Thesis

The Parasites of the Human Skin

by

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The Parasites of the Human Skin

Convinced that all must sympathise with the sentiment of a great philosopher (Boyle) when he says that "Nothing can be so insignificant or so minute as to be unworthy the investigation of man, which was not unworthy of being created by God." I deem it unnecessary to apologize for selecting a subject by some regarded as professing little interest. Considering how humiliating it is to human pride that the fair frame of the Lord of Creation should be the little world in which such "disgusting creatures" find a habitat, it is not surprising that this should lack the fascination attached to most other departments of Medicine and Natural History. Repulsive however though the subject be, it will not be difficult to show that the mechanism of the meanest of these creatures has been contrived with infinite skill, and that their nature and habits have been deemed not unworthy the attention of some of the foremost pioneers of Science. Professor
Owen remarks in reference to one of the lowest of the parasitic groups, the group of the Oncozoon, to the classification and elucidation of which he has devoted much successful labour, that the workmanship of the Divine Artificer is sufficiently complicated and marvellous in these outcasts of the Animal Kingdom, to exhaust the utmost skill and patience of the anatomist in unravelling their structures, and the greatest acumen and judgment of the Physiologist, in determining the functions and analogies of the structures so discovered.

We are in danger in this age of gigantic undertakings to look with contempt on whatever is mean and small, forgetting that "the ship which hath wrecked a navy is the work of a Colony of Worms" (Tupper) and that every great force is but an aggregation of thoroughly trained and well-concentrated units. It is when thus viewed that the study of Entomology starts into its natural importance.

Examined as individuals, insects are extremely insignificant, but when the number of species, the number of individuals in each species are taken into calculation, they assume a most impressive significance. This must be abundantly apparent
when it is remembered that all the other species of animals put together would not amount to more than 30,000. Insects alone reckon considerably upwards of 400,000 distinct species. Their power of propagation is not less remarkable than their astonishing variety and numbers, and is well fitted to excite the surprise of every intelligent mind. The Aphis fabae which attacks the Bean crop, may, according to Professor Allman, may, in one year, be the progenitor of one hundred thousand billions of young, and we are satisfied that a careful enquiry would make us acquainted with many of their minute organisms possessed of equal powers of reproduction.

Not less astonishing are the benefits which insects confer, and the injuries they inflict. They serve to maintain a due balance between the animal and vegetable kingdoms, to remove nuisances, to destroy other noxious insects, to afford food for other animals, to promote the fertilization of plants and to supply some of the most important and useful articles of commerce. On the other hand when they come upon the earth as a scourge, they are more terrible than a flood and more destructive in their attacks than a charge of cavalry. Safer, King of
Persius was compelled to raise the Siege of Nicopolis by
a plague of grasshoppers which so attacked his elephants
and beasts of burden as to cause the rout
of his entire army. In former times the devastations of
grasshoppers were truly terrific. In Egypt the whole land
was sometimes darkened, and every herb and tree
was often so devoured that not a vestige of green
was left behind. From Africa they often passed
over to Europe, and it is recorded that in 1478
thirty thousand persons perished in the Venetian terri-
tories in a famine occasioned by the visitation of
these dreadful invaders. Some insects attack the Wheat
crops, others the Oats, and others the Barley and
the Rye, in fact they leave no vegetable untouched,
and so fearfully are their ravages that their
track is marked by barrenness and desolation, as if
fire had passed over the face of the earth.

When one considers the wisdom and skill
manifested in the structure of these tiny frames,
the beauty and symmetry they display as they sport
in the sunlight, or are viewed beneath the Microscope,
the architecture of their dwellings, their manufactures,
their curious habits, and the instinct they show in obtaining
their food, in protecting their young, in avenging wrong
and in destroying their enemies, one can understand
how the illustrious Cuvier who commenced the study of Entomology when a boy, should have been led to say that "if he had not studied insects when he was young from taste, he would at a later period from reason and necessity."

The signification of the word parasite has undergone very wonderful transformations. The Parasite of the ancient Greeks was a priest or minister of the Gods whose office it was to gather from the husbandmen the corn allotted for sacrifices, and to superintend these sacrifices. Originally each Village had its parasite supported at the public expense, but to relieve the Commonwealth they were eventually saddled on the wealthier inhabitants. This change ultimately led to this public officer becoming a fawning flatterer, hypocrite, so much so, that to gain his bread, he was compelled to minister to the vanity of his master, and to submit to the most degrading and menial offices, and hence the meaning in modern times attached to the word when applied to persons. In Botany and Natural History it is applied to those animals and plants which live on or in the bodies of other animals or plants. Professor Virchow adopts or rather revives an older and much more comprehensive use of the term. He says, "Every
new formation which contributes to the body no serviceable structures must be regarded as a parasitical element in the body..... and that every single epithelial and muscular fibre cell leads a sort of parasitical existence in relation to the rest of the body..... As long as the requirements of the remaining parts demand the existence of a part, as long as this part is in any way useful to the other parts, so long will it not be termed a parasite; but it becomes so from the moment that it becomes foreign or injurious to the body.

The subject of Parasitic animals is well worthy our attention whether viewed in relation to the number of species, the discomfort they occasion, or the diseases they generate. Upwards of twenty different kinds of parasitic animals inhabit the various cavities and tissues of the human body, and their extraordinary number and variety in creation may be conceived when it is stated that almost every animal has its peculiar parasites, and that many animals far outstrip man in the number of parasites which find a lodgement in or about them.

It is a curious fact for which we have at present no proper explanation, that scarcely any two species select the same part of the body for a place of
residence, or are to be found in any other than that part. One penetrates into the brain, another into the muscles or the cellular tissue; others into the liver, the kidney or the ovaries of the female; some occupy various parts of the intestines or roam at large on the skin, whilst others confine themselves to the face or scalp, or take up their abode in the hair follicles and sebaceous glands. Nor are the larger animals alone a prey to these troublesome intruders, for some of the minutest of the insect tribes themselves are preyed upon by creatures smaller in the scale. These insignificant intermeddlers play a most important part in the Theatre of Life. They are nature's scavengers, clearing the earth from the effluvia and defunct remains of higher organisms, and reproducing out of the old materials new organisms in not less perfect forms. Without such a wise and benevolent provision our Planet would have been little else than a charnel-house in which chemical agencies would have been in operation sufficient to extinguish every living principle. Thus, what Shakespeare describes as being true of man is not less true of all the lower forms of life. Your worm is your only Emperor of this; we fat all creatures else to fat us, and we fat ourselves for maggots.
Your fat king and your lean beggar is but variable service: two dishes but to one table; that's the end. A man may fish with the worm that hath eat a king: and eat of the fish that hath fed of that worm. "Hamlet."

A question of great speculative importance is here presented in connection with the question, "When were parasites first created?" Admitting the doctrine of the Fall, some Naturalists find difficulty in reconciling the existence of parasitic life, or the presence of parasitic instinct in the Carnivora, with the state of universal harmony which they suppose have existed prior to that event. Kirby, especially in his Bridgewater Treatise, is overpowered by this difficulty, and is forced into a position in which he is compelled to allege, that the instinct of the Carnivora must have been restrained, and "that they must have eaten grass or straw like the ox, and neither injured nor destroyed their fellow beasts of a more harmless character." Such is the conclusion of this eminent Naturalist. Are we compelled to accept it? Certainly we are not. It is a conclusion opposed to all experience, analogy, and sound reason. That the various tribes of carnivorous animals whether quadrupeds, birds, reptiles, or fishes, professed as now with a structure totally unsuited for herbivorous
diet could subsist upon herbage, is opposed to the plainest principles of common sense. "The organs of every animal, observes Guérin, must be regarded as forming a machine, the parts of which are mutually dependent on each other, and exquisitely adapted for the functions they are distinctly to perform; and such is the intimate relation of the several organs that any variation in one part is constantly accompanied by a corresponding modification in another." But for the existence of this law of adaptation it would be utterly impossible to re-assemble the scattered remains of the past, to determine their place in the scale of being, or to reason on their organization, habits, and economy. With this law, however before us we can reason almost as clearly and conclusively in regard to the transactions of the prehistoric ages, as we can in reference to any event confined within the age of man. Suppose this law were blotted out of existence, how sadly would we wander about in darkness and mystery. Take for instance the teeth and jaw of an herbivorous animal. The teeth are here of two kinds, incisor for cutting and molar for grinding, and to further this arrangement we have the lower jaw articulated to the
skull by an arthrodial ginglymoid joint. Among the
carnivora on the other hand there is an entire
absence of cutting and grinding teeth, and the
articulation is ginglymoid alone. And yet we are
told that this animal so entirely unprovided with
the means of masticating herbage "must have eaten
gras and straw like the ox." Dr. Buckland in his
description of a cave in Kirkdale, in Yorkshire,sup-
ports our view of the question. He tells us
that the mud or clay which formed the floor
of the cave was filled with fragments of bones
belonging to a great variety of animals; and some
of the bones exhibited marks of having been
gnawed..... The bones thus preyed upon belonged
to the tiger, Bear, Wolf, Elephant, Hippopotamus,
Horse, Ox and Deer. Bones of a species of hare,
water-rat and mouse with fragments of the skel-
etons of ravens, pigeons, larks and ducks were em-
bedded with their remains. From these facts, and
from other evidence, Dr. Buckland inferred that the
cave had for many ages before man come upon
the stage, been the abode of carnivorous animals,
and that many of the bones were the remains
of creatures carried in and devoured whilst others
showed that the wild beasts had preyed upon
each other. The waters of the prebiminarian seas abounded with the shark, the rivers with the crocodile and the forests with the lion and tiger; and both sea and land with creatures infinitely more formidable and provided of an armament of offensive and defensive weapons in all respects superior to the existing races of animals. An analogous state of matters seems to have existed in the vegetable world; for palaeophytology reveals to us parasitical plants under conditions in all respects similar to those which now prevail. The inference from this analogy appears to be that as in the vegetable kingdom the laws relating to the life of parasitical plants remained unchanged, the law relating to the parasitical life of animals was neither abrogated nor suspended; and that as plants lived upon other plants, so animals preyed upon each other. We cannot help therefore agreeing with the sentiments of an eloquent geologist (Hugh Miller) when he says, 'The palaeontologist finds no trace in nature of that golden age of which the poet delights to sing, when all creatures lived together in unbroken peace. Ever since animal life began, there existed carnivorous clades which could not live but by the death of their neighbours.
Holding then as we do that there was quite as great a physical necessity in the earlier ages of our world, as there is at present, for the exercise of the predacious instincts, and that reason and experience point in the same direction, we are brought in irresistible to the conclusion that such instincts did exist, and that parasites infested and preyed upon the ancient tribes of animals just as they do now.

We are here brought face to face with a question of Mr. Kirkby's. "Can we believe that man in his pristine state of glory and dignity could be the receptacle and the prey of these unclean and disgusting parasites?" This question involves a difficulty I conceive however that it must be answered in the negative. It is not in the slightest degree probable that parasites could exist in any form upon the person of a pure and innocent being. Where then were they? Did they exist as germs in the land, the air, or in the water? or were they created subsequently to the fall, as Mr. Kirkby suggests?

The first hypothesis assumes that the germinating power of these germs was restrained, and that for an indefinite period they were enabled to support a vital existence in a habitat different,
in every respect from what was natural to them. We are prepared to admit that both plants and animals may retain their vital properties for an indefinite period when placed in conditions unfavorable to their development, as for instance the exclusion of air, light, heat and moisture. The vegetable kingdom furnishes proof of this in the case of the mummy wheat and among the infusoria, and especially in the case of the Bernehull, or Mountain meal, we have the best of illustrations in the case of animals. We have not the slightest proof however that any of the human parasites possess such tenacity of life. And if there be any truth in recent geological research which shows that there was a gradual progress in creation from low to high, and that, as Hugh Miller has expressed it, "The arrangements of geologic history as exhibited in time, if commencing at the earliest ages, we pursue it downwards, is exactly that of the Animal Kingdom of Cuvier read backwards," then the period between the creation of the Articulata, and that of man, must have embraced, of such untold ages that we feel justified in setting the hypothesis aside as quite impossible. Another objection which we have to
this explanation is that it supposes that the whole
of these parasites were created in a state of
fœtundated ova. We have however no proof in creation
that any animal was created otherwise than perfect.
That like begets like is prevalent throughout nature,
but what proof have we that from a lower form
of life, a higher and more perfect may be generated?
The second hypothesis is supported chiefly by
the fact that at the instance of Moses the
dust of Egypt was transformed into loci. Here
was evidently a great and imprefive miracle, but
was it really a new creation? We are not shut
up to such a conclusion. Supposing that it was
the common Pediculus that is here referred to, and
about this interpreters are far from being agreed,
the question is, Could the necessary imprefive
be made upon the Egyptian mind without violently
interfering with the established laws of nature? It
is well known that the Pediculus is one of the
most prolific of the insect tribe, and it is also
an established fact that the creature so infects
the Egyptians that it is difficult, as Kitto informs
us, for the most cleanly persons to keep themselves
wholly free from them. It is further to be observed
that few animals are exempt from parasites of this
nature), and it is only necessary to suppose that advantage was taken of existing circumstances, to impart additional stimulus to the reproductive energies of these creatures, so that what was formerly viewed as a pest now became a plague.

It is interesting to remark that most of the plagues of Egypt were the natural plagues of the land. It was by no means miraculous that swarms of flies should infest the houses of Egypt, that armies of locusts should spoil their fields, or that a murrain should destroy their cattle, and yet these circumstances might be so timed that they must be ranged as Dean French remarks "in the Catalogue of Miracles." At all events we have no proof of a new creation, nor have we any ground for presuming that any creatures were created subsequent to man.

In like manner we set aside the doctrine of spontaneous generation as an exploded theory held only by a few such morasses in science as the author of the "Vestiges of Creation." Not the slightest evidence has been brought forward to prove its truth.

Supposing that these theories are disposed of, the question still remains, where and in what state were human parasites prior to their assuming their
of coming into their natural habitat? The most natural conclusion is that before the Fall these creatures existed in the bodies of other animals, and were adapted to their new and proper habitat by the change which man's nature underwent after that great catastrophe. This explanation is at first sight opposed to the doctrine of the fixity of species which is subscribed to by every Geologist of eminence. It is now very generally admitted that in the establishment of species, nature seems never to have repeated herself, but as Sir Charles Lyell beautifully expresses it, 'breaks when the parent of a species has been moulded, the die in which they were cast.'

Differing though our theory appears to do with that just announced, it is in no way opposed to it. Whilst we are prepared to endorse the sentiment that the distinguishing features of each species is preserved from age to age, there are doubtless modifying circumstances which so alter the type that the most skilful Naturalist may mistake its identity, and adopt an erroneous classification, and such mistakes are of daily occurrence in all departments of Natural History. Still such deviations are within certain limits and usually
leave the characteristic conformation of species intact. In the transactions of the Royal Society of London for 1731 is reported the case of a man whose body was covered with a ragged bark or hide and which shed every autumn. This man had a family of six children all of whom had a similar covering. Clapperton and many other travellers in Africa show the superiority of the pure negro to that of the mixed races in all moral and physical characteristics. Even the Jew who seems to have been preserved by miracle, assumes differences under varieties of climate. Dr. Ritchard has proved that there are instances in which fair races of mankind have become dark without any remarkable change in their external conditions. He likewise mentions the case of cows which, in consequence of not being milked, failed to secrete milk, and of hogs transported to Peru by some of Pizarro followers, which, after half a century of freedom in the woods, changed so as strongly to resemble the wild bear. Their ears, he remarked, became erect, their heads larger, their foreheads vaulted at the upper part, and their colour lost the variety founds among the domestic breeds. Cuvier is of opinion that
the wolf is the progenitor of many of our tribes of domestic dogs, and Dr. Hancock observes that dogs through long association acquire some traits of character which can be considered in no light than as faint scintillations of reason, and this the more remarkable when it is remembered that cases have occurred where domestic dogs have lost their voice altogether, and with it much of their intelligence, when left to enjoy a wild and savage life. A most important fact bearing on this subject, and going a considerable way to establish our theory, is stated by Professor Ganger, that the scabies scabei is transferred from the lower animals to man, and from various of the lower animals to others. Volumes of facts might be advanced to prove the transmission of individual peculiarities, the modifying effects of climate on plants and animals, of domestication on the lower animals, and of civilization on man: but enough has been advanced to support the truth of such modification, and to show the probability of a migration having taken place in human parasitic life, as well as to account for the specific changes which have taken place in them, so as to lead to their being classified as distinct species.
Natural History Pathology & Treatment
of Cutaneous Parasites

The whole of the animals whose Natural History we have now to consider belong to the Annulosa, the plants to the Cryptogamia.

The Sub-Kingdom of the Annulosa, embracing the annuloidae and Articulata, is distinguished by the bodies of the creatures possessing bilateral symmetry, by being segmented, by having a distinct alimentary canal, shut off from the general cavity of the body, commencing with a mouth, and terminating with an anus, by having a pretty well developed circulation, and by the possession of a nervous system consisting of one or two chains of ganglia running along the ventral aspect of the animal.

Koch has classified the whole of the human animal parasites under two groups, the first embracing all those whose muscles exhibit no transverse striæ; the second, all the parasites with distinctly striated muscular fibres. According to this arrangement, one cutaneous Annuloid will be described under the first group, and nine cutaneous Articulata under the second. It may be as well here to mention that the Annuloida are to be
distinguished from the Articulates, though the latter as a general rule having their bodies composed of three segments, head, thorax and abdomen, and their limbs articulated; whilst the former have neither differentiated segments, nor articulated limbs.

The Annuloid just referred to is the *Filaria Medinensis* (Malis *Filaria*) connected with the slags of Worms called *Anomalaima*. This creature is an inhabitant of the tropics and is particularly notorious in India, Persia, and Egypt. When seen in this country it is invariably on persons who have just returned from the south, and then it appears to have lost its power of propagation. Its most frequent seat is the subcutaneous cellular tissue, particularly of the extremities, but also of the head, neck, and hands, the scrotum, the muscles, the eyeballs, and the internal viscera. Owen describes the worm as being from four inches to twelve feet in length, from half to two thirds of an inch in thickness, and of a yellowish or dark brown colour. Two singular circumstances regarding this creature are its life of perfect isolation, male and female never living together, and its power of remaining latent in the system.
for twelve months. The former fact is the more remarkable as the pus reuted from the sore tenms with young Helariic, which never develop in presence of the parent, but remain of equal size. When de-
velopment does take place it is as remarkable for its rapidity as for the length of time it remains dormant, in a couple of days the creature will grow several inches. The disease is to be diagnosed by redness, pain and swelling in the affected part, attended occasionally with headache, pain in the stomach, nausea, fever and the formation of vesicles. When the creature is extended it has the feeling through the skin of a varicose navel, and prior to its being discharged a pus-tule is formed. It is usually attended with much irritation, sometimes demands amputation, and has even caused the death of the patient. The therapeutical means for its removal are poultices of boiled garlic, when the disease is superficial, which have the power of speedily causing absorption of the worm. If it be situated in deeper parts, but within reach, the proper procedure is to puncture the nest, and by gentle traction from day to day to insure its gradual extrusion. Care must however be taken not to break the worm, as in such circumstance a milky juice, supposed to be its fertilized over is exuded, and which has the power
of reproducing the creature. Internal Anthelmintics are regarded by Küchenmeister as of no value, but he thinks it of importance to treat the internal febrile symptoms.

Before passing from the Ikemaetimia permit us me to refer to one of the order of the Gordia for the purpose of endeavouring to remove a difficulty which has frequently puzzled Naturalists. It has long been doubted whether the Gordica Aquaticus was a parasite in the Body of the Beetle. A friend who has been watching the creature for some years has found that it is a parasite in that animal. He watched a Beetle one day making great haste towards a pool. It swam to the middle of it, gave exit to the worm, sunk itself to the bottom of the pool and expired.

Of the Nine Cucanewo Articulata, two classified with the Arachnida, and seven with the Insecta. The differences existing between these two classes consist in the former possessing eight legs, whilst the latter has but six; and in the head and thorax being united in the Spiders to form a cephalo-thorax (the abdomen being disconnected) whilst the head thorax and abdomen among insects are separate and distinct. In the former the head is deprived of antennae
or of the parts concerned in sensation, their homologues being metamorphosed into organs ofprehension or weapons of defense. Although we have also wings in the latter for the first time in the ascending animal scale, the whole of the parasites with which we have to do want them, and for this very obvious reason, that as organs of flight are not required, nature seems it useless to supply them.

The respiratory system of the Arachnida is developed according to two types which has led to their being classified under the two sub-clades Trachearia and Pulmonaria. The one type as in Trachearia is the same as Insecta which consists of a series of branching tubes open externally, and carry the air into every part of the animal, just as water is admitted into the pores of a sponge. The tubes are membraneous, and to prevent collapse are provided internally with a delicate spiral ring which has the power of distending the tube, securing extreme lightness, and a thorough circulation of air. These constitute the trachea of insects, an arrangement of the utmost importance, considering that the creatures are ever on the wing. In harmony with this system of air tubes we find the circulation the converse of that
which exists among the mammalia. In man for instance the blood is carried to the lungs where it comes in contact with the air: on the other hand the air is carried to the blood. We have here also a dorsal heart, and the blood becoming extra-vascular. In the pulmonary arachnidae we have an example of the second type of structure, where the respiratory organs take the form of pulmonary sacs or depressions which go by the name of lungs.

Our two Arachnida belong to the Thacharii, e.g. the Sarcoptus scabiei to the group of the Monomer acarata, and the other the Demodes folliculorum to the group of the Adelostromatota. The difference between these two groups consists in the former not having the body majestically jointed but apparently composed of a single piece, whereas the latter has the body composed of distinct segments.

The Sarcoptus scabiei (Acarus scabiei, Necker), which the researches of M. Bouguignon has found to be the undisputed cause of itch, is an exceedingly minute animal, possessed of great power of locomotion, covered with short hairs, having a formidable head, somewhat retractable, with a pair of powerful mandibles, and carrying suckers
(Hoag, Kuchenmeister) in several of its eight feet, as in most of the parasitic arachnids. These ambulacriae are organs of locomotion. The mouth is situated on the anterior segment of the body (Owen) and is adapted for suction or mastication. Dr. Bennett remarks that no respiratory apparatus can be discovered although the creature may be seen to swallow minute bubbles of air which pass down the oesophagus, and like the nutritive fluid diffuse themselves through the interior. The male is about one third smaller than the female, carries his genital organs on the abdomen, and is not like the female visible to the naked eye, and is supposed to die after the act of copulation. Prior to full development the young mites pass through two periods of moulting and lose their skin three times. After the second change of skin the octopod loses its sexual organs, and only recovers them after the third change of skin (Kuchenmeister). Adams relates that whilst examining a mite with a compound lens the creature "leaped with a force not less than a flea" and he was injured by a person fully acquainted with their habits, that "the event he had witnessed was not uncommon."
This creature has a universal geographical distribution. It is found both in the old world and in the new, it exists in the tropics, and is not terrified by the snows of Greenland. It respects neither old nor young, if [as] neither sex nor rank, but chiefly affects the poor, and results most frequently from a want of cleanliness. Its chief seat is between the fingers and toes, under the thighs, and upon the genitals. The chief diagnostic features of scabies, as indicated by Wilson are, 1st, a scaly undermined state of the epidermis. 2d. Conical vesicles, with transparent acuminate points. 3d. And principally, by the presence of the scabres. A great variety of therapeutic agents have been recommended for the destruction of the disease, but what has of late years been found most serviceable is the unguentum sulphuris, rubbed well into the skin. Dr. Bennett is, however, of opinion that as the unguentum acts simply a mechanical part, by excluding air from the creature, the sulphur has really nothing to do in the cure, and those who have visited the Skin Ward of the Hospital during the present winter season must have been convinced of the truth of this theory by observing that several cases of
scabies treated with simple ointment got speedily quite well.

The *Demodex Follicularum* (Entozoon Follicularum, Schizoan Follicularum) represents the lowest organised form of the arachnida. It exists in the sebaceous follicles of the skin, sometimes singly and sometimes in great numbers in each gland and always with the head directed inwards. With the exception of newly born children this entozoon may be universally found in the human species. A writer in a recent number of the "Microscopic Journal" found similar creatures abounding in great numbers in the sebaceous glands of the dog. It may be got readily in both the living and the dead body from the scalp, the forehead, the nose, the chin, and other parts of the face and person, by squeezing out the contents of the follicles between the finger and thumb. A white cheesy mass is then extruded which must be torn with needles, and placed in a drop of oil, previous to introducing it beneath the microscope. The animadcole presents several forms which correspond to stages in development. In the first stage, the figure is elongated, the head which is placed on the anterior segment, consists of two palp and
a proboscis, possessed of elongation and retraction, is placed between them. The legs which consist of four pairs are short, concealed, composed of three segments and terminated with claws. The abdomen is covered with transverse striae which give the margin the appearance of a file. In the second stage the abdomen is obtusely pointed and one and a half times greater than the thorax. In the third stage the abdomen is very short, acutely pointed, and free from transverse lines. In the fourth stage the animal becomes more slender, and possesses only three pairs of legs, which has led to its being classified among the Insecta. Wilson is of opinion that the creature has not yet been seen in its perfect form, and he supposes that it may live in the human body during the early part of its existence, and out of the body in its fully developed condition. Usually the presence of the creature causes little irritation, or inconvenience, but Remak mentions one case in which it was the cause of true pathological conditions. He recommends for the extermination a preparation composed of equal parts of spirits of camphor, and oil of Terebinthe, but as the disease never fails to return under such treatment, Heidenmeister recommends Durand's Gall Stones.
<table>
<thead>
<tr>
<th>Louse Species</th>
<th>Habitat</th>
<th>Colour</th>
<th>Head</th>
<th>Eyes</th>
<th>Throat</th>
<th>Atomaen</th>
<th>Legs</th>
<th>Reproductive Organs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phthirius asini (Pubic or Crab Louse)</td>
<td>Pubic Region</td>
<td>Grey</td>
<td>Light Yellow</td>
<td>Yellow</td>
<td>Dark Grey</td>
<td>Small</td>
<td>Broad</td>
<td>Shaped with Minute Papillae</td>
</tr>
<tr>
<td>Pediculus capitis (Head Louse)</td>
<td>The head Ash, sometimes whitish on the body, hair grey</td>
<td>Large</td>
<td>Dark</td>
<td>Prominent</td>
<td>Oval</td>
<td>Segments forked at a large margin, elate</td>
<td>Pores very large and said to be used as a weapon of defence</td>
<td></td>
</tr>
<tr>
<td>Pediculus vestimenti (Body Louse)</td>
<td>Large segments forked at a large margin, elate</td>
<td>Contrary</td>
<td>Very large</td>
<td>Segments slender</td>
<td>Segments</td>
<td>Pores large, vagina surrounded with a row of spines</td>
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<tr>
<td>Pediculus interinfestum (Intertemporal Louse)</td>
<td>The breasts Pale Red, Rest of the body Yellow date</td>
<td>Contrary</td>
<td>Very large</td>
<td>Segments slender</td>
<td>Segments</td>
<td>Pores large, vagina surrounded with a row of spines</td>
<td></td>
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Of the seven parasitical insects which we have still to describe, four belong to the order of the Anoplura, one to the Hemiptera, and two to the Aphamiptera. The whole of these orders are possessed of sucking mouths, the first is ametabolic, the second is hemimetabolous with the mandibles formed like a stilette, the third holometabolous, with little scales, the homologues of wings, but rudimentary and functionless.

The Anoplura comprise the four species of pediculi, which infect the human body, and which a learned professor could not help pronouncing "the most disgusting of all the insect world." The differences existing between these various species of lice may be placed in a tabular form thus: - X (see opposite).

The geographical distribution of the pediculi among both men and animals is very general over the globe. McCann has described and figured 250 different species in his "Anoplurarium Britannicum." The lower classes in Spain and Portugal are much infected with them. They are said however to be very rare among the Colombian and Brazilian Indians. Leeuwenhoek allowed his zeal for science to overcome his disgust at
these insects. In his works will be found much valuable information in regard to their habits and nature. He carried on various experiments on his own person, and as the result of these he states that the littlemonster of the creature is a hundred times more slender than a common hair. He allowed them to feed upon his hand, and in order to discover their rate of propagation, he bound two femalelice upon his leg so that they could not escape, and found at the end of six days that the one had laid fifty eggs and the other forty, and, in eight days more, that the eggs were hatched and the whole brood matured in a position to carry on the functions of reproduction. Some idea will thus be furnished of the surprising power of propagation which these creatures possess.

The Pediculus Pubis (P. Inquinalis, Phthirius pubis) infests the pubic region, and is occasionally found among the hairs of the chest, the eyebrows, the eyelashes, and even the head. Denny relates the case of a lady who was infested with this species of pediculus in a very remarkable manner. They proceeded from all the natural orifices of the body, and infested the surface when warmer,
than usual. They were present in her eyes, her ears, and the neck of the bladder. They were often numerous in her throat, and were found among mucus ejected from her stomach. It is somewhat peculiar that her servant who sometimes slept with her was troubled by the lice, but never contracted the disease. The application of the external remedies which destroy the ordinary species of Pediculi failed entirely in exterminating these. Kichenmeister recommends rosemary oil for their extirpation. Marting rubbing the part with simple ointment.

The Pediculus capitis (P. humanus, P. cervicalis) prefers the head for its habitat, but is sometimes met with in other parts of the body, especially among children. It is difficult to account for the almost universal prevalence of this species in the heads of children of even the most scrupulously clean parents, and also for its occasional presence in the scalps of persons of the most precise habits. It would almost appear as if there must be some states of body more favorable to their development than others: the nature of these we have been unable to ascertain. This pediculus varies in colour and is said to change according to the colour of the hair. Lapeille states that
the louse found on the head of the negro is black. Murray, in a paper read a few weeks ago before the Royal Society of this City, proves that the lice inhabiting the different races of men belong to different species. Blumenbach states that a louse similar in all respects to the P. Capitis is to be found on two of the lower animals. Denny has found the same on the guen monkey. The males are fewer in number than the females, and smaller. The organs of reproduction in the male are situated on the dorsal aspect of the animal, whilst those of the female are placed on the ventral, so that the act of copulation is the converse of that takes place in the higher animals. Kichenmeister disapproves of the mercurial treatment being used in this disease. Oil, he says, employed for several days diminishes the number, but that the Persian insect powder (Pyrethrum canescens) will effectually destroy them.

The Pediculus Vestimenti (P. Romani corporis) is not known to exist anywhere but on the trunk, confining itself to the nape and parts. Its eggs instead of being glued to the hairs as in the other species described, are deposited on the clothing, especially in the folds and seams. The treatment is the same as for
the preceding. The common people purify their clothes by burying them several weeks among hay.

The Pediculus Gallinaceous (Distempered Louse) is said to be the cause of the disease called Phthiriasis. Kirkby and Genuce imagine this to be the disease with which Lady Porraicock was afflicted and which eventually caused her death. The creatures swarmed in every part of her body—her head, nose, eyes, lips, gums, the soles of her feet—tormenting her night and day and inducing the most exquisite torment I suffer from.

The order of the Hémiptera contains the Cimex Lectarius, or Bed-bug. The body is flat, of a ferruginous brown colour, somewhat large, divided by a joint, and one pair of feet. On the back are two small tubercles—the rudimentary wings, and the ventral segments are all nine in number. They exist in the frames of Bedsteads, in old wood, or in the walls of houses during the day and issue forth at night to destroy the peace and slumber of their victims. They are very plentiful in the North of Russia, but are not found in South America, New Holland or Polynesia. They are most difficult to extinguish as they can endure hunger for years. The best applications for their extinguishments are vinegar.
Spirits of Wine and Water, and Liquor Amendmiae Exaltatus.

The remaining two animal parasites belong to the order of the Insecta, and consist of the Pulsus irritans, or common Flea, and the Pulsus persiennas or Blaggre. The former is common to this country, and with the exception of Australia, to the rest of the world; the latter is a native of the West Indies and South America.

The Pulsus irritans is a reddish-brown insect, with a short, shield-shaped head, formed of one piece. The oral organs consist of a bristly tongue, which is covered by two maxillae, and these again covered by mandibles which lie together in the form of a sheath. The thorax consists of segments carrying a pair of legs. The abdomen has ten segments overlaid like the tiles of a roof, and fringed at the margins. The insect is possessed of great muscular strength, and can leap 200 times its own length. It will draw a load seventy or eighty times its own weight, and Goldsmid remarks that its feats of strength would, to a community of fleas, appear more miraculous than Asmonom campiing the Gates of Gaza. The female is larger than the male. It is insisted by some naturalists that
the male has no power to bite and suck the blood of man. Küchenmeister's experiments however have shown that on examining the body of a male pulse immediately after its bite, has been felt, a reddish fluid will be detected in its stomach, which he believes to be the red blood corpuscles. As fleas, like lice, have a great repugnance to fragrant odours, lavender, musk etc. may be employed for their removal. Linnaeus recommends the seeds of Wormwood.

The Pulix penetrans is smaller than the common flea and has a proboscis as long as the body. The male pulse lives in the sand, and at no time attacks man, and it is not till the female is fecundated that it perforates down to the muscles, and, concealed in its little canal, swells up into a white globular vesicle, which in a few days becomes as large as a pea. When the tumour bursts the pus exuded is found to contain large quantities of ova of an elongated form. The tumour is followed by an ulcer which the developing ova tend to irritate and inflame. The chigoe usually attacks the toes and sole of the foot, but sometimes also the dorsum, and the ulcerations to which it gives rise have induced necrosis of the bone, and occasionally mortification.
and death. Kichermeister recommends that in those places where the disease is endemic, the feet should be kept moistened with some sort of ointment oil, or otherwise that they should be examined very carefully every two or three days. In extracting the insect care must be taken not to open its abdomen, else the ova will escape, and induce an extension of the disease. The natives are most expert in extracting the creature, and when they have withdrawn it from the residue, they dry the wound with the juice of tobacco.

Such is a brief description of the various species of cutaneous parasitic animals which inhabit the human integument. We have now to direct attention to those parasitic cryptogamic plants which find a lodgment on the skin. Authors describe three of these viz. Iacuca Favogia, a certain kind in Pityriasis of the Scalf, and in Mentegra, but as these differ in no essential particulars, and are simply modifications of the same kind parasite, we shall confine ourselves to the description of Favogia.

Pittirby adds

Since Favogia is thus given by Dr. Bennett, the demonstration by Bajai of the vegetable nature of
the disease named mucor in silk worms, opened up to Pathologists a new field for observation, and led to the discovery that certain disorders in the higher animals, and even in man himself, were connected with the growth of parasitic plants of a low type. Schönlein of Berlin was the first to detect them on fowls crusts. Grubbe gave a very perfect description of these vegetables in 1841, and made numerous researches as to their seat, origin, and mode of propagation. These were repeated by myself, and further explored in 1843.

Furca is peculiarly a disease of the scalp. Although it has been seen on other parts of the body, its presence elsewhere is of the very rarest occurrence. Scrofulous and other cachectic states seem to be the soils best suited for its development. The patients are usually poor, have been ill fed, and clothed, and have invariably been brought up in anything but cleanly habits. The crusts are circular, bounded by an outline representing arcs of circles, often depressed or cupped in the centre, and very generally perforated by a hair. The crusts rise very slightly above the level of the skin, and are covered by epidermis, which is very rugged, laminated, and exfoliated. When the disease has exhausted itself on
any part of the scalp, the surface possesses a glazed and polished aspect. A minute examination shows that the crust is composed of thalli and spolaeas. The former has the base directed to the circumference of the crust, the branches being turned inwards, whilst the latter may be observed forming within the thalli and cast off towards the centre, giving it a pimple appearance. The crusts are sometimes isolated, and of variable size, but usually they are agglomerated, and in consequence of pressure exerted upon each other, they assume the appearance of a honeycomb. Innumerable modes of treatment have been adopted for the extirpation of the disease. On the Continent various means have been adopted to get rid of the hair, the existence of which, a barrier towards an effectual cure, and endless complicated internal and external remedies have been suggested. But as all these seem to overlook the constitutional nature of the disease, it is not necessary to refer to them here. It is sufficient to state that a simple practice founded on its constitutional character has been found much more successful towards its eradication. It is therefore recommended to treat the patient's constitutional state, to build up the system by an efficient nutrition, and it will generally be
found that in cases of comparatively recent date the disease will yield after being prescribed to any simple ointment, or to the sulphurous acid lotion, when well and constantly applied. In chronic cases it is doubtful whether a cure can be effected; at all events we have none such recorded, and if we may judge of the cases which have been treated in the hospital this winter, we cannot but pronounce the prognosis in the last degree hopeless.

In consequence of the length to which this paper has extended, we are sorry that we shall be prevented from entering upon the discussion of several points connected with parasitic life in the human subject, and its effect in inducing disease and in spreading contagion. Imperfect though the discussion of the subject has been, we trust that the time spent upon it has not been spent unprofitably, and we have to add, to such a desire to prosecute it further, that they will find it not without attraction and interest.

[Signature]