The history of a case in which animals were found in blood drawn from the veins of a boy : with remarks / by J. Stevenson Bushnan.

Fig. 1.

Fig. 2.

WORM OBTAINED FROM THE VEIN OF A BOY.

Fig. 1. Natural size.
— 2. Magnified.

a. The Mouth, with incipient antennæ & palpi.
b. b. Respiratory stigmata.
c. c. Fleshy appendages.
d. Direction of lateral respiratory organs.
e. Tubular ciliated organ.

Drawn by W. Bland.

Engd by W.H. Lizars.

THE

HISTORY OF A CASE

IN WHICH

ANIMALS WERE FOUND IN BLOOD

DRAWN FROM THE

VEINS OF A BOY,

WITH REMARKS.

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1833.

THE FOLLOWING PAGES ARE DEDICATED TO

WILLIAM SAMWAYS OKE, M.D.

EXTRA LICENTIATE OF THE ROYAL COLLEGE OF PHYSICIANS IN LONDON,
&c. &c. &c.

AS A TRIBUTE OF RESPECT FOR HIS EMINENT TALENTS,

AND

AS A SMALL TOKEN OF GRATITUDE FOR THE GREAT KINDNESS
HE DISPLAYED DURING A LONG AND ANXIOUS ATTENDANCE
UPON THE AUTHOR'S FATHER.

HISTORY OF A CASE, &c.

On the 3d of June 1833, Mrs Flannigan, the wife of a ship-carpenter, residing at the New Quay, about a mile below Dumfries, and upon the banks of the river Nith, presented herself at my Dispensary. She stated that her son, a boy of about eight years of age, was unwell; that he had been bled, and that fifteen worms had been found in the blood which had been drawn: one of these she produced in a cup of water. On the following morning I visited the boy, whom I found labouring under a severe attack of Influenza, a complaint very prevalent at that time in the neigh-

bourhood. He complained of great headache; his pulse was full and strong, and one hundred in the minute. I took about six ounces of blood from his left arm—in which I could not at first discover any thing preternatural, but which I carefully covered with a basin, placing it in such a manner that it could not be disturbed without my knowledge; on returning one hour afterwards, I found five animals swimming in the serum of the blood, all most vigorous and lively. On dividing the clot it was curious to see the powerful efforts made by the animals to disengage themselves from it. It appeared as if in the coagulation of the blood, some of the animals had been caught, as it were in a net, by the crassamentum, from which I disengaged eight, and found, as I have before stated, five others swimming in the serum; making thirteen obtained by me, and fifteen obtained by the previous bleeding: in all twenty-eight. Some of these I sent without delay, in serum, to my friend Mr Rhind, the well-known naturalist of Edinburgh, and the

author of a very excellent work on Helmithology—to examine for me; and the following is his description of them.

"Edinburgh, 12th June, 1833.

"My dear Sir,

"The animals I received from you lived with me two days in a little blood serum, when I had an opportunity of examining them most attentively. They are from about half an inch to six or eight lines in length; when dead the bodies relax and become about one inch long. They consist of an articulated body of eleven joints, of a head with rudiments of four organs, (antennæ and palpi), with an appendage immediately below the articulation of the head, which is ciliated and very similar to the respiratory tubes at the other extremity. The tail terminates in two tubular bodies or stigmata having ciliated margins, these are the external respiratory organs; besides these, there are two or three bands on each side which are mere fleshy appendages. Within the articulated body, ex-

tending on each side from the tail to the head, the respiratory organs are distinctly visible with the aid of a microscope. These consist of a continuous tubular structure, of a pale silvery colour, through which the air passes. The colour of the animals is bright red.

" These animals exactly correspond in structure and colour and size to the larvæ of the Tipula oleracea, which, in summer, is so abundantly found in ditch and river water. The eggs of these flies are very minute, and at a certain season of the year are deposited in great numbers in running water, by the Tipula fly—well known by its long legs and slender body.

" The worms cannot be mistaken for any of the Entozoa of the human body, or of other animals ; because they have distinctly formed aerating organs, which intestinal worms never have been discovered to possess.

"They are in many other points entirely different. Their red colour is a specific distinction, and, not likely to be accidental from the colour of the fluid in which they were found, and on which they appeared to feed. They also seemed to respire equally well in the blood serum as in water, for I could distinguish a constant succession of air globules in their respiratory tubes.

Believe me,

Very truly yours,

WILLIAM RHIND."

"To J. S. Bushnan, Esq.

Dumfries."

Some of these animals are still in the possession of my friends Mr Rhind and Dr Fletcher of Edinburgh, who will be happy to shew them to any persons interested in the case; and to these gentlemen I have also to return my thanks for the assistance they have afforded me in laying the following pages before the profession.

As it was obvious that Animals of this size—admitting that they might, in the state of ova, have passed with the blood from the system of the Venæ Cavæ, through the capillary branches of the Pulmonary Artery, and the radicles of the Pulmonary Veins, and thus have impregnated, as well the *Arterial*, as the *Venous* blood, in all the Larger Vessels of the body—could never, in their developed state enter the Parenchymatous Tissue, I was very desirous of obtaining some *mixed* blood from my little patient by cupping; since, if this also had been found to contain similar Animals, it would have favoured the idea, that, in the preceding instances, either they had been contained from the first in the tea cup, or had been developed in the blood, after its abstraction, from ova accidentally received into it. To this operation, however, I was not permitted to resort: and indeed either supposition seems to be very improbable—the former, from the blood having been received into two different vessels, at two different times—the latter, from the inter-

val between the abstraction of the blood and the appearance in it of the Animals in question having been so short. Moreover, the boy's mother, a poor simple uneducated woman, the man who bled him, an equally ignorant village bleeder, and a very respectable woman who witnessed the operation performed, assured me that, in the first instance, the Worms were visible swimming in the blood in less than a quarter of an hour after it had been drawn. So terrified were these persons that they alarmed the neighbours, and brought them in to witness the phenomenon. There could be no inducement to deceive, nor the slightest probability of deception.

I was equally unsuccessful also—in consequence of the fears and prejudices of the friends of the boy, who imagined I wished to experiment upon him—in my object of obtaining a little Arterial blood, for the purpose of ascertaining whether this also contained similar Animals—although, as I have just remarked, the appearance of such

in this fluid might have been easily explained, without prejudice to the presumption that they had pre-existed in it, as well as in the Venous blood in the two instances above related.

I may remark, in conclusion of the naked statement of my case, that my little patient lived on the banks of the Nith; the waters of which he had always drunk. He lingered long in a very hopeless condition, with every symptom of the greatest debility—a weak irritable pulse, seldom under one hundred and twenty in a minute, great prostration of strength, and severe wandering pains throughout the body but especially in the back, ædematous swelling of the legs, a thickly coated tongue, slight diarrhœa, sleepless nights, and not unfrequent delirium. He got better however, and early in August was able to leave his room; and by the end of the month was pronounced recovered.

I was at first led to believe that the

above mentioned case was almost, if not quite unique; and the same was the impression of several professional friends to whom I related it. This may be accounted for by the silence or scepticism on this subject of Rudolphi, Bremser, and the other Helmithologists, from whom medical men are at present accustomed to derive the chief part, if not the whole of their knowledge of these matters: the records of medicine however, contain, I find, numerous accounts of similar occurrences; to some of which I shall briefly refer, preparatory to saying a few words on the probable origin of the Animals in question.

The notion that Animals occasionally exist in the Human blood appears to be as ancient as the time of Pliny, who remarks, "Nascuntur, in sanguine ipso Hominis, Animalia exesura corpus;"* but it appears he was alluding, in this instance, to animals, not of the kind above described, but

* Plinius. Hist. Nat. Lib. XXVI. c. 13.

of that kind, the presence of which in the blood was supposed to give rise to the affection called Phthiriasis, of which he had just before been speaking, and to which I shall presently have occasion to allude. At any rate, in the vague assertions of authors of this date we can place but little reliance; and I intentionally omit also, on the same account, many of the wild relations propagated as well on this, as on most other subjects, by Schenck and other professed collectors of wonders. The first distinct and tangible notice that I meet with of the occurrence of Animals in the Veins of Man is in the works of Rhodi of Patavia; who states that John Prevost, the assistant of Jerome Fabrice of Aquapendente, on one occasion, during dissection, met with a worm in the left Renal Vein; and from the same author we learn that the successor of Fabrice, Adrian Spigel, also detected one, on another occasion, "in trunco Venæ Cavæ descendentis,"—that is to say, in the ascending or lower Vena Cava of modern times. Rhodi states further that an Apo-

thecary, of the name of John Renodé, had once, during venesection, observed a Worm, "palmi longitudine," rush forth with the blood;* and he elsewhere mentions, as from his own experience, that in the year 1625 Worms were found in the common Iliac Vein of a female who had died of dropsy: these worms, he says, had black heads, like that of a caterpillar, but they lost their black colour on being macerated in water.† Spigel says that the worm above alluded to, as found by him in the Vena Cava, was two inches in length; and he speaks further of having once found four cylindrical Worms in the Vena Portæ.‡ The occasional occurrence of Worms in the Veins was admitted by Zacuti of Amsterdam, who asserts that they give rise to the most agonizing wandering pains, which instantly cease upon the expulsion of the Worm by venesection;§ and both Riolan ||

* Rhodius. Obs. Med. Cent. III. Obs. 61.

† Ibid. Cent. III. Obs. 62.

‡ Spilegius. De Corp. Hum. Fab. Lib. V. c. 13.

§ Zacutus Lusitanus. Lib. III. Obs. 95.

|| Riolanus. Enchirid. Anat. Lib. II. c. 28.

and Ettmuller* speak of having themselves met with Animals in the Veins, but do not enter into any particular description of them. This seems to have been undertaken for the first time by Peter Borelli. The following are his words upon this subject: "Res huc usque inaudita, et certè stupenda est, naturæque lusus, vel providentiæ ejus admirandum argumentum. Ceti, seu Baleni-morpha Animalia in sanguine humano, tanquam in rubro Oceano natant; et, quemadmodum Muscilionibus proboscides Elephantorum Deus concessit, sic istis scyphones retro capita, ad sanguinem eructandum, tanquem Balenis, non denegavit. Cucurbitæ semen, vel Myrti folium æmulantur; venis etiam scatent, ita dispositis ut nervos foliorum referant. Existimandum est hæc Insecta (pedibus enim carent) ad usum corporis Animalium perfectiorum creata fuisse, utpote ad sanguinem pravum hauriendum.† It has been supposed by Daniel Le Clerc that what

* Ettmullerus in Schroderum, ubi de Aceto.

† Borellius. Obs. Medico-Phys. Obs. 4.

Borelli took for a new kind of worm, and an inhabitant of the veins, was in fact the common Fluke—Distoma Hepaticum—and an inmate of the Gall-ducts ;* and certainly both the form which he assigns to them, and the means which he recommends for procuring them, are in favour of this supposition. "Si illa cernere cupias," says he, "accipe jecora Vervecina vel Bovina ; seca illa frustulatim, et in aqua projice, ea manibus mulgendo et attrectando, &c."—At the same time there are some points in his description which seem to me to correspond much better with the characters of the Animals described above by Mr Rhind, than with those of the Fluke, or any other common parasite of the Human body—but of this again in future.

Among the principal authors who have drawn attention to the occurrence of Animals in the Veins is Nicholas Andry, who affirms that he himself had twice met with them. He states also that a certain Pari-

* Clericus. Hist. Lat. Lumb. c. 13.

sian Surgeon had told him that, on one occasion of venesection, finding the flow of blood suddenly arrested, he separated the lips of the wound with his fingers, when he observed a foreign body obstructing its orifice ; this, upon a slight motion of the arm, rushed out, and proved to be a Horned Worm, of about the size of an Ear-wig—a coarse description, which (as we shall see by referring to the annexed plate) might have been easily applied to the Animals there delineated, as passed by my patient. Andry quotes likewise the testimony of a Mons. Daval, a physician of Paris, who had often, as he asserted, observed Worms voided during venesection, and whose father had, on one occasion, seen two, each about a foot long, extricated in this way. It was commonly reported also, as we further learn from Andry, that, two days before the death of a Presbyterian Clergyman, of the name of Senault, a small Worm, furnished with wings, was found in his blood, which had been drawn from a vein ; but Andry admits that it is more probable that the in-

sect in this, as well as in many similar reported cases, had fallen into the cup, either before or after the blood had been received into it, than that it had been voided with this fluid.* As somewhat allied, however, to this reputed case of Animals in the veins I may mention that related in the German Ephemirides of a certain Marquess, from whose vein, opened by venesection, two days before his death, a worm was extracted.† Daniel Le Clerc likewise, although he seems to question the accuracy of many of the alleged examples of Animals in the veins, and had never met with them himself, yet states that he had heard of a young man, with whose family he was acquainted, having passed one, during venesection, on the day of his death ; and he obviously believes this account, since he brings it forward (as we shall presently find) in support of an hypothesis to account for their production.‡

* Andry. Sur la generation des Vers dans le corps de l'Homme, chap. 3.

† Misc. Cur. Decur. I. Ann. 2. Obs. 154.

‡ Clericus. Hist. Lat. Lumb. c. 13.

In the excellent Thesis published by Pallas in 1760, some of the foregoing instances of the occurrence of Animals in the Veins are repeated; and to these are added one from the periodical work just mentioned, in which Worms were found in the Ranine Vein;* a second from Du Verney, in which they were found in the Falciform Sinus;† a third from Peyer, in which an Hydatidiform Worm was detected in the Vena Portæ;‡ and a fourth from a person called Willius, in which Animals were found in all the branches of this Vein.§ It is remarked by Pallas, in conclusion of this part of his subject, "Cœterum mihi satis apta vermibus habitacula venæ videntur, præsertim Portarum venæ; cum in iis sanguinis flumen haud adeo impetuose feratur, ut secum rapiat vermiculos, suo motu renitentes."‖ How far the presumed slower course

* Misc. Cur. Decur I. Ann. 3. Obs. 100.

† Du Verney. Hist. de l'Acad. 1700.

‡ Peyer. Misc. Cur. Decur. I. Ann. 7. Obs. 206.

§ Willius, apud Heucherum. Diss. Errores circa causas Mortis Subitæ § 22.

‖ Pallis. De Infestis Viventibus circa Viventia.

of the blood through the Vena Portæ, than through the other Veins, is favourable to the accumulation of Animals in this vessel, may be reasonably questioned; but there are other circumstances, to be in future mentioned, which may, perhaps, have some real influence in this respect. The only other alleged instance of the occurence of Animals in the Veins of Man, which I shall at present mention, is one related by Treutler, whose deservedly high reputation as a Helminthologist, seems to entitle all that comes from him on this subject to implicit credit. He states that a young man, whom he had long treated for Worms, while bathing, by his advice, in the river at Leipsic, suddenly suffered a considerable hemorrhage, from a rupture of the anterior Tibial Artery in the foot. Styptics and pressure were both ineffectual in permanently suppressing the discharge of blood; till at length a thick substance, mistaken at first for coagulated blood, but proving afterwards to be two Animals impacted together, was voided from the opening,

when the hemorrhage immediately stopped and did not recur. He was for some time after this relieved of all the distressing symptoms he had suffered, but soon relapsed—owing, as was supposed by Treutler, to the presence of more Animals in the same situation. The Animals, in this case, are described as " Vermes corpore utrinque obtuso, lanceolato; in antica parte subattenuato, plano, depresso; capite mutico, subconspicuo, labiato, *poris sex infra labium;* collo indistincto; dorsi, ante mediam animalculi partem, areola elongata ex albo-cœrulea, subulata; translucentibus ad latera dorsi intestinis visceribus, secundum vermis longitudinem in serie ordinatis; *ventre biporeo,* poro majore ad trunci initium, minore sub ejus finem; visceribus utrinque ad latera in ramificationem formam dispositis, translucentibus; cauda recta, acuminata, subpellucida, margine nullo."* Treutler does not mention the size of the Animals, but, from the accompanying delineation of them, we may conclude they

* Treutler. Auctuarium p. 23. Tab. IV. Fig. 1—3.

were about two lines long: he includes them among the Entozoa of the Human body, under the name of Hexathyridium Venarum. By Zeder and Rudolphi they were subsequently referred to the Genus Polystoma, under the name of P. Venarum; but they nevertheless express great doubts, not only of their title to be classed with the proper Entozoa of Man, but also of their pre-existence in the Veins under any circumstances.† Allusion is made to this case also by Lamarck,‡ Brera,§ Bremser,‖ and others; by the first of whom, the Animal in question is called Linguatule des Veines; by the second, Exatirideo Sanguicola; and by the last again, Hexathyridium Venarum: like Zeder and Rudolphi however Bremser is very sceptical as to its origin and pretensions. For my own part, I have no doubts that the Animals, in this instance, pre-existed in

† Rudolphi. Entozoorum Hist. Nat. Vol I. p. 352.

‡ Lamarck. Hist. Nat. des Animaux sans Vertebres. Tom. III. p. 174

§ Brera. Memoire, &c. p. 101. Tab. II. Fig. 3—4.

‖ Bremser, Sur les Vers Intestinaux. p. 327.

the Vein; but very great doubts whether they were the proper Parasites of this vessel—but of this again hereafter. Finally, it is pretty well established that Animals have been not unfrequently found in the veins of some of the lower Animals, as in those of the Phoca Barbata, also by Treutler; in those of the Salmo Alpinus by F. Fabricius, and probably also in those of the Sepia Octopodia, &c. by others. In Fabricius' case, the worm was called by its discoverer, Fasciola Umblæ, a name changed by Zeder into Distoma Umblæ, and by Rudolphi into Distoma Seriale: and here again it is said by the latter, that it was probably between the coats of the vessel, and not within its canal, that the Worm was found—that it was, therefore, an Entozoon, but not of the Vein; perhaps, however, we shall find reason to believe, on the contrary, that its habitat *was* the Vein, but that it *was not* an Entozoon.

The foregoing are some of the most remarkable cases on record of the occurrence

of Animals in the Veins; but it is a question of considerable collateral interest whether such Animals have ever been detected in the Arteries also. As far as I know, there are no recorded examples—at least none worthy of credit—of this occurrence in Man, although in some of the lower Animals they appear to be not uncommon.—One of the first is related by Ruysch, who, on one occasion, found a bundle of oblong worms, matted together, in the Aorta of a Horse.* Morgagni also has found worms, referred by Rudolphi to the Genus Strongylus, under the name of S. Trigonocephalus, in the tuberculated substance of the same vessel of a dog;† and Schulz in the thickened coat of a branch of the mesenteric Artery going to the colon of a Horse:‡ but these cases do not properly belong to my present subject, since, in them, the Animals were contained in the solid Tissues,

* Ruyschius. Op. Omn. Anatomico-Chir. Vol. I. Obs. 4, and Decad. III. Art. 6.

† Morgagni. Epist. Anat. Lib. IX. Ep. 44 and 45.

‡ Schulz. Acta. Nat. Cur. Vol. I. Obs. 219.

and not in the blood. The presence, however, of Animals, within the Aneurysmatic Arteries of some quadrupeds, particularly of the Horse and Ass, seems to be abundantly common. M. M. Girard, Professors of the Royal Veterinary School at Alfort, have often met with them in the larger Arteries, particularly the upper Mesenteric and Descending Aorta of the Horse, Ass and Dog. They appear to be of two kinds, one called by Chabert Filaire Papilleuse, and the other Hamulaire Aplatie, the latter being by far the more common. They occur commonly in large masses—"paquets enormes"—and are almost uniformly found conjoined with an Aneurysmatic state of the vessel in which they are met with.* Rudolphi also states that he has frequently observed, in the Aneurysmatic Mesenteric Arteries of the Horse, a kind of Worm; which, however, as well as the Worm found by Morgagni, he refers to the genus Strongylus, but under the specific

* Chabert. Traité sur les Maladies Vermineuses.

name of S. Armatus.* Actuated by these statements, Mr Hodgson dissected no fewer than nine Asses, for the purpose of examining the Arteries said to be so frequently the domicile of Worms; and succeeded in finding these Animals almost constantly in the upper Mensenteric Artery, and once in the Cœliac. The parietes of the Artery about the part were almost always changed in structure as well as dilated—sometimes softened and pulpy, at others indurated, and even, in one case, calcareous. The Worms, from three or four to thirty in number, and from half an inch to an inch in length, in general floated, within the vessel, in a clear lymph, frequently mixed with pus: they were of a reddish colour, with a blunt head and filiform tail, and, examined by the microscope, presented several longitudinal lines intersected by transverse rings. Whether they belonged

* Rudolphi. Entozoorum Hist. Nat. Tom II. Part 1. p. 205.

to the genus Filaria, Hamularia or Strongulus he does not determine.*

So much then for some of the principal recorded cases of the occurrence of Worms in the Veins and Arteries; as well of the Inferior Animals, as of Man: and if they are so frequently met with in these vessels, we should, *a priori*, conceive that similar Worms would occasionally be found in the Heart also. Nor are there wanting recorded instances of this description.

I intentionally pass over Schenck and his marvellous cases—among the rest that of a living Worm found "Principis cujusdam Cordi adhærescens," since whether to the inside or outside of this organ does not appear. The same ambiguity prevails likewise with respect to the case related by Riviére, of a girl, seven years old, in whom, not only the Intestines and Liver were found, as he says, "exesa et vermibus

* Hodgson. Dis. of the Arteries and Veins. Appendix.

transfixa," but the heart also is described as " ab iis corrosum et alte excavatum."* It may be inferred however, that the Worms were, in this case, external. In a case related by Paulinus the Heart of a Goose was found to been circled by what he calls a " pusillum Serpentulum, gyros suos mirè facientem"—the said Serpentulus being, in all probability, a species of Worm admitted by Rudolphi, under the name of Filaria Anatis—and he speaks further of having once seen two Horned Beetles, firmly attached to the Heart of a Bullock, which had been recently extracted.†

With these cases however, whether credible or otherwise, we have little or no concern at present. But the records of Medicine contain not a few instances of Animals found within the Heart, albeit they are not all entitled to implicit credit. Thus, in a case of this description, related

* Riverius. Observ. Communicat. p. 586.

† Paullinus. Misc. Cur. Decur. II. Ann. 6. Obs. 13.

by Zacuti, what was taken for a Worm, was pretty obviously a polypous growth from the inner surface of the Heart; and the same was probably the case in many other reputed examples of a similar nature.—Severino speaks of a Snake found, on one occasion, in the left cavity of the Heart,* and Horst of a winged Worm detected at another time in the same situation†—nay, in the year 1676, a Serpent is said to have crept out of the Heart of a French Prince, and after his death many more were found nestled together in that organ.‡ It is hardly necessary to remark that these cases are somewhat apocryphal: they seem to acquire however some little title to consideration from their analogy with cases said to be by no means unfrequent in the lower Animals. The chief collector of this kind of cases has been Paullinus, who asserts that he had himself seen, on one occasion, four Maggots within the

* Severinus. De Abscessuum Natura.

† Horstius. Manuductio ad Medicinam.

‡ Relations Publicæ, 31st December, 1676.

Heart of a Magpie, and on another, a black Caterpillar, of a very offensive smell, within that of a Fowl. The same Author details many similar cases from other observers; among the rest one from Kellner, in which six white Worms, about the size of a needle, were taken from the left ventricle of the Heart of a Crane; and another—still more wonderful—in which the Heart of a Hog, who, from being very fat, had become exceedingly emaciated, and seemed to suffer great pain, was found, after slaughtering the animal, to contain a nest full of winged Worms, which had almost, it is said, eaten away its whole substance; each Worm is said to have had six feet, with three joints, black at their extremities, but elsewhere reddish, and to have been furnished in place of a tail, with a long sharp proboscis.* A comparatively recent case, of a similar description, is related by M. Peyssen of Montpellier, who found, on one occasion, six or seven living Worms in the right ventricle of the Heart of a Dog,

* Paullinus. Misc. Cur. Decur. II. Ann. 6. Obs. 13.

which for some time before death had been ailing, and attacked with frequent convulsions : these Worms were from six to eight inches long, with cylindrical bodies tapering towards each extremity ; they lived for some seconds after having been placed on a table. The parietes of the ventricle were sound, but its Columnæ Carneæ were a little thicker than ordinary ; no Worms were found in the other cavities of the Heart, nor in any of the large Blood-vessels.*

Now the instances cited above—questionable though some of them certainly are —of the occasional presence of animals in the Veins, Arteries, and Heart, seem to me quite sufficient, independently of the manifest improbabilities of any other conclusion, to bear me out in the presumption that the animals found in the Blood of my little Patient, actually existed in the Veins at the time of this Blood being drawn, and that they were neither previously present in the

* Peyssen. Journ. de Med. Tom. XI. p. 441.

vessel into which it was received, nor subsequently hatched in that fluid. The question then naturally arises, How did they get there?

There is but a certain number of Animals generally admitted by Rudolphi, Bremser, and the best modern Helminthologists, as the proper Entozoa of the Human body, as well as of those of all other Animals; each Organ of every kind of Animal having, for the most part, its own proper Parasite, and no others. Thus, of the twelve Entozoa commonly regarded as proper to the Human body, one—the Hamularia Subcompressa,—is found only in the Bronchi; six—the Ascaris Lumbricoides, Distoma Hepaticum, Trichocephalus Dispar, Tænia Solium, Bothriocephalus Latus and Oxyuris Vermicularis—are found only in the several portions of the Alimentary canal, including those branches from it constituting the Gall-ducts; one—the Strongylus Gigas—in the Uriniferous passages; one—the Polystoma Pin-

guicola—in the fat of the Ovaries; one—the Cysticercus Cellulosæ—in the Choroid Plexus, the Muscles, and, as we must now add, the Aqueous humour of the eye;* one—the Filaria Medinensis—in the Cellular Tissue, sometimes under the Tunica Conjunctiva, but generally under the Skin; and lastly, one—the Echinococcus Humanus—in almost every Organ of the body. These have been admitted as the only proper Entozoa of the several Organs of the Human body, because they alone have, in each, characters quite distinct from those of Animals found in any other situation.

But, besides these, it is not denied that

* A most interesting example of the occurrence of the Cysticercus Cellulosæ in this situation presented itself last winter in Edinburgh, in the person of a little girl, the child of a servant of Dr Meikle of Albany Street. The case attracted a great deal of attention, and was seen by most of the Professional men in town; who had thus an opportunity, not only of viewing the Cysticercus in this unusual habitat, but of witnessing for weeks together, the motions of a living Parasite in a living Human being. It is to be regretted that the case terminated so unfortunately as it did.

numerous Animals have been frequently, either found in, or voided from various Organs—as the Stomach and Intestines, Uriniferous Organs, Uterus, Skin, &c.—which have no resemblance whatever either to the proper Parasites of these organs, (when they have any), or to each other; while, on the other hand, they are closely allied to, if not identical with certain Animals, which, as occurring out of the body, are familiar to us all. Of this nature are the numerous cases on record of the voiding, either by the Mouth or Anus, of the Larvæ of the common Fly;* of the Larvæ of the Dragon Fly;† of the Larvæ of the Black-Beetle;‡ of Spiders,§

* Wahlbom. Cases communicated to the Royal Society of Sciences at Stockholm.

Calderwood. Ed. Med. Com. 1782.

Bateman and Chichester. Ed. Medical and Surgical Journal, 1811.

† Yule. Ed. Phil. Journ. 1825.

‡ Forestus. Obs. et Cur. Med. Lib. XXI. c. 25.

Tulpius. Obs. Med. Lib. II. c. 51.

Bateman. Ed. Med. and Surg. Journ. 1811.

§ Planchon. Journ. de. Med. 1804.

Leeches, * Snails, † Frogs, ‡ Toads; § and even Lizards; ‖ some of these certainly a little suspicious, but others, as certainly, entitled to the fullest credit. So also by the Urethra are said to have been passed the Larvæ of the Common Fly; ¶ the Larvæ of the Black-Beetle; ** and some other Animals real or apparent, †† but certainly quite distinct from the proper Entozoa of the Uriniferous passages—to say nothing of the Lice, Dragon-Flies, Scorpions, Tortoises, and Mag-pies, which are gravely stated by Schenck to have been occasionally voided by this passage. But

* Galenus. Loc. Affect.
Riverius. Prax. Med. Lib. IV. c. 26.
Paisley. Ed. Med. Ess. 1732.
Bond. Med. Obs. and Inq. 1753.

† Eyting. Hufeland's Journal, 1822.

‡ Chisholm. Ed. Med. and Surg. Journ. 1825.

§ Bremser. Sur. les Vers Intestinaux.

‖ Weikard. Obs. Med.
Spence. Ed. Med. and Surg. Jour. 1813.

¶ Ruyschius. Thesaur. Anat. Lib. I. cap. 52.

** Henry. Ed. Med. and Surg. Journ. 1811.

†† Barry. Ed. Med. Ess. 1735.
Laurence. Med. Chir. Trans. 1811.

of all the organs of the Human Body the Uterus is that which appears to have most signalized itself by the ejection of this kind of inmates; and the accounts related by Schenck, and other authors, of "Polypi, Echini, Erucæ, Sanguisugæ, Astaci, Musculi, Tenchæ, Ranæ, Bufones, Serpentes, Lacertæ"—and not only of these, oviparous as most of them are, but also of sundry viviparous Animals, as "Talpæ, Lepusculi, Cati, Canes, Feles, Porcelli, Leones, Elephanti (! !)" expelled at divers times from this organ—to omit the Legions of Suygers, or little Demons, seriously described by Mowbray (the first Lecturer on Midwifery in London) as sometimes also issuing forth by this outlet—are perfectly appalling. It is hardly necessary, however, to remark in the present day that the majority of these stories have originated in error, and been perpetuated by credulity; and that the presumed Animals were, in these instances, nothing more than either a polypous growth, which had been separated,

from the inner surface of the Uterus, or an unformed monster

"horrendum, informe, ingens,"

the product of conception, in either case, bearing, perhaps, some rude resemblance to the Animal after which it was called;— but there is no reason to doubt that from the Female Genital passages, as well as from the Stomach and Intestines, or from the Urethra, Animals, not the proper Parasites of these passages (for they appear to have no proper Parasite) have been occasionally expelled. The presence also of Mites in and about the pustules of Scabies has been noticed ever since the times of Avenzoar; and they have been particularly described by Ingrassias, Joubert, Bonomo, Geer, Wichmann, Alibert and others; and that in and about the healthy integuments also are occasionally found Animals, quite distinct from the Parasite of the Dermoid Tissue, is sufficiently well known. The

Lice sometimes found between the hairs of the eyelashes, constituted the disease, to which I have already alluded, called by the ancients Phthiriasis;* and numerous cases are on record in which they have been found, as well below as above the cuticle. This disease was the reputed cause of death to Plato, Ennius, Sylla, Herod and many other celebrated personages of ancient times; and examples have been since related of the occurrence of such Animals, sometimes separately, at others gregariously, in this situation from the days of Ingrassias, Da Vigo, Lange, Zacuti, Joubert and Van Forest, to those of Heberden and Alibert. One of the most remarkable of these is that related by Zacuti—of a nobleman, the surface of whose body was so prolific in this way, that it furnished constant work to two black servants to carry all the Lice generated upon the body of their master down to the Sea! It is very generally known also, that the members of a

* Corn. Celsus. De Re Med. Lib. VI. c. 6.
Cæl. Aurelianus. De Morb. Chron. Lib. IV. c. 2, &c.

certain noble family in this country are afflicted in a similar manner, though not to an equal degree; and I am very credibly informed that a most respectable family in the neighbourhood of Dumfries are martyrs to the same complaint.* But a still more

* A somewhat similar case, too, lately occurred in the Dispensary under the care of my colleague Dr Thorburn, in whose words I detail it, as kindly communicated to me by him :—" A boy of about nine years of age, and evidently of a strumous habit, presented himself at the Dispensary in August 1832. His mother, who accompanied him, informed me, that for the last three years he had been covered with lice, which neither the greatest cleanliness, nor any topical application had removed. His skin appeared rough and elevated, and numerous small and hard tumours, causing pain upon pressure, and with no visible external openings, were interspersed throughout the surface of the body. The breast and axillæ were swarming with minute living animals, but of what species I cannot decide. From his birth, the boy had been sickly, and when about six years of age had been attacked with fever, attended with cough, dyspnœa, and pain in the breast. These symptoms terminated by a discharge of blood from the mouth, followed by a profuse diaphoresis, which continued for two days, and left the boy covered from head to foot with vermin. From that period to the present day, he has been periodically attacked in the same way; the febrile paroxysm being always followed by the diaphoresis and exhibition of the vermin. By frequent lavation the

wonderful case is that mentioned by Sauvages, as having occurred in the year 1729, in which were continually voided from the Anus, Urethra, Eyes, Ears, and other natural passages, as well as from *a wound made by Phlebotomy*, "Pediculi, Pulices, Forficulæ, Araneolæ, Scarabæoli" and sundry other Animals of a similar description.*

With respect to the origin of the proper Entozoa of the Human body, very different opinions have been at different times entertained. It was supposed by Hippocrates and the ancients in general, who

numbers of lice are daily diminished, but before they are actually removed, another attack leaves him as procreant of them as before. As the patient resides several miles from Dumfries, I have not been able to pay so much attention to him as I could have wished; such, however, are the facts of the case."

Under Dr Thorburn's care, however, the boy has since recovered, and has had no return of the complaint.

* Sauvagesius. Nosol. Method. Tom. II. p. 603.

were acquainted only or chiefly with the proper Parasites of the Intestinal Canal, that they consisted merely of strips of abraded Intestine, which in some way or other had become vivified ;* and by all the earlier Pathologists, after the revival of literature, they were considered as merely Phlegm or Mucilage, or perhaps Chyle or some other matters, vivified by Heat—either that natural to the body, or that generated by Putrefaction—to the different qualities and degrees of which they ascribed all the differences in their character and physical properties.† Upon these notions it is unnecessary, in the present day, to offer any remarks ; although I cannot avoid observing, that they probably approximate more to the truth than many of the hypo-

* Hippocrates. De Morbis. Lib. IV.
Aetius. Tetrab. III. Serm. I. c. 14.
Ægineta. Lib. IV. c. 57, &c.

† F. Platerus. Prax. Mep. Vol. III.
Mercurialis. De Internis Puerorum Morb. Lib. III. c. 2.
Licetus. De Sportare Viventium Ortu.
Riverius. Prax. Med Lib. X. c. 9.
Dapper. De Vermibus, &c.

theses which have been since hazarded on the subject. In more recent times five opinions, principally, have been taken up by Helminthologists :

First,—That of Leuenhoeck, Harder, Linnæus, Andry, Boerhaave, Hoffman and others, and adopted recently in this country by Brodie, Barry, and Mason Good, that the Entozoa of the Human body are always received into it with the aliment, &c. in the form of Ova, deposited by Animals, the natural habitat of which is without.

Secondly,—That of Hartsoëcker, Pallas, Reinlein and Brera, and of Rhind in this country, that they are always received into the body, indeed in the form of Ova, but that such Ova are, not those of any Animals the natural habitat of which is without, but of the proper Entozoa of the Human body, which have been previously passed from the bodies of persons affected with them.

Thirdly,—That of Valisnieri, Goëze, Bloch, Werner and others, that such Ova, generated by Entozoa already in the body of the Mother, are communicated to the Infant along the Umbilical cord, during its developement in the Uterus, or with the milk, during Lactation.

Fourthly,—That of those who adopt the "Evolution" hypothesis of Generation proposed by Haller and Bonnet, that the Ova of the Parasites of every Animal existed in the Ovum of that Animal from the beginning of Time, and that the former are developed in proportion to the developement of each Organ of the latter.

Fifthly, and lastly,—That of Rudolphi and Bremser, that the Entozoa in general are generated primarily, not from Ova at all, but spontaneously in each Organ in which they are found.

It has been shrewdly remarked by Car-

minati that a man of information and ingenuity might take up any one of these notions he pleased, and succeed in persuading his auditors that he was in the right; but still there are certain strong objections to each of the four first hypotheses, from which the last is exempt, while on the contrary every fact worthy of the name of an argument is in its favor.

Against the first of these hypotheses it may be urged:

First,—That animals with the characters of the proper Entozoa of the Human body are never met with in any other situation, the statements to the contrary with respect to the Ascaris Lumbricoides, Distoma Hepaticum, Tænia Lata and Oxyuris Vermicularis, by Umzer, Linnæus, Schaeffer, Gadd and others, having been abundantly shown by Bremser to be erroneous; and that the differences between these and any other Animals are such as are very inade-

quately explained by the different circumstances to which they are exposed.

Secondly,—That Entozoa are found in the Infant while still nourished by the milk of the mother alone, and even in the Fetus, the statements to the contrary by Knox and others being amply refuted by numerous well authenticated cases from Hippocrates,* Dolæus,† Hartmann,‡ Brendell,§ Raulinus,‖ Wolf,¶ Wepfer,** Frank,†† Froman,‡‡ Kerckring,§§ Blumenbach,‖‖ Goëze,¶¶ Bloch,* Rudolphi† and Bremser.‡

* Hippocrates. De Morb. Lib. IV.

† Dolæus. De Morb. Infant. Lib. IV. c. 10.

‡ Hartmannus. Misc. Cur. Dec. I. Ann. 117. Obs. 189.

§ Brendel, in Prælectionibus.

‖ Raulinus. Obs. Sur. le Tænia.

¶ Wolfius, apud Schenkium.

** Wepferus. De Cicuta. pp. 230, 282, 383, &c.

†† Frank. Misc. Cur. Dec. II. Ann. 5. Obs. 222.

‡‡ Froman. Biblioth. n. 294.

§§ Kerckring. Biblioth. n. 123.

‖‖ Blumenbach. Biblioth. n. 19.

¶¶ Goëze. Naturgesch. p 371.

* Bloch. Preisschrift. p. 36.

† Rudolphi. Entozoorum Hist. Vol. 1. p. 387.

‡ Bremser. Sur les Vers Intestinaux. p. 27.

Thirdly,—That they are found not only in the Intestinal Canal, and other open passages, but in almost every Organ of the body; and though this may be explained upon the presumption that the alleged Ova may have been absorbed from the Stomach and Intestines into the blood,—which is sufficiently probable, as we shall presently see—it has never been proved, nor rendered probable, that they are ever, by the blood, deposited in the state of Ova, elsewhere; indeed the molecular changes which this fluid is known to undergo in the process of secretion, is almost incompatible with this opinion.

Fourthly,—That the Entozoa, as well of each portion of the Intestinal Canal, as of every other Organ, are of a specific character; which, is not easily reconcileable with this supposed common origin of them all.

One of the last and most ingenious attempts to trace a real Parasite of the Human body to the ingesta, was made by

Dr Chisholm, with respect to the Filaria Medinensis or Skin Worm; and in this view of the matter he is borne out, not only by the authority of Bremser, Bruce, Chardin, Dampier, Dubois and numerous other writers, but by some very forcible arguments derived from his own observation.* If however, this fact were quite established, it would follow, not that such was the case with the Entozoa in general, but only that the Worm in question is not really one of these, but belongs, in fact, to the second class of Animals, with which, as I have already shown, the various organs of the Human body are so frequently infested.

With respect to the second hypothesis above mentioned, it explains away indeed the first objection urged against the preceeding one; but it leaves equally unexplained the three last—that the Entozoa are found in the sucking Babe and in the Fetus; that they are not confined to the

* Chisholm. Ed. Med. and Surg. Journ. 1815.

alimentary passages; and, that they differ in every different organ of the body. Moreover it is amenable to a few additional objections:

First,—That verminous diseases are not unfrequently epidemic; a fact which, if they resulted from Ova of the alleged description, a definite number of which could alone at any time be diffused, is not easily explicable.

Secondly,—That they should be far more prevalent in Cities, where such Ova must be comparatively numerous, than in the country; which, contrary to the assertion of Pallas, is said not to be the case by Bremser.

Thirdly,—That animals actually fed with aliment, which had been previously mixed with the Ova of their own proper Entozoa, do not, on that account, more abound with them than naturally—a fact which has been

established by the experiments of Schreiber, quoted by Bremser.

The third hypothesis again, while it explains sufficiently well, not only the specific character of the Entozoa in general, but also their occurrence in Babes and Fetusses, and their general diffusion over the body, leaves equally unaccounted for the individual nature of each in the several Organs, and the occasional prevalence of verminous diseases in an epidemic form.—It is liable besides to its own proper objections :

First,—That, if it were true, no person should be exempt from the Entozoa ; and

Secondly,—That they should always display themselves in early age ; whereas it is sufficiently well established that, in some persons, there are no traces of them at any period ; and that, in others, they do not show themselves before the middle or close of life.

The fourth hypothesis goes one step further than the third, since it explains as well the individual nature of each Entozoon in each Organ of the body, as their generally specific character, their occurrence during Infancy and Fetal life, and their universal distribution; but how verminous diseases are sometimes epidemic, in what way any body altogether escapes from them, and why they often display themselves only in advanced age, remain entirely unexplained.

Further against this hypothesis, founded as it is on one of the wildest vagaries of Malebranche, who could not conceive the possibility of a successive generation of Life—that all the animals which were subsequently to overrun the globe, were created at once from the beginning, the Ova of the last generation which is destined to exist forming nuclei round which those of the last but one are folded, while these again are enclosed in those of the last but two, and so forth, so that the Ova of the inhabitants of Eden, Man and Brute,

were to all the rest like the outermost of a nest of pill-boxes—it may be reasonably objected that it is a most unwarrantable extension of a doctrine already beyond all admissible bounds visionary and extravagant, and, what is worse, totally uncalled for, since it was invented for the purpose principally of explaining a difficulty which has no existence.

The opinion of Rudolphi and Bremser, that Entozoa are primarily generated, not from Ova at all, properly so called, but spontaneously in each Organ of the Animals in which they are found, seems to me, as I have before remarked, infinitely the most tenable, being not only exempt from all the objections brought forward, severally or conjointly, against the rest, but supported at once by common sense, and by all the most enlightened views of modern Physiology. It is not a return to the "Equivocal Generation" of the ancients, by which was understood the vivification of certain *pre-existing* substances, by the heat generated

during putrefaction, &c.—although, as I have elsewhere observed, this doctrine was a closer approximation to the truth than many which were subsequently advanced—nor is it a renewal of the "Univocal Generation" at one time supported by Redi, by which was implied the communication of Life to certain *pre-existing* substances by already Living beings—but it is the formation de novo of smaller Living beings by the separation of certain living particles from larger ones. "Horum enim," says Rudolphi, "particulis quibusdam minus assimilatis, indeque cum reliquis non convenientibus, vel ab iisdem separandis, vita propria conceditur;"* and to the same effect writes Bremser,† who refers to Treviranus‡ for proofs of the truth of this kind of spontaneous generation. For my own part I am abundantly satisfied of this truth, as applied to the production, not only of Parasites, but of the proper offspring of every

* Rudolphi. Entozoorum Hist. Tom. I. p. 405.

† Bremser. Sur les Vers Intestinaux. pp. 94. et seq.

‡ Treviranus. Biologie.

kind of Animal: I would still contend, however, for a little more precision, with respect to the quomodo, than is to be found in the authors above mentioned. It is surely far more satisfactory to describe the Entozoa as directly secreted in the Organs in which they are found, than as resulting from the spontaneous and indiscriminate throwing off, as it were, from these Organs, of certain living particles, which subsequently coalesce into a new animated being. Bremser indeed, although he does not explicitly say so, distinctly implies that it is by secretion that all Parasites are formed; since, in his concluding passage on this subject, he thus describes the mode in which the developement of one kind of Intestinal Worm takes place—"A part of the intestinal mucosity, or rather of the living mucosity, (in other words Organizable Lymph,) but still without form, coagulates into a somewhat compact mass; it covers itself with an epidermis and enjoys, from that moment, a proper Life." But the said so called Mucosity is a

Secretion ; therefore this particular Worm, which is nothing but this Mucosity containing from the first within itself the rudiments of its future organization, is also a Secretion from the blood of the Capillary Arteries of the part in question. And the same doctrine may be applied to all the rest ; each being a Secretion from the blood of the Capillary Arteries of the respective Organs, and varying therefore in character, in the same manner as the other Secretions of these Organs. Nor does this doctrine appear to be applicable only to the Entozoa, but also—as I have just hinted—to the proper offspring of all kinds of Animals, the formation of the Ova in the Ovaries of which, like that of Semen in the Testicles, being attributable only to Secretion — a fact which becomes sufficiently obvious, when we contemplate the strict analogy which subsists between the Ova of the most perfect Animals, and the Germ of those which are the least so. This Germ, as in the Polypus, is at first a part of the Ani-

mal itself, and as certainly the product of Secretion as any other of its Organs; it constitutes primarily a sprout or limb of the Parent, and it is only when afterwards thrown off that it enjoys an independent existence. In all these circumstances the Ovum of the Human being strictly corresponds with it; and, if we admit that Ova of the most perfect animals are thus the products of the Secretion of the Ovaries, we must, a fortiori, allow the possibility of Animals so much less perfect, being in like manner the product of other Organs of the body, each of which is capable of forming living Tissues, which are susceptible, in like manner, of an independent existence. Nay, it appears to me that the production of Parasitical Animals is even a simpler process than that of new Tissues, (such as Tubercle or Scirrhus) in general; since, presuming that each of the latter is deposited in the form of Organizable Lymph, containing within itself, from the first, the rudiments of its own future structure, and therefore

capable of an independent existence,* it requires a more complicated process to produce adhesions between this and the parent Animal, than to leave it in possession of its individuality.† The objection to this doctrine—which, as remarked by Bremser, is foolishly regarded by some "presque comme un blasphême"—founded upon its implying a power of creating Life, I need hardly advert to. Such an objection could never have been urged, had the real nature of Life, consisting, as it does, only in a peculiar mode of being—a series of proper phenomena—been rightly understood. Animals can create nothing: but they can form, out of ultimate elements, certain new compounds endowed with irritability, which, when acted upon by proper stimuli, gives rise to the display of all the phenomena in which alone Life consists.

* See the recent remarks, on the progressive organization of new Tissues, of Meckel, Béclard, Lobstein, Hastings, and particularly Gruithuisen and Kaltenbrunner.

† See the observations of Jenner, Adams, Baron, Fosbrook and others, tracing all or most of the false Tissues originally to Hydatids.

It is absurd to talk of finite beings creating anything; but it is worse than absurd to talk of their creating that which has no existence.

Such, then, I conceive to be the nature of the process by which the proper Parasites of the Human body, and those of other Animals, are formed, the new secretion, of which they are the result, like that giving rise to the deposition of Tubercles, Melanoses, Encephaloid Tumours and Scirrhi, being the consequence, in all probability, of an Inflammation of a specific character; and, we may thus perhaps speak of a Verminous, with as much propriety as of a Scrophulous, a Melanotic, a Fungous or a Scirrhous Diathesis, implying merely a constitution in which any Inflammation of the several Tissues has a tendency to this, rather than to any other termination. And not only analogy, but the numerous morbid symptoms, which are known frequently to precede and attend their formation, seems to be strongly in favour of this opinion.

Numerous instances are mentioned by Bremser and others, in which Hydatids, the Cysticercus and Echinococcus have been found, after death, in organs which had suffered severe contusions; and it appears not improbable, that the endless train of symptoms commonly ascribed to the presence of Entozoa in general, particularly in the Intestinal Canal, is indicative rather of that degree of Gastro-Enteritis, which preceded and perhaps accompanies their developement. It is very remarkable that almost precisely the same symptoms, local and general, which in children are commonly attributed to Worms—because, at this period of life, inflammations of the Intestinal Canal have very frequently this result—are, in Adults, set down at once to Gastro-Enteritis. It is perhaps not true, as supposed by Goëze, Abilgard, Gautieri and others, that Intestinal Worms are per se rather salutary than otherwise; but we seem to be quite justified in adopting the opinion of Bremser—unquestionably the

best practical Helminthologist of the present day—that their mere presence produces very little irritation, and that this is rather itself one of the many effects of a certain character of Gastro-Enteritis, than the *cause* to which all the rest should be referred.

Such then is the probable origin of the proper Entozoa; on the other hand, the numerous other Animals occasionally either found in, or voided from the several Organs —Stomach and Intestines, Uriniferous Organs, Uterus, Skin, &c.,—are pretty obviously the result of Ova, deposited by Animals, the natural habitat of which is without, and accidentally received into these parts. In proof of this may be adduced as arguments all those circumstances formerly brought forward against the presumption that the proper Parasites of the Human body ever arose from this cause:

First,—The identity, or, at least, striking

similarity of the Animals so voided, and certain others with which, as found in other situations, we are all familiar.

Secondly,—The absolute immunity from this kind of Animals of the Fetus, and, perhaps, also of the Sucking Babe.

Thirdly,—Their occurrence only, or chiefly, in the open passages of the body, which are directly exposed to the deposition of such Ova ; and,

Fourthy,—The total independence of their character upon the nature of the Organ in which they occur, very different kinds of Animals, on the one hand, being often met with in the same organ, and the same kind of Animals, on the other, being equally frequently found in Organs altogether different.

Now it becomes a question to which of these two Classes of Animals do those oc-

casionally found in the Veins and other Circulating Organs belong;—are they the proper Parasites of these parts, and to be attributed therefore to a secretion from the Blood of the Capillary Arteries of their Coats; or are they Aliens, and to be ascribed to the accidental reception into these Vessels of Ova from without?

After a careful consideration of the principal recorded cases of the occurrence of Animals in these Organs, and particularly in the Veins, I am decidedly of opinion that they belong to the latter Class, and that they are not among the proper Parasites of the Human body. For, in the first place, the character of Animals so found has frequently, as in my own case, very accurately corresponded with that of the Larvæ of well known Animals; secondly, I have met with no reported instance in which they have been detected before that period of life at which the ingesta of the body may be easily supposed to have contained Ova; thirdly,

the Veins, although not ranking directly among the open passages of the body, yet have an immediate communication with these passages, and, as the chief instruments of absorption, may be readily believed to become soon impregnated with any thing which the former have admitted —further, Animals occur most frequently in Veins which immediately communicate with those passages into which Ova are most likely to be received; and lastly, the character of the Animals found in the Veins has been, in hardly any two instances, precisely alike. To the two former of these arguments I need not recur; but upon each of the two latter I must make a few observations.

I have said that Animals occur most frequently in Veins which immediately communicate with those passages into which Ova are most likely to be received. It is true they have *been found* most frequently in the Veins of the Arm, as in the case which occurred to myself, and in those

already described from Rhodé,* Andry,† Le Clerc,‡ and the German Ephemirides;§ but this appears to be owing to the infinitely greater frequency of the examination of their contents, than of those of any other Vein in the body. After death certainly, when the contents of *all* the Veins are exposed, such Animals appear to have been found most frequently in the Vena Portæ, as in the cases related by Spigel,‖ Borelli,¶ Peyer,** and Willius;†† and, as I have already remarked, this Vein was considered by Pallas a more convenient domicile for them than any other, owing to the reputedly slower course of its blood. In all likelihood, however, the more frequent presence of Animals in this Vein is attributable to their Ova which had entered the Intestinal

* Rhodius. Obs. Med. Cent. III. Obs. 61.

† Andry. Sur La Generation des Vers, &c. Chap. 3.

‡ Clericus. Hist. Lat. Lumb. c. 13.

§ Misc. Cur. Dec. I. Ann. 2. Obs. 154.

‖ Spigelius. De Corp. Hum. Fab. Lib. V. c. 13.

¶ Borellius. Obs. Med. Phys. Obs. 4.

** Peyer. Misc. Cur. Dec. I. Ann 7. Obs. 206.

†† Willius apud Heucherum. Dis. § 22.

Canal with the ingesta, having been immediately taken up by its radicles, and become developed in its larger branches; whence it is impossible that they could subsequently pass into the general system of the Cava, the Capillary vessels, into which this Vein is subdivided in the Liver, being too minute to admit of it. But it does by no means follow that the Ova, so received, shall be there developed; since it is easy to conceive that, while still in their original state, they may with equal ease pass out of the Capillary branches of this vessel as into its Radicles, and thus reach the Lower Vena Cava and Right Heart, and, if still undeveloped, pass again through the Capillary branches of the Pulmonary Artery into the Radicles of the corresponding Vein, and, reaching thus the Left Heart and System of the Aorta, be at length transmitted by the Capillary branches of this vessel into the Radicles of all the Veins of the body. And we may thus explain—independently of the probability that Ova are directly absorbed by the Veins from many other sur-

faces besides that of the Intestinal Canal—the occasional occurrence of Animals, not only in the Veins of the Arm, but in the Sinusses of the Skull, as in Du Verney's case;* in the Ranine Veins, as in that quoted by Pallas from the German Ephemirides;† in the Anterior Tibial Vein, as in Treutler's case;‡ in the common Iliac Vein, as in the case related by Rhodi;§ in the Renal Vein, as occurred to Fabrice ab Aquapendente;‖ and in the Lower Vena Cava, as in the case of Spigel.¶ In whatever system of Vessels however the Ova, whether directly absorbed from without, or received in the course of circulation, at length become developed, it is pretty obvious that the Animals must in general there remain, their size being for the most part incompatible with any ulterior change of situation; and when we remember, on the

* Du Verney. Hist. de l'Acad. 1700.

† Misc. Cur. Decur. I. Ann. 3. Obs. 100.

‡ Treutler. Auctuarium, p. 23.

§ Rhodius. Obs. Med. Cent. III. Obs. 62.

‖ Ibid. Obs. 61.

¶ Spigelius. De Corp. Hum. Fab. Lib. V. c. 13.

one hand, that Veins alone, and not Arteries, absorb from exposed surfaces, and, on the other, that any given portion of blood, in the course of circulation, abides perhaps from four to six times longer in the Veins than in the Arteries—affording thus a proportional greater chance of the Ova becoming there developed—we shall be at no loss to explain why such Animals should be so much more frequently found in the former set of Vessels, than in the latter.

I have adduced further, as arguments that the Animals found in Veins are not the proper Entozoa of the parts, not only that they have often the characters of the Larvæ of well known Animals, but also that they have been hardly in any two instances precisely alike. Thus we find them described at one time as one-sixth of an inch,* at another as two inches,†

* Treutler. Auctuarium, p. 23.

† Spigelius. De Corp. Hum. Fab. Lib. V. c. 13.

at a third as a span,* and at a fourth as no less than a foot in length.† Sometimes again they are cylindrical,‡ at others flattened, § and at others hydatidiform or spheroidal.‖ They are frequently described also as red, or reddish, a colour which the true Parasites of the Human body, as remarked by Mr Rhind, never have ; ¶ and sometimes as having black heads, which is characteristic of the Larvæ of many Insects, but never met with in the proper Entozoa of Man. Sometimes moreover, as in my own case, and in the Animals described by Borelli,** they appear to have distinct respiratory siphons, which, as likewise observed by Mr Rhind, the proper Parasites never display ; and sometimes, lastly, they are said to be winged,††

* Rhodius. Obs. Med. Cent. III. Obs. 61.

† Andry. Sur la Generation des Vers, &c. Chap. 3.

‡ Spigelius. De Corp. Hum. Fab. Lib. V. c. 13.

§ Treutler. Auctuarium. p. 23.

‖ Peyer. Misc. Cur. Decur. I. Ann. 7. Obs. 206.

¶ Page 9.

** Borellius. Obs. Med. Phys. Obs. 4.

†† Andry. Sur la Generation des Vers, &c. Chap. 3.

which is still more foreign to the character of the Entozoa.

But it may be asked if many persons habitually use the same ingesta, for example drink of the same water, abounding probably in the Ova in question, how is it to be explained that in comparatively so very few cases they enter the Veins, and become there developed, so as to give rise to Animals in these Vessels?

I might, perhaps, answer this question by saying that, in these few cases—presuming that such Ova always enter the Veins—the character of the blood is in all probability such as to favour, while, in all others, it prevents their developement; in the same way as in persons constitutionally affected with the Morbus Pedicularis, the Secretions of the surface are such as to promote, while, in other persons, they oppose the developement of Ova, to which all are alike exposed. But there is another, and probably a better way of explaining this

circumstance; and that is upon the presumption that it is only in certain cases that Ova, received into the Stomach and other open passages, are ever absorbed into the Veins. It is a singular fact that, in many of the instances related of the presence of Animals in the Veins, they have been found, either after death, or when death was near at hand. Thus, in the case of Senault, mentioned by Andry,* and in that of the Marquess, related in the Ephemirides,† they were found in blood drawn only two days before death; and, in the case of the young man described by Le Clerc,‡ in that drawn on the very day on which the patient died; in my own case also, the boy was almost in a hopeless state at the time the Worms displayed themselves.

Now it is supposed by Le Clerc that, in these instances, owing to the relaxation of

* Andry. Sur la Generation des Vers, &c. Chap. 3.

† Misc. Cur. Decur I. Ann. 2. Obs. 154.

‡ D. Clericus. Hist. Lat. Lum. c. 13.

the parietes of the Vessels, the Animals in question make their way into them from the surrounding Tissues;* but, as the said Animals, already developed, are not to be met with in such Tissues, and as no apertures for their admission are to be found in the coats of the Veins, may we not believe that this relaxation is of their radicles, rather than of their parietes, and that it favours the absorption of the Ova of such Animals, rather than allows of the forcible irruption of the ready-made Worms, the character of the blood being, at the same time, probably such as to promote their speedy developement? To me it appears that the above differences of circumstances, either alone or in conjunction, are abundantly sufficient to explain away any objection to the doctrine that such Animals always originate in absorbed Ova, founded on their very partial occurrence under circumstances of general exposure. I must not omit to repeat however, that Rudolphi,

* D. Clericus. Hist. Lat. Lum. c. 13.

Bremser and others are very sceptical respecting the presence of Animals in the Veins, either as the proper Entozoa of the Vessels—although from having, in some instances, given them "a local habitation and a name," they virtually admit them into the fraternity—or as developed from Ova; and accordingly in the case related by Treutler*—the only one which they seem to think worthy of any serious attention—they ascribe the presence of the Worms found in the Vein to the entrance into it of some of the Planariæ, from the water in which the youth was bathing.†

I do not mean to question the possibility, or even the probability, of such an event having occurred in this instance; but my own case has satisfied me that a little more confidence in cases of this description in general, would not have been misplaced,

* Treutler. Auctuarium. p 23.

† Rudolphi. Entozoorum Hist. Vol. I. p. 352, Note *
Bremser. Sur. les Vers Intestinaux.

while it might have prevented them from adopting, in this solitary instance, an explanation which is manifestly inapplicable to many others equally entitled to credit.

In like manner it is believed by Rudolphi that, in the numerous cases, both seen by himself and recorded by others, of Animals found in the Aneurysmatic Arteries of many Quadrupeds, these Animals were originally formed in Tubercles or Sacs attached to the outer surface of the Vessel, whence they made their way, in some manner, through its coats.* This hypothesis however has been proved by Hodgson to be erroneous ; the parietes of the Artery being frequently quite imperforated, and no such Tubercles or Sacs existing in its neighbourhood.† Hodgson conceives that the Animals are, in these cases, the *cause* of the disease ; but, for my own part, I am

* Rudolphi. Entozoorum. Hist. Vol. I. p. 437, &c.

† Hodgson. Dis. of Art. and Veins. Appendix.

induced by many considerations to regard them as rather the proper Entozoa of the Organ in question, and, like the hypertrophy of the Vessel, and the Lymph and Pus, with which they are so generally found conjoined, as the *result* of a new Secretion from an inflammed surface. Upon this subject however I must content myself with referring to what I have already said when speaking of the proper Intestinal Parasites; the question appertaining, not to the Animals found in the Veins of Man, but to those found in the Arteries of the lower Animals, and being therefore only indirectly connected with the proper business of the present Essay. The obvious error of Rudolphi however, with respect to the nature of these cases, may serve to throw additional doubt over the justness of his conclusions with respect to that of the cases previously alluded to.

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