Insanity in its public aspect : three of the Morison lectures for the year 1877 / by John Sibbald.

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Three of the MORISON LECTURES for the Year 1877.

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THE following pages contain the first three Lectures of the course delivered by me before the Royal College of Physicians of Edinburgh, in the year 1877, when I had the honour to hold the Morison Lectureship on Insanity. They appeared in the numbers of the Journal of Mental Science for July and October, 1877, and January, 1878. I had hoped to have continued the publication of the remaining three in the succeeding numbers of the Journal; but unforeseen circumstances prevented me from preparing them for the press; and the delay which has occurred would require them to be almost entirely rewritten to make them suitable for publication at the present date. I have therefore ventured to issue these three separately. They consist of an attempt to deal with the subject of insanity from what may be called the public, or social point of view, excluding all considerations of a purely scientific, medical, or legal nature. Any practical value they may possess lies in the degree of success with which they show it to be a natural result of the increasing complexity of our civilisation that we deal with the slighter departures from the normal mental condition as states of insanity; and that this is sufficient to account for much of the statistical basis on which the belief in a great recent increase of mental disease has been founded.

In the remaining Lectures, an attempt was made to discuss the medical relations of insanity, that is, viewing it as a disease; and also the relations of insanity to criminal law, that is, viewing it as a state of irresponsibility. I hope at some future time to be able to return to these aspects of the subject.

INSANITY IN ITS PUBLIC ASPECT.

Lecture I.—Insanity in Ancient Greece and Rome.

The first, and one of the most important, questions to be determined in dealing with the subject of insanity is the meaning which we ought to attach to the word insanity itself. The condition which the word is supposed to indicate has most important relations, both social and scientific. It is a frequent subject of popular discussion, and it forms an important element in many enquiries—philosophical, medical, and juridical. Speaking generally, it may be said that it invariably signifies a marked abnormality of mental condition. But it is frequently necessary that we should be able to form a much more precise idea of the degree as well as the kind of abnormality that it implies. And a very superficial examination is sufficient to show that the degree and the kind vary greatly, according to the point of view from which the subject is regarded.

It may perhaps seem inappropriate that I should occupy your attention in this place with the signification of the term in its popular acceptation; but I believe that it is of special importance to us as physicians that we should have a very complete appreciation of this aspect of the subject. In the discharge of many of our duties as private practitioners and as servants of the State, we have to take this popular idea carefully into consideration. And I think it is impossible to gain an intelligent view of any of the special relations of insanity without having first correctly appreciated

its position in regard to the community in general. I shall not be able to present a very sharply edged definition or description of this popular acceptation. The nature of the subject scarcely admits of it; for we find that the limits popularly assigned to the term have been both vague and shifting in character. To obtain a comprehensive view of it, we should, therefore, require to understand its historical development; we should have to examine the mode in which the idea first originated in the early history of civilisation, and to trace the steps of its development down to the present time. This historical examination is indispensable to a proper understanding of the form which many similar ideas have taken in the public mind. The ideas which we form of sanity and insanity, of virtue and vice, of purity and impurity, of luxury and hardship, of enlightenment and superstition, and even of good and evil, are more or less correlated to one another. And they have all received modifications of form or colour at different periods, when mingling with the stream of human thought in its progress onward from age to age. Sir George Cornewall Lewis, a most learned historian, as well as a most careful reasoner, insists strongly on the importance of the historical elements in such studies. In a letter to Mr. Grote he said, "It seems to me that there is too little *consensus* about elementary facts in the moral sciences for any abstract treatment to be of much avail; and I have come to the conclusion that an enlightened commentary upon historical data, well ascertained, is the best form in which instruction in such subjects can be presented to the public."*

It may be well to point out that a recognition of the changes which such ideas have undergone does not affect the question of whether or not they may also exist as typical ideas, based upon unchanging conditions, and, therefore, independent of historical development. It is sufficient for our present purpose, if we perceive that the *popular conception* of them must be an outcome of the thought of past generations, as well as a result of contemporary discussion and speculation. But it must not be supposed that the changes of conception in different periods were merely speculative or theoretical. They were also real and practical. Neither can they be considered as untrue when considered in relation to the changing

* Letter from G. C. Lewis to G. Grote, October 21, 1847. Life of Grote, 1873, p. 118.

circumstances of successive times. What would be properly regarded as virtue in a savage might be vice if manifested by a member of a highly civilised community. What is luxury in a tent becomes hardship in a town. And "preposterous would be the pedantry," as Isaac Taylor remarked, "of a writer who, in discoursing of Superstition or Enthusiasm, should confine himself to such a definition of those terms as might comport with the sense they bore centuries ago, in the minds of Lucian, Plutarch, Epictetus, or Aristotle." And if we were able to ascertain with accuracy the facts which bear on the history of the development of these ideas, we should not only have a fuller appreciation of their present position, but we should probably be able to perceive also in what direction their further development or modification is to be anticipated.

It would be very useful, therefore, if we could obtain a history of the idea of insanity in its relation to European civilisation. It is to be regretted, however, that the materials at our disposal for this purpose are but meagre; and I must ask you to accept what I lay before you as a very imperfect exhibition of them. I cannot pretend to have explored any recondite sources of information, and I can only hope to indicate the phases through which the idea has passed by a reference to the more salient points in its history. The problem which we have to solve is to ascertain the kind and degree of that mental abnormality which at different epochs was treated as insanity. It will, therefore, be necessary that we should start with a common understanding of what is implied by these words—"*treated as insanity.*" I, therefore, define the phrase as meaning—*subjected to such exceptional treatment on account of abnormal mental condition as, without holding the person legally responsible for that condition or its consequences, involves interference with his liberty, in order to save himself and others from injurious consequences.* It thus includes all abnormal mental conditions which society interferes with, except where criminal responsibility is in some way attributed to the persons who are affected by such conditions.

The classic civilisation of ancient Greece, so perfect in some of its features, so defective in others, presents us, in its annals, with only a fragmentary view of the idea which its public opinion had formed of the limits of insanity. But we must recognise, as is indicated by a very slight consider-

ation of the facts, that in this and all other periods we have two sets of ideas to deal with. One of these, whose variations are restricted within comparatively narrow limits, characterises the philosophic thought of the highest intellects; the other, whose variations are sometimes both rapid and important, characterises the views which are practically acted on by the community. The philosophic ideas may, in most cases, be found, when looked for in after years, clear and well defined, crystallized in the permanent literature of the epoch. But when we try to discover what have been the common ideas of the community, we must often be content with a mere inference from what seems to have been their effects, and what seems to have been the influences which have acted upon them. This separation of the enquiry into two channels, though more or less necessary for all periods, is peculiarly so in dealing with our knowledge of ancient Greece.

Very little light is thrown on the subject of insanity by that single reference to it in Homer, when the bard calls up the dim figure of Bellerophon—

> "Hated of all the gods, straying o'er Lycian plains,
> Eating his heart, and shunning the footsteps of his kind."

But that insanity existed in the same forms then as it does now, is abundantly evident from the descriptions of it which we find so admirably given by the dramatic writers. The pictures which they paint are excellent representations of some of those phases of insanity with which we are most familiar at the present day.*

We may select as typical of the phase most frequently delineated the representation of the insanity of Orestes by Euripides, in the Electra and in the Iphigenia. The hero is described as impelled by his sister's pleading, to avenge his royal father's death by the murder of his mother Clytemnestra, and he is seized with consequent remorse. This drifts rapidly into deep morbid depression, ending in an explosion of maniacal excitement. He is described by Electra as "sick," and "languishing upon his couch."

> "His mother's blood he shed has tortured him
> With madness; for—"

* I wish to record my obligation to Dr. Gasquet for the aid received from his papers on the Madmen of the Greek Theatre, in the numbers of this Journal for July, 1872, and six subsequent numbers up to April, 1874. I have in several instances availed myself of his excellent metrical translations.—J. S.

she says, in recognition of the Divine influence, whose vengeful action he had so impiously provoked—

"I may not speak of *them*,
The Gracious Ones, who hunt him down with fear.
Five days have passed since that his mother's corse,
But lately slain, was purified by fire.
These five days gone, he has not tasted food,
Nor washed; but hid within the coverlets.
If eased his body be from his disease,
He weeps in conscious grief. Then from his bed
He swiftly leaps, as bounds an unyoked steed."

During the fits of excitement, hallucinations of vision manifest themselves.

" O, mother, urge them not," he cries,
" The blood-faced furies, with the snaky hair;
There, there they stand, ready to leap on me."

In the Iphigenia, the herdsman describes Orestes as shouting—

" Pylades, sees't thou yonder Fury, and
Another hellish Dragon, who is armed
With fearful snakes, and strives to slay me too.
Ah, and that third one, breathing fire and death,
Bearing my mother in her arms, flies down
Towards yonder rock, which she would hurl at me.
Alas, she'll slay me. Whither shall I fly."

The herdsman then explains that nothing was visible of all the ghosts Orestes seemed to see.

"He but mistook the lowing of the kine,
And barking of the dogs, for sounds
Which we are told Furies are wont to utter.
We meantime, close together, silent sat,
As men about to die. For he drew forth
His sword, and, rushing on the cattle, smote
Them, like a lion, on their flanks, until
(For thus he thought to ward the Furies off)
A bloody foam rose on the very sea?"

* * * * *

"The fit of madness past, the stranger fell
With slaver dropping from his chin; while we
Seeing him timely fallen, did our best
By throwing stones to strike him; but his friend
Wiped off the slaver from his mouth, and sheltered him
By spreading out his garment—warded off
Each threatened blow, and gave him every care."

We have here a graphic description of a maniacal paroxysm preceded by a period of deep dejection, which we would now call melancholic. The ignorant herdsman is naturally alarmed at the symptoms; but Pylades, aware of

the objectless character of the violence, treats the patient with intelligent kindness. We might extend the illustrations of insanity to many other forms described or alluded to by the Greek writers. But it will be sufficient here to remind you of the old gentleman, who is described by Aristophanes in the "Wasps." His is a form of madness more troublesome than dangerous; and the case is an illustration of the fact that the Greeks were sometimes able to attribute to their true origin symptoms of mental disease which fell far short of wild fury, or speechless stupidity. The story also possesses a peculiar interest from its illustrating the kind of treatment popularly thought suitable to such a malady by Athenians who lived so early as the fifth century before Christ. The patient is thus described by one of his servants:—

"My master's madness, I can tell ye now, if ye be silent;
He loves the law courts more than ever mortal did before him,
And grieves if he can't get a place on the first bench of judges.
At night he gets no wink of sleep, and if perchance he doses,
His mind is always on the strain from watching for the time-glass,*
So used is he to hold the ballot ball, that when he rises
'Tis with three fingers joined as though about to offer incense;
And if he sees on any door chalked 'Demos is so handsome,'
He'll go and scribble by the side, 'O Voting Urn, how lovely!'

* * * * * * *

This is his madness, which, in spite of warnings, e'er increases;
We, therefore, keep him locked in here, from fear that he escape us.
His son has taken much to heart his father's strange disorder;
He sought to make him stay at home, by using moral suasion,
And failed, then had him bathed and purged; but all was unavailing."

We find among the stories told by Athenæus, in his Deipnosophists, those Alexandrian Noctes Ambrosianæ, an actual instance of a somewhat similar form of insanity, which was successfully subjected to medical treatment in the case of Thrasylaus, son of Pythodorus. This young man "was seized with such an insanity that he imagined all the ships which came into the Piræus were his own; reviewed, dismissed, and launched them; received those which arrived in port with as much joy as if he were the proprietor of the merchandise they brought home, of which if any were lost, he made no enquiry about it, but rejoiced greatly for whatever came safe. Thus," he is said to have "passed a life of much pleasure. But his brother Crito, returning from Sicily, had him secured, and put under the care of physicians. Being cured of his

* The κλεψύδρα.

insanity, he declared he had never before lived with so much satisfaction and pleasure, for he had had nothing to disturb him, and a multitude of things to afford him delight."

The most cultivated intellects of Athens seem generally to have concurred with Hippocrates in regarding mental derangement as a disease similar in its nature to bodily disease. "The evil humours of the body," says Plato, "may disorder the soul, producing manifold forms of melancholy and dejection, of rashness and cowardice, of obliviousness and ignorance." And the author of the Second Alcibiades, who, if not Plato himself, was an imitator who wrote what Plato was believed to think, represents Socrates as saying, "There are different kinds of unsoundness of mind. Those who are afflicted by it in the highest degree are called mad. Those in whom it is less pronounced are called wrongheaded and crotchety, or, as persons fond of smooth words would say, enthusiastic or excitable. Others are eccentric; others are known as innocents, incapables, dummies, or are called by other like names. All these kinds of unsoundness of mind differ from one another, just as diseases of the body do." The Stoics, whose school was influential in Greece, and became much more so afterwards under the Roman Empire, took a very broad view of the relations of abnormal mental states. They divided men into two classes, the wise and the foolish—just as sticks may be divided into straight and crooked sticks; and they called special attention to the fact, as it was neatly put by them, that very few sticks in this world are absolutely straight. We should not be justified, however, in suggesting that comprehensive conceptions such as these fairly indicated the practical ideas of the period in regard to insanity. "The general public of ancient Greece," as is remarked by Professor Mahaffy, "did not approach so nearly to the enlightenment of its intellectual leaders as our modern public does. We find, for example, in the ordinary life of Athens, cruelties and barbarities so violently in conflict with the humanity of a Socrates, a Euripides, or a Plato, as to astonish us and make us doubt our estimate of Attic culture." We have sufficient evidence to show that in one sense the Greek public was often disposed to take a broad view of insanity by regarding very harmless deviations from ordinary conduct as indicating its existence. An interesting illustration of this is afforded in the commission which Hippocrates received from Abdera to make inquisition into the mental state of the worthy

anatomist Democritus, who had caused anxiety to the inhabitants by his practice of dissecting the bodies of the lower animals.

But in the relation of insanity to supernatural influences, the philosophical and vulgar ideas were widely divergent. The madness of Orestes, Ajax, and other similar examples that are pourtrayed by the dramatists, is represented, in accordance with the popular belief, as being induced by the special interposition of Apollo, or some other divine power. But when used in the philosophic writings, such language seems generally to imply merely that madness was like all other mundane states, controlled by the supernatural machinery of gods and goddesses, who constituted the over-ruling providence of the classic mythology. In the general literature of Greece, we find the same phrases introduced, when ordinary disease, or any similar interruption of the ordinary course of events, is described in a rhetorical or poetic manner. But there were certain unmistakable, morbid, mental conditions, that were associated in the minds of the people with their religious rites. This was the case in the prophetic utterances at Delphi, and in the epidemic religious excitements when persons were supposed to be "*inspired or possessed.*" It was supposed to be under inspiration by Dionysus that the Bacchic maidens believed they drew milk and honey from the flowing river.

These associations must necessarily have prevented the less enlightened portion of the community from acquiring the really broad views which we find expressed in the philosophic writings. But there were two other circumstances which must have exercised a most important influence on public sentiment. These were, the frequent political disorganisations caused by war, and the existence of the class of slaves. The influence of such circumstances would necessarily be to divert attention from complicated political or philanthropic questions. It is seldom, if ever, indeed, that the public mind of a community makes any earnest attempts to solve difficult or complicated questions, until some practical necessity forces them inexorably on its attention. Experience has shown that the modes in which such practical necessity may arise in connection with insanity are, when questions of capacity or responsibility before the law require to be solved, and when public provision for the care and treatment of the insane requires to be made. The question of mental capacity did sometimes

require to be dealt with in ancient Athens; but it was only as part of the process whereby aged and infirm fathers might be stripped by their sons of every kind of power and authority. This proceeding, which seemed to be regarded in cultivated Athenian society as quite consistent with justice and filial duty, was frequently resorted to. But the inquiry which it involved was inspired rather by a wish to facilitate the complete removal of the feeble from power and influence, than from any desire to protect their rights. But even if such a desire had existed, or if there had been a demand for a system of jurisprudence, under which nice and exceptional questions of liberty or responsibility could be determined, a necessary condition for their practical development would have been a prolonged and uninterrupted period of political tranquility. It is obvious, also, that any comprehensive system of public benevolence, under which any public provision for the insane was possible, would have required a similar condition for its development. The frequent occurrence of devastating wars was therefore an insuperable obstacle to the directing of public attention in a practical manner to these subjects. It is evident, also, that the existence of slavery, if it were of the specially harsh form in which it was to be found in Sparta and some other localities, must have so familiarised the mind with cruelty and injustice, as to render impossible any public feeling of philanthropy. But even in Athens, in the age of Pericles, where slavery existed in a milder form, the indifference to the rights of others, always induced by the presence of a class recognised by law as servile, combined with the disregard of human life, which is begotten by the frequency of war, was sufficient to prevent public attention from being forcibly directed to what would probably appear to be, at such a time, evils of only minor importance.* It is indeed curious and instructive to observe how an extraordinary refinement of thought and manners is sometimes found compatible with a brutal ferocity of dispo-

* The number of slaves in the time of Pericles, in Athens, appears to have been 400,000, to a free population of 30,000, including metics. As an illustration of the extent to which mental abnormality is treated as insanity among a servile class, compared with the way in which it is regarded among free citizens, it is interesting to note that in the United States census for 1850, the proportions of lunatics registered among the white population and the free blacks are almost identical, being 1·49 per thousand among the whites, and 1·51 per thousand among the free blacks. In contrast with this, the number registered among the slaves is only ·47 per thousand.

sition. And perhaps the most memorable illustration of this was the sacrifice of three thousand Athenian prisoners at Ægospotami, which took place during the most brilliant period of Attic history. With all its refinement, it could not be at such a time that legislative protection would have been largely extended to the rights of the insane; nor is it likely that any careful provision was made for their treatment at a time which has left no record of the existence of any public institution for the care of persons sick of ordinary diseases, except one allusion to a house used for that purpose, said to have been situated in the Piræus.

We are probably warranted in concluding that though the higher intellects of the time had a wonderfully clear and just perception of what ought to be regarded as mental disease, it was only in dealing with persons of the most elevated social class that such views were practically applied; that the total number of those who were recognised as insane was comparatively small; and that only a small proportion of these would experience the benefits of considerate care and treatment.

I believe there is no trace in the Solonian legislation, of any provision for dealing with questions of insanity, except in rendering the wills of insane persons invalid, and if we may regard it as coming under the same head, the limitation of the control of prodigals over their property.

There may have been, and I have no doubt there were, a large number of persons of abnormal mental condition, who would now have been counted among the insane. But it is evident that governments of that day did not much concern themselves about persons who did not require to be interfered with except for their own personal benefit. It was only in cases, therefore, where danger to the community was apprehended, that public interference did take place. Weak-minded and harmless lunatics were dependent on voluntary care. Dangerous lunatics who were imprisoned, and harmless lunatics who were cared for by their friends, thus include all who can be said to have been treated as insane. Those who wandered about the unsettled localities alone, or as members of the vagabond herds, were practically disregarded altogether by civilised communities.

The Romans, in the period of their greatest intellectual glory, had made themselves inheritors of the Greek civilisation, and, to a great extent, they adopted the Greek ideas. The teaching of the philosophic schools of Greece was

imported into Rome, and became incorporated with its literature. Cicero, who was most conspicuous in presenting the Greek modes of thought to the attention of his countrymen, speaks of Plato, Aristotle, and Zeno as "the only teachers who arm and instruct a citizen for the duties of social life." He accordingly adopts very comprehensive views of the nature of insanity. "All fools," he says in his Tusculan Disputations, "are disordered in mind; all fools, therefore, are insane. For it is the opinion of philosophers, that sanity, or health of mind, consists in a certain tranquillity, or equanimity, or as they term it, constancy. And they consider the mind, when void of these qualities, as insane; since sanity can no more exist in a disordered mind, than in a disordered body. We separate, however," he says, "this insanity from fury; for, being of the nature of folly, that term possesses a wider signification." The distinction here drawn between insanity and fury—*insania* and *furor*—was an important practical distinction in ancient Rome. Those persons who laboured under the disorder called *furor* were placed, by the Laws of the Twelve Tables, under tutelage, which freed them from responsibility for their acts, and deprived them of liberty, except such as their tutors granted to them. The tutors thus became responsible for them, and had power to imprison them, or dispose of them in whatever way they deemed best. *Furor* is defined by Cicero as consisting in a confusion of the mind in regard to everything—*mentis ad omnia cæcitas*; a definition which perhaps survives in our modern expression, "blind fury." The law also took cognizance of persons suffering from a less violent kind of insanity, under the name of *mente capti*. These were associated in law with the "deaf and dumb, and those who laboured under persistent disease," as requiring to have their property placed under the care of curators, "since they are unable to take charge of it themselves." But there was also included among those to whom curators should be appointed the class called prodigals. This class, according to the definition of insanity with which we started, must, therefore, be counted by us among those whom the Romans treated as insane. They are defined by Ulpianus, as persons "who have neither method nor purpose in their expenditure, but squander their means in havoc and dissipation." They are, therefore, persons who are *subjected to exceptional treatment on account of their abnormal mental condition*, with the intention of saving them from the injurious consequences of that condition.

Dementes, that is, *furiosi* or *mente capti*, when under tutors or curators, were held to be incapable of civil actions, and were held irresponsible for crime. The condition of tutelage, was, however, suspended during remissions or intervals in the disease.

The dangerous lunatics were removed, under the authority of tutors, to places of detention, "*carceres*." And it appears to have been the practice also to send insane persons to be subjected to treatment in the houses of physicians. In the Menaechmi, the Comedy of Errors, by Plautus, we find the doctor sending for four men to remove the supposed lunatic to his house, and declaring his intention of making him "drink hellebore some twenty days," when he got him safely lodged there.

The evidence upon which the Roman magistrate declared a person to be furious, was not the opinion of experts, but such evidence as showed *that the fact was admitted by the general voice of those to whom the circumstances of the case were well known*. We thus find that careful provision was made for the treatment of the Roman citizen when he became insane; and it is probable that the religious tolerance or indifference, which prevailed until the time of the Christian prosecutions, must also have been accompanied by a very considerable diminution of the superstitious element which had complicated the idea of insanity among the Greeks. The Romans looked on this condition as a disease which was to be cured, if at all, by ordinary medical treatment. Seneca makes this possibility the distinguishing mark of the kind of insanity which implies civil incapacity.* "We say that every fool is insane," he says, "we do not, however, attempt to cure them all with hellebore, but trust many of them to vote in our assemblies, and to exercise magisterial jurisdiction." This remark received a melancholy illustration in the history of his pupil, Nero; one of the cruelties by which the tyrant marked his mad career being to condemn the great philosopher to death. It is curious, with reference to the remark of Seneca, which has just been quoted, to note that Nero was actually called upon by the satirist, Persius, to "clear his mind with hellebore, instead of meddling with government, for which he was, by nature, so unfit."

Descriptions and allusions might be cited from many authors, showing that the forms of insanity were, in Rome,

* De Beneficiis, lib. ij. cap. xxxv.

as we have found them to be in Greece, similar to what are met with at the present day. Ovid, Plautus, Horace, and Virgil, all make reference to them. But it is unnecessary to occupy time by quotation of the passages.

The state of the community, which a consideration of the provisions of the Roman law for dealing with insanity naturally suggests, is one which, so far, may properly be regarded with satisfaction. And in the earlier days of the Republic, perhaps, it deserved to be so regarded. But after that period, we require to take an element into consideration, which must produce an important modification of our opinion. In considering the condition of a civilized community at the present time, the persons whose condition would occupy the most important place in our imagination would be labourers, artizans, members of learned professions, and active members of the commercial class But a few sentences will be sufficient to show how little the vast mass of the Roman population was benefited by the legislation intended only for those enjoying the privileges of citizenship.

The class of slaves were entirely excluded from these benefits. "During the latter times of the Republic, and under the Empire," says Dr. Smith, "this class had greatly increased. The first question asked respecting a person's fortune, was, 'How many slaves does he keep?' Ten slaves seems to have been the lowest number which a person could keep, in the age of Augustus, with a proper regard to social respectability. The immense number of prisoners taken in the constant wars of the Republic, and the increase of wealth and luxury, augmented the number of slaves to a prodigious extent. A freedman, under Augustus, who had lost much property during the civil wars, left, at his death, as many as 4,116. Two hundred was no uncommon number for one person to keep. The mechanical arts, which were formerly in the hands of clients, were now entirely exercised by slaves, a natural growth of things; for where slaves perform certain duties, or practise certain arts, such duties or arts are thought degrading to a freeman. And it must not be forgotten, that the games of the amphitheatre required an immense number of slaves, who were trained for that purpose." Slave-dealing was one of the most lucrative of commercial avocations, and high prices were paid for those who might be sources of pleasure or profit to their owners. Eunuchs, literary men, and doctors, were esteemed among the most valuable.

The proportion of the slaves to the rest of the population,

is described as being much smaller in the provinces than in the capital, and glowing descriptions have been given of the order, comfort, and happiness which prevailed over the Empire during the period between Trajan and Marcus Aurelius. But I confess that when the condition of slavery was so widely spread, and when, as we know, vice and cruelty were rampant among those occupying the highest places in the government, I am unable to believe that the social state of the community generally was orderly and happy, and especially, I fear, that as a rule, the sick and the insane were neither kindly nor intelligently cared for. As for the slaves, they could not, indeed, be killed with impunity, and after the edict of Claudius the killing of them was looked on as murder. But their treatment was certainly inhuman enough. It is not necessary, for proof of this, to show that every Roman wished to follow the example of Velius Pollio, who, in the time of Augustus flung such slaves as displeased him into his fishponds, to feed his lampreys. It is sufficient to know that slaves were often to be seen in chain-gangs, labouring as draught animals upon the farms—that some were specially bred for slaughter in the sports of the arena, and that masters had been frequently known to get rid of old and useless slaves, by exposing them to starvation on an island in the Tiber. When almost the whole of the working classes, and a large proportion of what would now be called the middle class of the population, was in this condition of slavery, and might be subjected to such cruel treatment, it is impossible to believe that the helpless or troublesome among them could have generally received much consideration, or even mercy. We can make no attempt to estimate the proportion of these lower strata of the community which was regarded as insane, in the sense of being irresponsible, and deserving of protection. Neither can we indicate the nature of such protection as was provided. But there can be no doubt that in the latter days of the Empire the action of public charity and the efforts of benevolent solicitude must have dwindled rather than increased. Whatever healthy energy of public spirit had previously existed, was then rapidly and hopelessly passing away. Almost every institution or pursuit by which virtuous habits would naturally have been formed, had been tainted or destroyed, while agencies of terrific power were impelling the people tovice. The rich, excluded from the most honourable paths of ambition, and surrounded by countless parasites, who inflamed

their every passion, found themselves absolute masters of innumerable slaves, who were their willing ministers, and often their teachers in vice. The poor, hating industry, and destitute of all intellectual resources, lived in habitual idleness, and looked upon abject servility as the normal road to fortune.* The decay of Paganism and the rise of Christianity did not suffice, in this poisonous moral air, to check the growth of superstition, which found a fitting pabulum in the ignorance and vice which prevailed. The dark ages were at hand. The principles, the habits, the convictions which held society together, were giving way, one after the other, before luxury and selfishness. The entire organization of the ancient world, was, as Mr. Froude expresses it, "on the point of collapsing into a heap of incoherent sand."

I fear that I may seem, in this lecture, to have wandered round about the subject of insanity, when I ought to have presented it definitely to your minds. But you will doubtless appreciate the difficulty of catching more than mere fragments of the popular ideas in any age of the world. And in dealing with the earlier periods of history, it is impossible to get into very direct contact with them. I hope, in dealing with the next period, to bring the subject somewhat more satisfactorily before you.

* See Lecky's Morals, I. 278.

Lecture II.—Insanity in the Middle Ages.

The fall of the Roman empire was followed by a lengthened period of political confusion and social anarchy, during which the ideas that had been developed by the action of Greek and Roman culture were lost sight of, and seemed for a time to have been lost altogether. The epoch which thus followed the disintegration of the Roman power, and which lasted till the social and political elements began again to exhibit symptoms of stable organisation and vigorous life, has become known as the Middle Ages. As limited by Hallam, it comprises about a thousand years, dating from the invasion of France by Clovis at the end of the fifth century, to the invasion of Naples by Charles VIII. at the end of the fifteenth. We may regard these dates as broadly marking off the period of history which derives its characteristics from what is known as mediævalism. But the features which marked the epoch did not show themselves in all countries at one time. In some they gave place to the features of the modern epoch earlier than in others. Nor did anywhere the whole mediæval character die out at once. Some of its characteristics faded earlier, some later; and some remain with us to the present day. We must therefore, in tracing their history, refrain from binding ourselves by too precise a demarcation of the limits of the period.

As a preliminary to any enquiry into the condition of the insane or the conception which was formed of the nature of insanity, we must, as was pointed out in last lecture, glance for a moment at the general condition of society at the time, in regard to its intellectual and political life. During the first half of the epoch there seems indeed to have been scarcely any development worthy of such an appellation. The whole of Europe was almost without exception sunk in the darkest ignorance and the most wretched barbarism. But even at a later period, when the clouds began to lift, and signs of returning light were undoubtedly to be discerned, the culture, such as it was, affected merely a fraction of a special class.

"Whatever mention we find of learning and the learned during these dark ages," says Hallam, "must be understood only to relate to such as were within the pale of clergy, which was, however, pretty extensive, and comprehended many who did not exercise the offices of religious ministry. But even the clergy were for a long period not very materially superior, as a body, to the uninstructed laity. An inconceivable cloud of ignorance overspread the whole face of the church, hardly broken by a few glimmering lights who owe almost the whole of their distinction to the surrounding darkness. In the sixth century, the best writers in Latin were scarcely read; and perhaps from the middle of this century to the eleventh, there was in a general view of literature little difference to be discerned." The darkness, it is true, was not spread equally over the whole of Europe; nor was the darkness at its thickest in every region at one time. "France reached her lowest point at the beginning of the eighth century; but England was at that time more respectable, and did not fall into complete degradation till the middle of the ninth. . . . . But of the prevailing ignorance, it is easy to produce abundant testimony. Contracts were made verbally for want of notaries capable of drawing up charters. . . . . In almost every council the ignorance of the clergy forms a subject of reproach. It is asserted by one held in 992 that scarcely a single person was to be found in Rome itself who knew the first elements of letters. Not one priest in a thousand in Spain, about the age of Charlemagne, could address a common letter of salutation to another. In England, Alfred declares that he could not recollect a single priest south of the Thames (the most civilised part of England) at the time of his accession, who understood the ordinary prayers, or could translate Latin into his mother tongue."

The political condition during this period may be fitly described as one of incessant perturbation. The struggles of races for possession of the countries that had been loosed from the Roman yoke continued for centuries to make the state of war persistent and almost universal. And when these had resulted in the establishment of the states into which Europe became ultimately divided, the conflicts within themselves of factions and of princes striving for sovereign authority still prevented the development of stable political organisation.

In such a state of society little thought could be bestowed

on anything which did not directly relate to the fierce struggle for very life in which every state and every individual was engaged. Questions relating to philanthropic or even social duty were scarcely mooted; and we have no satisfactory record of the views that may have been held regarding them. There were still preserved in the administration of justice, where it was possible to carry it out in any regular form, the traditions of the old Roman law; and its provisions for dealing with *dementes*, *furiosi*, and *mente capti* would probably influence the treatment of many cases. A great portion of the inhabitants of France and Spain, as well as Italy, were governed by the provisions of a body of law called the Theodosian code, which had been compiled soon after the establishment of Christianity. Early in the twelfth century attention was directed to the systematic study of jurisprudence; and the comprehensive system of Justinian was adopted as the basis of teaching in the schools which arose in Bologna, Naples, Padua, and other places. And though the canon law was for a time imposed upon a great portion of mediæval Europe by the overwhelming influence of the church, the influence of the Justinian code was widely felt; and it is still to be traced in our modern legal systems, forming as it does the actual basis of French, German, and Scottish jurisprudence.

But during the barbarous epoch of which we have just been speaking, the influence of Roman law upon the mind of the community in determining its treatment of the insane (either in regard to the mode in which their care and treatment were provided for, or in regard to holding them responsible for their acts,) can only, as in earlier times, have had any extensive application in the case of persons of great social importance.

The most important change which took place during the Middle Ages in the constitution of society was the gradual abolition of slavery in southern and western Europe. "The eleventh and twelfth centuries," says Hallam, "saw the number of slaves in Italy begin to decrease; early in the fifteenth, a writer quoted by Muratori speaks of them as no longer existing. The greater part of the peasants in some countries of Germany had acquired their liberty before the end of the thirteenth century. In other parts, as well as in all the northern and eastern regions of Europe, they remained in a sort of villenage till the present age. Some very few instances of predial servitude have been discovered

in England so late as the time of Elizabeth, and perhaps they might be traced still lower." In France this condition was not entirely abolished till the time of the first revolution.

This desirable social change was to a great extent due to the influence of the Christian church; and that influence was also exerted in other notable though widely divergent directions. The church rendered invaluable service by inculcating the duty of caring for and protecting those sufferers from insanity whose condition was recognised as a result of disease. The story of the village asylum of Gheel which originated in the legend of St. Dymphna, shows that as early as the seventh century the custom had arisen of sending mad persons for cure to the shrines of saints. In the twelfth century we find madmen being taken to St. Bartholomew's, in London, and wonderful cures are recorded in the monkish narratives as having taken place there. To some hospitals, long before they ceased to be altogether ecclesiastical establishments, there were attached chambers, or cells, into which lunatics were received. But unless the provision which was thus made in these earlier times was much better than the condition in which these places were found in the eighteenth century would seem to indicate, the benefit of the charity was conferred more on the public which was relieved from the presence of the patients than upon the patients themselves. And judging by the kind of structures which we know to have been devoted to this purpose, it is probable that such was really the view with which they were erected.

But I think we should fail to do justice to the benefit conferred by the monastic establishments if we omitted to recognise their utility as sanctuaries in which persons of morbidly sensitive nature, or those suffering from religious excitement or depression, could find a refuge from the jarring influences of active life. It scarcely admits of doubt that many of those who devoted themselves to the practices of extreme asceticism were, like the emperor Charles V. at Yuste, subjects of mental disease, and that they often found in such asylums a protection and a sympathy which might have been sought in vain elsewhere. In connection with the benefits conferred upon the insane through the instrumentality of the mediæval church, we must also recognise the truly noble work carried out by Vincent de Paul, who in addition to his other labours for the relief of suffering humanity, strove successfully, though within a limited field, to ameliorate the condition of the insane.

But in the midst of the unstable social conditions of the mediæval period there was little consideration or even tolerance extended to persons who exhibited anything exceptional in their language or demeanour. The tendency of the human mind to regard with anxiety and terror all deviations from what was believed to be the natural order of events was then an overpowering force. To excite apprehension it was not necessary that the deviation should be so marked as would be shown in the behaviour of the insane. Even the acquisition of a little more knowledge than what is usual seems at some periods to have been sufficient to excite serious fears. The ingenious Gerbert, afterwards Pope Sylvester II., who introduced the use of clocks, was suspected of necromancy and regarded with apprehension. Roger Bacon, the greatest natural philosopher of the Middle Ages, was imprisoned for ten years for practising magic. Vergilius, Bishop of Salzburg, having asserted the existence of the Antipodes, the Archbishop of Metz declared him to be a heretic, and caused him to be burnt. And even Thomas Aquinas, "the seraphic doctor," did not escape the accusation of dealing in the black art. In the same spirit, there was a disposition to fear and persecute those who were afflicted with a form of disease which produced unusual kinds of behaviour. There can be no doubt that a large number of disorderly persons who would at the present day be treated as insane were unhesitatingly regarded at that period as merely criminal, and were punished accordingly. But besides this, an immense number of harmless persons were believed to be under demoniacal influence—witches or wizards—and were sacrificed in thousands to the ignorance and fears of those who should have protected them. That the cruelties which were thus perpetrated attained such remarkable dimensions was due to their association with the struggle carried on during the last stages of mediævalism, when the classes which had previously held society in thrall became conscious that their power and influence were slipping from their grasp. It had been at a previous epoch when the fact was recognised by pagan and imperial Rome that neither was its power invincible, nor even its continuance assured, that the extravagance of reckless cruelty assumed the chronic form which disgraced the later pages of its history.

And it was in like manner, "at the beginning of the end" of the mediæval period, when its social and religious systems were threatening to give way, that every

deviation from established rule was looked on with special alarm. Exceptional conduct was attributed to the worst conceivable causes, and every effort was used unsparingly to stamp it out. The sternness, or we may say the brutality, with which this determination to stamp out all such deviations was carried out, was a consequence of the fact that the efforts of civil government at the time were devoted almost exclusively to the preservation of the existence of the state. The political organisation had nowhere fully attained to a condition of consolidated stability, and society was, in many instances, still trembling near the verge of anarchy. It was almost inevitable, therefore, that persons, whether sane or insane, who committed breaches of public order, should, in most cases, be dealt with by the public executioner. But it also resulted from this necessity, real or supposed, of at once stamping out everything that was exceptional, that many insane enthusiasts and others not guilty of actual violence were also subjected to capital punishment. So late as the time of Queen Elizabeth we find an illustration of this. Three enthusiasts, named Arthington, Coppinger, and Hacket were accused of conspiracy against the Queen. Hacket was hanged, drawn, and quartered; Coppinger died raving mad; and Arthington, recovering from his fanaticism and insanity, was pardoned. The circumstances are thus recorded:—"On Friday, the 15th of July, Coppinger having sent for Arthington out of his bed, declared to him that he had had a revelation which assured him that he was *prophet of mercy* and Arthington *prophet of judgment*; that Hacket was *king of Europe*, and that they were to go before *him* and separate the sheep from the goats. Arthington the more readily credited this, because he found a mighty burning in himself, which he interpreted to be a commencement of the angelic nature." . . . "Coppinger magnified Hacket as the holiest man that had ever lived, except Christ. A little after he was apprehended he ran absolutely distracted, and never recovered his senses, but obstinately refusing all nourishment, died of hunger the day after Hacket was executed."*

We have evidence that the insane did not universally come to such tragic ends. Some must have been cared for in an intelligent manner. And we know that a considerable number who possessed a certain amount of shrewdness and

* Biograph. Britain, ed. 2nd, vol. i.

drollery were received into the great houses and protected, partly from feelings of kindness, and partly because their eccentricities provided a source of amusement.

But we cannot doubt that a large number were also to be found among the herds of outcast vagabonds who existed in a worse than savage condition, wandering about the outskirts of the more civilised localities. These bands were truly sources of injury and danger to the community, and were, as might be expected, subjected to severe treatment when brought within the power of the law. Just before the adoption of a more humane system in the time of Elizabeth, "we find the magistrates of Somersetshire capturing a gang of a hundred at a stroke, hanging fifty at once on the gallows, and complaining bitterly to the Council of the necessity for waiting till the Assizes before they could enjoy the spectacle of the fifty others hanging beside them."*

It seems impossible, also, to escape the conviction that a very considerable number of lunatics were included in the multitude which, in accordance with the intolerance of the day, were hanged or burnt as heretics. Very slight occasion was sufficient to afford ground for an accusation of heresy; and it is appalling to be reminded of the immensity of the number of those who fell victims of the charge. The motive which impelled society to adopt or to sanction the cruelties which were inflicted on heretics was no doubt, as in the other cases we have been considering, the fear with which they were regarded as sources of danger to the State. It seemed impossible for those charged with governing authority to understand that a man might refuse to give his support to the authorised doctrines of the church, without at the same time wishing to overturn the secular administration. It was not, for example, the mere theological aspect of his opinions which raised the storm of anger against Wiclif, but rather that he was looked on as a raiser of sedition, and "a source of strife, who, by his serpent-like instigation, set the serf against his lord." And the view which Henry IV. took of the Lollards was, as persons whose object was "to destroy himself, his brothers, and several of the spiritual and temporal lords." The mere recognition of any social element as abnormal implied a belief in its dangerous character. To permit the continuance of anything like an unusual intellectual development was to admit the thin edge of a wedge

* Green's History of the English People, 1874, p. 385.

which might rend asunder the imperfectly united members of the political body. Hence the burning of 31,000 persons by the Spanish Inquisition, as recorded by Llorente ; and hence the death "for Anabaptist errors" of 30,000 persons in Holland and Friesland, mentioned in the official report of the Venetian ambassador at the Court of Charles V. And can any one acquainted with the tendency of persons suffering from early stages of insanity to be infected by surrounding enthusiasm or fanaticism, and to fasten with eagerness upon exceptional religious beliefs, doubt that many of those who then perished as heretics were really the victims of mental disease?

So late as 1761, in Portugal, we have evidence that the most obviously insane manifestations were treated as heresy, in the burning by the Inquisition of Gabriel Malagrida, an old man of seventy. No other charge was laid against him but the utterance of incoherent nonsense, the true significance of which it seems difficult to have ignored. "Will posterity believe," asks Isaac Disraeli, in his notice of the case,* "that in the eighteenth century an aged missionary was led to the stake for having said amongst other extravagancies, that 'The holy Virgin having commanded him to write the life of Anti-Christ, told him that he, Malagrida, was a second John (but more clear than John the Evangelist); that there were to be three Anti-Christs, and that the last should be born at Milan, of a monk and a nun, in the year 1920; and that he would marry Proserpina, one of the infernal furies.'" Poor old man. He was one of the last of the poor lunatics who were admitted by the gate of fire into that asylum whose inmates remain for ever—which returns no patients, either cured or uncured, to cause anxieties, or to share them, in this busy world.

But if we pursue our examination of the annals of those dark and troublous Middle Ages, we find ourselves driven more and more to the conviction that every one who exhibited any peculiarity, either physical or mental, and who could not be counted a criminal, a vagabond, or a heretic, ran imminent risk of being burnt as a wizard or a witch. The belief in witchcraft was not only inculcated by the church, but even the horrible ideas of the incubus and the succubus were sanctioned. "It has come to our ears," so runs a Bull of Pope Innocent VIII., published 1488, "that

* Disraeli, Cur. of Lit., 63.

numbers of both sexes do not avoid to have intercourse with the infernal fiends, and that by their sorceries they afflict both man and beast. They blight the marriage bed; destroy the births of women, and the increase of cattle; they blast the corn on the ground, the grapes in the vineyard, the fruits of the trees, and the grass and herbs of the field." And in order that criminals so atrocious might be destroyed, the Pope appointed inquisitors in every country armed with apostolic power to convict and punish. Stimulated by the church, the search for persons who ought to be punished for such crimes was only too successful. To be noticed as more than ordinarily ugly was sufficient to excite suspicion in the case of an old woman. And once suspicion was aroused, it was difficult to escape conviction. "The trial of this offence," said Bodin, "must not be conducted like those for other crimes. Whoever adheres to the ordinary course of justice perverts the spirit of the law both divine and human. He who is accused of sorcery should never be acquitted, unless the malice of the prosecutor be clearer than the sun; for it is so difficult to bring full proof of this secret crime that out of a million of witches not one would be convicted, if the usual course were followed." Now it is important that we should remember the character of the man who thus seems deliberately to throw all semblance of fair dealing to the winds. It is important that we should recognise that he was no ignorant inquisitor who might be expected to exaggerate the intolerant and partial view of his era. He was a learned scholar—placed by Mr. Buckle above Comines as a historian, and on a level with Machiavelli. Hallam says he "possessed a highly philosophical mind, united with the most ample stores of history and jurisprudence. No former writer on political philosophy had been either so comprehensive in his scheme, or so copious in his knowledge; none perhaps more original, more independent, and fearless in his enquiries; two men alone, indeed, could be compared with him—Aristotle and Machiavel." It is also well that we should note here that he was the direct controversial antagonist of John Wier, the physician of Cleves, who was the first to raise his voice with effect in making protest against the atrocious murders committed in this infatuated crusade against witchcraft. Wier brings forward clear evidence to show that many of the victims of that crusade were undoubtedly suffering from mental disease. It is hardly necessary, indeed, to have detailed proof that many insane persons were believed to be

witches, and were consequently driven to the dreadful stake. We have, however, in the discharge of fourteen persons by the Parliament of Paris, in the year 1589, an interesting indication of what many cases must have been, in which the inquiry did not terminate so satisfactorily. The incident is also interesting as being one of the first instances in which medical evidence of insanity was permitted to prevent the infliction of punishment. "Fourteen persons condemned to death for witchcraft appealed against the judgment to the Parliament of Paris, which for political reasons had been exiled to Tours. The Parliament named four commissioners —Pierre Pigray, the king's surgeon, and Messieurs Leroi, Renard, and Falaiseau, the king's physicians—to visit and examine these witches, and see whether they had the mark of the devil upon them." Pigray, who relates the circumstance in his work on Surgery (Book vii., chap. 10), says "the visit was made in presence of two counsellors of the court. The witches were all stripped naked, and the physicians examined their bodies very diligently, pricking them in all the marks they could find, to see whether they were insensible to pain, which was always considered a certain proof of guilt. They were, however, very sensible of the pricking, and some of them called out very lustily when the pins were driven into them." If any of them had been suffering under local anæsthesia, so frequent in some diseases of the nervous system, how inevitable would have been their condemnation. Fortunately they had fallen into merciful hands. "We found them," continues Pierre Pigray, "to be very poor, stupid people, and some of them insane. Many of them were quite indifferent about life; and one or two of them desired death as a relief from their sufferings. Our opinion was that they stood more in need of medicine than punishment; and so we reported to the Parliament. Their case was thereupon taken into further consideration; and the Parliament, after mature counsel amongst all the members, ordered the poor creatures to be sent to their homes, without inflicting any punishment upon them." For a time the numbers who were executed for witchcraft were so great as almost to exceed belief. For many years Cologne burnt its three hundred witches annually; the district of Bamberg its four hundred; Nuremberg, Geneva, Paris, Toulouse, Lyons, and other cities their two hundred. In Great Britain this form of persecution did not commence so early as in some other countries; but it continued longer than most of them,

and seems to have been carried out with vigour. Every record that has been preserved mentions that the witches were hanged and burnt, or burnt without the previous hanging—"alive and quick." During the whole of James's reign, amid the civil wars of his successor, the sway of the Long Parliament, the usurpation of Cromwell, and the reign of Charles II., there was no abatement of the persecution. If at any time it raged with less virulence it was when Cromwell and the Independents were masters. During the first eighty years of the seventeenth century the number executed has been estimated at five hundred annually—making the frightful total of forty thousand.

These numbers are probably to be regarded as only a rough estimate of the facts. But if we suppose that a large proportion of the annual five hundred were, as we have reason to believe, persons of unsound mind, it becomes interesting, if not important, to reflect for a moment on the bearing of such a fact on the proportion of insanity in the country. According to the proportions which are furnished by the statistics of insanity at the present day, a population such as that of England in the seventeenth century would have furnished about two thousand persons annually who would, according to our present views, have been placed in asylums. The terrible deduction which an acceptance of such a statement would force upon us is that under the rule of the Stuart kings, a proportion of nearly one out of every four persons who would with our present views have been sent to an asylum was actually sent to the stake and burnt as a witch. It was so far a terrible solution of problems regarded at the present day as of the utmost importance—how to deal with patients so as to prevent recurrence of their malady, and how to prevent them from propagating an insane predisposition to a succeeding generation.

Towards the end of the mediæval period, and when social organisation began to exhibit symptoms of strength and stability, there still existed a sensitive intolerance of exceptional conduct. But we find existing along with this a dawning consciousness in the public mind, that the community has a duty to perform towards its abnormal members, beyond merely keeping them out of sight or stamping them out of existence. In England, it was in the reign of Elizabeth that the first legislative recognition of this duty is recorded. It was then that the Act was passed which laid

the foundation of the English poor-law, and which established the system that was in force till a comparatively recent period. Under this law a distinction was for the first time drawn between mere idle vagrants and those impotent and destitute persons who are proper objects of charity; each town and parish being for the future held responsible for the relief of its indigent and disabled inhabitants.

In 1547, at the close of the preceding reign, was established the first lunatic asylum in England unconnected with ecclesiastical administration. This took place when the monasteries were suppressed, by the transfer to the authorities of the City of London of a monastic establishment which for a century and a half had afforded accommodation to *mente capti*. This institution, which was then situated in St. Botolph's without Bishopsgate, was originally a priory for the order of St. Mary of Bethlem; but at the time of the transfer it had already acquired the name of Bedlam—a word which had even then been incorporated into the English language. The change from ecclesiastical to lay management does not seem to have been any advantage to the unfortunate inmates, whatever disadvantage may have resulted from it; for we find it reported fifty years after the change that the condition of the hospital was too loathsome for any one to enter. The place was really a horrible prison and not a hospital in any sense of the word. Up to the year 1770 the patients were exhibited to the public like wild beasts in cages, on payment of a penny; and they are said to have afforded much sport to the visitors, who flocked to see them, in numbers estimated at not less than 48,000 annually. A wretched privilege was granted to some whose condition had undergone such modification that they were no longer considered dangerous to the public. They were "licentiated to go a begging." On their left arm was placed an armilla—an iron ring for the arm about four inches long, which they could not get off. "They wore about their necks," says Aubrey, as quoted by Disraeli, "a great horn of an ox in a string or bawdry, which when they came to a house they did wind; and they put the drink given to them into this horn whereto they put a stopple. Since the wars," he continues, and I fear it indicates a melancholy fact, "I do not remember to have seen any one of them." It is probable, indeed, that most of them perished unheeded during the conflict. In the "Tom a Bedlam" song, which dates as

early as the first part of the seventeenth century, the comforts of his asylum life are alluded to by the "licentiated beggar"—

> "In the lovely lofts of Bedlam,
> In stubble soft and dainty,
> Brave bracelets strong,
> Sweet whips ding dong,
> And a wholesome hunger plenty."

The first unmistakable evidence of changing views in the public mind is the stoppage of the practice of licensing these Bedlam beggars in the year 1675. At the same period a large building, a new Bethlem, was erected in Moorfields, to accommodate the insane. The necessity for making provision in this manner for lunatics steadily increased as the country came more and more under systematic government and as the wholesale butchery of such unfortunate persons as wizards or witches died out. This hideous barbarity had almost ceased at the end of the seventeenth century, though a case of witch burning occurred in Germany in 1749, one in Scotland in 1722, and one in England in 1716. In the Scotch case, which happened at Dornoch, the poor victim was undoubtedly insane, and laughed and clapped her hands at the sight of "the bonnie fire" that was destined to consume her. In 1736 the English law against witchcraft was repealed; and it is a notable fact that eight years afterwards we have the first legislative attempt to provide protection to lunatics; and it does not destroy the significance of the fact that it amounted to little more than a measure for chaining and locking up dangerous lunatics in secure places.

In 1751 St. Luke's Hospital was founded in London by voluntary subscription, and several institutions of a similar character were erected in other parts of the kingdom. There seems also to have sprung up about this time a very considerable number of private establishments for the safe custody of lunatics. But these, as well as the public institutions, seem to have been dens of misery and cruelty, where "chains, whips, darkness, and solitude" characterised the treatment.

An interesting record of what was the popular view of the condition we now call harmless insanity, is contained in Addison's description of Moll White, whose appearance, he says, reminded him of the lines of Ottway—

"A wrinkled Hag, with Age grown double,
Picking dry sticks, and mumbling to herself;
Her eyes with scalding Rheum were galled and red,
Cold Palsy shook her Head; her Hands seemed withered,
And on her crooked Shoulders she had wrap'd
The tattered Remnants of an old striped Hanging,
Which served to keep her Carcase from the Cold."

"He begged his friend Sir Roger," he says, "to go with him into the old woman's Hovel, which stood in a solitary Corner under the side of the Wood. Upon our first entering," says Mr. Spectator, "Sir Roger winked to me and pointed at something that stood behind the Door, which, upon looking that Way, I found to be an old Broomstaff. At the same time he whispered me in the Ear to take notice of a Tabby Cat that sat in the Chimney-Corner, which, as the old Knight told me, lay under as bad a Report as *Moll White* her self; for besides that *Moll* is said often to accompany her in the same Shape, the Cat is reported to have *spoken* twice or thrice in her Life, and to have played several Pranks above the Capacity of an ordinary Cat.

"I was secretly concerned to see Human Nature in so much Wretchedness and Disgrace; but, at the same time, could not forbear smiling to hear Sir Roger, who is a little puzzled about the old Woman, advising her as a Justice of Peace to avoid all communication with the Devil, and never to hurt any of her Neighbours' Cattle. We concluded our Visit with a Bounty which was very acceptable." The whole paper is interesting and important as revealing, not only the condition of such persons as this miserable old woman, but also as showing that the philanthropic feeling was acquiring force in the public mind; though its practical expression was still inactive. "I have been the more particular in this Account," says Addison, in concluding, "because I hear there is scarce a Village in England that has not a *Moll White* in it. When an old Woman begins to doat and grow chargeable to a Parish, she is generally turned into a Witch, and fills the whole Country with extravagant Fancies, imaginary Distempers, and terrifying Dreams. In the mean time the poor Wretch that is the innocent Occasion of so many Evils begins to be frighted at her self, and sometimes confesses secret Commerce and Familiarities that her Imagination forms in a delirious old Age."

The learned ideas of this period ran nearly in the same groove as those which we found to exist among the philosophers of Greece and Rome. John Locke, who was a con-

temporary of Addison, said, "Opposition to reason deserves the name" of madness, "and is really madness; and there is scarce a man so free from it, but that, if he should always, on all occasions, argue or do as in some cases he constantly does, would not be thought fitter for Bedlam than civil conversation." In this, and in the other better known passage in his "Essay Concerning the Human Understanding," where he unsuccessfully attempts to define madness, his reference to Bedlam is worthy of careful note. For it clearly indicates that whatever the philosophical theory might be, fitness for Bedlam, loathsome as it was, was in that day accepted as the popular criterion of what deserved to be called insanity.

I shall now conclude this lecture with a quotation from Boileau, the French satirist of the same epoch, who certainly adopts a sufficiently broad view of insanity:—

"Tous les hommes sont fous, et malgré tous leurs soins
Ne diffèrent entre eux que du plus ou du moins."

"All men are mad, and spite of all their pother,
Scant difference show: one is but madder than another.

Lecture III.—Insanity in Modern Times.

We have attempted in the previous lectures to obtain some idea of the way in which insanity was regarded, and the manner in which the insane were treated up to the beginning of the eighteenth century. We have found that a large number of those who would now be regarded as insane had been, up to this time, either disregarded altogether, or looked upon as exercising supernatural powers of evil, or as inspired with beliefs which were dangerous to the state. Three circumstances seem to have been the chief influences that tended to prevent persons labouring under mental disease from being treated with the consideration due to that affliction, or often with any feeling that they were worthy of sympathy or requiring to be cared for. These were pointed out to be (1) the character of the social system in ancient times—powerfully affected as it was in every detail by the existence of slavery; (2) the political exigencies of communities both in ancient and mediaeval times—so seldom in prolonged possession either of the external peace, or of the internal tranquility necessary for the development of philanthropy in a government or a sense of social duty in a people; and (3) the superstitious ideas arising from ignorance—under which abnormalities of mental condition were attributed to self-induced possession by the devil or to other criminal conduct or supernatural association. In the beginning of the eighteenth century, however, these conditions had either been abolished or had perceptibly diminished in power and importance. Slavery no longer existed in Western Europe; civil administration appeared to have developed into stronger and more stable forms; and owing to the diffusion of knowledge that followed the invention of printing, the grosser kinds of superstition were rapidly dying out.

Under the changed conditions of the new epoch we accordingly find that a large number of persons whose condition or fate had formerly been disregarded, became objects of humane consideration, and that many others who had for-

merly been regarded only with feelings of hatred or terror, were now being recognised as deserving and requiring both active sympathy and protective care. Two classes of people, therefore—one previously disregarded, and the other persecuted, and neither of which had been counted among the insane requiring care and treatment—were now recognised as objects of philanthropic regard, and as requiring to be provided for in a special manner. There arose a demand for places where these persons could be disposed of; and this was met by the establishment of a considerable number of asylums in various parts of the country, some being public institutions, but the larger number being provided by private enterprise.

But at first the practical effect of the enlightenment of public sentiment was more a negative than a positive change in public action. The demented vagabonds were no longer to be hanged, and the maniacal witches were no longer to be burnt; but short of the disuse of such intentional cruelty, the reformation at first made little progress. No public measure was adopted in this country for dealing comprehensively with the question till the year 1828, or it may perhaps be more accurately said, till the year 1845, when the Act was passed under which the present lunacy administration in England is carried on. The "Vagrant Act," passed in 1744, showed, indeed, that the community was becoming conscious that it was the duty of the State to deal with the matter in some way. By one of the sections of that Act, two Justices of the Peace were authorised to issue a warrant for the arrest of any person furiously mad, or so far mentally disordered as to be dangerous if left at large. He was then to be locked up in a secure place, and if it was found necessary, he was to be chained and confined in his own parish. The prevalent view of insanity still was, that the term could only be properly applied to such a condition as rendered a person dangerous to others; and the necessity for combating the danger on behalf of the rest of the community was regarded as so important that every other consideration sank into insignificance. It was still the general idea of society which seems to have been expressed by Justice Tracy, when in 1723 he compared a "madman" to "a brute or a wild beast." This date may, however, be accepted as marking in the history of our own country the perceptible rise of broader and juster views. It was about

that time that it began to be recognised that among the members of the abnormal class which had now to be regarded as insane, there were a large number who could not properly be left at large, and yet who were in no way brutish or wild.

And here it is well that we should recall to our minds for a moment what was the kind of provision made at that time for the care and treatment of those insane persons who could not be left at large. We cannot obtain complete descriptions of the condition of asylums generally during last century, but we have evidence enough that they were mere prisons, and prisons of the most loathsome character. This is shown in the Report of a Committee of the House of Commons which sat in 1763. The disclosures which it contained led ten years afterwards to the passing of an imperfect measure intended to reform the administration of asylums; and this Act constituted the only authoritative regulator of the treatment of the insane till 1828, though it proved altogether inadequate to prevent the continuance of the most frightful abuses.

We may obtain inferentially some idea of the state of things which had to be dealt with during last century by looking at the facts disclosed in the evidence taken by the Committee of the House of Commons on Madhouses, and reported to the House in the year 1815. Prominent among much that was calculated to awaken feelings of horror and of shame was the picture which is there presented of the Asylum at York. It had been known for many years to those who took the trouble to make careful inquiry, that the condition of the inmates of that institution was one of extreme wretchedness. Representations had been made to the Committee of Management, asking for inquiry and reform. But these had been met with indignant denials that any abuses existed; and persons of the highest station came forward to certify to the excellence of the administration of the establishment. At last public feeling was roused to a degree sufficient to obtain in January, 1814, the appointment by the Court of Governors of a Committee of Inquiry. An important obstacle was, however, interposed to the carrying out of any complete investigation. A few days after the appointment of the committee the asylum was in flames, having, as was believed at the time, been set fire to for the purpose of frustrating inquiry. And there can be little doubt, that as the

pitiless fire ran along the walls of those miserable chambers it wiped out the tangible vestiges of many a deed as pitiless as itself, and incalculably more terrible, from the prolonged suffering that it had occasioned. Four, at least, of the inmates were admitted to have perished in the fire, and the investigation by the committee failed to show whether this admission represented the whole truth as to the number of victims of the conflagration. In spite, however, of all attempts to prevent investigation, sufficient evidence was obtained to show that the administration of the establishment had been a disgrace to the age, and to the people that had suffered it to exist. Those who had, amid much obloquy and against powerful opposition, ascertained the facts which had forced on the inquiry, were able to afford ample proof of much that the officials attempted to conceal; and many a damning admission was wrung from the unwilling lips of the officials themselves. Proof was obtained that many of the inmates had been kept huddled together in apartments miserably small for the number of inmates, and affording no means of providing for the requirements of decency or cleanliness. In one filthy cell, twelve feet long by less than eight feet wide, 13 women slept, or passed the time which ought to have been allotted to sleep. Many patients were half-starved. Many died, of the date of whose death no record had been kept, and the cause of whose death might have been suspected, but could not be discovered. In the year 1813, according to the records of the institution, 11 inmates had died. On inquiry it was found that 24 had actually died during that year; and it was ascertained that numbers of inmates who had died from unknown, or, perhaps, too well-known causes, were systematically represented in the annual statements as having been cured. The use of chains and heavy irons seems to have been frequent. The committee of management, who had so angrily asserted the excellence of the treatment which the inmates received, were shown to have been ignorant, not only of the whole doings of the officers, but even of the existence of parts of the building in which patients were constantly confined. "The physician had for many years past been the sole physician, sole visitor, and sole committee, and had the whole management of the institution."* This physician, the steward, and the

* Evidence of Mr. Godfrey Higgins, before the Committee on Madhouses, 1815.

matron were all found to have fraudulently appropriated to their own use large portions of the funds that were paid for the maintenance of the patients. The steward burnt his books rather than allow them to be submitted to the committee.

One would willingly refrain from giving, in detail, a record such as this, which must excite feelings of burning indignation and shame. But it is necessary that we should fully recognise the character of the institutions to which persons regarded as insane were consigned, if we would form a clear conception of the degree of mental disorder that must have been reached by patients in whose cases such treatment was possible. Before leaving this subject therefore, let us look for a moment at the state of things in the Royal Hospital of Bethlem, an institution claiming at the time to be so circumstanced as to be properly exempt from any supervision by the State, and which had been held up to the admiration of France, in 1787, by Soulavie, in a pamphlet translated by the King's chaplain. The following extract, from the evidence of Mr. Wakefield, before the Parliamentary Committee already mentioned, will indicate how far that institution deserved the exemption which it claimed:—

"On Monday, the 2nd of May," says Mr. Wakefield, "we revisited the Hospital, introduced by Robert Calvert, Esq., a governor, and accompanied by Charles Callis Western, Esq., Member of Parliament for Essex, and four other gentlemen." (The first visit had been on 25th April, 1814.) "At this visit, attended by the Steward of the Hospital, and likewise by a female keeper, we first proceeded to visit the women's galleries; one of the side rooms contained about ten patients, each chained by one arm or leg to the wall; the chain allowing them merely to stand up by the bench or form fixed to the wall, or to sit down upon it. The nakedness of each patient was covered by a blanket-gown only; the blanket-gown is a blanket formed something like a dressing-gown, with nothing to fasten it with in front; this constituted the whole covering; the feet even were naked. One female in this side-room, thus chained, was an object remarkably striking; she mentioned her maiden and married names, and stated that she had been a teacher of languages; the keepers described her as a very accomplished lady, mistress of many languages, and they corroborated her account of herself. The Committee can hardly imagine a human being in a more degraded and brutalising condition than that in which I found this female, who held a

coherent conversation with us, and was, of course, fully sensible of the mental and bodily condition of those wretched beings, who, equally without clothing, were closely chained to the same wall with herself. Unaware of the necessities of nature, some of them, though they contained life, appeared totally inanimate and unconscious of existence."*

"In the men's wing," writes Dr. Conolly, in his abstract of the evidence, "six patients in the side-room were chained close to the wall, five were handcuffed, and one was locked to the wall by the right arm as well as by the right leg. Except the blanket-gown these men had no clothing; the room had the appearance of a dog-kennel. Chains were universally substituted for the strait-waistcoat. Those who were not cleanly, and all who were disinclined to get up, were allowed to lie in bed; in what state may be imagined. In one cell they found a patient, a representation of whose condition is preserved in a plate published in Esquirol's work. Not much to the honour of our English treatment. This patient's name was Norris. He had been a powerful and violent man. Having on one occasion resented what he considered some improper treatment by his keeper, he was fastened by a long chain which was ingeniously passed through a wall into the next room, where the victorious keeper, out of the patient's reach, could drag the unfortunate man close to the wall whenever he pleased. To prevent this sort of outrage, poor Norris muffled the chain with straw, but the savage inclinations of the keeper were either checked by no superintending eye, or the officers of the asylum partook of his cruelty and his fears; for now a new and refined torture for the patient was invented, in the shape of an ingenious apparatus of iron."†

"A stout iron ring," as Mr. Wakefield describes it, "was rivetted round his neck, from which a stout chain passed to a ring made to slide upwards or downwards on an upright massive iron bar, more than six feet high, inserted into the wall. Round his body a strong iron bar about two inches wide was rivetted; on each side of the bar was a circular projection which, being fastened to and enclosing each of his arms, pinioned them close to his sides."‡ "The effect of this apparatus was, that the patient could indeed raise himself up so as to stand against the wall, but could not stir one foot

* Evidence of Mr. Wakefield, before the Committee on Madhouses, 1815.
† "Treatment of the Insane," by Dr. Conolly.
‡ Evidence of Mr. Wakefield.

from it, could not walk one step, and could not even lie down except on his back; and in this thraldom he had lived for twelve years. During much of that time he is reported to have been rational in his conversation. But, for him, in all those twelve years, there had been no variety of any kind; no refreshing change; no relief; no fresh air; no exercise; no sight of fields or gardens, or earth or heaven. Each miserable day was like another, and each night. At length release came, which he only lived about a year to enjoy."* It is painful to have to add that this long-continued cruelty had the recorded approbation of the committee of management, the medical officers, and of all the authorities of the hospital.

Such was the state of asylums in Britain. In Germany they were no better. "One is seized with horror," says Franck,† "on entering these refuges of misfortune and affliction; one hears nothing there but cries of despair. It is frightful to be assailed by the miserable creatures, clothed in rags, and disgusting with filth; while others are prevented from approaching, by chains and ropes and the brutal treatment of the keepers." In France the Salpétrière and the Bicêtre were almost the only establishments to which the same sad description would not apply. The cells, dens, or cages in which they were kept, writes Esquirol in 1818, "were everywhere horrible: without air, without light, damp, narrow, paved like the street, often below the level of the ground, and sometimes underground. Chains, filth, and a supply of the coarsest food, often insufficient in quantity to support life!"‡ Such throughout Europe, till within the last fifty years, was, with an exception probably for a short period in Italy, usually regarded as an appropriate provision for the class of persons to whose condition the term insanity was then commonly applied.

But even so far back as the beginning of the eighteenth century, as I have already explained, the seeds of coming improvement had been sown. The feeling of terror, which had in ruder and more superstitious times overwhelmed every other sentiment that might have been excited by the presence of a lunatic, was now beginning in the minds of cultivated persons such as Addison to be replaced by a feeling of compassionate consideration. The philanthropic reflections ex-

* Dr. Conolly, op. cit.
† Quoted by Esquirol, "Maladies Mentales," chap. xv.
‡ Loc. cit.

cited in his mind by the spectacle of Moll White were the expression of a feeling that must have been shared by many others. But as has already been observed, the first effect of this feeling was to increase the number of persons regarded as insane rather than to improve their treatment. A large number of persons came to be regarded as insane whose mental overthrow was much less complete than had been thought necessary to make them so regarded a hundred years before. In the earlier period it had been only those who had passed into a condition which suggested Tracy's "wild beast" comparison, that were regarded as insane. In the later period such persons were beginning to be counted lunatic as harboured perverse delusions or showed outrageous eccentricity of conduct. *In the earlier period, therefore*, by the time a person came to be regarded as fit to be sent to an asylum, the feelings of affection with which he had been regarded by those naturally bound to him had been blunted or perhaps destroyed. *In the later period* a considerable number of patients must have been in a condition that in no way prevented them from being followed into the cells of the asylum by the unstifled affection of their friends.

We should fail, however, to fully comprehend the change that was taking place in the position of what relates to insanity, if we omitted to keep in view that during the latter half of last century social organisation generally was undergoing rapid improvement, and acquiring year by year greater and greater stability. As a consequence of this, the humane sentiment of society becoming more and more developed, began to exhibit strength sufficient to exercise a powerful influence on every department of civil administration. It was in 1774 that Howard began to direct public attention to the abuses in the administration of prisons. And it is impossible to believe that his efforts could have produced their happy result if public feeling had not arrived at a condition which made it willing to respond sympathetically to his appeal. When, therefore, we take into consideration the condition of asylums as they then were, and the fact that a number, continually increasing, of persons in whom their friends were deeply interested, were being placed in them, it is evident that some attempt to ameliorate the condition of the insane could not be long delayed. The first important step was taken in 1791. It was in that year that a female member of the Society of Friends was placed in the York Lunatic Asylum, whose terrible

condition has been already alluded to. Her family, residing at a considerable distance, requested some of their acquaintance in York to visit her. The visits of these friends were objected to by the superintendent of the asylum; and in a few weeks after, the unhappy patient died. The circumstance was regarded as a confirmation of suspicions which had for some time existed. This feeling was believed by William Tuke to be so well founded that he resolved upon the establishment of an institution where members of the Society to which the patient and he himself belonged might receive judicious and humane treatment. In 1792, Tuke formally proposed his project; and in 1796, the Retreat near York, now so famous in the history of insanity, "was opened for the reception of patients, and commenced its career of usefulness and importance." It was almost at the same moment, in 1792, that Cousin, Thouret, and Cabanis, being the administrators of the hospitals of Paris, appointed to be physician to the Bicêtre the illustrious Pinel, who there immediately released no less than eighty patients who had been kept in chains; and after subjecting them to milder and more humane treatment had the satisfaction of sending many of them in a state of sanity back to the outer world.

Tuke and Pinel thus became the heroes of one portion of the struggle which was taking place between barbarism and civilisation—between darkness and light. And it in no way dims the glory which surrounds their names that we recognise the movement which they led as having become inevitable. Such systems as that of asylum administration which had grown up under the adverse influences of the middle ages were everywhere showing themselves unfitted for the requirements of modern life; and encumbered as they were with abuses that shocked the cultivated conscience of the community, their reformation or reorganisation must sooner or later have been undertaken. But those who were the first to probe the vices of the old administration, and to feel the necessity for their extirpation, must have been among the noblest spirits of the age; and none have deserved better than Pinel and Tuke to be placed high in the bead-roll of those whom mankind should ever delight to honour.

The reform in the treatment of the insane which they so worthily began was destined however to proceed only by

slow degrees. We have already seen how political embarrassments and social disturbance could prevent the rise of philanthropic feeling in the community, and it is perhaps more than a mere coincidence that during the stormy period between the years 1792 and 1815, the reform of asylum administration made little progress. The political convulsions which followed the outbreak of the French revolution shook every state in Europe to its foundation; and the almost incessant wars which blazed over the whole continent and threatened to extend to our own shores, seriously damped the interest that had been excited in works of public benevolence. At first it seemed as if the results of a century of social development were to be completely sacrificed. "The Habeas Corpus Act was suspended; a bill against seditious assemblies restricted the liberty of public meeting, and a wider scope was given to the Statute of Treasons. Prosecution after prosecution was directed against the Press; the sermons of some dissenting ministers were indicted as seditious; and the conventions of sympathisers with France were roughly broken up. The worst excesses of the panic were witnessed in Scotland, where young Whigs whose only offence was an advocacy of Parliamentary reform were sentenced to transportation, and where a brutal judge openly expressed his regret that the practice of torture in seditious cases should have fallen into disuse."*

After the first panic had passed off, the public feeling of the country did not immediately regain the elevation from which it had been rudely thrown. But even during those years of conflict with which the name of the first Napoleon has become inseparably associated, the philanthropic element in public sentiment did not altogether die out. The attention of Parliament was directed to legislation for the benefit of the insane in the year 1813, two years before the re-establishment of peace. During this year and the following, two unsuccessful attempts were made to pass an act for the better regulation of asylums; and in 1814, a Committee of the House of Commons was appointed to enquire into the condition of these institutions. The report of that Committee, as we have already seen, disclosed the existence of most terrible abuses; but every bill for their reformation was rejected, till the gathering force of public opinion at last carried

* Green's "History of the English People," p. 785.

through the Act of 1828. This measure was brought forward by Mr. Gordon and Lord Ashley, and was a very important and beneficent enactment. It was an earnest, though imperfect, attempt to carry out the excellent principles which received fuller development in the Lunacy Act of 1845. The statute of 1845 is that under which the treatment of the insane in England is at present regulated; and for it the country is mainly indebted to the indefatigable efforts of Lord Ashley, who, now Earl of Shaftesbury, presides over the administration which it is his glory to have established. A measure of the same kind was enacted for Scotland in 1857, and laws of similar character have come into force also in France, Germany, and other civilised countries. We may now, indeed, regard it as an established principle of all enlightened legislation, that it is the duty of the state to protect, and if need be, to succour all those whose mental condition renders them helpless or unfit to conduct themselves according to the requirements of public order. Henceforward, the secret horrors of the loathsome cell with its ponderous chains, and the irresponsible savage with his terrifying whip have been abolished, and their place is taken by the cheerfully decorated asylum, furnished to serve as a comfortable home or fully appointed hospital, carefully inspected by Government officials, and directed by officers carefully selected and held fully responsible. Henceforward, though occasional instances of neglect or harsh treatment may or perhaps must occur, they cannot but be exceptional, and in direct opposition to the general spirit of the system.

We have seen that one of the circumstances which acted most powerfully in creating the irresistible demand for the improvement of asylums was the broader conception of the nature of insanity which advancing civilisation had generated in the public mind. Asylums, bad though they were, had been the only places to which the insane could be sent, and it followed that as soon as the inmates began to consist in a considerable proportion of persons suffering from the less violent forms of mental disorder, the uselessness and cruelty of the treatment to which they were subjected became greatly more obvious. But the history of the popular idea of insanity entered a new phase after the improvement of asylums had been effected. The existence of the improved institutions had a powerful influence on public opinion. The broadened view of insanity had caused the improvement of

asylums; the improved asylums were now in their turn to cause a further broadening of the view of insanity. It soon became apparent that asylums under the improved administration afforded suitable provision for many persons who had not previously been considered fit inmates for such establishments. Formerly, asylums had only been thought of as places to which persons might be sent who were troublesome or dangerous to the public. Now they came to be looked upon more as hospitals for the treatment of mental disease. Instead of being places to which no one would be sent except when the interests *of others* made such a step imperative, they had become places to which many would be sent in the belief that *their own* interests would thus be best promoted. It is not difficult to understand how, under these altered conditions, a large number of persons came to be sent to asylums whose degree of mental disorder was far short of what would have been thought necessary at a former period to justify their being branded with the then opprobrious name of lunatic. The revolution in public sentiment which thus took place was both considerable and important; and that it was likely to occasion an extension of the limits of the popular idea of insanity will be at once apparent. That such an increased comprehensiveness of signification has actually been given to it must be within the personal knowledge of most of those whom I now address.

I must now ask your attention to a circumstance which must be taken into consideration if we would fully understand the idea of insanity as it exists at present in the public mind. That circumstance is the rapidly increasing complexity of organisation in our modern social state. Mr. Spencer, in his work on Sociology, finds an analogy between the organization of animals and that of political bodies. He compares the ruder states of society to the simpler zoological organisms which consist of almost homogeneous elements; and the highly civilised states he compares to the higher animals with their complex anatomies. With every advance in the scale of development, a correspondingly higher quality is attained in the performance of the several functions of the organism; and this results from the increased differentiation of the elements into organs, and from the more delicate adaptation of the structural machinery to the function to be performed. I believe that there is here a profound and instructive analogy, which admits, as Mr. Spencer has shown, of being followed into considerable detail. And in no direc-

tion does the analogy appear more complete than in the direct proportion which intolerance of incongruous matter seems to bear to the degree of development of the organism. The contrast between the indifference which is displayed by the tissues of the amoeba or polyp to the nature of what may become involved in them, and the sensitive intolerance of any abnormal matter which is shown by the irritable tissues of the human body, is not more remarkable than the difference between the effect of an abnormal element existing in a primitive and rudely organised community, and the effect of a similar abnormality when placed in a community whose civilisation is advanced and highly developed. Abnormalities of conduct that might be borne without difficulty in a district where the population is sparse and pastoral, and might even be compatible there with a capacity for useful work, cannot be tolerated in a busy city full of the complex operations of a highly developed commerce. Persons whose eccentricities of conduct would scarcely have interfered with public order or private comfort, as they were understood in the time of Queen Anne, would be felt to be intolerable in the present state of society under Queen Victoria. In the former period they would have continued members of the household in which they were born ; at present they would be regarded as insane and sent to an asylum.

But there is a collateral aspect of the relation of modern life to the mental constitution of the individual, which is also of considerable importance. The intellectual element enters so much into the labours of the present day, that persons suffering from feebleness or perversion of mind have much more difficulty in finding useful employment than was the case in the days of our fathers, when avocations were simpler and less intellectual. This is, therefore, a factor, whose influence must be recognised in the problem with which we have to deal. In London, in Edinburgh, and in every other locality where commerce, manufactures, and all forms of industry have undergone great and rapid development, there must necessarily from the comparatively high standard of capacity that is required be a much larger number now than formerly of persons who are incapacitated by their mental condition from earning a livelihood, or from taking their places in any way as useful members of society. Such persons require to be regarded now as abnormal elements in the working mass ; and as such they are extruded from it. A considerable proportion of these also come to be included in the number of persons now regarded as insane.

We have now traced, though very imperfectly, the progress of the popular conception of insanity as it has been carried along the current of European history. We saw it at first dimly as it grew among the classic influences of ancient Greece and Rome. We caught transient glimpses of it amid the darkness and storms of the middle ages. And following it in its course during the more tranquil modern epoch, we have seen how the increase of enlightenment and the advance of civilisation have permitted it to reach the position which it at present occupies.

The method that we have adopted was to ascertain as far as possible what class of persons were, during the periods we have examined, treated as more or less irresponsible, or who on account of mental abnormality were looked on as requiring to be dealt with in an exceptional manner. And if the inquiry has been satisfactorily carried out, we have found that the number and character of such persons has differed at different epochs and in different localities, according to *the political circumstances of states*, *the moral and intellectual condition of peoples*, and *the social organisation of communities*.

We thus arrive at the conclusion that the idea of insanity in its popular and practical significance is essentially relative; that in some circumstances it includes certain mental conditions which in other circumstances it does not include; that in some states of society certain persons would be regarded as insane who would not be so regarded in other states of society.

We have found that in recent times the idea has amongst ourselves acquired a greatly increased comprehensiveness, and that this seems to be chiefly due to the following circumstances: —

1.—Political: freedom from danger to the State either by attack of enemies from without, or from seditious tumult at home.

2.—Moral and Intellectual: decrease of superstition and religious intolerance among the people, and growth of the philanthropic sentiment; and—

3.—Social: the extinction of slavery, the increased density of population in many districts, and the high development and complexity of our industrial and commercial organisation.

The question now suggests itself:—In what does insanity, in the popular and practical sense, consist at present? And whether we succeed in making the answer to this question definite we must at least endeavour to make it intelligent.

But it must, above all, be, if possible, accurate; and the short time now at our disposal obliges us to dispose of the matter in as few words as possible. Let us then keep distinctly before our minds the special object of the inquiry. It is not what condition *ought* to be regarded as insanity, or what persons *ought* to be treated as insane, that we are expected to indicate, but what conditions *are at present* regarded by the public as constituting insanity, and what persons *are in actual fact* treated as insane.

So long as a man shows himself capable of managing his own affairs, and conducts himself in an orderly manner, neither injuring nor threatening to injure himself or others, we may be sure that he will not be regarded as insane by society. Let his mental condition be what it may, we are safe in affirming that so long as he shows ordinary capacity and conducts himself with ordinary propriety he will be no lunatic in public estimation. This does not imply, of course, that every one who does *not* come within this description is regarded as insane. Many incapable persons are incapable merely by reason of bodily infirmity, and many who conduct themselves improperly are properly regarded as vicious or criminal. These kinds of incapable and disorderly persons are obviously to be excluded from the number of those regarded as insane. There are cases of incapables, however, in which the question whether an individual is to be regarded as insane, or his incapacity is to be attributed to bodily infirmity, will depend on circumstances independent of the mere physical or mental state of the patient. It frequently, for example, depends on the kind of provision that is available for beneficial treatment, whether a person is kept at home or placed in an hospital as a paralytic, or sent to an asylum as labouring under dementia. And in such cases it will only be when asylum treatment is resorted to, that the patient will be classed as a lunatic, either formally or in ordinary conversation. That such considerations have an appreciable effect upon the number of persons statistically regarded as insane, is perhaps well known to all who have been brought specially into contact with the treatment of insanity. But I may note, as an illustration of this and cognate facts, four of the five causes which Dr. Clouston, who may be regarded as likely to have the subject forced upon his attention from points of view somewhat different from those with which I am most familiar, gives as producing the increase in the number of the patients

sent during recent years to asylums. I quote them from the Report read at the meeting of contributors to the Royal Edinburgh Asylum, on the 26th of last month:*—"Short transient cases," he says, "especially those due to bouts of alcoholic excess, are now sent in greater numbers than formerly. Cases of slighter mental disturbance, the result of old age, of paralytic attacks, of bodily diseases affecting the brain, and of general breaking down of the bodily powers, that formerly would not have been reckoned as insanity at all, are now sent to the asylum to be nursed and cared for. The country is richer, and the parochial officers hesitate much less about charging the rates with the cost of providing for an insane person in an asylum. The capitation grant of four shillings a patient from the Imperial exchequer greatly aids the last reason." He remarks, in support of this, "that the number of broken down cases sent here," *i.e.*, to Morningside, "this year was more marked than had been the case before."

We have also to take into consideration that the kind of capacity which is required to enable a poor man to manage his own affairs is different from that which a rich man must possess. In the case of the poor man, it consists almost entirely in being able to earn sufficient to support himself and those dependent on him. In the case of the rich man, it often consists chiefly in being able to spend his money judiciously. And it is evident that a man may be able to do one of these duties who is wholly unable to perform the other. It therefore depends so far upon his degree of wealth or poverty whether a man is to be regarded as insane. Difference of locality may also be an important element in determining the question of capacity. In the case of a poor man, he may be found capable of supporting himself in a locality where the ordinary means of earning a livelihood are the simpler avocations characteristic of remote rural or insular districts; while a man of similar capacity, resident in a town, would starve if left to subsist on his own earnings. The effect of this difference is, that the man, if resident in the country, would be counted by society as sane, while the same man, if resident in the town, would have to receive parochial aid on account of mental incapacity, and would thus be constituted a pauper lunatic. In the case of a rich man, the question of capacity or incapacity will often depend even upon a circumstance apparently so extrinsic as the character of the friends with

* April 26th, 1877.

whom he is associated. If he is fortunate in having judicious friends who influence him fairly, he may manage his property in a most satisfactory manner ; while another man no more gifted, but subjected to unfair and injudicious influence, may require to be placed under legal control and be regarded as a lunatic.

Of the large class of incapables between the extremes of wealth and poverty, the question of insanity is very largely determined by the conduct of friends and relatives. Every one must be able to call to mind instances where there is a member of a family who has a certain amount of weakness or eccentricity, but who passes through boyhood, looked on as a lad with odd tastes, and not clever, and who lives through manhood, known as the brother or the uncle who never took a very active part in business, but was the children's favourite, and had the affection of all. In many such cases, the idea of applying the epithet imbecile or lunatic would perhaps never be suggested. But suppose such a person to be destitute of kindly relatives, or still worse, to have unkindly relatives, and the history becomes sadly altered. The incapacity and the eccentricity become much more obvious. Left to choose his own course of life, the unfortunate man becomes involved in countless difficulties, probably comes to be placed under legal guardianship, perhaps ultimately finding refuge in an asylum; and in that event the statistics of lunacy come to be affected by his being tabulated in the public records as one of the insane.

It must be evident that an analogous series of considerations may affect the determination of the question of insanity even in regard to many of those who are dangerous to themselves or others. This is most obvious in the case of mental disorders of short duration. The transient delirium which is symptomatic of various acute diseases, is not of itself sufficient to constitute insanity, as the term is popularly understood, though it may undoubtedly be a manifestation of extreme disorder of the mental functions of the brain. But a person suffering from such an affection may become technically a lunatic, if it be found necessary to place him in an asylum in order to obtain the treatment required. The delirium of meningitis may thus be regarded either as insanity, or not as insanity, according to circumstances independent of the nature of the mental disorder. The same may be said of delirium tremens, puerperal mania, mania à potû, and what has been

called mania transitoria. Similar circumstances affect many of the more chronic conditions of mental perversion. But enough has been said to show that, practically, the fact of a man becoming a lunatic from a public point of view, depends greatly on whether the nature of his surroundings makes it necessary that he should be treated as one. And this again depends as much on the nature of the surroundings as on the condition of the individual himself. And, paradoxical as it may seem, in some cases it may be said with truth that the decision of the question whether a particular individual is or is not to be counted as a lunatic from the social point of view, depends more on the mental condition of his friends than on his own.

If then we were to attempt to reply in one sentence to the question: What condition does society regard as insanity? we should say, it is any mental abnormality recognised as a result of disease or defective development, which renders an individual in the particular circumstances in which he is placed either dangerous to or a disturber of order in the community, or incapable of performing the duties required of him in his position. The amount of abnormality here implied will vary according to the time and place in which the individual lives, the duties he may be called upon to perform, and the condition of the community by which he is surrounded.

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THE DEVELOPMENT OF THE OVA, AND THE STRUCTURE OF THE OVARY IN MAN AND OTHER MAMMALIA; WITH SPECIAL REFERENCE TO THE ORIGIN AND DEVELOPMENT OF THE FOLLICULAR EPITHELIAL CELLS.

By James Foulis, M.D., *Edinburgh.* (Plates XIX., XX., XXI.)

Waldeyer's beautiful monograph on the ovary was published in 1870. In 1872, at the suggestion of Professor Turner, I undertook a series of observations with the object of inquiring into the accuracy of Waldeyer's views as to the tubular structure of the ovary, and also of ascertaining whether Graafian follicles were formed from these tubular structures in the way described by Waldeyer and his predecessors.

The conclusions at which I arrived, as the result of my investigations, were communicated to the Royal Society of Edinburgh, by Professor Turner, on the 21st December 1874, and were published in the *Transactions* of the Society in vol. xxvii., 1875, in a paper entitled, "The Development of the Ova, and the Structure of the Ovary in Man and other Mammalia."

My chief conclusions were as follows:—The ova are derived from the germ epithelium cells, but the cells of the follicular epithelium have a different origin, viz., from the cells of the stroma of the ovary; and with reference to the tubular structure of the ovary I stated that, although I had examined the ovary of the human fœtus and new-born child, and the ovaries of many animals in various stages of development, I was unable to find any real tubular structures, and consequently was obliged to deny their existence, and that Graafian follicles are formed from such structures in the way described by Valentin, Pflüger, Speigelberg, and Waldeyer.

As I shall have to refer frequently in the course of the following paper to the views of Waldeyer on the development of the follicular epithelium and the tubular structure of the ovary, it is necessary that I should state clearly what these views really are.

According to Waldeyer, the first appearance of the ovary consists of a thickened germ epithelium investing a small outgrowth rich in cells

which projects from the interstitial tissue of the Wolffian body on its median side.

The thickened epithelium gradually forms the rudiments of the ova and Graafian follicles and of the subsequently appearing epithelium of the ovary, whilst the outgrowth itself is destined to furnish the vascular stroma of the organ.

In the embryo of fowls, Waldeyer states the interesting observation may be made as early as the fourth day of incubation, that some among the germ epithelial cells have become conspicuous by their round form, their size, and the size of their nuclei. It may be concluded from the regular arrangement of these structures and the constancy of their position that they represent the youngest primordial ova, which thus, even during embryonic life, are formed by a simple process of growth from the epithelial cells of the germ organ.

The further development of the ovary depends on a peculiar mode of growth of the superficial epithelium on the one hand, and of the vascularised stroma on the other. Certain more or less delicate processes of the connective tissue now shoot forth from the stroma, whilst coincidently the epithelium increases by the continual production of new cells. The processes then penetrate between the epithelial cells, enclosing a variable number of them, which thus, by degrees, become more and more imbedded in the vascular stroma.

Some, and sometimes many, among the imbedded epithelial cells become conspicuous by their size and the size of their nuclei, as we have already seen to occur amongst the superficial epithelial cells. Other cells remain of small size, and surround the larger cells as a kind of epithelium. The connective tissue stroma between the imbedded masses of epithelial cells constantly undergoes increase, and especially grows in between the several egg cells with their epithelial investment. Thus each epithelial ball is divided by these ingrowing vascularised trabeculæ into as many cavities as it contains egg cells.

In describing the ovary of a newly-born child, Waldeyer thus states, in reference to its tubular structure,—"One sees long branching formations in the form of tubes, anastomosing with each other, as Valentin first described, and lying separate from each other at considerable distances. They pass upwards opening with narrow mouths into the epithelium, and appear as direct tubular gland-like processes of it.

"At the time in which the tubes described by Pflüger exist, that is, as far as I can find, from the ninth month till a short time after birth, they present the structure ascribed to them by Pflüger, with the exception already mentioned, that there is as little of a membrana propria in them as there is in the primary follicles. In the tubes, and mostly in the middle of them, as Pflüger described, we meet with egg cells distinguished by their size and form, often immediately concatenated one behind the other. Whether in the tubes new egg cells are formed, I cannot decide; but I think it likely, because here, as well as on the surface epithelium, some epithelial cells may develop into egg cells."

Follicles are formed from the tubes as well as from the egg compartments, directly through the growth of interstitial tissue. At the lower end of the tube, as may be well explained from the want of a membrana

propria, interstitial tissue grows into the tubes and encloses the individual egg cells along with a portion of the not fully developed epithelial cells which surround them, and in this way primary follicles are produced.

In summing up Waldeyer thus remarks :—

"As the chief result of my investigations, it must be stated that both the egg and the follicular epithelial cells are derived directly from the germ epithelium. There is a reciprocal growth of vascular connective tissue and germ epithelium cells, in consequence of which large and small masses of the latter become imbedded more and more in the stroma of the ovary. The imbedded cells present a variety. Some of them, by simple increase in size, grow into ova, viz., primordial ova, while others keep to their original size, and by numerous divisions, at least as it appears to me, produce still smaller cells, viz., the follicular epithelial cells. A genetical distinction between primordial ova and follicular epithelial cells has consequently no existence. The germ epithelium is the common source of both."

In 1875, soon after the publication of my results, Kölliker published a short paper,[1] in which he brought forward altogether new views as to the origin of the follicular epithelial cells. He has reproduced his views in the second edition of his *Entwicklungsgeschichte des Menschen und des Höheren Thiere.* At page 971, vol. ii. of this work, he gives a drawing of part of a section of the ovary of a one to two days' old bitch, and endeavours to show that the follicular epithelial cells are derived from certain cords of cells situated in the hilus of the ovary, which he believes are derived from the Wolffian body. He says the cords of cells are continuous with the egg tubes of Pflüger, and give origin to the cells of the follicular epithelium.

In the *Quarterly Journal of Microscopical Science*, vol. xviii., Mr F. M. Balfour, of Cambridge, has lately published a most interesting paper on "The Structure and Development of the Vertebrate Ovary." This paper records observations on the ovaries of two types, viz., Elasmobranchii and Mammalia.

In Mammalia, Balfour's observations have been carried out on the ovaries of rabbits at various stages of development. He states that his results are most in accordance with those of Waldeyer, with whom he agrees in the fundamental proposition that both the ovum and follicular epithelial cells are derived from the germ epithelium, but he cannot accept Waldeyer's views of the relation of the stroma to the germ epithelium.

[1] *Verhandlung d. Phys. Med. Gesellschaft*, Wurzbürg, 1875, N. F. Bd. VIII.,

The following is the summary of his observations on the Mammalian ovary :—

1. The ovary in an eighteen days' embryo consists of a cylindrical ridge attached along the inner side of the Wolffian body, which is formed of two parts,—(*a*) an external epithelium, two or three cells deep (the germinal epithelium); (*b*) a hilus or part forming in the adult the vascular zone, at this stage composed of branched masses of epithelial tissue (tubuliferous tissue) derived from the walls of the anterior Malpighian bodies, and numerous blood-vessels, and some stroma cells.

2. The germinal epithelium gradually becomes thicker, and after a certain stage (twenty-three days) there grow into it numerous stroma ingrowths accompanied by blood-vessels. The germinal epithelium thus becomes honeycombed by strands of stroma. Part of the stroma eventually forms a layer close below the surface, which becomes in the adult the tunica albuginea. The part of the germinal epithelium external to this layer becomes reduced to a single row of cells, and forms what has been spoken of in Balfour's paper as the pseudo-epithelium of the ovary. The greater part of the germinal epithelium is situated internal to the tunica albuginea, and this part is at first divided up by strands of stroma into smaller divisions externally and larger ones internally. These masses of germinal epithelium, probably sections of branched trabeculæ, may be spoken of as nests. In course of the development of the ova they are broken up by stroma ingrowths, and each follicle, with its enclosed ovum, is eventually isolated by a layer of stroma.

3. The cells of the germinal epithelium give rise both to the permanent ova and to the cells of the follicular epithelium. For a long time, however, the cells remain indifferent, so that the stages, like those in Elasmobranchs, Osseous Fish, Birds, Reptiles, &c., with numerous primitive ova imbedded amongst the small cells of the germinal epithelium, are not found.

4. The conversion of the cells of the germinal epithelium into permanent ova commences in an embryo of about twenty-two days. All the cells of the germinal epithelium appear to be capable of becoming ova. The following are the stages in the process, which are almost identical with those in Elasmobranchs :—

(*a.*) The nucleus of the cells loses its more or less distinct network, and becomes very granular, with a few specially large granules (nucleoli).

The protoplasm around it becomes clear and abundant—the primitive ovum stage. It may be noted that the largest primitive ova are often situated in the pseudo-epithelium.

(*b.*) A segregation takes place in the contents of the nucleus within the membrane, and the granular contents pass to one side, where they form an irregular mass, while the remaining space within the membrane is perfectly clear. The granular mass gradually develops itself into a beautiful reticulum with two or three highly refracting nucleoli, one

of which eventually becomes the largest and forms the germinal spot *par excellence*.

At the same time the body of the ovum becomes slightly granular.

While the above changes, more especially those in the nucleus, have been taking place, the protoplasm of two or more ova may fuse together, and polynuclear masses be so formed. In some cases the whole of such a polynuclear mass gives rise to only a single ovum, owing to the atrophy of all the nuclei but one, in others it gives rise by subsequent division to two or more ova, each with a single germinal vesicle.

5. All the cells of a nest do not undergo the above changes, but some of them become smaller (by division) than the indifferent cells of the germinal epithelium, arrange themselves round the ova, and form the follicular epithelium.

6. The first membrane formed round the ovum arises in some cases even before the appearance of the follicular epithelium, and is of the nature of a vitelline membrane. It seems probable, although not definitely established by observation, that the zona radiata is formed internally to the vitelline membrane, and that the latter remains as a membrane, somewhat irregular on its outer border, against which the ends of the follicle cells abut.

At the beginning of his paper on the mammalian ovary, in referring to my paper in the *Transactions of the Royal Society*, Balfour thus remarks :—

"In the very interesting paper of Foulis, the conclusion is arrived at that while the ova are derived from the germinal epithelium, the cells of the follicle originate from the ordinary connective tissue cells of the stroma.

"Foulis regards the zona pellucida as a product of the ovum, and not of the follicle. To both of these views I shall return, and hope to be able to show that Foulis has not traced back the formation of the follicle through a sufficient number of the earlier stages. It thus comes about that, though I fully recognise the accuracy of his figures, I am unable to admit his conclusions."

This statement of Balfour's has puzzled me very much. My recorded observations show that I carefully traced the first appearance of the follicle in the ovary of a fœtal calf of about nine inches in length, in the ovaries of kittens at birth and onwards, in the ovaries of the human fœtus of $3\frac{1}{2}$ months and $7\frac{1}{2}$ months, and the new-born child.

It was in my endeavour to trace the formation of Graafian follicles from the so-called Pflüger's tubes, and from the tubular structures described by Waldeyer, that I came to the conclusion no such structures of the nature of tubes exist in the ovary,

and that Graafian follicles are not formed from long tubular ingrowths of the germinal epithelium in the manner described by Valentin, Pflüger, Spiegelberg, and Waldeyer. In describing the ovary of the new-born child, Waldeyer states—"At the time in which the tubes described by Pflüger exist, that is, as far as I can find, from the ninth month till a short time after birth," &c.; and again he says, "Follicles are formed from the tubes as well as from the egg compartments," &c., and he goes on to describe the process. Now, if I have examined the ovaries of the human fœtus of $3\frac{1}{2}$ months, of $7\frac{1}{2}$ months, and of the new-born child, I must have both seen and traced the first appearance of the follicles. I certainly proved to my own satisfaction that the formation of follicles from tubular structures in the new-born child, as described by Waldeyer, was altogether erroneous. In fig. 21, Plate XXIX., I gave a drawing of the first appearance of the follicles in the ovary of the human fœtus of $3\frac{1}{2}$ months; and in fig. 24, Plate XXX., which is a drawing of part of the ovary of a human fœtus of $7\frac{1}{2}$ months, Graafian follicles in all stages of development are represented. Balfour fully recognises the accuracy of my figures, therefore, I am at a loss to understand what he means when he says I have not traced back the formation of the follicle through a sufficient number of the earlier stages.

During the last two years, in connection with the important subject of the development of the ovary, most of my attention has been directed to the question of the origin and development of the follicular epithelial cells. That it is a difficult question to decide may be concluded from the fact that there are now three different views as to their origin. All recent observers are agreed as to the origin of the ova from the cells of the germinal epithelium; the point of dispute is as to the origin of the cells which invest the ova, viz., the cells of the follicular epithelium.

Having thus briefly stated the views of Waldeyer and Balfour as to the origin and development of the ova and follicular epithelial cells, and the view of Kölliker as to the origin of the latter, and as I have continued in the investigation of the subject since my original memoir was published, I shall relate the further observations which I have made.

I think it necessary, first, to give a short account of the method of preparing ovaries for section, which I have hitherto used, especially as the reagent I chiefly employ is described by Balfour as useless.

My experience is that, on the whole, no reagent gives such excellent results as Mueller's fluid. I have used it for several years in preference to any other, for the following reasons:—It preserves the finest protoplasmic processes of cells exceedingly well. It enables us to examine, with great clearness, the outline and definition of cells. In tissues prepared in it the nuclei of cells as distinguished from their protoplasm are rendered very distinct.

Osmic acid has given me most excellent results as regards the relations of parts, but Mueller's fluid is far preferable to this or any other regent I have used in enabling me to examine satisfactorily the cellular elements of tissues.

My method of preparation is as follows:—The ovary, whole or in part, as fresh as possible, is immersed in Mueller's fluid, which should always be prepared from the best chemicals. The fluid is changed after three days. The ovary is allowed to remain at rest in this for not less than three weeks. I generally allow it to remain a month or five weeks in the fluid, by which time the cellular elements are well fixed. The ovary is then placed in water, to which a tenth part of alcohol is added. By this means the potassium bichromate is dissolved out. The ovary is then placed in pure alcohol for twenty-four hours, when it is ready for cutting into sections. Ordinary strong methyl spirits, without any resins in solution, will answer all purposes as well as pure or absolute alcohol.

In cutting sections, the ovary is removed from the spirit and placed in oil of cloves for about ten minutes. The superfluous oil of cloves is then removed by means of a piece of coarse blotting paper, and the ovary is imbedded in paraffin. The razor used in cutting should be well flooded with oil of cloves. The sections are at once placed in strong spirit, which dissolves out the oil of cloves. The spirit should be changed three times to ensure that all the oil of cloves is removed from the tissues. When immersed in glycerine for twenty-four hours or so, the sections slightly swell up, and may be then subjected to microscopic examination.

The Relation of the Ovary to the Wolffian Body.

My observations begin with the study of sections made through the body of a fœtal lamb about half an inch in length, the exact age of which I was unable to ascertain.

Such a section is represented in fig. 1, Plate XIX.

The Wolffian bodies, W.W. in section, may be recognised as two large globular masses projecting downwards and outwards from their attachment to the mesoblast on either side of the aorta (*a o*). Passing from the aorta, two large blood-vessels enter into the Wolffian bodies at their attachment. The primitive intestine (I), with its mesenteric attachment, occupies a situation almost in the middle line between the Wolffian bodies. In the bay formed by the Wolffian body and the mesentery, on both sides, the young sexual gland (O) may be seen projecting forward towards the middle line from its attachment to the Wolffian body. In section the young sexual organ appears as a triangular shaped outgrowth connected by its base to the Wolffian body. Under a magnifying power of a thousand diameters, it presents the appearance given in fig. 2.

The young sexual organ consists of a thickened germ epithelium (*g*) which caps a central core of stroma (*str*). On tracing the germ epithelium superiorly, it passes round the bay previously mentioned on to the surface of the mesentery, its cells at the same time gradually assuming the appearance of the ordinary peritoneal epithelial cells (*e*). Inferiorly, the germ epithelium may be traced gradually passing into and becoming continuous with the epithelial layer covering the surface of the Wolffian body. Tracing the peritoneal epithelium round the surface of the Wolffian body at a spot almost opposite to the young sexual gland, we meet with the lumen of a well-marked tubular structure (MD) in section. This is situated immediately under the peritoneal layer, and is Mueller's duct, formed at an early stage of development by the closing in of an inflection of the peritoneal epithelium in this situation. Mueller's duct eventually becomes the Fallopian tube in the female.

The germ epithelium (*g*, fig. 2) consists of a layer of cells arranged three or four deep. The cells do not present any remarkable variety in size. Each cell consists of a well-marked

round or oval nucleus with protoplasm around it. At this stage no cells having the characters of a primitive ovum can be detected among the ordinary germ epithelial cells.

Immediately under the germ epithelium a very fine linear structure may sometimes be seen. This appears to be of the nature of a membrana propria or basement membrane, and is formed, as far as I can make out, by a condensation or hardening of a portion of the protoplasm of the most deeply situated germ epithelial cells. It is by no means a perfect structure, mere traces of it only being occasionally seen. It may be traced in continuity with a similar structure on which the ordinary peritoneal cells lie.

The central core of stroma appears to consist for the most part of embryonic connective tissue, derived, as Waldeyer described, from the interstitial tissue of the Wolffian body. It is of mesoblastic origin. In the few sections that I have examined, I have not detected any traces of buds or processes from the walls of the Malpighian bodies of the Wolffian body passing into this young tissue. According to Balfour's observations, the main mass of the tissue internal to the germ epithelium in an eighteen days' old embryo of a rabbit consists of branched masses of epithelial tissue derived from the walls of the anterior Malpighian bodies, and numerous blood-vessels, and some stroma cells. Kölliker has also described this tissue, and, as I have already stated, believes that in older ovaries it gives rise to cells of the follicular epithelium. Balfour calls it tubuliferous tissue.

In many of my preparations of the ovaries of kittens at birth, I long ago noticed that deeply situated in the ovary near the hilus were many small tubules seen in section. They consisted of a basement membrane lined with columnar or oval cells. I noticed similar appearances in the ovaries of rabbits at birth. On comparing sections of the ovary and the testicle of the rabbit at birth, I was struck by the resemblance of these tubules in the female to the seminiferous tubules in the male; and I came to the conclusion that in the female they are the homologues or representatives of the seminal tubules of the testicle in the male. In the earliest stages of development it is impossible to say if the sexual gland will ultimately be an ovary or testicle.

Balfour has very carefully traced the origin and development

of this tubuliferous tissue, and has no hesitation in identifying it with the segmental cords (Segmentalstränge) discovered by Braun in Reptilia.[1] According to Braun, as stated by Balfour,

"The segmental cords in Reptilia are buds from the outer walls of the Malpighian bodies. The bud from each Malpighian body grows into the genital ridge before the period of sexual differentiation, and sends out processes backwards and forwards, which unite with the buds from the other Malpighian bodies. There is thus formed a kind of trabecular work of tissue in the stroma of the ovary, which in the Lacertilia comes into connection with the germinal epithelium in both sexes, but in Ophidia in the male only. In the female in all cases it gradually atrophies and finally vanishes; but in the male there pass into it the primitive ova, and it eventually forms, with the enclosed primitive ova, the tubuli seminiferi.

"The chief difference between Reptilia and Mammalia, in reference to this tissue, appears to be that in Mammalia it arises from only a few of the Malpighian bodies at the anterior extremity of the ovary, but in Reptilia from all the Malpighian bodies adjoining the genital ridge."

Balfour has given a figure, 35 B, which is a longitudinal section through part of the Wolffian body and the anterior end of the ovary of an eighteen days' old embryo of a rabbit, to show the derivation of this tubuliferous tissue from the Malpighian bodies close to the anterior extremity of the ovary. There can be no doubt that this tissue occupies a very large part of the ovarian stroma in the earliest stages of development in mammals, but it gradually disappears until, in the ovaries of kittens at birth, it is represented by a comparatively few tubules situated deeply in the ovary near the hilus. I have satisfied myself by a careful examination of the ovaries of kittens at birth and onwards that it has nothing to do with the ova or with the origin of the follicle cells. The true ovarian stroma, consisting of connective tissue, may always be traced passing upwards from the deeper parts of the ovary towards the germ epithelium, between the tubules; and it is this connective tissue alone that comes into contact with the ova, and, as I hope to show presently, gives origin to the follicular epithelial cells.

The next stage in the development of the ovary which I have lately studied is that of the ovary of a fœtal lamb about two inches in length. Such an ovary attached to the atrophying Wolffian body is represented in the drawing fig. 3.

[1] *Arbeiten a. d. Zool. Zoot. Institute*, Würzburg, Bd. IV.

For the convenience of description, the ovary may be divided into three zones—the true germ epithelium (*g*), the parenchymatous zone internal to this (*y*), and most deeply is the fibro-vascular zone continuous with the stalk or peduncle (*a*). The ovary from which this section was prepared was hardened in osmic acid, and it shows very well, as seen in the drawing, the germ epithelium as a thick (*g*), dark, rim or border passing round the whole organ, and becoming continuous with the peritoneal epithelium (*e*) on the stalk (*a*). The parenchymatous zone (*y*) consists of cells which resemble very closely the deeper cells of the germ epithelium, and have undoubtedly been derived from them. From the fibro-vascular zone numerous offshoots of vascular connective tissue pass upwards in a radiating manner throughout the whole parenchymatous zone, communicating with each other, and actually coming into contact with the germ epithelium. This part or parenchymatous zone of the ovary, as described by Balfour, becomes honeycombed by the upgrowing strands of stroma.

Under low powers of the microscope, the blood-vessels, with the blood corpuscles in them, may be seen, as in the figure, ramifying throughout the parenchymatous zone of the ovary. All these blood-vessels are derived from the main trunks that enter the ovary at the hilus. Each blood-vessel is accompanied by young connective tissue, with which it has an intimate relation. Within the meshes produced by the ramifications of this young vascular connective tissue are groups of cells derived from the germ epithelium. At this early stage of development there is no trace of a tunica albuginea. It is impossible to draw a line of demarcation between the true germ epithelium (*g*) and the subjacent parenchymatous zone. All that part of the ovary external to the fibro-vascular zone—*i.e.*, the parenchymatous zone and the true germ epithelium—may be regarded as consisting of germ epithelial cells in the act of being included in meshes formed by the ramifications of processes of vascular connective tissue, derived from the fibro-vascular zone.

The stalk of the ovary from which the central stroma of the ovary is derived proceeds from and is continuous with the tissue, which at this stage of development constitutes the remains of the Wolffian body (W). Mueller's duct in section may now be

seen as a large tube, and becomes the Fallopian tube. On comparing fig. 3 with fig. 2, both of which were drawn under the same power of the microscope, so that they might be more easily compared, one sees how enormously the young ovary has grown, and at the same time the Wolffian body has gradually atrophied until it appears in transverse section as represented in fig. 3. This change in the Wolffian body is brought about by the atrophy and gradual disappearance of the tubes which at an early stage formed its main structure. The shrunken Wolffian body now constitutes the greater part of the broad ligament.

In the ovary of a fœtal calf, about 10 inches in length, the structure is very much the same as that of the ovary of the fœtal lamb just described, but everything is in a more advanced stage of development. The germ epithelium still consists of cells arranged in a layer three or four deep, and the parenchymatous zone consists of cells derived from the germ epithelium, delicate bundles of vascular connective tissue from the central mass of stroma ramify in every direction among the cells of the parenchymatous zone. There is, as yet, no trace of a tunica albuginea, and it is not possible to draw a definite line between the germ epithelial layer and the subjacent zone. All round the ovary under the germ epithelium, groups of cells are in the act of being imbedded in meshes of the delicate young stroma. Deep in the ovary the imbedded cells present a considerable variety in size. The largest cells are situated in close relation to the central mass of stroma, and are characterised by the large size of their nuclei and their abundant protoplasm, while the cells more superficially imbedded are in various stages of development. The youngest cells are immediately under the germ epithelial layer. Some of the most deeply imbedded cells have already assumed the character of primordial ova. In each primordial ovum the nucleus becomes the germinal vesicle, and the protoplasm which surrounds it gradually forms the yelk of the ovum. These primordial ova have been derived at an early stage from the germ epithelium, and there can be no doubt that they have developed from the cells which were first imbedded in the stroma.

In fig. 4, which is part of the ovary of a $3\frac{1}{2}$ months human

fœtus, we have the appearances presented by the primordial ova, P,P, situated most deeply in the stroma of the ovary. Such primordial ova are found chiefly in the situation indicated by the letter *y* in fig. 3, *i.e.*, in close relation to the central mass of stroma. Each primordial ovum consists of a central vesicular nucleus, around which is a quantity of clear or slightly granular protoplasm. In contact with the yelk or protoplasm, in each case are fusiform nuclei (*mm*) exactly similar to the nuclei in the stroma of the ovary. Superficial to these primordial ova are groups of cells (H), derived from the germ epithelium, in various stages of development. The fusiform corpuscles in contact with the yelk of the primordial ova are the centres from which the cells of the follicular epithelium are developed.

If we examine a section of the ovary of a 7½ months' human fœtus, we see that the central zone of fibro-vascular tissue is continuous with the stalk of the ovary, and numerous vascular processes of it pass upwards in a radiating manner towards the germ epithelium, and they ramify and communicate with each other, forming meshes in which are imbedded groups of germ epithelial cells. At the deepest part of the ovary, in close relation to the main mass of stroma, numerous large primordial ova are met with, and superficial to these are various sized groups of germ epithelial cells in different stages of development. A portion of such an ovary is represented in fig. 5. The germ epithelium (*g*) is seen as a well-marked layer consisting of columnar or oval cells, for the most part arranged one or two cells deep. They vary in size; some are oval, others round, and here and there we meet with specially large individuals, P.P., which present the characters of primordial ova. The germ epithelium passes round the whole ovary, dipping into and lining the furrows and clefts which lie between the irregularities of the surface of the ovary. At this stage the tunica albuginea is a well-marked layer of the ovarian stroma, immediately under the germ epithelium on which the latter rests.

Below the germ epithelium are groups of cells, H, H, H, derived from the germ epithelium. Such groups may be seen in many situations in the act of being shut off by the stroma from the deeper cells of the germ epithelium; while deeper in the ovary other cell groups may be seen in a more advanced stage

of development. These latter were derived from the germ epithelium at an earlier stage, and are now composed of cells gradually assuming the characters of primordial ova. All the germ epithelial cells in a nest are potentially ova.

The stroma, STR, consists of very vascular connective tissue, in which are numerous fusiform cells. The processes of the stroma may be seen arching round the groups of cells immediately under the germ epithelium. This youngest stroma is the forerunner of the tunica albuginea. By the constant imbedding of germ cells from the germ epithelium, the latter seems to become gradually exhausted in its production of new cells to take the place of those already imbedded, until at last it is reduced to a single layer of cells, and then the young stroma immediately under it becomes much more marked as the tunica albuginea. In the human child at birth onwards the germ epithelium consists of a single layer of cells resting on a well-marked tunica albuginea. This single row of germ epithelial cells has been termed by Balfour the Pseudo-Epithelium.

In an ovary of the human fœtus of $7\frac{1}{2}$ months, the germ epithelium varies in thickness. Here and there the cells are two or three deep, but in the greater part of its extent it consists of a single row of cells. In examining a series of sections, such as fig. 5 represents, we often meet with specimens in which the germ epithelium has been partially or entirely stripped off from the subjacent tunica albuginea. In such places it is of the greatest interest to examine the youngest connective tissue in the act of imbedding the germ epithelial cells.

This tunica albuginea, when first formed, consists of a very young connective tissue, and fine processes of it in the form of an undifferentiated protoplasm, in which nuclei are visible, may be seen passing upwards between the germ epithelial cells, as the first step towards imbedding them. In some situations where the germ epithelium has been entirely stripped off, small groups of germ epithelial cells may be seen surrounded by this jelly-like or undifferentiated protoplasm. This jelly-like tissue, in which a few small fusiform nuclei are seen, is undoubtedly the youngest form of connective tissue, and it is derived from the older connective tissue, of which the tunica albuginea consists.

In other specimens we see jelly-like processes of the youngest

connective tissue passing up from the tunica albuginea through among the cells of the germ epithelium, completely enclosing them in groups. In fig. 18 the letters R, R, point to this jelly-like tissue enclosing the groups of germ cells, *q*, *q*. What we see in fig. 18, as indicated by the letters R, R, is in reality the cut surface of an entire capsule or tunic. The whole group of the germ epithelial cells (*q*, *q*), is actually contained within the capsule of jelly-like tissue derived from the young tunica albuginea.

Below the tunica albuginea (STR) in fig. 18, we see groups of cells or cell nests (H, H, H), which have been undoubtedly derived from the germ of epithelium in a similar manner at an earlier stage of development. In the microscopic examination of sections of the ovary, we must always endeavour to picture to ourselves the actual condition, viz., that which exists in the living ovary. Now, there can be no doubt that the numerous cell nests in the whole egg-bearing part of the ovary, which are more or less globular in form, have been derived from the germ epithelium in the way I have described. When once a large cell nest is formed in this way, it may be broken up or subdivided into smaller nests by a continuation of the same process. From the wall of the first formed capsule jelly-like offshoots pass in among the included germ cells, and by their continued growth the germ cells become separated from each other, and the whole cell group becomes subdivided into small egg-containing meshes of stroma. The cell groups when first formed are often very small, appearing to contain but three or four germ epithelial cells. Such small cell groups are seen in great numbers imbedded in the young jelly-like stroma immediately under the germ epithelium. Wherever this young jelly-like tissue proceeds fusiform, or elongated-oval, nuclei are to be seen in its substance.

The Origin and Development of the Follicular Epithelial Cells.

The ovaries of kittens at birth and onwards are exceedingly well suited for studying the relation of the germ epithelium to the stroma of the ovary, and also for the study of the origin of the follicular epithelial cells.

In fig. 6 (Plate XX.) we have represented a part of the ovary of a kitten about two weeks old. The germ epithelium (*g*, *g*),

consists of a layer of cells three or four deep. Among the germ epithelial cells there is a great variety as to size and form; some are oval and columnar, others round or spherical; while others are conspicuous by their size and the size of their nuclei, and they stand forth prominently among the ordinary germ epithelial cells. These latter are primordial ova, P. P. P. Each consists of a central large vesicular nucleus, and around the nucleus is a quantity of clear or slightly granular protoplasm.

In some sections of the ovary of a kitten at birth, I have lately observed some very curious appearances among the cells of the germ epithelium. These appearances are shown in figs. 8, 9, 10, 11. The germ epithelium (*g*) consists of the ordinary oval or columnar cells. A young tunica albuginea is present in these sections, and the germ epithelium (*g*) rests upon it. The outermost row of germ epithelial cells are on the same level, and clear protoplasm fills up the clefts between the nuclei, as shown in fig. 8. Numerous long club-like processes (*n*, *n*), are seen projecting considerably above the level of the germ epithelial layer. These processes consist of clear protoplasm. In the club-like extremities no nucleus can be detected, but in some instances I have observed a few fine granules in them. Sometimes we may trace the thin tail-like processes down between the germ epithelial cells as far as the tunica albuginea, and there they appear to be continuous, with long, fine processes of connective tissue, which are offshoots of the ovarian stroma, as shown in fig. 15. In fig. 9, one of the long processes (*n*), ending in a club-like extremity, is seen. In the nob-like end of this process a distinct vacuole exists. In figs. 9, 10, some of the nob-like ends have been broken across. In fig. 11 small bud-like processes (*n*) of protoplasm are seen sprouting up between the nuclei of certain germ epithelial cells. In the great number of instances, it appears to me that these club-like processes spring from the protoplasm surrounding the nuclei of certain germ epithelial cells; while in other cases it would appear as if they were the terminal ends of long connective tissue processes of the ovarian stroma which have grown up between the germ epithelial cells. It is not unlikely that the latter appearances are deceptive. There can be no doubt, as seen in fig. 11, that some of the buds spring directly from the protoplasm of the germ epithelial cells. In

many instances certain ordinary germ epithelial cells may be seen with long tail-like processes of protoplasm, which pass downwards into the tunica albuginea. At the extreme left of figs. 8 and 10 two such germ epithelial cells are represented.

I hope that future investigations may clear up all doubt as to the nature of these long club-like processes. They present a very remarkable appearance under the microscope. Although I have examined a very large number of sections of ovaries of kittens at birth, I have never before observed such appearances; but I can quite understand that such delicate outgrowths might be easily broken off in preparing and cutting sections of the ovary.

Examined under high powers of the microscope, there can always be seen around each large primordial ovum (P, fig. 6) a thin capsule of a jelly-like material, in the substance of which, in section, are seen two or three fusiform or elongated oval nuclei, (*m*, *m*, *m*). Between the capsule and the yelk or protoplasm of the primordial ovum no cell or other structure can be detected. The capsule lies close in contact with the yelk substance of the primordial ovum. The nuclei are not *within* the capsule, but lie imbedded in the substance of the latter, as represented in fig. 26 (Plate XXI.) It is a very remarkable and interesting observation that every large primordial ovum among the ordinary germ epithelial cells on the surface of the ovary presents the appearances just described. This nucleated capsule is always present, and there can be no doubt that it is a special arrangement for the nourishment of the ovum contained within it. The capsule is always found in close relation to the youngest connective tissue stroma, and the nuclei in it when first formed are exactly like the nuclei which exist in the youngest connective tissue in all parts of the stroma.

In some specimens of the kitten's ovary, when the tunica albuginea is formed, numerous primordial ova may be seen resting on this young connective tissue stratum, among the ordinary germ epithelial cells, and in each case a more or less delicate nucleated tunic in close contact with the yelk can be detected. In the human fœtal ovary of 7½ months and in the child at birth exactly similar appearances may be observed.

In fig. 6 the tunica albuginea is not yet formed, although there are evident traces of it. In this specimen of the ovary the large primordial ova lie in close relation to the ends of bundles or strands of young connective tissue, which may be followed down into the deeper parts of the ovary where they are discovered to be processes of the general stroma. These bundles of young connective tissue are in reality offshoots from meshes of the general stroma. The cut surfaces, as in section, of such meshes (STR) may be seen surrounding large groups of developing germ epithelial cells (H, H, H), which were imbedded at an earlier stage of development.

Below the germ epithelial layer (*g*, *g*), all round the ovary, we meet with various sized cell nests (H, H, H). In the kitten's ovary these cell nests are mostly of an elongated or oval form. Many of the cell nests are in connection superiorly with the deeper cells of the germ epithelium. They have not yet been completely cut off from the germ epithelial layer by the offshoots of young connective tissue, which eventually form the tunica albuginea. The strands of connective tissue between the cell nests are in reality the cut surfaces of the walls of the meshes which enclose the cell nests. These elongated cell nests still in connection with the germ epithelium superiorly are Pflüger's egg tubes. He supposed they were long tubes filled with developing germ cells. They are simply cell nests formed by the growth of stroma around certain of the germ epithelial cells in the usual way. The germ epithelial cells, when included in meshes, do not grow downwards into the ovarian stroma; but as the stroma grows around the cells they enlarge, and the whole group expands generally in a direction upwards and outwards in the line of least resistance. The whole ovary enlarges by the outward growth of its stroma, and by the expansion outwardly of the numerous cell nests which make up the greater part of the organ.

In my original paper I carefully described the changes which the imbedded germ epithelial cells in the egg clusters or cell nests undergo in passing into primordial ova. When an individual germ epithelial cell in the germ epithelial layer grows into a primordial ovum, the nucleus becomes spherical and vesicular. It presents a fine limiting membranous wall. Around the nucleus there is gradually added a large quantity of the proto-

plasm which gives bulk to the young ovum (see P, P, fig. 6). The great change in the size of the cell is brought about by the addition of such a large quantity of protoplasm to that which originally existed around the nucleus. In the cell nests, as the imbedded germ epithelial cells grow into primordial ova the nuclei become spherical and vesicular, and there is gradually added to the nuclei that protoplasm which forms the yelk of the young ova. From whence comes all this material to form the yelk substance of the primordial ova? Without doubt, it is supplied by the vascular young connective tissue with which such developing ova are always in close relation. Among the cells of the germ epithelium around each primordial ovum (P, P, P, fig. 6) may generally be detected the nucleated capsule which I have already described. So generally is this the case, that I am forced to the conclusion that no ordinary germ epithelial cells develop into primordial ova until the jelly-like processes of the stroma come into intimate contact with them in such a way as eventually to enclose them in capsules or tunics, in the substance of which are the nuclei from which the future follicle cells are developed. The primordial ovum is not produced before the follicle, nor is the follicle developed before the ovum. Now, what takes place in connection with the development of the primordial ova among the germ epithelial cells on the surface of the ovary also takes place in connection with the development of the germ cells imbedded in the stroma of the ovary.

Waldeyer, in his description of the formation of the Graafian follicles, states that in the cell nests some, and sometimes many, among the imbedded cells become conspicuous by their size and the size of their nuclei, other cells remain of small size, and by numerous divisions produce smaller cells, which form the follicle cells. Connective tissue then grows into the cell nests, enclosing the eggs along with the not fully developed epithelium, and in this way Graafian follicles are produced.

Balfour, in describing the formation of the follicles in mammalia, says some of the cells in a cell nest, instead of passing from primitive ova into permanent ova in the way he has described, do not undergo those changes, but become smaller (by division) and arrange themselves round the ova and form the follicular epithelium. So that, according to these two observers,

the eggs are formed first, and the follicle cells then arrange themselves around them. In-growths of stroma then enclose the eggs with the follicular epithelium. The germ epithelium is the common source of both the eggs and the follicular epithelial cells. The view I hold is this. All the ova are derived from the germ epithelial cells, but the follicle cells are derived from, and are parts of, the ovarian stroma. As the result of my observations, I have come to the conclusion that the cells which nourish the ova, and the tissue from which that nourishment is secreted, are parts of the general vascular stroma of the ovary. From the beginning of the development of the ova these two tissues are in intimate relation to each other, and progress, hand-in-hand, so to speak, during the nourishment and development of the ova. The follicle cells are formed from the nuclei in the capsular tunic of the developing ova. As soon as a primordial ovum becomes conspicuous by its size, at the same time we detect the first trace of a Graafian follicle around it. The jelly-like capsule, with its nuclei, around each developing ovum, is the first trace of the Graafian follicle.

I shall now proceed to describe the drawings which I have made in support of my views.

Figures 7, 12, 13, 14, 16, 17, are all portions of the ovary of a two or three weeks' old kitten.

In fig. 7, the germ epithelium (*g*) (pseudo-epithelium, Balfour) rests on the young tunica albuginea, STR. Delicate strands of connective tissue (STR) are seen passing upwards and becoming continuous with a jelly-like capsule (R), which encloses several large germ epithelial cells. In the substance of the capsule are seen two fusiform nuclei, *m*, *m*. Certain delicate processes of the capsule appear to pass inwards among the developing germ epithelial cells.

Figure 12 is a portion of the pseudo-epithelium (*g*) from the same ovary resting on the young tunica albuginea. A single large primordial ovum (P) is represented as being enclosed in a capsule (R, R), in the substance of which are two fusiform nuclei (*m*, *m*). Between the letters R, R, the capsule is cracked, and the broken ends are quite separate from each other. The capsule closely invests the young ovum, and is in intimate relation to the subjacent connective tissue.

Figure 13 is a portion of the pseudo-epithelium of the same ovary. To the left of the figure a primordial ovum (P), with its nucleated capsule, is seen; while to the right of the figure an empty capsule (R), with a crack in it, is observed. The crack in the capsule is close to the fusiform nucleus, *m*. Such empty capsules in the pseudo-epithelium are frequently seen. In cutting the section, the ovum has apparently been knocked out of its tunic, which now remains, looking like a ring standing up among the ordinary germ epithelial cells.

Figures 14, 16, 17, are portions of the pseudo-epithelium of the same kitten's ovary. In each figure a large primordial ovum (P) is seen; around each is the usual nucleated capsule. Strands of stroma (STR), which are part of the walls of meshes enclosing large cell nests (H) below the tunica albuginea, may be traced in each case, in direct continuity with the capsules which invest the primordial ova. I call particular attnetion to these figures.

Figure 15 is a drawing of two delicate strands of stroma which were seen passing up from the deeper parts of the ovary to the germ epithelial layer. The ends of such strands appear to pass in among the cells of the germ epithelium. In numerous instances I have seen long processes of the ovarian stroma passing through the germ epithelial layer, projecting in the form of loops beyond the level of that structure. The figures which I have thus described represent only a few of similar appearances I have lately observed; but I am of opinion that by themselves they afford sufficient evidence of the truth of my view, viz., that the nucleated capsules which invest primordial ova are parts of the ovarian stroma and constitute the first trace of the Graafian follicles.

The nourishment and the development of the germ cells in the cell nests in the stroma are carried on in an exactly similar manner. First of all, as already described, small and large groups of germ epithelial cells become imbedded in jelly-like capsules derived from the ovarian stroma immediately under the germ epithelial layer. As this process of imbedding goes on, the first formed cell groups or nests become deeper and deeper imbedded in the ovarian stroma. Not every germ cell in the cell nest develops. Only those cells which become completely invested by the nucleated capsules may be considered as permanent

ova. From the walls of the mesh of stroma enclosing a large cell nest there grow in among the included germ cells jelly-like processes of the ovarian stroma, just as we saw takes place among the germ epithelial cells on the surface of the ovary. These processes of undifferentiated protoplasm completely invest certain of the germ cells, which then rapidly advance in development to the stage of primordial ova. Wherever these processes of young stroma grow, in the substance of them fusiform nuclei appear, and these latter are thus brought into intimate contact with the yelk substance of the young developing eggs. Many of the cells in a cell nest atrophy and disappear. In studying the cell nests I have frequently seen groups of cells whose protoplasm appeared to be fused together, presenting the appearance of one large protoplasmic mass in which were several nuclei, the whole mass being surrounded by a nucleated capsule. From the ovary of a child two years of age, I have a section in which six distinct germinal vesicles are noticed in the centre of one large protoplasmic mass, while fusiform nuclei of the ovarian stroma indent the mass of protoplasm all round its periphery.

The development of the follicle cells from the nuclei of the ovarian stroma immediately in contact with the yelk of the primordial ova is a subject of the greatest interest, and I shall now proceed to describe what I have traced out during my observations.

An ordinary germ epithelial cell consists of an oval or columnar nucleus, with protoplasm round it, as represented in figure 20. In the act of becoming a primordial ovum it swells up, the nucleus becoming a sharply defined vesicular body, spherical in form, while within it a spot appears. The nucleus becomes the germinal vesicle of the ovum. Around the nucleus there is gradually added protoplasm to form the yelk substance of the ovum (fig. 21).

As the ovum becomes larger, immediately outside the yelk substance, and in contact with it, a distinct tunic or capsule may be seen investing it (figs. 22, 23). Nothing in the form of cell or nucleus is to be detected between the capsule and the included ovum. These two objects are in most intimate relation from their first appearance. The capsule consists of a jelly-like or undifferentiated protoplasm, in which fusiform

nuclei are visible. These nuclei at first are always fusiform in outline, and lie flat against the ovum, but in the substance of the capsule.

The first evidence of development which I have noticed is as follows:—The nuclei at first appear like solid fusiform rods, as in fig. 24 *m*, *m*. As they develop they swell out, becoming vesicular, and within them a distinct spot or nucleolus appears (figs. 25, 26, *m*, *m*.) At this stage they often indent the yelk substance of the ovum, as I described in my original paper. The nuclei divide, as represented in figs. 26, 27, *x*, *x*, and continue to swell out, sometimes producing deep indentations in the yelk of the ovum. External to these dividing nuclei, as represented in fig. 27, *x*, a portion of the original capsule remains, and, without doubt, forms the membrana propria folliculi. When first formed around the ovum, the follicle cells present the appearance of little vesicular nuclei, spherical in form, and surrounded by protoplasm, and within each a spot or nucleolus can be seen, while outside the follicle cells the membrana propria folliculi (fig. 28 *u*) is a well-marked structure. During the time this development of the follicle cells is going on, the ovum itself is developing, gradually becoming larger, and distending the follicle in every direction.

What I have now described can be seen by any one who will carefully examine sections from the ovary of a two or three weeks' old kitten.

Balfour says (page 430):—"An examination of the follicle cells from the surface, and not in section, demonstrates that general resemblance in shape of the follicle cells to the stroma cells is quite delusory. They are, in fact, flat, circular, or oval plates, not really spindle-shaped, but only apparently so in section." With this statement I cannot agree.

In section, the nuclei from which the follicle cells originate, without considering the form these eventually assume, are *always at first* of a fusiform shape. Looked down upon from above, they appear as elongated oval bodies, somewhat flattened against the ovum. As they develop, they undergo the changes in form I have described. When the primordial ova are young, and comparatively small, they are few in number and very rarely spherical in form; but when the ova are large, they all become

spherical and vesicular, and numerous around the yelk substance inside the membrana propria folliculi.

Both Waldeyer and Balfour state that the follicle cells are formed by division from certain of the germ epithelial cells.

Do these observers mean to imply that these cells first divide, and become either flat, circular, or oval plates, and then, lastly, spherical bodies, as they "arrange themselves" round the ovum to form the follicle? How do they "arrange themselves"?

I venture to state that neither Waldeyer nor Balfour have carefully traced out the steps in the development of the follicle cells from their first appearance to their last stage, or they would not have overlooked the fact that the nuclei from which the follicle cells are developed are at *the first* always minute fusiform bodies like the nuclei of the stroma cells. They are at first much smaller than the germ epithelium cells. As they develop they become larger and larger, not smaller and smaller as these two observers state, until they at last form a row of comparatively large spherical nuclei, with protoplasm round them, around the young ovum. Compare figures 23, 24, 25, 26, 27, 28, with figure 31. We thus see how the small nuclei grow until they become large spherical bodies, such as represented by the letter T in figure 31.

In the ovary of a cat about six months old, a cell nest presents a very beautiful object for study. Such cell nests are seen in fig. 19, H, H, H. Each ovum in the nest is now of large size, and around each the follicle cells are in various stages of development. In fig. 30 we have the appearance of a portion of a cell nest. The ova are all of large size; each is enveloped in a capsule of clear protoplasm, in the substance of which are nuclei of various forms. Some of the nuclei appear to be cut across, as represented in fig. 29; around such a nucleus the protoplasm may be traced in processes dipping in between and passing around two contiguous ova. In other cases the nuclei may be seen dividing, as at x, at the lower part of the figure. I know of no appearances in the ovary which seem to me to prove so conclusively the origin of the follicle cells from the stroma cells of the ovary, as those we observe in the case of a ripe Graafian follicle just about to burst to liberate the ovum.

Fig. 31 is a carefully-prepared drawing of part of the wall

and the follicle cells of such a Graafian follicle, from the ovary of an adult cat. The follicle cells, T, are large spherical bodies, in which the nuclei are at once conspicuous by their size and vesicular nature. A well-marked membrana propria (*u*) is seen in this particular specimen, and it serves to define the wall of the follicle cells.

Immediately outside the membrana propria, the cells in the wall of the stroma mesh have been converted into bodies exactly similar to the true follicle cells within the membrana propria, and among them we can detect many large fusiform cells in the act of swelling out into similar spherical bodies. At a greater distance from the membrana propria the mesh consists almost entirely of large fusiform cells, which gradually become more and more like the ordinary cells of the stroma farther away from the membrana propria. The cellular tissue outside the membrana propria is very vascular in the case of the ripe Graafian follicle, and the swelling up of the cells of the stroma outside the membrana propria into spherical bodies, exactly like the follicle cells, appears to be a provision to enable the follicle to rupture more easily than if the tissue had been fibrous. Such ripe Graafian follicles, with the appearances I have now described, afford, in my opinion, most conclusive evidence of the similarity of origin of the cells within and without the membrana propria folliculi. They are both derived from the ordinary cells of the connective tissue stroma of the ovary.

General Conclusions.

All the ova are derived from the germ epithelial cells. In the development of the ovary small and large groups of the germ epithelial cells become gradually imbedded in the ever-advancing stroma. Germ epithelial cells do not grow downwards into the substance of the ovary. The ovarian stroma constantly grows outwards, surrounding and imbedding certain of the germ epithelial cells. As these latter increase in size, and as the stroma thickens around them, the whole ovary becomes enlarged. Pflüger's tubes in the kitten's ovary have no existence as such, but are appearances produced by long groups of imbedded germ epithelial cells, many of which groups are not completely cut off from the germ epithelial layer by the young ovarian stroma. Such groups

of germ epithelial cells, in various forms, are met with in all ovaries, but have no importance whatever as tubular structures. In the human child's ovary numerous furrows or clefts between irregularities of the general surface are met with. Sections through these furrows and clefts produce the appearance as if the germ epithelium (pseudo-epithelium, Balfour) passed downwards into the ovary in the form of tubular open pits, as was described by Waldeyer and his predecessors. No real tubular structures from which Graafian follicles are formed exist in the Mammalian ovary at any stage of its development. Graafian follicles are formed only in one way from the beginning of the ovary to the end of its existence.

The youngest connective tissue of the stroma, in the form of offshoots of jelly-like protoplasm, surrounds and imbeds large and small groups of germ epithelial cells. A single germ epithelial cell may be completely surrounded by this young connective tissue. When this takes place the germ epithelial cell rapidly grows and becomes a primordial ovum. Each individual cell in a group of germ epithelial cells, surrounded by the young ovarian stroma, shows a similar tendency to become a primordial ovum. All the groups of developing germ epithelial cells or cell nests in the ovary are broken up into still smaller cell nests by the ever-advancing young connective tissue, until, at last, individual cells in the cell nests become completely surrounded by the youngest connective tissue. When an individual germ cell becomes surrounded by the young connective tissue, at the same time, and as part of the process, the Graafian follicle begins to be formed. Wherever the young jelly-like connective tissue appears, in its substance nuclei, generally fusiform at first, make their appearance. These nuclei may be always seen in contact with the yelk substance of the primordial ova. The follicle cells are derived from the nuclei which lie in contact with the protoplasm or yelk substance of the developing ova. This takes place in all parts of the ovary wherever cell nests are formed. The follicle cells thus originate from the cells of the ovarian stroma, and not from the germ epithelial cells. In the Mammalian ovary at birth the most advanced ova are met with deep in the ovary, and not in passing from without inwards, as described by some observers. In a ripe Graafian follicle the stroma cells outside the membrana

propria folliculi become converted into cells exactly similar to the true follicle cells, and it is possible to trace the ordinary stroma cells outside the follicle through all stages of development into cells resembling the follicle cells, the observation affording a most conclusive proof of the origin of the follicle cells from the ordinary cells of the stroma.

Explanation of Plates XIX., XX., XXI.

The same letters have been employed to mark corresponding structures in the whole series of figures :—

a, Stalk or peduncle of the ovary; *d*, bloodvessels; *e*, peritoneal epithelium; *g*, germ epithelium; H, egg clusters or cell nests; I, primitive intestine; *m*, fusiform nuclei in contact with primordial ova; *n*, club-like processes of protoplasm among the germ epithelial cells; P, primordial ova; *q*, groups of germ epithelial cells in the act of being enclosed in meshes of the youngest jelly-like connective tissue; R, the youngest jelly-like connective tissue; T, follicular epithelial cells; *u*, the membrana propria folliculi; *x*, fusiform nuclei dividing; *y*, the deepest part of the parenchymatous zone of the ovary; *ao*, aorta; CH, chorda dorsalis; MD, Müller's duct; STR, stroma of the ovary.

All the figures have been carefully drawn by the aid of the camera lucida. In all my investigations I have used Hartnack's instrument with No. 3 ocular. In figures 1 and 2, R. & J. Beck's 2-inch lens was employed. In figure 19, Swift's one-sixth lens was used, but in all the other figures R. & J. Beck's one-tenth immersion lens was employed.

Fig. 1. A section through the body of a fœtal lamb, about half an inch in length, showing the Wolffian body (W), Müller's duct (MD), and the young sexual gland (O).

Fig. 2. A highly-magnified drawing of the young sexual gland (O), in last figure, to show the relation of the germ epithelium (*g*) to the ordinary peritoneal cells (*e*), and to the central core of stroma (STR).

Fig. 3. A section through the ovary and Wolffian body of a fœtal lamb about two inches in length, to show the relation of the stroma of the ovary to the germ epithelium and to the parenchymatous zone (*y*).

Fig. 4. A portion of the ovary of a human fœtus of $3\frac{1}{2}$ months, to show the primordial ova (P) and the fusiform nuclei (*m*) in contact with them, from which the follicle cells are developed.

Fig. 5. A portion of the ovary of a human fœtus of $7\frac{1}{2}$ months, to show the germ epithelium (*g*), cell-nests (H), primordial ova (P), and ovarian stroma (STR).

Fig. 6. A portion of the ovary of a two weeks' old kitten, to show the germ epithelium (*g*), primordial ova (P), fusiform nuclei, from which the follicle cells are derived (*m*); cell-nests (H), and the ovarian stroma (STR).

Fig. 7. A portion of the ovary of a two weeks' old kitten, to show the germ epithelium (*g*), and a group of primordial ova (P), enclosed in a nucleated capsule of jelly-like young connective tissue (R) derived from the stroma (STR).

Fig. 8. A portion of the ovary of a kitten at birth, to show long club-like processes of protoplasm (*n*), projecting above the level of the ordinary germ epithelial cells (*g*).

Figs. 9, 10, 11. Portions of the same ovary as the last to show the same appearances.

Fig. 12. A portion of the germ epithelium (*g*) of the ovary of a two weeks' old kitten, to show a large primordial ovum (P) enclosed in a nucleated capsule (R), consisting of young jelly-like connective tissue derived from the stroma (STR).

Fig. 13. A portion of the same ovary, to show a primordial ovum (P) in its capsule, and alongside of it is an empty capsule (R), the ovum having tumbled out.

Fig. 14. A portion of the same ovary, to show a primordial ovum (P) in its nucleated capsule, which latter is in intimate relation with processes of the ovarian stroma (STR).

Fig. 15. Long processes of the ovarian stroma, which may be traced up as far as the germ epithelial cells.

Figs. 16 and 17. Portions of the ovary of a two weeks' old kitten, to show primordial ova (P), among the germ epithelial cells (*g*) in their capsules, which are in connection with long processes of ovarian stroma (STR). These latter are derived from the meshes (STR) enclosing cell nests (H).

Fig. 18. A portion of the ovary of a human fœtus of $7\frac{1}{2}$ months, to show the germ epithelial cells (*g*), the cell nests (H), and the young ovarian stroma (STR) or tunica albuginea on which the germ epithelium rests. Also, groups of germ epithelial cells (*g*) in the act of being enclosed in a nucleated capsule (R) of the youngest connective tissue derived from the tunica albuginea.

Fig. 19. A portion of the ovary of a six months' old cat, to show the cell nests (H), the ovarian stroma (STR) in its relation to the tunica albuginea, and the pseudo-epithelium (*q*).

Fig. 20. A germ epithelial cell, consisting of a central oval nucleus with protoplasm around it.

Fig. 21. A germ epithelial cell developing into a primordial ovum (P).

Fig. 22. A primordial ovum (P) in its capsule, in the substance of which fusiform or elongated oval nuclei (*m*) are seen.

Fig. 23. The nucleated capsule.

Fig. 24. A large primordial ovum (P) with its nucleated capsule, to show the first appearance of the solid rod-like nuclei (*m*).

Fig. 25. A large primordial ovum (P), to show the nuclei (*m*) gradually becoming vesicular.

Fig. 26. A nucleated capsule, to show the division (*x*) of the nuclei (*m*).

Fig. 27. The division (*x*) of the nuclei (*m*), and the first appearance of the membrana propria folliculi.

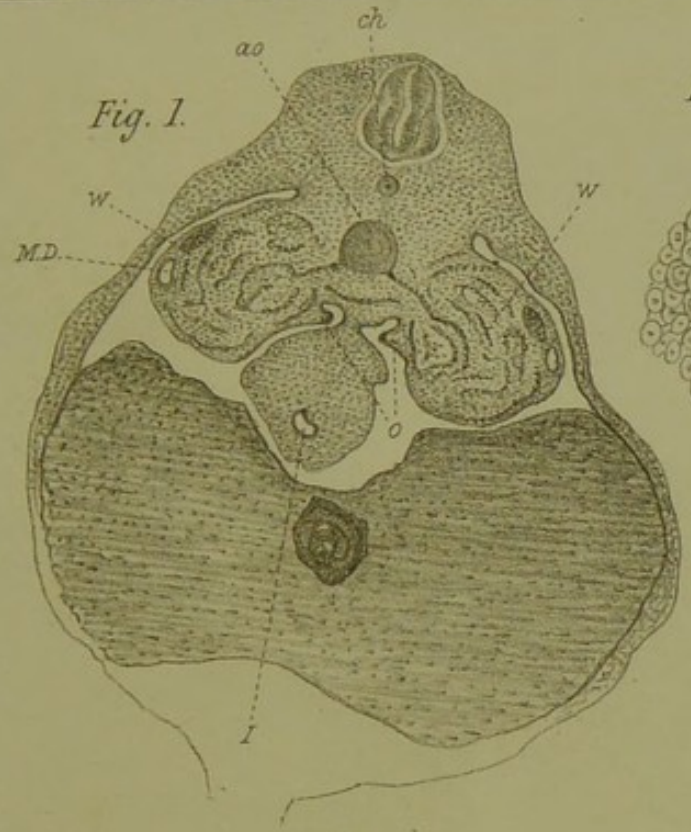
Fig. 28. To show the first appearance of the follicle cells (T) and the membrana propria folliculi (*u*).

Fig. 29. A transverse section through a vesicular nucleus in the substance of the capsule of a primordial ovum. Processes of the protoplasm of the capsule pass in between contiguous primordial ova.

Fig. 30. A group of large primordial ova from the ovary of an adult cat, to show the first appearance of the Graafian follicle cells which are developed from the nuclei (*m*) in the capsule of each primordial ovum.

Fig. 31. A portion of a ripe Grafiaan follicle, to show (in section) the follicle cells (T), the membrana propria folliculi (*u*), and the conversion of the ordinary stroma cells (STR) into cells exactly similar to the follicle cells within the membrana propria.

Fig. 1.



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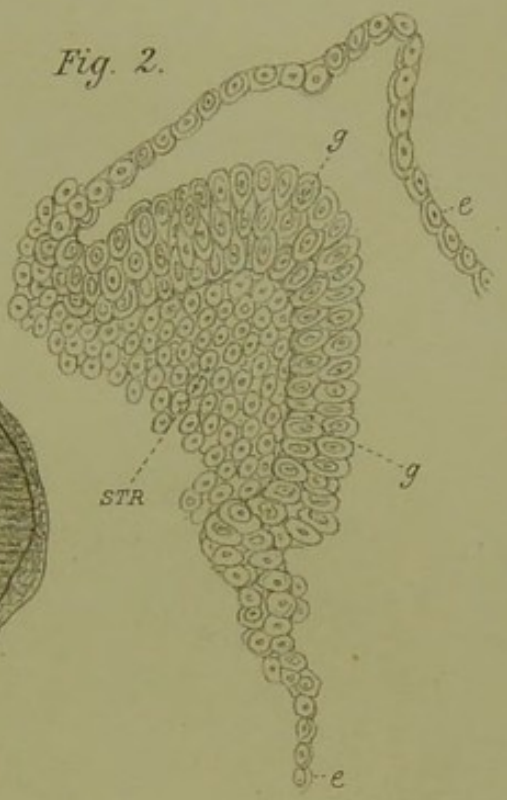

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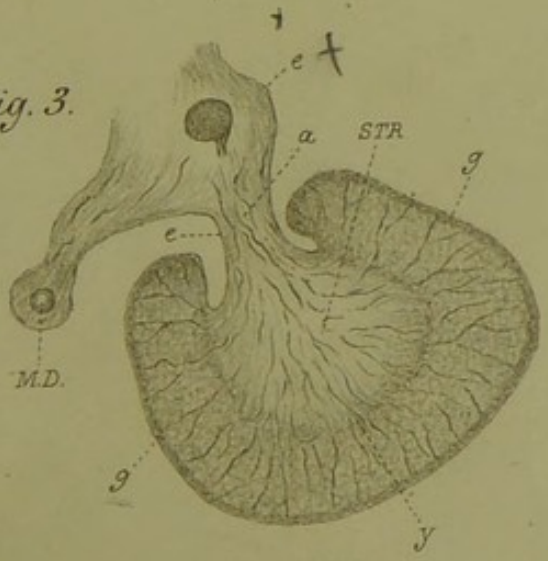

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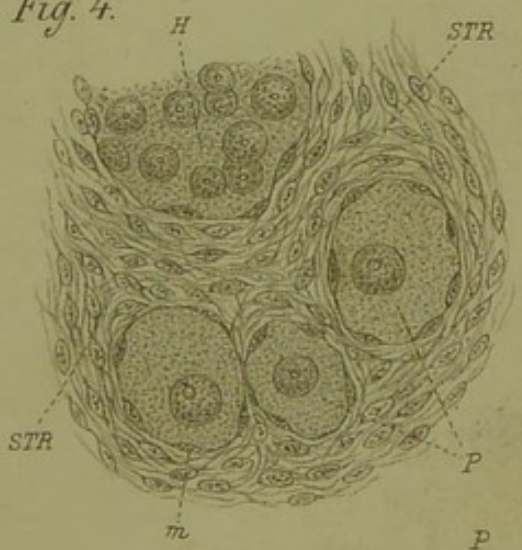

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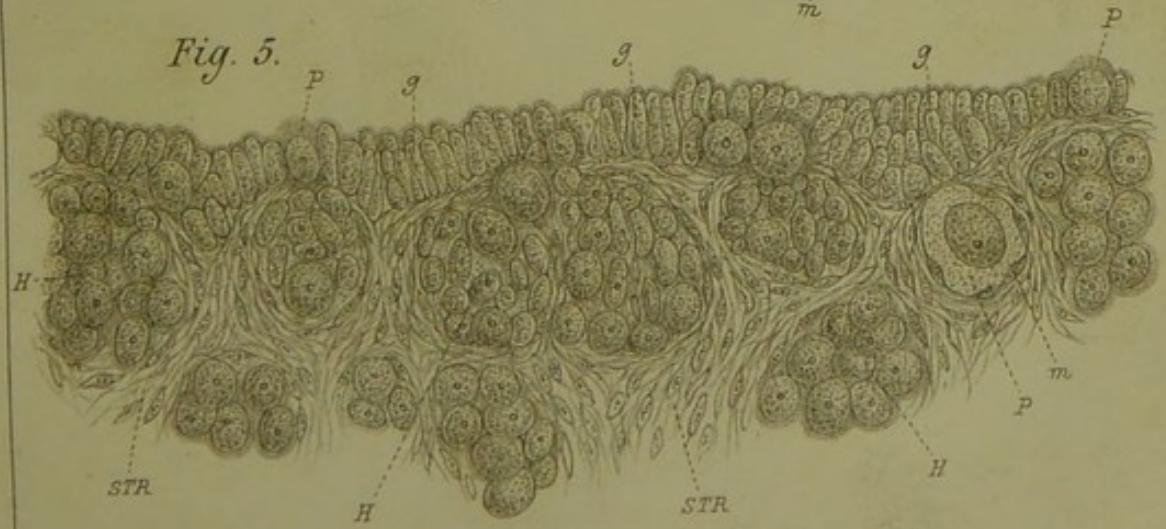

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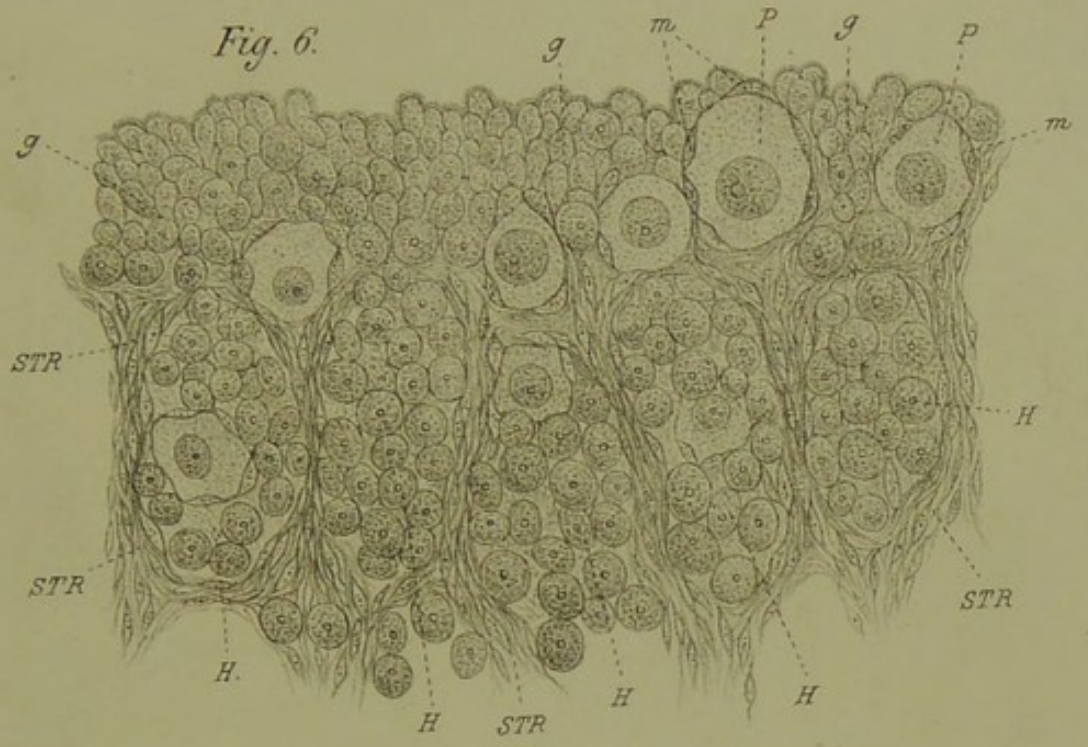


Fig. 7.

Fig. 8.

Fig. 9.

Fig. 10.

Fig. 12.

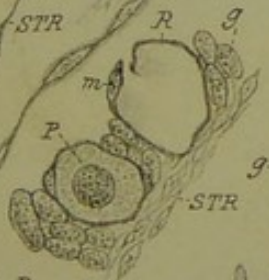


Fig. 13.

Fig. 16.

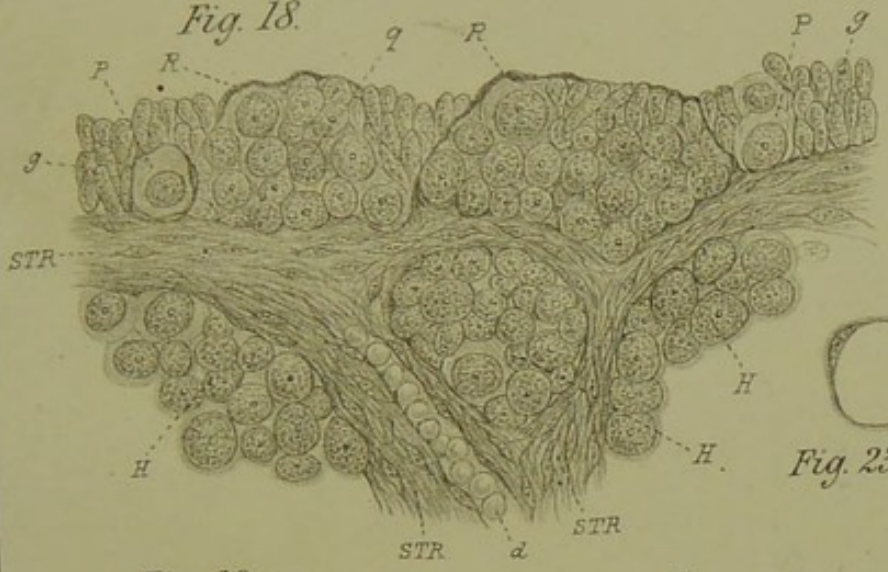
Fig. 11.

Fig. 14.

Fig. 15.

Fig. 17.

Fig. 18.



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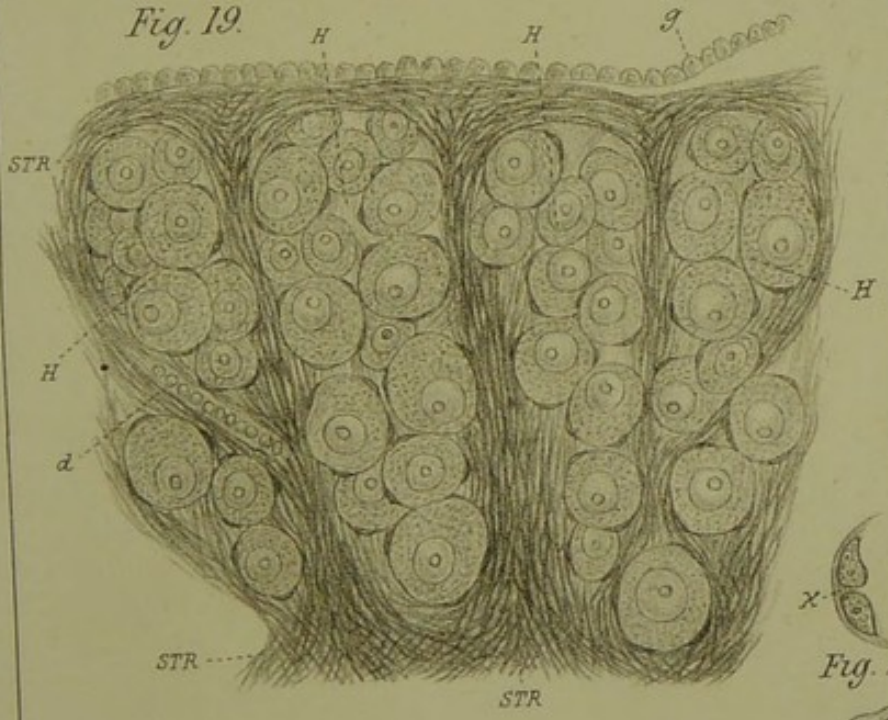
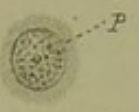


Fig. 20.

Fig. 21.



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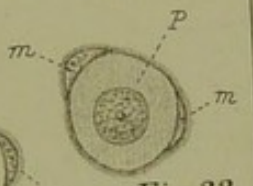

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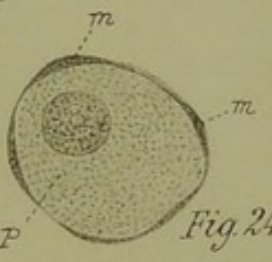


Fig. 24.

Fig. 25.

Fig. 26.

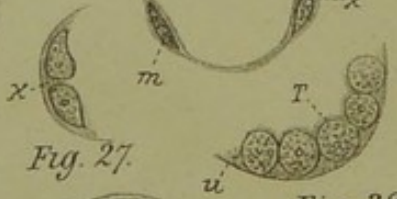
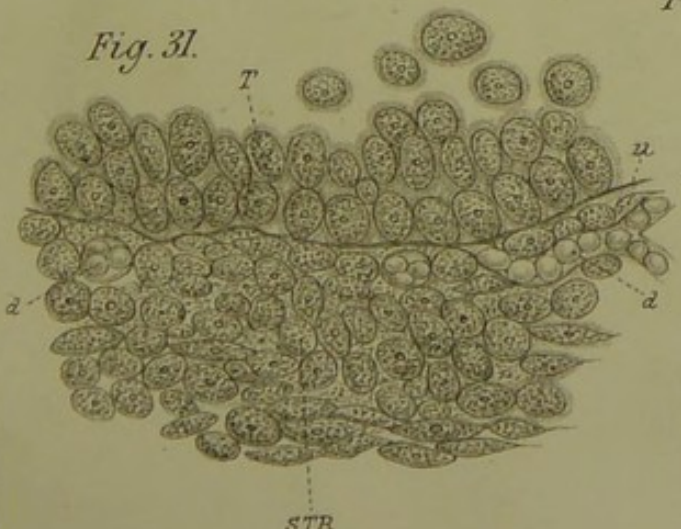


Fig. 27.

Fig. 28.

Fig. 29.

Fig. 31.



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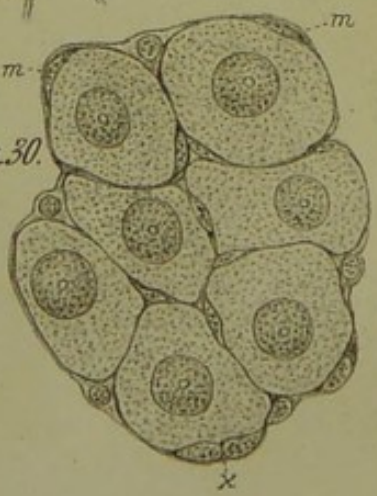

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