitina*), expressed as above, and viewed with the microscope, (no. 1, tube A.)—*a b c d*, Hemispheres, or rather ovaries, in which are seen an immense quantity of other small eggs.

FIG. VII. Two other eggs of the same species of worm, magnified by microscope (no. 1, tube A.) These pretended eggs are in truth, two real ovaries full of eggs.

FIG. VIII. A cluster of vesicular worms, which, connected with another like it, was found in the two lateral ventricles of the human brain. Its form resembles that of a small bunch or cluster. In each ventricle, this assemblage of worms was parallel with the plexus choroides, as exhibited in pl. III.—*a a a*, The petiole or stem of the vesicular verminous cluster.—*b b*, Little bladders or vesicles, which constitute the vesicular human worms (hermits) attached to and pendent from the petiole.—*c c*, Vesicular worms that are smaller and almost imperceptible to the naked eye.

FIG. IX. A human vesicular worm, (hermit) enlarged by the microscope.—*a*, The head, similar to that represented, pl. I, fig. VI.—*a b*, The neck.—*b c*, The bladder, or rather the body of the worm, the outer membrane of which has been removed in order to raise its circular fibres.

FIG. X. A bladder taken from the medullary substance of a sheep's brain; on its internal surface are seen different small white clusters, united together, which are so many families of the social vesicular worms. They are represented here of the natural bigness.—*a b c d e*, Five separate families.

FIG. XI. Another similar bladder of the natural size, in which the abovenamed worms are in part detached and artificially distended—*a b c d e f*, Social vesicular worms distended.—*g g g*, Points where they are attached to the family or maternal bladder.—*h h h*, The real head of these vesicular worms.—*i l k*, Social vesicular worms found interiorly with the head turned inward.

FIG. XII. A B, Two social vesicular worms, which form a part of the families already described and magnified by a weak lens, (nos. 1, 2.)—*a a*, Head of the worm.—*b b*, The posterior part furnished with two points in form of crotchets, with which it fixes itself to the small bladders or vesicles represented in figures X, XI.

FIG. XIII. Lobe of the medullary substance of the brain of a sheep which had vertigo, in which may be seen *a b c*, the natural size of the cavity which contained the little bladders of fig. X and XI.

FIG. XIV. A piece of the torn membrane, which constitutes the little bladders above mentioned.

FIG. XV. One of the social vesicular worms, which, collected into a family or colony, are situated on the vesicles of figures X, XI, insulated, compressed and viewed, with the microscope (no. 6.)—*a b*, Protuberant wrinkles, which cover two thirds of the body, in a spiral manner.—*c d*, Two very minute vesicles, or rather papillae for the purpose of sucking.—*e*, The crown, with the crotchets elevated on its surface.

FIG. XVI. Another of the social vesicular worms already demonstrated, enlarged by the microscope (no. 3, tube A,) a little compressed but well distended.—*a b*, Its body covered with an infinite number of small molecules.—*c c*, The tail already fixed to the bladder.—*d d d d*, The four minute vesicles or papillae which suck.—*e f*, The crown with double crotchets.

FIG. XVII. A third worm of the aforesaid social vesicular family, attached to their portion of the bladder, and magnified by microscope (no 4, tube A.)—*a*, Its adhesion to the bladder.—*b b*, Its body detached.—*c d e*, The papillae for sucking, torn.—*f*, The crown with the crotchets seen on its surface with the tube.

PLATE THIRD.

A horizontal section of the brain made in order to expose the two lateral ventricles, in each of which is discovered an assemblage of human vesicular worms (hermits,) extending along the course of each plexus choroides.—*a a a*, Circumference of the brain.—*A A*, The two clusters of worms (one in each lateral part) which, coming from the bottom of each ventricle, follow the direction of the two plexus choroides and meet at an acute angle, by means of a particular petiole, in the anterior portion of the ventricles.—*B B*, The two plexus choroides to which adhere the clusters of human vesicular worms (hermits.)

PLATE FOURTH.

- FIG. I. A male human tricocephalus, represented of the natural size, in which the posterior part of the worm is seen to be turned in a spiral manner.
- FIG. II. The female human tricocephalus, folded in its natural size.
- FIG. III. The male tricocephalus, enlarged by the microscope (no. 4, tube A.)—*a*, The head which becomes insensibly round.—*a b c d e f*, Course of the intestinal tube.—*g h*, Transverse lines made in form of crowded rings.—*k*, Intestinal tube.—*l m*, A cylindrical body, surrounded by a very thin canula, from which it is thrust out by mere pressure. May it not be a principal part of the male? In fact in all these viscera there is not found the smallest trace of eggs or embryos.
- FIG. IV. The posterior extremity of the female tricocephalus, (fig. II.) cut off at the commencement of the transverse rings, and seen with the microscope (no. 4, tube A.)—*a*, The extremity of the tail quite obtuse, and different from that of the male.—*b c*, The vermicular intestine twined round. In females it is quite filled with eggs; and *d e* shows its course winding round the intestinal tube, extending from *f* to the aperture *g*.
- FIG. V. *a b*, Two eggs of the human female tricocephalus, observed through the microscope (no. 2, tube A.) In a contorted sack several hundreds have been found.
- FIG. VI. A tricocephalus of the *lacerta apoda*, as it is represented and described by *Pallas*.—*a*, The head, or anterior extremity, having a small button or knob.—*b*, The posterior extremity, or tail with double crotchets.—*c*, The scaly twisted part near the posterior extremity.—*A*, The head, mouth and crown, with the crotchets magnified by the microscope.
- FIG. VII. The human ascaris vermicularis of the natural size.—*a*, The head.—*b*, The tail.
- FIG. VIII. The male ascaris vermicularis, observed with the microscope (no. 4, tube A.)—*a*, The head, having two lateral oval eminences *b c*, separated in the middle by the mouth *a*.—

ad, A slender canal, which by opening into the mouth and then extending and contracting, unites with the stomach and intestinal tube.—*X*, A triangular mass, or rather stomach.—*ef*, The intestinal tube terminating in *gh*.—*i*, A small aperture to give passage to the excrements and organs of generation.—*dl*, A small white canal, which, passing under the triangular mass *x*, and intestinal tube *fg*, reaches to the end of the tail *kl*. Here the genital organs of the male are probably inclosed, which communicate externally through the orifice *i*—*lm*, Very fine end of the tail, perforated by very minute bodies.

FIG. IX. A female ascaris vermicularis, magnified by the microscope (no. 4, tube A.)—*a*, Eminences at the superior extremity of the head, hardly visible in a dead ascaris.—*b c*, Two oval eminences like jaws, as in the male, separated by the mouth *a*.—*ad*, A canal, which conveys the food into the stomach *e*, communicating with the intestinal tube from *f* to *g*, beyond which we see the transparent tube *gh*, which is probably an appendix of the intestinal tube.—*i*, A considerable appendix to the tail, which is characteristic of the females.—*k*, The vagina, through which the female deposits her young.—*l*, The place where the small canal, forming the vagina *k*, is given off. The dark bodies from *f* to *g* are fetuses, which can be in great part expelled from the vagina *k*, by simple pressure.

FIG. X. A portion of the membrane of a female ascaris vermicularis, compressed and seen with the fetuses through the microscope (no. 1, tube A.)

FIG. XI. The fetus of an ascaris vermicularis, enlarged by the microscope (no. 1, tube A.)

PLATE FIFTH.

FIG. I. The entire body of a lumbricoïdes, so situated as to exhibit its four lateral lines.—*a*, The trilobed head.—*b*, The posterior extremity, or tail.—*c d e f*, The four lateral lines.

FIG. II. Tail of the lumbricoïdes.—*a*, A tubercle, under which

is seen the exterior opening of the intestinal tube—*b*, The termination of the obtuse extremity.

FIG. III. The same tail viewed on its superior part.—*a*, The orifice.—*b*, End of the tail.

FIG. IV. The head of the lumbricoïdes seen on its anterior part.—*a a a a*, The body of the lumbricoïdes, or rather the four white lines passing in a parallel direction on the surface of the body.—*b*, Anterior view of the head, having three hemispherical risings in the dead worm; these eminences are pyramidal in the living worm. In the centre is situated the trilabial mouth.

FIG. V. The external membrane of the lumbricoïdes, seen on its internal part.—*a b c d*, Longitudinal lines.—*e e e*, Small rings, occupying the space left by the longitudinal lines.

FIG. VI. The male lumbricoïdes opened longitudinally, distended and retained in this position by means of six needles.—*a*, The three hemispheres of the mouth.—*a b*, Oesophagus.—*b h*, The stomach and afterward intestine.—*i*, White vessels, the origin of which is concealed by the stomach.—*c*, The tail.—*e c*, The penis.—*f e*, Seminal vesicle.—*d*, Intestine.—*f g g*, Spermatic vessels.

FIG. VII. Spermatic vessels of the male lumbricoïdes out of their natural situation.—*a b*, Penis.—*b c*, Seminal vesicle.—*c d*, Length and winding of the spermatic vessels, or vasa deferentia.

FIG. VIII. The female lumbricoïdes opened lengthwise.—*a*, Trifid mouth.—*a b*, Oesophagus.—*b c*, Stomach.—*e f*, The great intestine coloured black, the middle part of which *ce* is covered by the spermatic vessels.—*d d*, Great white vessel situated under the stomach and oesophagus.—*g*, Extremity of the oviduct.—*g h*, The beading vagina.—*h*, The point of division of the two horns of the uterus, which, becoming narrower and wonderfully folded, occupy all the space between *k h*.

FIG. IX. The uterus of a female lumbricoïdes with the parts adjacent, all removed from their natural situation.—*a*, External orifice.—*b b*, Commencement of the two extremities of the uterus itself.—*e e e e*, Clusters of eggs included in these extrem-

ities, or rather horns of the womb.—*dd*, Wonderful circumvolutions of the smaller extremities of the horns.—*cc*, End of the horns: here after forming a vesicle, they change into delicate slender branches.

FIG. X. The part of the skin of the female lumbricoïdes, which corresponds exactly to the white ventral line: here the oviduct opens; the whole is magnified by the microscope.—*aa*, The white ventral line.—*b*, The parenchyma found underneath.—*c*, The opening of the oviduct, which at the point *e* takes the name of vagina.—*e*. Division of the horns of the uterus —*dd*, These horns cut horizontally.

FIG. XI. Eggs of the female lumbricoïdes examined with the microscope. Some *aa* are of a round form; others *bb* are rather oval. In all, independently of the outer villous surface, we see a spiral line, regarded by *Werner* as the rudiment of a young lumbricoïdes.

END OF THE EXPLANATION OF THE PLATES.

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The reader is desired to correct the following

ERRATA.

- Page* 26, *line* 1, *for* their—have, *read* its—has.
27, “ 2, “ deudroïd, *read* dendroïd.
42, “ 5, “ anteriorily, *read* anteriorly.
44, “ 4, “ papillae, *read* papilla.
“ “ 4, 5, “ toward, *read* to.
48, “ 3, “ last, *read* fullest.
50, “ 14, *dele* but.
68, “ 15, *for* scolopondre, *read* scolopendre.
92, “ 23, “ insutis, *read* insectis.
128, “ 5, “ lumbricïdes, *read* lumbricoïdes.
156, “ 31, “ first of ventose year 9, *read* Feb. 19, 1801.
160, *last* line, *for* constituted, *read* constipated.
212, *line* 12, *for* venereal, *read* venereal.
256, “ 6, *dele* comma after digitalis.
283, “ 4, *for* placcid, *read* flaccid.
298, “ 13, “ vermins, *read* vermin.
312, *after* ‘relieved’, *second* line, *insert* ” *to* close the quotation.
313, *line* 1, *for* voracity, *read* veracity.
328, *last* line, “ uniformibus, *read* reniformibus.

