

THE
PARASITIC DISEASES
OF
POULTRY.

BY

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WITH ILLUSTRATIONS BY THE AUTHOR.



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* In a work on New Mallophaga published this year, by V. L. Kellogg, the Mallophaga are treated as a distinct order of Insects; and this order is subdivided into two sub-orders, (i.) *Ischnocera* and (ii.) *Amblycera*—the characters being taken from the antennæ and the labial palps.

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PREFACE.

THE fact that Poultry-breeding is increasing to such an extent in England, and the numerous enquiries the Author receives regarding the many parasitic diseases to which Poultry are subject, has influenced him in issuing this small Manual relating to the parasitic infestation of Fowls and the various methods of coping with such diseases. The worst parasitic diseases in Fowls are due to animal parasites, such, for instance, as the 'Gapes' and Diphtheritic Roup; a few minor complaints are, however, due to Vegetable Parasites—minute fungi. In many cases the knowledge of the life-history of these enemies helps us to be able to battle with them more successfully. One of the objects of this Manual is to place before Poultry-keepers all the changes through which these pests go, with reference particularly to those points in their life-history that are of some economic importance. My best thanks are due to the many

it adhere more firmly to the walls. The sprinkling of finely powdered lime upon the floors of the houses and into the corners will tend much to help their eradication, whilst the perches should also receive their share of attention. As pointed out later on, both these and the nests should be movable, relays of them being kept, so that they can be completely purified at intervals. It is extremely difficult, of course, in old sheds and houses where poultry are often kept, to keep off these insects. To remedy this, however, it is quite possible, and most advisable, to dress the nests with some powder that will ward off these invaders and yet not affect the eggs. There is nothing I find better for this purpose than to use 'wood-wool' or wood shavings, instead of the much employed straw. There is something nauseating to the fleas about 'wood-wool' which tends to keep them away from the nests, and I have found that the flavour of the eggs is in no ways impaired. Failing the use of wood-wool, the well-known Keating's Insect Powder dusted about the nests once a week will keep off all marauders. Similar successful results in keeping off noxious insects from sitting birds have been obtained by the simple method of putting a small quantity of sawdust soaked in naphthalin in each nest.

B. LICE (*Mallophaga*).

The Lice which prey upon Birds are quite distinct from those affecting animals and man. They are

scientifically known as *Mallophaga*, and are true insects. Their exact place in classification is not conclusively settled. They show in many respects close relationship to the order Neuroptera, the group of insects that includes the Dragon-flies, Lace-wing-flies, and others. They are quite distinct from the Human Lice or *Pediculidæ*, and equally distinct from most of the Mammalian Lice (*Hæmatopinæ*). The true Bird-Lice have a mouth formed for biting and chewing their food; the Human and Mammalian Lice have the mouth formed into a piercing-organ, by which they *suck* out the blood of their host. The *Mallophaga*, sometimes known as the *Ricinidæ*, subsist upon the productions of the skin. They also devour the fragments of feathers, and even (sometimes to a most alarming extent) feed upon the barbs of the feathers, especially attacking the saddle-hackle—the feathers of the latter showing curious jagged and notched edges in lice infestation.

Closely related, however, to the Bird-Lice are some Mammalian Lice, or Ticks, known as *Trichodectes*. These so-called Ticks are quite distinct from the general run of Mammalian forms and are very abundant. They are provided, like the Bird-Lice, with a biting-mouth, but they can at once be distinguished from the latter by the structure of those remarkable sensory organs common to all insects, namely the antennæ or 'feelers.'

On examining one of the commoner Bird-Lice, these antennæ will be found to be composed of either

four or five joints. Compare the Mammalian Lice with the biting-mouth, and you will only find three joints constituting the antennæ. The reason I am pointing out this structural character is because, owing to the similarity between these two groups, they are often confounded with one another, and you find such statements in Poultry Journals as that poultry lice can be transmitted to animals and *vice versâ*. A few minutes' examination with a microscope would soon dispel the idea that the lice, for instance, on horses are similar to those on fowls. So particular are Bird-Lice, that it is quite the exception to find one species upon two distinct kinds of birds. Fowl-lice will not even attack the duck, nor duck-lice the fowl. Nearly every bird has its own particular Mallophagan parasite or parasites. They may possibly pass to some strange host for a short time, but they will not live and breed. Moreover, we shall see later on that particular species attack restricted areas on the same host, and are seldom found in other positions.

Damage caused by Lice.

The damage caused by Lice is often very considerable, and in many cases it is entirely overlooked, or even if the cause is known little attention is paid to the matter, and wonder is still expressed if the poultry do not flourish. The serious loss occasioned by lice cannot be too fully considered by poultry-breeders and fanciers.

By constantly biting at the skin violent irritation

is set up. The rest of the fowls is disturbed, and a general weak and cachectic condition will be sure to prevail if the parasites are present in force and no steps are taken for their destruction.

Brood-hens are frequently much inconvenienced by lice, many failures in hatching being due to their constant irritation.

It is, however, chiefly in chicks that the mischief is caused. The lice, as it were, sap the life-blood out of the young growing birds. The result is that by this constant biting, causing violent pruritus and inflammation in the affected parts, the growth of the birds is checked, and stunted birds are the consequence.

Some experiments in this direction showed that chicks suffering from lice, at the end of the year, weighed one pound less than those which had been kept free from these pests, both having exactly the same diet.

It must be remembered that the sharp biting and violent irritation causes considerable pain to the bird, when these parasites are present in abundance.

We often find that lice are present in superabundance in fowls suffering from Diphtheritic Roup and Gapes. As a rule the lice are the precursor of these two maladies, especially the former. By their deleterious effects the constitution of the host becomes impaired, and thus, just as with human beings, rendered more liable to contract any such infectious complaint as Diphtheritic Roup is well known to be.

The different species seem partial to particular

parts of the host; their favourite positions are the neck, rump, under the wings, and between the wing-feathers. Certain species seem to be restricted to given areas; others wander about upon the host to some extent.

The presence of these lice in chicken is ascribed to a variety of causes. Food, if too uniform, is stated to be answerable for their presence. Insufficient nourishment again is said to help them to flourish in chicken-runs. Neither, I find, have any real bearing on this parasitic affection. On the other hand, dark, damp, badly ventilated, and above all dirty runs and houses are sure to encourage them, and make the fowls acceptable to their presence.

The irritation, pruritus, and cachectic conditions produced by these gallinaceous 'guests' is usually spoken of as *Phthiriasis*.

Varieties of Fowls affected.

It is sometimes stated that breed affects their presence. This, however, is contrary to all information sent me and to my own experience.

Certainly the more delicate varieties of fowls suffer to a greater extent than the hardier breeds. Cochins, for example, are very prone, both as chicks and adults, to Phthiriasis. White Brahmas are again much affected by lice.

Plymouth Rocks alone seem to be indifferent to these unbidden guests. So far I have not noticed any lice on Bantams; but I have no doubt they affect

them like all other Gallinaceæ. (They are recorded by Neumann as attacking Bantams.)

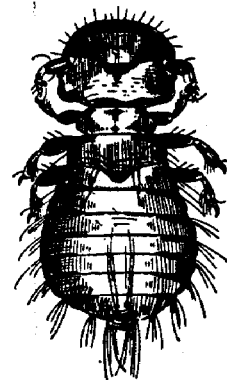
Species of Lice found on the Fowl.

There are eight distinct species of Mallophaga found on the Fowl in England. Seven of these have been known for a considerable time. The eighth species, which is quite new, was forwarded to me by Mr. Till, of Eynsford, Kent. Two of these belong to the genus *Goniodes*, two to the genus *Goniocotes*, two to the genus *Lipeurus*, and two to the genus *Menopon*.

The seven previously described species are characterized by the following points:—

- (1) *Goniodes dissimilis* (fig. 4).—Dull white to pale

Fig. 4.



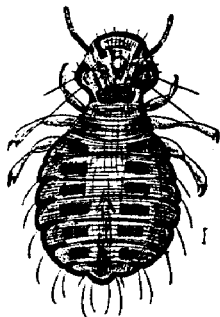
Goniodes dissimilis.

brown in colour, with dark chestnut-brown markings;

end of abdomen slightly bifurcate. Head wider than long; in the female the first joint of the antennæ is most developed, there is also a long hair on the inner side. On the posterior border of the metathorax are five bristles; in the abdomen there are two median bristles and three at the sides of the anterior segments, four at the posterior; each segment has also a curved marginal dark mark. Length in ♀, 2.5 mm.; in ♂, 2 mm.*

This is an abundant species on most varieties of fowls, and is especially located under the wings and on the rump. According to Denny †, whose work appeared some time ago, this species is rare. It seems to be more abundant in the South than the North of England.

Fig. 5.

*Goniocotes hologaster.*

(2) *Goniocotes hologaster* (fig. 5).—This species is

* A millimetre (mm.) = $\frac{1}{25}$ of an inch.

† Monographia Anoplurorum Britannie, 1842.

much smaller than the former and of commoner occurrence. Dirty yellow in colour, somewhat chestnut-brown toward the thorax. The head is as wide as long. Two large bristles on each side of the lower angles and a few short ones in front. The abdominal segments being marked with dark brown, quadrangular lateral bands. A single hair on each side of the segments, except the last two, in which there are more. Length in ♀, 1.3 mm.; in ♂, .8 mm.

G. hologaster is very partial to the rump and back.

(3) *Goniocotes gigas*.—This is a large species, not very abundant. It can be told by its large round abdomen. Yellow in colour. The abdomen has pale brown patches, coloured with dark brown at the border. Length in ♀, 4 mm.; in ♂, 3 mm.

I have not observed this species on the fowl myself, and am not aware if it locates itself in any particular part.

(4) *Lipeurus variabilis* (fig. 6).—The members of this genus have long narrow bodies.—Narrow elongated abdomen; pale yellowish, with dark brown bands and fawn-coloured spots, there is a dark brown middle spot beneath the thorax. Head quite rounded in front, with a dark border and a number of marginal hairs. End of the abdomen bilobed, with a genital lance-shaped spot; last six abdominal segments with from one to three hairs on each side. Length in ♀, 2.2 mm.; in ♂, 1.9 mm.

This is a very abundant and widely distributed species in most breeds of fowl. It lives amongst the

Fig. 6.

*Lipeurus variabilis.*

barbs of the primary and secondary wing-feathers, amongst which they remain stationary, but can move with great rapidity if they choose.

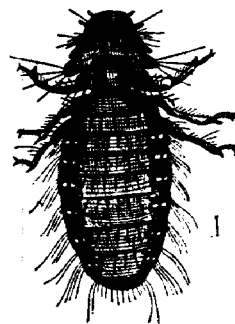
(5) *Lipeurus heterographus*.—Very similar to the former in colour, but smaller in size, and the head is parabolic, not rounded as in *variabilis*. The abdomen is also more oval; in the female there are six bristles springing from tubercles on each segment; there are also median brown spots on each segment, bordered with large hairs. Length in ♀, 2 mm.; in ♂, 1·8 mm.

This species is not nearly so abundant as the preceding. It lives in exactly the same manner.

(6) *Menopon pallidum* (fig. 7).—Dull yellow in colour, with darker side markings; in each segment of the abdomen are two pairs of lateral pale dots. The head is angular in front, with four bristles and some hairs on the lower angles, a few hairs also on each side. The abdomen is oval in the male, slightly longer in the female, with a series of bristles on each segment.

This louse is extremely active and smooth to the touch. This is the species found running over the hands whilst plucking fowls. It is extremely abundant and lives in all parts of the body, constantly changing its position. On many occasions I have found these lice *in* the nests, and possibly this and the next species are spread in this way from bird to bird, as well as during copulation.

Fig. 7.

*Menopon pallidum.*

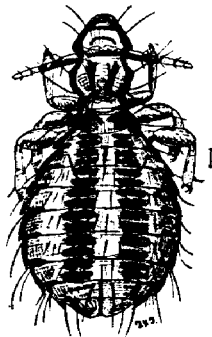
(7) *Menopon biserialatum*.—This is like the preceding

in colour, only it has a rounded head and two series of bristles on the segments. It is larger than *pallidum*, and the male is larger than the female. Length in ♀, 2·3 to 2·5 mm.; in ♂, 2·8 mm.

Found on the turkey, pigeon, and pheasant, as well as upon fowls.

(8) *Goniodes Eynsfordii*, n. sp. (fig. 8).—Tick-like in appearance. Ground-colour of female pale yellowish white or grey, the lateral bands dark shining chestnut-brown. A double pair of horizontal lateral stripes on each segment, chestnut-brown in colour,

Fig. 8.

*Goniodes Eynsfordii*.

much darker towards their outer edges, and forming a ready feature of distinction for the species. Four long bristles on front of head and two large pairs of posterior ones. The 5-jointed antennæ slightly hairy

at tip. Metathorax with four lateral bristles. Four anterior abdominal segments with a single lateral bristle, fifth and sixth with two lateral bristles, seventh with four. Anal segments bilobate, with four long and two short bristles. Each segment has four central and three pairs of lateral bristles, except the last, which has two large central ones. Legs thick, a single bristle on the tip of each tibia.

The male is narrower than the female, bright yellowish brown, borders of the segments very dark brown. Five pairs of fine bristles on the head and one large one on each side of the posterior angle. Each abdominal segment with a pair on each side. Abdomen dark in centre. Legs not so thick as in the female; three hairs on femora of second and third pairs. Length in ♀, 2·6 to 2·7 mm.; in ♂, 2·8 to 2·9 mm.

This species does not seem to leave the head and neck. It is especially abundant in chicks in the above-named positions. Specimens were first sent me by Mr. Till, of Eynsford, who finds they are most prejudicial to the health of the birds. They are found with their heads buried in amongst the feathers and their bodies in the air, just like a Tick. A full account of this species will be found in the Journal of the S.E. Agric. College, No. 5.

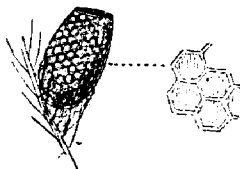
Life-history of Chicken-Lice.

Apparently Chicken-Lice breed all the year round, but more abundantly in the spring of the year than

at other times. Reproduction is fairly rapid under favourable conditions.

The eggs laid by the female have, I believe, only once been described; they are beautifully sculptured objects, oval in form, and, most that I have examined, truncated at the top. These 'nits' in *G. Eynsfordii* are covered with small hexagonal sculpturings (fig. 9). The ova are laid amongst the feathers of the birds, especially amongst the 'down' feathers; they are attached to the feathers by numerous fine threads around their base, as seen in the figure. In from six to ten days these hatch into small pale lice, which

Fig. 9.



Ovum of *Goniodes*.

at once commence to irritate the birds. There is little difference between the young and adult lice; they gradually become darker in colour. Some kept by the author moulted as many as twelve times, but this surely must be exceptional. There is no pupal stage in these insects; they undergo what we call an incomplete metamorphosis, remaining active all their life, no passive stage or pupa intervening as we saw

in the 'Hen-Flea.' There is little doubt but that reproduction takes place chiefly upon the host, although the writer has found on many occasions *Menopons* in copulá in the nests. The two *Goniocotes* have only been observed in copulá on the birds. Although the two *Menopons* are found often plentifully in the nests, they nevertheless spend most of their time upon the fowls. Mallophaga apparently live for a considerable time, for the author has kept *M. pallidum* alive for nine months on fresh feathers, they seemingly eating the quill-epidermis.

Mode of Distribution.

There are three ways in which Lice are spread from fowl to fowl. Firstly during copulation; an infested cock will soon distribute the lice to all the hens. Secondly, there is no doubt that anyhow some of the eight species leave the birds and may be found in the nests occasionally, and thus crawl upon the hens sitting subsequently upon the same nest. Thirdly, as Dr. Sharp says:—"Possibly Mallophaga may be transferred from one bird to another by means of the parasitic two-winged flies that infest birds." This very probably does take place, but we must not overlook the fact that the parasitic two-winged flies spoken of, namely the *Ornithobia pallida* and the *Ornithomyia avicularia* (figs. 10 and 11), are not so very common on fowls. They have never been recorded to me as injurious to any serious extent, but

it is well known that they do occasionally enter the ear and nose of the fowl, duck, and gosling.

Dr. Sharp has observed this method of transference himself. In 1890 he exhibited, at the Entomological Society of London, a specimen of the *O. avicularia*, taken at Dartford, to which there were firmly adhering several specimens of a Mallophagous insect.

Prevention and Remedies.

Just as in the prevention of Fleas, so in Lice, cleanliness is one of the most powerful agents we can employ. Floors, ceilings, nests, and perches should be well whitewashed in the early spring, paraffin being added as mentioned before, with soft soap to make it adhere more firmly to any small lice that may have wandered off the birds. This wash should be sufficiently liquid so as to run into every crevice. A second cleaning should also be given again in the autumn.

There is nothing that keeps birds free from lice so well as *Dust-Baths*; these are natural remedies for the lice, and fowls should never be kept without them. In every run or house there should be placed a good-sized square box containing some powder in which the bird can dust itself. The writer has, after numerous experiments, found that ordinary road dust, in which a few handfuls of sulphur and lime are mixed, is as successful as anything. Sand mixed with a small quantity of creosote will also keep the birds

free from these noxious insects. The writer is also told that finely-powdered gypsum mixed with a small quantity of paraffin or carbolic is most successfully employed, quickly clearing off any lingering pests that the birds cannot reach.

Regarding the head and neck infestation of chicks, there is nothing like dressing them, once or twice early in the season, with *White-Precipitate*. The very smallest quantity rubbed upon the skin with a gloved hand will suffice to destroy all the lice, that would eventually stunt the chick's growth. It is well to give the caution that this is a strong irritant poison and needs great care in its use, especially upon very young chicks.

In the case of brood-hens it can be safely and most beneficially used: a small quantity of the ointment should be well rubbed into the feathers (at their base) around the anus, under the wings, and other places where lice congregate. It is surprising how many failures in hatching can be saved by this simple precaution, and by dusting the nesting-boxes with some of the numerous insecticides mentioned.

Amongst other methods experimented with, upon old birds suffering from 'lousiness,' the following may be worth recording:—Two hens badly infested with *Menopons* and *Lipeuri* were dipped in a bath of boiled elder flowers, twigs, and leaves, to the concoction being added a small quantity of soft soap. In both cases the lice were all destroyed and the plumage not damaged.

Fumigating the birds is sometimes resorted to, but it is troublesome and not always successful. An engine named Lagrange's Exterminator has been used for some time with more or less success. This is simply a wooden box, in which the fowl is placed in such a position that its head is out in the air and its legs firmly tied down. The box being made airtight, and the extruded head being tied around with a piece of thick cloth close to the opening in the box, no vapour inside can escape. In this box a small piece of brimstone can be burnt, the vapour soon killing all the body lice.

C. OTHER INSECT PARASITES.

There are two Diptera or true Flies found sometimes infesting the Fowl and other poultry. These pests are related, although distantly, to the Fleas, very closely to the Sheep-Tick, which, as I have pointed out, is also one of the true two-winged insects, only, like the Flea, it is minus its wings.

Diptera on Fowls.

These bird parasites are known as *Ornithobia pallida*, Mg., and *Ornithomyia avicularia*, L. (figs. 10 and 11). Both belong to the family *Hippoboscidae*, in which all the species pass their egg and larval state in the body of the mother, instead of leading a free larval life. These strange insects are born in fact as pupæ, or anyhow adult larvæ ready to pupate. Only a single egg is produced by each female, and

the young, either larva or pupa, when expelled from the parent's body is nearly equal to it in size.

O. pallida (fig. 10) has a small, oval, tough body, slightly hairy and bristly, tawny in colour, paler

Fig. 10.



Ornithobia pallida.

beneath. Eyes large, oblong, and brown. Mouth (which is formed for suction) is not long; it consists of a pair of hairy hard valves, which enclose a slender stiff tube, the sucking-tube, which is formed by the union of two setiform pieces. There are very short antennæ, and stout wings, grey in colour with dark brown veins. The legs are robust and wide apart; claws long, curved, and black. About $\frac{1}{4}$ of an inch long.

O. avicularia (fig. 11) is greenish in colour, more or less varied with tawny. The thorax has a reddish-brown dorsal stripe. Wings ample, rather long, grey with black veins. Legs stout and bristly. Slightly larger than the former and more hairy.

Both these Diptera crawl about upon the fowls and fly from one to another. They generally infest the nostrils and ears, crawling into them and setting up

FILARIDÆ.

34. *Dispharagus nasutus*, Dujardin Gizzard.
= *Filaria nasuta*, Schneider.
Spiroptera nasuta, Rudolphi.
35. *D. hamulosa*, Stossich Gizzard.
= *Cheilospirura hamulosa*, Diesing.
Spiroptera hamulosa, Diesing.
36. *D. spiralis*, Molin Œsophagus.
= *F. papillosa*?
37. *D. laticeps*, Dujardin Œsophagus.
= *F. laticeps*, Schneider.
S. laticeps, Rudolphi.
38. *Filaria Mansoni*, Cobbold Eye.

STRONGYLIDÆ.

39. *Syngamus trachealis*, Von Siebold } Trachea and
= *Strongylus trachealis*, Creplin. } Bronchi.
Sclerostoma syngamus, Diesing.
Syngamus primitivus, Molin.
Fasciola trachea, Montagu.
40. *Psiloptera truncata*, Schneider Gizzard.

TRICHOCEPHALIDÆ.

41. *Trichosoma longicolle*, Rudolphi Intestine.
42. *T. annulatum*, Molin "
43. *T. collare*, Linstow "
44. *T. retusum*, Railliet "

ANGULLULIDÆ.

45. *Anguillula stercoralis*, Bavay Intestine.

ACARINA. (MITES.)

46. *Argas mauritanus*, Guérin External.
47. *Dermanyssus gullinæ*, Redi External.
= *D. avium*, De Geer.

48. *Cytodites nudus*, Vizioli Air-tubes.
= *Cytoleichus sarcoptooides*, Mègnin.
Sarcoptes Gerlachii, Rivolta.
49. *Dermoglyphus minor*, Nörner External.
= *Analges minor*, Nörner.
50. *D. elongatus*, Mèguin External.
= *Analges elongatus*, Nörner.
51. *Epidermoptes bifurcatus*, Rivolta External.
52. *E. bilobatus*, Railliet & Lucet "
= *Symbiotes avium*, Caparini.
53. *Leptus autumnalis*, Latreille External.
54. *Laminosioptes cysticola*, Vizioli "
= *Symplectoptes cysticola*, Vizioli.
L. gallinarum, Mègnin.
55. *Lophoptes patavinus*, Mègnin External.
56. *Megninia cubitalis*, Mègnin "
57. *M. asternalis*, Mègnin "
58. *Pterolichus obtusus*, Robin "
59. *Sarcoptes levis*, var. *gallinæ*, Railliet.. Skin.
60. *S. mutans*, Robin "
= *Knemidokoptes viviparus*, Fürstenberg.
61. *Syringophilus bipectinatus*, A. Heller .. External.
= *Picobia bipectinatus*, O. Heller.
62. *Tydeus molestus*, Moniez External.

INSECTA. (LICE AND FLEAS, ETC.)

MALLOPHAGA.

63. *Goniocotes gigas*, Taschenberg Rump & Wings.
= *G. hologaster*, Denny.
G. abdominalis, Piaget.
64. *G. hologaster*, Nitzsch Rump & Wings.
Var. *maculata*, Tasch.
65. *Goniodes dissimilis*, Nitzsch General.
66. *G. Eynsfordii*, n. sp. Head & Neck.
67. *G. Burnetti*, Packard ?

68. *Lipeurus variabilis*, Nitzsch } Primary & second-
 69. *L. heterographus*, Nitzsch } ary feathers.
 70. *Menopon biseriatum*, Piaget " General.
 71. *M. trigonocephalum*, Railliet "
 72. *M. pallidum*, Nitzsch "

DIPTERA.

73. *Pulex avium*, Tasch. General.
 = *P. gallinae*, Bouché.
 74. *Sarcopsylla gallinacea*, Westwood "
 75. *Vermipsylla alakurt*, Schimk. "
 76. *Ornithobia pallida*, Mg. Partial parasite.
 77. *Ornithomyia avicularia*, L. "

HEMIPTERA.

78. *Acanthia columbaria*, Jenyns Partial parasite.

COLLEMBOLA.

79. *Isotoma*, sp. Nests & Skin.

II. VEGETABLE PARASITES.

1. *Achorion Schonleinii* Skin.
 2. *Aspergillus glaucus*, Link. Air-passages.
 = *Eurotium herbariorum*, Link.
E. aspergillus glaucus, De Bary.
 3. *A. candidus*, Link. Air-passages.
 4. *A. fumigatus*, Fresenius "
 5. *A. nigrescens*, Link "
 = *A. niger*, Van Tieg.
 6. *Oidium albicans*, Robin Throat.
 = *Saccharomyces albicans*, Reiss.
Syringospora Robini, Quinquaud.

7. *Penicillium glaucum* Albumen of egg.
 8. *Mucor stolonifer* "
 9. *Botrytis*, sp. ? "
 10. *Dactylium*, sp. ? "
 11. *Hætophora*, sp. ? "
 12. *Sporotrichium*, sp. ? "
 13. *Leptomitius*, sp. ? "
 14. *Macrosporium*, sp. ? "
 15. *Stysanus*, sp. ? "

II.

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