their figure, eſpecially when the liquor began to evaporate *.

On all theſe accounts, Mr. Needham conjectured, that the pretended ſpermatic animals were only a kind of natural machines, bodies much more ſimply organized than thoſe of real animals. I examined the machines of the calmar along with him, and the reader may be aſſured that his deſcription of them is both exact and faithful. His experiments, therefore, demonſtrate, that the ſeminal fluid conſiſts of particles in queſt of organization; that, in fact, it produces organized bodies; but that theſe bodies are not animals, nor ſimilar to the individual which produces them. It is indeed, probable, that theſe organized bodies are only a kind of inſtruments for perfecting the ſemen, and beſtowing on it an active force; and that it is by their internal action that they intimately penetrate the ſeminal fluid of the female.

* See Leeuwenh. Arc. nat. p. 306, 309, and 319.

CHAP. VII.

Compariſon of my own Experiments with thoſe of Leeuwenhoek.

THOUGH my experiments were made with all the attention of which I was capable, and though I often repeated them, I am ſatisfied that many things muſt have eſcaped me. I have deſcribed only what I ſaw, and what every man may ſee, at the expence of a little art and patience. To free myſelf from prejudice, I even attempted to forget what other obſervers pretended to have ſeen, endeavouring, by this means, to be certain of ſeeing nothing but what really appeared; and it was not till I had digeſted my experiments, that I wiſhed to compare them with thoſe of former writers, and particularly with thoſe of Leeuwenhoek, who had occupied himſelf more than 60 years in experiments of this kind.

Whatever authority may be due to this acute obſerver, it is certainly allowable to inſtitute a compariſon between a man's own obſervations, and thoſe of the moſt reſpectable writer on the ſame ſubject. By an examination of this kind,

truth may be eſtabliſhed, and errors may be detected, eſpecially when the only object of inquiry is to aſcertain the genuine nature of thoſe moving bodies which appear in the ſeminal fluids of all animals.

In the month of November 1677, Leeuwenhoek, who had formerly communicated many microſcopic obſervations to the Royal Society of London, concerning the juices of plants, the texture of trees, the optic nerve, rain water, &c. writes to Lord Brouncker, preſident of the Society, in the following terms: 'Poſtquam * Exc. 'Dominus Profeſſor Cranen me viſitatione ſua 'ſæpius honorarat, litteris rogavis Domino Ham 'cognato ſuo, quaſdam obſervationum mearum 'videndas darem. Hic Dominus Ham me ſe'cundo inviſens, ſecum in laguncula vitrea ſemen 'viri, gonorrhœa laborantis, ſponte deſtillatum, 'attulit, dicens, ſe poſt pauciſſimas temporis mi'nutas (cum materia illa jam in tantum eſſet 'reſoluta ut fiſtulæ vitreæ immitti poſſet) ani'malcula viva in eo obſervaſſe, quæ caudam et 'ultra 24 horas non viventia judicabat: Idem 'referebat ſe animalcula obſervaſſe mortua poſt 'ſumptam ab ægroto therebintinam. Materi'am prædicatam fiſtulæ vitreæ immiſſam, præ'ſente Domino Ham, obſervavi, quaſdamque in 'ea creaturas viventes, ac poſt decurſum 2 aut 3 'horarum eamdem ſolus materiam obſervans, 'mortuas vidi.

* See Phil. Tranſ. No. 141. p. 1041.

'Eamdem

'Eamdem materiam (ſemen virile) non æ'groti alicujus, non diuturna conſervatione cor'ruptam, vel poſt aliquot momenta fluidiorem 'factam, ſed ſani viri ſtatim poſt ejectionem, ne 'interlabentibus quidem ſex arteriæ pulſibus, 'ſæpiuſculè obſervavi, tantamque in ea viven'tium animalculorum multitudinem vidi, ut in'terdum plura quam 1000 in magnitudine are'næ ſeſe moverent; non in toto ſemine, ſed 'in materia fluida craſſiori adhærente, ingen'tem illam animalculorum multitudinem obſer'vavi; in craſſiori vero ſeminis materia quaſi 'ſine motu jacebant, quod inde provenire mihi 'imaginabar, quod materia illa craſſa ex tam va'riis cohæreat partibus, ut animalcula in ea ſe 'movere nequirent; minora globulis ſanguini 'ruborem adferentibus hæc, animalcula erant, 'ut judicem, millena millia arenam grandiorem 'magnitudine non æquatura. Corpora eorum 'rotunda, anteriora obtuſa, poſteriora ferme in 'aculeum deſinentia habebant; cauda tenui lon'gitudine corpus quinquies ſexieſve excedente, 'et pellucida, craſſitiem vero ad 25 partem cor'poris habente, prædita erant, adeo ut ea quo 'ad figuram cum cyclaminis minoribus, longam 'caudam habentibus, optime comparare queam: 'Motu caudæ ſerpentino, aut ut anguillæ in 'aqua natantis, progrediebantur; in materia vero 'aliquantulum craſſiori caudam octies decieſve 'quidem evibrabant antequam latitudinem capilli 'procedebant. Interdum imaginabar me inter-

'noſcere

'noſcere poſſe adhuc varias in corpore horum 'animalculorum partes, quia vero continuo eas 'videre nequibam, de iis tacebo. His animal-'culis minora adhuc animalcula, quibus non niſi 'globuli figuram attribuere poſſum, permiſta 'erant.

'Memini me, ante tres aut quatuor annos, ro-'gatu Domini Oldenburg B. M. ſemen verile ob-'ſervaſſe, et prædicta animalia pro globulis ha-'buiſſe; ſed quia faſtidiebam ab ulteriori inqui-'ſitione, et magis quidem a deſcriptione, tunc 'temporis eam omiſi. Jam quoad partes ipſas, 'ex quibus craſſam ſeminis materiam, quoad 'majorem ſui partem conſiſtere ſæpius cum ad-'miratione obſervavi, ea ſunt tam varia ac multa 'vaſa, imo in tanta multitudine hæc vaſa vidi, 'ut credam me in unica ſeminis gutta plura ob-'ſervaſſe quam anatomico per integrum diem 'ſubjectum aliquod ſecanti occurrant. Quibus 'viſis, firmiter credebam nulla in corpore hu-'mano jam formato eſſe vaſa, quæ in ſemine 'virili bene conſtituto non reperiantur. Cum 'materia hæc per momenta quædam aëri fuiſſet 'expoſita, prædicta vaſorum multitudo in aquo-'ſam magnis oleaginoſis globulis permiſtam ma-'teriam mutabatur,' &c.

The ſecretary of the Royal Society replied to this letter of Leeuwenhoek, that it would be proper to make ſimilar experiments on the ſemi-nal fluids of other animals, not only to ſupport the original diſcovery, but to diſtinguiſh what-ever differences might appear in the number and figure

figure of the animalcules: And, with regard to the vaſcular texture of the thick part of the ſe-minal fluid, he ſuſpected that it was only a con-geries of filaments, without any regular organi-zation: 'Quæ tibi videbatur vaſorum congeries, 'fortaſſis ſeminis ſunt quædam filamenta, haud 'organice conſtructa, ſed dum permearunt vaſa 'generationi inſervientia in iſtiuſmodi figuram 'elongata. Non diſſimili modo ac ſæpius no-'tatus ſum ſalivam craſſiorem ex glandularum 'faucium foraminibus editam, quaſi e convolutis 'fibrillis conſtantem*.'

Leeuwenhoek replied, 18th March 1678, in the following words: 'Si quando canes cœunt 'marem a fœmina ſtatim ſeponas, materia quæ-'dam tenuis et aquoſa (lympha ſcilicet ſperma-'tica) a pene ſolet paulatim exſtillare; hanc 'materiam numeroſiſſimis animalculis repletam 'aliquoties vidi, eorum magnitudine quæ in 'ſemine virili conſpiciuntur, quibus particulæ 'globulares aliquot quinquagies majores permi-'ſcebantur.

'Quod ad vaſorum in craſſiori ſeminis virilis 'portione ſpectabilium obſervationem attinet, 'denuo non ſemel iteratam, ſaltem mihimetipſi 'comprobaſſe videor; meque omnino perſuaſum 'habeo, cuniculi, canis, felis, arterias venaſve 'fuiſſe a peritiſſimo anatomico haud unquam 'magis perſpicue obſervatas, quam mihi vaſa in 'ſemini virili, ope perſpicilli, in conſpectum 'venere.

* See Phil. Tranſ. No. 141. p. 1043.

'Cum mihi prædicta vaſa primum innotuere, 'ſtatim etiam pituitam, tum et ſalivam perſpi- 'cillo applicavi; verum hic minime exiſtentia 'animalia fruſtra quæſivi.

'A cuniculorum coitu lymphæ ſpermaticæ 'guttulam unam et alteram, e femella extillan- 'tem, examini ſubjeci, ubi animalia prædicto- 'rum ſimilia, ſed longe pauciora, comparuere. 'Globuli item quam plurimi, plerique magnitu- 'dine animalium, iiſdem permiſti ſunt.

'Horum animalium aliquot etiam delinea- 'tiones tranſmiſi; figura, 1. [pl. VI. fig. 1.] ex- 'primit eorum aliquot vivum (in ſemine cuni- 'culi arbitror) eaque forma qua videbatur, dum 'aſpicientem me verſus tendit. A B C, capitu- 'lum cum trunco indicant; C D, ejuſdem cau- 'dam, quam pariter ut ſuam anguilla inter na- 'tandum vibrat. Horum millena millia, quan- 'tum conjectare eſt, arenulæ majoris molem vix 'ſuperant. [Pl. VI. fig. 2. 3. 4.] ſunt ejuſdem 'generis animalia, ſed jam emortua.

'[Pl. VI. fig. 5.] delineatur vivum animalcu- 'lum quemadmodum in ſemine canino ſeſe ali- 'quoties mihi attentius intuenti exhibuit. E F G, 'caput cum trunco indigitant, G H, ejuſdem 'caudam. [Pl. VI. fig. 6. 7. 8.] Alia ſunt in 'ſemine canino quæ motu et vita privantur, 'qualium etiam vivorum numerum adeo in- 'gentem vidi, ut judicarem portionem lymphæ 'ſpermaticæ arenulæ mediocri reſpondentem, 'eorum ut minimum decena millia continere.'

In

In another letter to the Royal Society, dated May 31, 1678, Leuwenhoek adds, 'Seminis 'canini tantillum microſcopio applicatum iterum 'contemplatus ſum, in eoque antea deſcripta 'animalia numeroſiſſime conſpexi. Aqua plu- 'vialis pari quantitate adjecta, iiſdem confeſtim 'mortem accercit. Ejuſdem feminis canini por- 'tiuncula in vitreo tubulo unciæ partem duo- 'decimalem craſſo ſervata, ſex et triginta hora- 'rum ſpatio contenta animalia vita deſtituta ple- 'raque, reliqua moribunda videbantur.

'Quo de vaſorum in ſemine genitali exiſten- 'tia magis conſtaret, delineationem aliqualem 'mitto, ut in figura A B C D E [pl. VI. fig. 9.] 'quibus literis circumſcriptum ſpatium arenulam 'mediocrem vix ſuperat.'

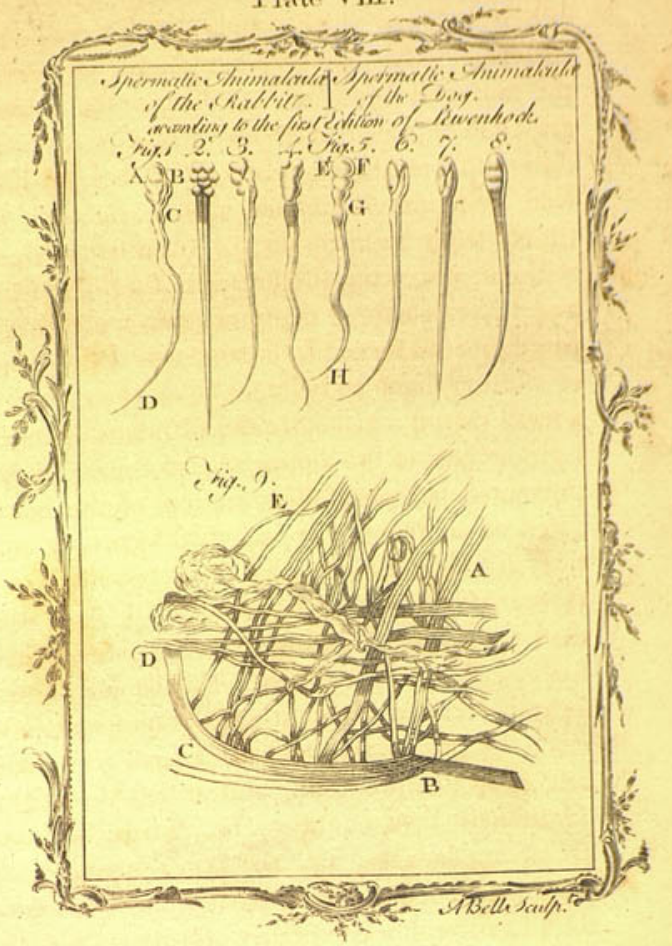
I have tranſcribed theſe paſſages from the Philoſophical Tranſactions, becauſe they firſt appeared in that work, before Leeuwenhoek had formed any theory; and, therefore, they muſt be more agreeable to truth. After the ingenious author had formed a ſyſtem of generation, his account of the ſpermatic animals varies, even in eſſential articles*.

In the firſt place, what he ſays concerning the number of theſe pretended animalcules is true; but the figure of their bodies correſponds not always to his deſcription. Sometimes the end

* Here the author attempts a formal proof that Leeuwenhoek invented the ſingle microſcope, and diſcovered the exiſtence of ſpermatic animals, before Hartſoeker, which interrupts the argument, is nowiſe intereſting to the reader, and therefore I have here omitted it in the tranſlation.

next the tail is globular, and ſometimes cylindrical; ſometimes it is flat, and at other times it is broader than long, &c. With regard to the tail, it is often thicker and ſhorter than he repreſents. The vibratory motion he aſcribes to the tail, and by which he alledges the animals are enabled to proceed forward, I never could diſtinguiſh in the manner he deſcribes. I have ſeen theſe moving bodies vibrate eight or ten times, from right to left, or from left to right, without advancing the breadth of a ſingle hair: and I have obſerved many of them which never could proceed forward, becauſe this tail, in place of aſſiſting them to ſwim, was, on the contrary, a ſmall thread attached to the filaments or mucilaginous part of the liquor, and, of courſe, totally prevented the progreſſive motion of the body. Even when the tail appeared to have any motion, it reſembled only the ſmall bendings of a thread at the end of a vibration. I have ſeen theſe threads or tails fixed to the filaments, which Leeuwenhoek calls veſſels: I have ſeen them ſeparate from the filaments, after repeated efforts made by the moving bodies: I have ſeen them firſt long, then diminiſh, and at laſt diſappear. Thus theſe tails ought to be regarded as accidental appendages, and not as real members of the moving bodies. But, what is more remarkable, Leeuwenhoek expreſsly affirms, in his letter to Lord Brouncker, that, beſides the tailed animals, he obſerved in this liquor animalcules ſtill more minute that had no tails, and were perfectly

Plate VIII.



perfectly globular: ‘ His animalculis (caudatis ‘ ſcilicet) minora adhuc animalcula, quibus non ‘ niſi globuli figuram attribuere poſſum, per- ‘ miſta erant.’ This is the truth. After Leeuwenhoek, however, had maintained that theſe animalcules were the only efficient principle of generation, and that they were transformed into men, he regards as real animals thoſe only which had tails; and, accordingly, as it was neceſſary that animalcules, to be transformed into men, ſhould have a conſtant and invariable figure, he never afterwards mentions the round animals without tails. I was ſtruck with the difference between the original compoſition of this letter, and the form in which it appeared twenty years afterwards in his third volume: For, inſtead of the words which we have juſt now quoted, we meet with the following in page 63: ‘ Animalculis hiſce permiſtæ jacebant ‘ aliæ minutiores particulæ, quibus non aliam ‘ quam globulorum ſeu ſphæricam figuram aſ- ‘ ſignare queo.’ This is a very different account of the matter. A particle of matter, to which he aſcribes no motion, is extremely different from an animalcule. It is aſtoniſhing that Leeuwenhoek, in copying his own letter, ſhould have changed an article of ſo much conſequence. What he immediately ſubjoins likewiſe merits attention. He ſays, that, at the intreaty of Mr. Oldenburg, he had examined this liquor three or four years ago; and that he then imagined theſe animalcules to be globules. Thus, theſe

pretended animalcules are ſometimes globules without any ſenſible motion; ſometimes they are globules which move with great activity; ſometimes they have tails, and ſometimes no tails. Speaking of ſpermatic animals in general, he remarks*, 'Ex hiſce meis obſervationibus cogitare 'cœpi, quamvis antehac, de animalculis in ſemi-'nibus maſculinis agens, ſcripſerim me in illis 'caudas non detexiſſe, fieri tamen poſſe ut illa 'animalcula æque caudis fuerint inſtructa, ac 'nunc comperi de animalculis in gallorum gal-'linaceorum ſemine maſculino:' Another proof that he has often ſeen ſpermatic animals of all kinds, without tails.

Secondly, It is worthy of remark, that Leeuwenhoek had very early diſcovered the filaments which appear in the ſemen before it be liquified; and that, at that time, when he had not conceived his hypotheſis concerning the ſpermatic animals, he imagined the filaments to be veins, nerves, and arteries. He firmly believed, that all the parts and veſſels of the human body might be clearly diſtinguiſhed in the ſeminal fluid. He even perſiſted in this opinion, notwithſtanding the repreſentations made to him by Mr. Oldenburg, in name of the Royal Society. But, after he conceived the notion of transforming his ſpermatic animals into men, he never again takes any notice of theſe veſſels. Inſtead of regarding them as the nerves and blood-veſ-

* Tom. iii. p. 371.

ſels

ſels of the human body already formed in the ſemen, he does not even aſcribe to them their real function, which is the production of the moving bodies. He obſerves*, 'Quid fiet de 'omnibus illis particulis ſeu corpuſculis præter 'illa animalcula ſemini virili hominum inhæ-'rentibus! Olim et priuſquam hæc ſcriberem, 'in ea ſententia fui prædictas ſtrias vel vaſa ex 'teſticulis principium ſecum ducere,' &c. And, in another place, he ſays, that what he had formerly remarked concerning veſſels in the ſemen deſerved no attention.

Thirdly, If we compare the figures 1. 2. 3. and 4. pl. VIII. IX. which we have repreſented exactly as they appear in the Philoſophical Tranſactions, with thoſe which Leeuwenhoek cauſed to be engraved ſeveral years after, we ſhall find very great differences, eſpecially in thoſe of the dead animalcules of the rabbit, 1. 3. and 4. and in thoſe of the dog, which I have alſo delineated, in order to give a diſtinct idea of the matter. From all this, it may fairly be concluded, that Leeuwenhoek has not always ſeen the ſame phænomena; that the moving bodies, which he regards as animals, have appeared to him under different forms; and that he has contradicted himſelf with a view to make the ſpecies of men and of animals uniform and conſiſtent. He not only varies as to the fundamental part of theſe experiments, but alſo as to the manner of mak-

* Tom. i. p. 7.

ing

ing them; for he expreſsly tells us, that he always diluted the ſemen with water, to ſeparate its parts, and to give more freedom of motion to the animalcules*; and yet, in his firſt letter to Lord Brouncker, he ſays, that, when he mixed the ſemen of dogs, in which he before had ſeen innumerable animals, with water, they all inſtantly died. Thus Leeuwenhoek's firſt experiments were made, like mine, without any mixture; and it appears, that he was not in uſe to mix the liquor with water till long after he began his experiments, and till he conceived the idea that water killed the animalcules; which, however, is not true; I imagine that the addition of water only diſſolves the filaments too ſuddenly; for, in all my experiments, I have ſeen but very few filaments in the liquor, after its being mixed with water.

Leeuwenhoek was no ſooner perſuaded that the ſpermatic animalcules were transformed into men and other animals, than he imagined that he ſaw two diſtinct kinds in the ſemen of every animal, the one male and the other female. Without this difference of ſex in the ſpermatic animalcules, it was difficult, he ſays, to conceive the poſſibility of producing males and females by ſimple transformation. He mentions theſe male and female animalcules in his letter publiſhed in the Philoſophical Tranſactions, No. 145. and in ſeveral other places †. But he attempts not to

* Tom. iii. p. 92, 93.

† See tom. i. p. 163. and tom. iii. p. 101. of his works.

deſcribe

deſcribe the differences between the male and female animalcules, which never exiſted but in his own imagination.

The famous Boerhaave having aſked Leeuwenhoek, whether he had obſerved any differences in the growth and ſize of ſpermatic animals? Leeuwenhoek replied, that, in the ſemen of a rabbit which he had opened, he ſaw an infinite number of animalcules: 'Incredibilem,' ſays he, 'viventium animalculorum numerum 'conſpexerunt, cum hæc animalcula ſcypho 'impoſita vitreo et illic emortua, in rariores or- 'dines diſpareſſent, et per continuos aliquot dies 'ſæpius viſu examinaſſem, quædam ad juſtam 'magnitudinem nondum excreviſſe adverti. Ad 'hæc quaſdam obſervavi particulas perexiles et 'oblongas, alias aliis majores, et, quantum ocu- 'lis apparebat, cauda deſtitutas; quas quidem 'particulas non niſi animalcula eſſe credidi, quæ 'ad juſtam magnitudinem non excreviſſent*.' Here we have animalcules of different ſizes, and ſome with tails, and others that had no tails, which better correſpond with my experiments than with Leeuwenhoek's ſyſtem. We only differ in a ſingle article. He conſiders the oblong bodies without tails as young animalcules which have not yet arrived at their full growth: But I, on the contrary, have ſeen theſe pretended animals originally ſpring from the filaments with their tails or threads, which they gradually loſt.

* See tom. iv. p. 280, 281.

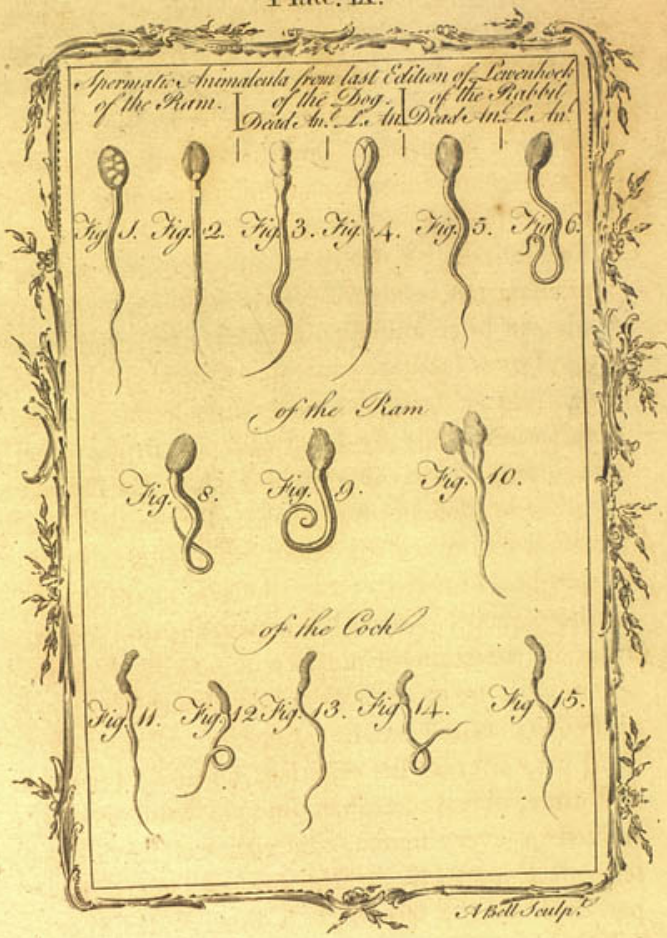
In

In the ſame letter to Boerhaave he ſays*, that, in the ſemen of a ram he obſerved the animalcules marching in flocks like ſheep: 'A tribus 'circiter annis teſtes arietis, adhuc calentes, ad 'ædes meas deferri curaveram; cum igitur ma- 'teriam ex epididymibus eductam, ope micro- 'ſcopii contemplarer, non ſine ingente voluptate 'advertebam animalcula omnia, quotquot inna- 'tabant ſemini maſculino, eundem natando cur- 'ſum tenere, ita nimirum ut quo itinere priora 'prænatarent, eodem poſteriora ſubſequerenter, 'adeo ut hiſce animalculis quaſi ſit ingenitum, 'quod oves factitare videmus, ſcilicet ut præce- 'dentium veſtigiis grex univerſus incedat.' This obſervation made by Leeuwenhoek in the year 1713, and which he regarded as new and ſingular, is a ſufficient proof that he had never ſo attentively examined the ſeminal fluids of animals as to enable him to give exact deſcriptions of them. In the year 1713, he was 71 years of age: He had been in the conſtant practice of making experiments with the microſcope for 45 years: He continued to publiſh his obſervations during 36 years: And yet, after all his practice, he now, for the firſt time, obſerved a phænomenon which is exhibited in every ſemen, and which I have deſcribed, Exper. IX. in the human ſemen, Exper. XII. in the ſemen of a dog, and Exper. XXIX. in the ſemen of a bitch. To explain the moving of the animalcules of the ram in flocks,

* Tom. iv. 28.

therefore,

Plate. IX.



therefore, it is unneceſſary to ſuppoſe them endowed with the natural inſtinct peculiar to ſheep; ſince thoſe of man, of the dog, and of the bitch, move in the very ſame manner; and ſince this motion depends upon particular circumſtances, the principal of which is, that the fluid part of the ſemen ſhould be on one ſide, and the thick or filamentous part on the other; for then the whole moving bodies diſengage themſelves from the filaments, and proceed, in the ſame direction, into the more fluid part of the liquor.

In another letter, written the ſame year, and addreſſed to Boerhaave*, he relates ſome farther obſervations concerning the ſemen of the ram: He tells us, that, when the liquor was put into ſeparate glaſſes and examined, he obſerved flocks of animalcules moving all in the ſame direction, and other flocks returning the contrary way. He adds: 'Neque illud in unica epididymum 'parte, ſed et in aliis quas præcideram partibus, 'obſervavi. Ad hæc, in quadam paraſtatarum 'reſecta portione complura vidi animalcula, quæ 'necdum in juſtam magnitudinem adoleverant; 'nam et corpuſcula illis exiliora et caudæ triplo 'breviores erant quam adultis. Ad hæc, caudas 'non habebant deſinentes in mucronem, quales 'tamen adultis eſſe paſſim comperio. Præterea, 'in quandam paraſtatarum portionem incidi, 'animalculis, quantum diſcernere potui, deſtitu-'tam, tantum illi quædam perexiguæ inerant

* See tom. iv. p. 304.

'particulæ,

'particulæ, partim longiores partim breviores; 'ſed altera ſui extremitate craſſiunculæ; iſtas 'particulas in animalcula tranſituras eſſe non du- 'bitabam.' From this paſſage, it is apparent that Leeuwenhoek had ſeen in this ſeminal liquor, what I have found in the ſemen of all the animals which I examined, moving bodies that differed in ſize, figure, and motion; and theſe circumſtances, it is obvious, correſpond better with the notion of organic particles in motion, than with that of real animals.

It appears, therefore, that Leeuwenhoek's obſervations, though he draws very different concluſions from them, perfectly correſpond with mine: And, though there be ſome oppoſition in the facts, I am fully perſuaded, that, whoever ſhall take the trouble of repeating the experiments, will eaſily diſcover the ſource of theſe differences, and find that I have related nothing but truth. To enable the reader to decide in this matter, I ſhall add a few remarks:

We do not always ſee, in the human ſemen, the filaments I have mentioned: For this purpoſe, the liquor muſt be examined the moment it is extracted from the body; and even then they do not uniformly appear. When the liquor is too thick, it preſents nothing but large globules, which may be diſtinguiſhed with a common lens. When examined with the microſcope they have the appearance of ſmall oranges; they are very opaque, and one of them occupies

pies the whole field of the microſcope. The firſt time I obſerved theſe globules, I imagined them to be foreign bodies which had fallen into the liquor. But, after examining different drops, I found that the whole liquor was compoſed of theſe large globules. I obſerved one of the largeſt and roundeſt of them for a long time. At firſt it was perfectly opaque: A little after, I perceived on its ſurface, about half way between the centre and circumference, a beautiful coloured luminous ring, which continued more than half an hour, then gradually approached the centre, which became clear and coloured, while the reſt of the globule remained opaque. This light, which illuminated the centre, reſembled that which appears in large air-bubbles. The globule now began to grow flat, and to have a ſmall degree of tranſparency: And after obſerving it for three hours, I could perceive no other change, no appearance of motion, either internal or external. I imagined that ſome change might happen by mixing the liquor with water. The globules were indeed changed into a tranſparent homogeneous fluid, which preſented nothing worthy of remark. I left the ſemen to liquify of its own accord, and examined it at the diſtance of 6, 12, and 24 hours; but found nothing like life or motion. I relate this experiment to ſhow, that the ordinary phænomena are not always to be expected in ſeminal fluids, though they be apparently ſimilar.

Sometimes all the moving bodies have tails, eſpecially in the ſemen of man, and of the dog; their motion is not then very rapid, and appears to be performed with difficulty. If the liquor be allowed to dry, the tails or threads are firſt deprived of motion; the anterior extremity continues to vibrate for ſome time, and then all motion ceaſes. Theſe bodies may be long preſerved in this ſtate; and, if a ſmall drop of water be then poured upon them, their figure changes; they fall down into ſeveral minute globules, which appear to have a ſmall degree of motion, ſometimes approaching each other, and ſometimes trembling, and turning round their centres.

The moving bodies in the human ſemen, and in thoſe of the dog and bitch, reſemble each other ſo ſtrongly, that it is not eaſy to diſtinguiſh them, eſpecially when examined immediately after they are taken from the body of the animal. Thoſe of the rabbit appear to be ſmaller and more active. But theſe differences and reſemblances proceed more from the different ſtates of the fluids during the time of examination, than from the nature of the fluids themſelves, which ought indeed to be different in different ſpecies of animals: For example, in the human fluid, I have remarked large filaments, as repreſented in pl. III. fig. 3. &c. and I have ſeen the moving bodies ſeparate from theſe filaments, from which they appeared to derive their origin. But I could perceive nothing of this kind in the ſemen

ſemen of the dog. Inſtead of diſtinct filaments, it is generally compoſed of a compact mucilage, in which we with difficulty perceive ſome filamentous parts; and yet this mucilage gives birth to moving bodies ſimilar to thoſe in the human ſemen.

The motion of theſe bodies continues longer in the fluid of the dog, than in that of man, which enables us more eaſily to diſtinguiſh the change of form above remarked. The moment the fluid iſſues from the body of the animal, we find moſt of the animalcules poſſeſſed of tails. In 12, 24, or 36 hours afterwards, almoſt the whole tails diſappear; we then perceive only oval bodies moving about, and generally with more rapidity than at firſt.

The moving bodies are always below the ſurface of the liquor. Several large tranſparent air-bubbles commonly appear on the ſurface: but they have no motion, unleſs when the liquor is agitated. Below the moving bodies we often perceive others ſtill more minute: Theſe have no tails; but moſt of them move: And, in general, I have remarked, that, of the numberleſs globules in all theſe liquors, the ſmalleſt are generally blacker and more obſcure than the others; and that thoſe which are extremely minute and tranſparent have little or no motion. They ſeem likewiſe to have more ſpecific gravity; for they are always ſunk deepeſt in the fluid.