

rank of medical officers, be it what it may, is fixed, and its privileges or immunities are never contingent upon the presence or absence of a line officer of inferior rank, called "executive"—whose official functions are local—temporary; he is simply the agent, the *locum tenens* of his commander, whose general instructions he executes, without authority to originate any order.

To a private citizen naval rank of any degree is worthless, perhaps absurd; no statesman, scientist, physician, or lawyer, labours assiduously in his vocation to win as a reward a legal right to be of the same rank as a commodore or even admiral in the naval service.

"But officers of the medical staff, as well as those of other staff corps, have learned from 'the line' to appreciate the value of rank in the navy; and they have also learned, from some other source however, to believe implicitly that merits of all kinds are brothers, and, in the same community or organization, are equally entitled to rewards and distinctions of the same nature. Their faith in this doctrine is so firm that it cannot be shaken by the assumption that 'the line' is the whole navy, and that to it exclusively belong all the merits, all the distinctions, and all the rewards, as well as all the honours and glory won by the joint efforts of men who, though not of 'the line,' are recognized nevertheless to be honest, intelligent, skillful, brave, and patriotic. But in preferring their own claims, they wish not to disparage others in any degree. They cheerfully recognize the merits of 'the line,' and rejoice that its efforts, aided by the staff, have deservedly won reward and public approbation."—p. 145.

The pamphlet before us is a fair exposition of the subject, and embraces, perhaps in too much detail to interest the general reader, views of every aspect of the question. No one can read it without a conviction that Congress should, without unnecessary delay, enact such a law as is calculated to put an end to a controversy which has lasted too long, probably with detriment to the harmony which should characterize an organization composed of gallant and intelligent gentlemen. In such a community Congress should not permit well-founded dissatisfaction to exist for want of a law to remove it.

Inasmuch as the degree of rank accorded to medical men in the military establishments of the nation may be regarded as a measure of the common estimation of the profession by the public, the subject is of general interest to all physicians and surgeons. We offer this reason in excuse for a somewhat extended notice of this pamphlet, which is exhaustive in its character.

W. S. W. R.

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ART. XXXIII.—*Report on the Diseases of Cattle in the United States, by the Commissioner of Agriculture.*

A REPORT on the diseases of cattle in the United States is now being published at Washington under the direction of the Commissioner of Agriculture. If the gentlemen selected for the other portions of the work be as competent investigators as those to whom the asserted causation of some of these diseases by fungi has been intrusted, the report will be of the deepest interest to medical men as well as of very great practical importance to the country. It seems to us that in no other way can the department spend its funds more advantageously; the general ignorance on the subject being so great and the money value concerned so enormous. We sincerely hope that Congress will make a sufficient appropriation to enable the Commissioner to issue the final report in a style commensurate with the importance of the subject, and which may bear comparison with the magnificent volumes published by the government of Great Britain on the cattle plague.

We have been favoured with early sheets of the report of Drs. J. S. Billings and Edward Curtis of the Surgeon-General's Office, to whom was intrusted the examination of the blood of infected animals, also with that of Mr. J. W. Ravenel, than whom no more competent person could have been selected to examine the fungal flora of the territory in which the "Texan disease" originates.

Mr. R. collected two hundred and eighty-two distinct species of fungi, but "was surprised to find comparatively so few of the entophytral coniomycetes which infest living plants, the rusts, smuts, etc." He failed entirely to find the *Coniothecium Stilesianum* of Hallier, the asserted cause of the disease, or any plant allied to it, although he examined most carefully the living grasses, the dead wild grasses of the previous year, as well as the hay on which the animals were fed. Of course his not finding them is only a negative proof, but to any one acquainted with Mr. R. it is very strong presumptive evidence that no such plants existed there.

The results obtained by Drs. Billings and Curtis are still more decisive. Their duty was to answer the following questions:—

1. Are any forms of cryptogamic growths present during life in the blood or secretions of the diseased animals?

2. If so, of what character are they, and what is their probable source?

In introducing an account of their experiments the authors of the paper state very clearly the latest position that the advocates of the cryptogamic origin of disease have assumed, as follows:—

"The fungi which are supposed to cause disease in animals are, when in their perfect state, or at least in such a state that they can be identified, composed of mycelium and spores. But according to the advocates of the cryptogamic origin of disease, neither the mycelium nor the spores of the fungus that produces the malady are necessarily or even usually to be found in the fluids or tissues of the affected animal, their theory being that the disease is produced by the presence in the economy of minute particles of protoplasm (*micrococcus* of Hallier), resulting from the development and breaking up of the spores or mycelium of a fungus; from which granules, they assert, can be developed perfect forms of fungi, of recognizable genera and species, by proper 'cultivation' outside of the body of the animal fluids containing them.

"Thus, when the blood of a pleuro-pneumonic cow fresh from the vein is examined with a magnifying power of 1200 diameters linear, nothing distinctive or unusual may appear; the red and white blood corpuscles may be perfectly normal, and nothing like spores or mycelium will be seen. But there will probably be, either single or in masses, some minute granules or molecules appearing as glistening points scattered over the field. If such are not present at first, by keeping the blood exposed to the air for a few hours they may be found in abundance.

"Now it is these little molecules which are asserted to cause disease by their presence in the animal economy, and which are claimed to be vegetable in their nature, as being developed from and capable of reproducing certain common fungi, popularly known as rusts, smuts, or moulds.

"To prove the truth of the latter statement, experiments have been made by various investigators on the principle of placing the fluids containing the *micrococcus* in the proper conditions as regards warmth and moisture for the development of fungi; supplying the germs with suitable pabulum for their nourishment, and adopting such precautions as are possible against the fortuitous introduction of spores of fungi from the atmosphere. And if under such circumstances a mould or mildew appears upon the suspected matter, the argument is that such mould necessarily sprang from the *micrococcus* granules as its parent germs, and therefore represents the perfect fungus of which such *micrococcus* is a special form.

"Now, since the spores of the common moulds are almost omnipresent, the conclusiveness of all such experiments must depend upon the possibility of showing that all extraneous bodies have been perfectly excluded from the fluids cultivated."

In order to prove that all possible precautions were taken by themselves, Drs. Billings and Curtis then minutely describe the apparatus used. These were the "isolation apparatus" and the "culture apparatus" of Hallier slightly modified and, we think, improved, and "growing slides." Almost all the various described varieties of the latter were employed, as well as a new one invented by the authors. Their description of this is as follows:—

"For the general purposes of a growing slide, that which has given the most

satisfaction is made by laying on an ordinary glass slide, three inches by one, a piece of thin, fine, white blotting-paper of the same size, with an opening in the centre three-fourths of an inch in diameter, or a little less than that of the thin glass cover used. The edges of the paper may be cemented to the glass with a little Canada balsam, although this is not necessary.

"To use it, put in strong alcohol for ten minutes, then in distilled water for the same length of time; free the central opening from water; place in it a drop of the fluid to be cultivated, and cover it with a very thin glass cover. Care must be taken to keep it perfectly flat. Place the slide in a culture apparatus, in which water alone is used as the isolating fluid; let one end of a piece of sewing thread rest on the end of the slide, and the other dip into the water.

"If the slide is to be used without being placed in a moist chamber, the paper should be covered with a piece of thin sheet-rubber or oiled silk, of the same shape and size, and with a corresponding opening. If it be desired to use high powers, or to trace the germinations of a spore found in examining a slide, the glass cover may rest on the slide, and the blotting paper be placed on instead of under it.

"If it is desired to develop the fruit, the drop of alimentary fluid should be small, and a groove should be cut in the paper to the edge of the slide to allow the admission of air. The amount of moisture can be regulated at will by varying the size and number of the threads used to keep the paper wet. This slide is simple, cheap, and susceptible of being so modified that it is available for almost every purpose for which a growing slide is required.

"Another form of development apparatus which was used towards the close of our experiments consisted of a six-ounce glass beaker, having a little water at the bottom, and hermetically closed by a piece of thin sheet-rubber tightly stretched over the top. From the centre of this cover there was suspended by a thread a strip of thin blotting paper, which had been previously soaked in alcohol and distilled water, and on which the material to be cultivated had been placed. The thread was attached to the cover and the paper by Canada balsam. This is a sort of isolation apparatus, and is more satisfactory than the one used by Professor Hallier.

"The material or substratum upon which the cultures are made, and which is intended to furnish nutriment to the fungi, is of various kinds. We used extract of beef, healthy blood, condensed milk, solutions of cane and grape sugar, pulp of lemon, orange, potato, &c. &c.

"The solutions of sugar used were made with crystallized sugar, and a little tartrate of ammonia and ashes of yeast were added to furnish the nitrogen and salts required for the growth of fungi."

The experimenters also took every precaution to obtain the diseased products without contact of the exterior air. With fluids this was comparatively easy by means of "vacuum tubes." These were formed and used as follows:—

"Take a glass tube three-sixteenths of an inch or so in diameter, seal one end by the flame of a lamp, and, at a point about three inches from the sealed end, draw it out to a slender tube.

"The tube is then held nearly upright in the flame of a Bunsen burner until the whole of the sealed end up to the narrow neck is red hot. The part in the flame is held with pincers, the other end in the fingers, and when the requisite heat is obtained the slender neck is rapidly drawn to a point and sealed. We now have a pointed, hermetically sealed tube, in which there is a partial vacuum, and in which by the red heat all organic matters have been destroyed.

"This we call a 'vacuum-tube.'

"Suppose, now, that we want some blood for experiment. As soon as possible after the death of the animal, lay bare the jugular vein, prick it with a lancet, introduce the pointed end of the tube and break it off within the vein, pressure being at the same time made upon the vessel from above and below towards the opening, by the fingers of an assistant. The blood will rush into the tube, and if it has been properly made, will fill it for three-fourths of its length. Then, holding a lighted spirit lamp or candle close to the vein, withdraw the point of the tube directly from the vessel into the flame, and hold it there until sealed.

"If the operation has been properly performed, and the blood be healthy, it will coagulate and then remain unchanged for an indefinite period.

"Exudates in the pleural or peritoneal cavities, bile, urine, &c., are obtained and preserved in the same way."

With the solids of the body it is simply impossible to prevent the access of impurities from without, and indeed, as the doctors remark, "even with the more manageable blood it is impossible to be absolutely certain when we see its surface covered with mould that the possibly single spore from which that forest sprang must infallibly have been in the vein of the animal whence the blood was drawn."

For these reasons Drs. B. and C. resorted to the method of comparison, and herein seems to us to lay one of the great values of their paper.

The experiments themselves were in two series; 1st. Those made on cattle suffering with contagious pleuro-pneumonia. 2d. Those made with material obtained from animals affected with the so-called Splenic or Texan fever.

Of the first series there were seven experiments, all confirming and corroborating one another. We select the following as examples:—

"On the 26th of February, 1869, a cow in the last stages of pleuro-pneumonia was killed near Washington, and vacuum tubes filled from the jugular vein. Tubes were also filled with the serum contained in bullæ formed by the false membrane lining the bronchial tubes.

"About four inches of each jugular vein were removed, ligatures having been first applied. Eighteen hours afterwards the blood in the veins from which the tubes had been filled was carefully examined with a power of seven hundred and fifty diameters. It was coagulated, and the serum contained some molecules, single or in chains of two or three, which were motionless. Blood from one of the vacuum tubes contained no such bodies. The lung serum contained molecules like those in the vein.

"*Experiment 6, February 26, 1869.*—In a culture apparatus were placed three watch-glasses and two growing slides, arranged as follows: The growing slides and watch-glass No. 1 contained boiled potato and diseased blood; watch-glass No. 2 contained boiled potato and healthy blood; watch-glass No. 3 contained boiled potato and lung fluid. Twenty-four hours later in the growing slides the red corpuscles had nearly disappeared; bacteria and monads, single or in short chains, were seen; a few moving, but the greater part at rest. Seven days later there was no change; motionless bacteria and monads were present in all the glasses, but no trace of mycelium or spores.

"*Experiment 7, February 26, 1869.*—Seven watch-glasses and five growing slides were arranged as follows: Watch-glass No. 1 contained potato boiled in distilled water; watch-glass No. 2 contained lemon boiled in distilled water; watch-glass No. 3 contained lemon boiled with diseased blood; watch-glass No. 4 contained diseased blood alone; watch-glass No. 5 contained healthy blood alone; watch-glass No. 6 contained boiled potato with diseased blood; watch-glass No. 7 contained boiled potato with healthy blood; growing slide A contained boiled lemon with diseased blood; growing slide B contained boiled lemon with healthy blood; growing slide C contained boiled potato with diseased blood; growing slide D contained boiled potato with healthy blood; growing slide E contained boiled potato alone. These were placed in four sets of culture apparatus, and kept at a temperature of 78° Fahrenheit. In twenty-four hours a few small cells were seen in the slide B, which rapidly developed into ordinary yeast, continuing to bud and increase for four days. The fluid in watch-glasses 4 and 5 rapidly putrefied, and was filled with bacteria and monads. In watch-glasses 1 and 2 and growing slide E no change had occurred in eight days. In the others a few motionless bacteria appeared on the second day, after which there was no change. The precautions taken in this experiment to exclude extraneous bodies were great, embracing every point which could be thought of as liable to lead to error. In April one of the tubes containing lung serum from this cow was given to Mr. Reid, residing near Washington, and with its contents he successfully inoculated several cattle, producing in each case the same effects, and, judging by the after results, conferring the same immunity against the disease as if perfectly fresh virus had been used. The jugu-

lar vein from this cow, which had not been opened, was suspended in a glass jar, closed with a cork dipped in paraffine. This was kept at the ordinary temperature of the room and in diffuse daylight.

"June 3, 1869, the jar was opened and the contents examined. The serum had drained from the vein and collected in the bottom of the jar, was of an offensive odor, and contained bacteria, moving and at rest. No trace of mould on the outside of the vein. The contents of the vein showed no bacteria or molecular forms.

"The contents of the vein and the serum which had drained from it were cultivated upon various substrata and in the several forms of apparatus, with the usual results, viz., luxuriant development of *cryptococcus* and *penicillium*.

"On the 3d of June, 1869, three months after it had been put up, one of the vacuum tubes of blood from this animal was opened, and the contents carefully examined; they could not be distinguished from freshly coagulated blood; the corpuscles were perfectly normal, and there was no trace of bacteria or micrococcus.

"The blood was cultivated on growing slides and in the beaker isolation apparatus—in one case with negative results, in others with the productions of the usual *penicillium* forms. Healthy blood kept for the same time and treated in the same way gave the same results.

"Other experiments were made with the pleuro-pneumonic fluid by cultivating them with solutions of cane and grape sugar, which will be referred to subsequently.

"The general conclusion from all the observations and experiments we have made is, that in the contagious pleuro-pneumonia of cattle there is no peculiar fungus germ present in the blood or secretions, and that the theory of its cryptogamic origin is untenable."

Of the second series of experiments, we select the following:—

"On the 29th of May vacuum tubes of blood and secretions from two yearling steers, killed at Houston, Texas, May 18, 1869, were received and examined. These animals presented the usual lesions—enlarged spleens, erosions of the stomach, &c.

"The blood from these tubes was in an advanced stage of putrefaction, and filled with bacteria and micrococcus.

"The bile from the four-year-old steers was normal in appearance; that from the one-year-old animals was very dark and tenacious. Micrococcus was found in each, but not abundant. In each there were found moving rods (bacteria?), which were somewhat peculiar, one end being bent, forming a little knob or hook. They were of an orange color, probably owing to imbibition of biliary colouring matter.

"The urine in each set of tubes was found to contain micrococcus, bacteria, and cryptococcus.

"*Experiment 1.* Blood from the first series of tubes was placed in a De Bary's growing slide, on blotting-paper, in a beaker isolation apparatus, and in a watch-glass under a culture apparatus, with a few drops of freshly-boiled solution of sugar. In the growing slide *cryptococcus* forms were observed in thirty-six hours; in twelve hours more, delicate mycelium filaments appeared, and on the fourth day the usual fructification of *penicillium crustaceum* was seen in the air space in the slide. The isolation apparatus was opened on the fifth day, and *penicillium* found on the blotting-paper. In the watch-glass *cryptococcus* was developed on the second day; two days later this was very abundant, and of various sizes and forms, including *C. guttulatus* of Ch. Robin.

"Four days later mycelial filaments, with dilatations of various forms and sizes (*Schizosporangia* of Hallier), covered the surface of the blood. One month later careful examination showed nothing but *penicillium*.

"*Experiment 2.* The precautions taken in this case were very great, and were as follows: The beakers, culture apparatus, watch-glasses, slides, blotting-paper, and thread were treated with dilute nitric acid, then with liquor potassæ, and finally rinsed with hot, freshly-distilled water. The knife, glass rod, and file used were cleansed in hot alcohol just before being used. The vacuum

tubes were cleansed with liquor potassæ and alcohol just before being opened. The sheet-rubber was thoroughly washed with the same fluids.

"To prepare the beaker isolation apparatus, after the articles used had been treated as above, the cover with blotting-paper was placed on the beaker strong alcohol having been first poured in, and then it was thoroughly shaken. The alcohol was then removed by similar treatment with freshly-distilled water. The apparatus was then taken to a room in which no experiments had been made, and the fluids added to the blotting-paper. During this operation the interior of the apparatus was exposed for about one minute.

"Blood from four-year-old steer (first set of vacuum tubes) was placed in a De Bary's growing slide, in a watch-glass with pulp of lemon, same with pulp of orange; also in beaker isolation apparatus on lemon and orange.

"Blood from one-year-old steer (second set of vacuum tubes) was arranged in the same manner.

"And lastly, a similar series of apparatus was arranged with lemon and orange without blood.

"The growing slides and watch-glasses were examined daily, with powers ranging from two hundred to one thousand diameters.

"At the end of five days the isolation beakers were opened. The phenomena in all, with one exception, were the same. *Penicillium crustaceum* (Fr.) was developed in all, more slowly and less luxuriantly where no blood had been added. The exception referred to above was in the watch-glass to which the putrescent blood from the one-year-old steer was added; in this there was a luxuriant growth of *mucor racemosus* (Fres.), and also *coremium*, a luxuriant and fasciculated form of *penicillium*.

"It is considered needless to give the details of all the culture experiments undertaken with this blood; suffice it to say that it was placed on various substrata and compared with healthy blood, and the results were in all cases the same: *i. e.*, production of *penicillium*, *coremium*, and *mucor*.

"In cultures undertaken with the urine, either no result was obtained or the usual *penicillium* made its appearance.

"Culture of the bile upon lemon gave the same results, but the *penicillium* growth was much less than when the blood was used. Disk-like masses of *mycelium* (the *Sclerotia* of Hallier), usually bright yellow in colour, were produced alike with diseased and healthy blood.

"To judge, therefore, from the specimens that we have had the opportunity of examining, it would appear that in the blood, bile, and urine of cattle slaughtered in Texas, apparently healthy while alive, but presenting after death the appearances considered characteristic of the splenic fever, there are present minute bodies corresponding to the micrococcus of Hallier, which exhibit the same behaviour with reagents as the spores of fungi.

"In the bile and urine bacteria and cryptococcus cells also occur. The micrococcus granules, however, have no specific characteristics, and cannot be distinguished from similar bodies which are to be seen in any blood in an incipient stage of putrefaction. Thus, on the 4th of June, vacuum tubes were filled with blood from a healthy sheep slaughtered near Washington, and this blood, examined sixty hours afterwards, contained in equal abundance these same bodies (micrococcus) that were found in the blood of the Texas cattle. The attempt to give these micrococcus molecules a special and important character by the 'cultivation' in various ways of the blood containing them, also failed. In all cases the fungous growth that appeared upon the cultivated material was composed of the commonest moulds, and, instead of being unique as to species or even genus, comprised various forms and sizes of cryptococcus, torula, *penicillium*, *coremium*, *mucor*, and the so-called schizosporangia of Hallier, of all forms and sizes; these various fungi being either simultaneously or successively developed. Moreover, all these varieties of fungi can be also developed by a similar cultivation of healthy blood, though not as rapidly nor in as great luxuriance.

"The fact that in our cultivations we never obtained any growths of *ustilago*, *coniothecium*, or *tilletia*, which were so frequently produced in Hallier's experi-

ments, is probably due to the circumstance that no specimens of those fungi were ever brought into the room where our experiments were conducted.

"In cases of splenic fever of cattle our experiments, therefore, fail to establish the presence of any peculiar or special cryptogamic germs in the blood; and, instead of supporting the notion that the micrococcus granules which are present in any way cause the disease, tend rather to show that their occurrence should be considered as an effect of the malady, whether constant or inherent, or altogether fortuitous; for since these granules, if fungous in their nature, must be, as indicated by the cultivations, forms of the very commonest moulds, it is certainly a much more probable hypothesis that the disease so destroys the vitality of a part of the blood as to render it capable of supporting and nourishing a low form of these ubiquitous fungi, which perish when introduced into a healthy subject, than it is to imagine a deadly disease, occurring only under certain rigidly prescribed conditions, as caused by the presence, in the economy of the germs, of fungi notoriously harmless and of universal occurrence."

Drs B. and C. then detail some experiments made to determine whether bacteria are fungoid or not; whether they are a sort of first stage of the yeast plant.

The method of experimentation was as follows: the experiments themselves want of space forces us to omit.

"Our aim was to develop in a saccharine solution an unmistakable yeast cell with its attendant special form of fermentation, from a vibrio or bacterium contained in a putrefying fluid; and the practical problem was to devise some means whereby the putrid fluid might be added to the sugar solution, without at the same time any yeast cells, which it might accidentally contain, also passing into the solution, and so vitiating the result. To accomplish this end we availed ourselves of the different behaviour of yeast cells on the one hand, and the various cryptogamic organisms of putrid fluids on the other, in respect to their ability to pass through certain tissues. Now, bacteria, vibrios, and molecules, either single or in chains (*Monas*, *Microzymas*, *Micrococcus*, *Leptothrix*, *Zoozoea* and *Schizomycetes*, of various authors), will readily pass through thoroughly moistened filtering paper; while, as originally shown by Mitzscherlich (*Pogg. Annal.*, 1855, p. 224), and again proven by the following experiments, yeast cells will not. Furthermore, none of the above-mentioned bodies will pass through vegetable parchment, although fluids will. If, then, upon adding a putrefying fluid to a saccharine solution, through the intervention of filtering paper, we produce yeast and fermentation in that solution, while upon making the addition through vegetable parchment we produce none, the method of the experiment leaves no doubt that the yeast must have been developed from cryptogamic germs other than yeast contained in the putrid matter. To carry out this plan of experiment, the following apparatus was used.

"In a four or six-ounce glass beaker (not lipped) was placed a tube, made by cutting off the bottom of a common test tube, three-fourths inch in diameter, and as high as the beaker. This tube was open at the top, but closed at the bottom by two layers of fine, strong filtering paper tied tightly over the flaring end with waxed string, and rested on a fragment of glass rod placed in the beaker; all these articles having been carefully washed, were put together as described, and about two ounces of hot strong alcohol were poured into both the tube and beaker. A piece of thin sheet rubber was next tied over the top, hermetically closing both beaker and tube, and the whole apparatus, having been thoroughly shaken, so that the hot liquid should come fully in contact with every part, was then set aside to cool until wanted.

"The solution to be experimented on, which had been boiled, filtered, and then reboiled in a flask fitted up as an isolation apparatus, was in the mean time cooling in that vessel. When this had cooled to about 85°, the alcohol was removed from the apparatus, and the tube was rinsed with a little freshly-distilled water. Then from one to two ounces of the solution to be experimented on was placed in the beaker, while a little of the putrefying or fermenting fluid was put in the inner tube. The sheet-rubber was finally stretched tightly over all and tied as before, and the apparatus was then kept at a temperature of 75° Fahrenheit to 85° Fahrenheit in diffused daylight.

"The solutions used were of cane or grape sugar, mixed with extract of beef, or with tartrate of ammonia and ashes of yeast.

"The two following formulæ gave the best results :—

## A.

"Cane sugar	.	.	.	.	.	.	.	.	10 parts.
Tourtelot's extract of beef	.	.	.	.	.	.	.	.	10 "
Water	.	.	.	.	.	.	.	.	100 "

## B.

"Cane sugar	.	.	.	.	.	.	.	.	10 parts.
Tartrate of ammonia	.	.	.	.	.	.	.	.	5 "
Ashes of yeast	.	.	.	.	.	.	.	.	5 "
Water	.	.	.	.	.	.	.	.	80 " "

The results in the majority of the experiments favoured the view that some of the bacteria and micrococcus germs were capable of developing into the yeast plant.

Commenting on these, the authors speak as follows :—

"If the above expressed view of the nature of these bodies be accepted as probable, the results of the culture experiments with the fluids of diseased and healthy animals can be readily understood. In many animals, whether healthy or diseased, there are no fungus germs in the blood. We have kept vacuum tubes of blood for four months, and at the end of that time the contents were perfectly normal. In other animals there are probably germs in the blood during life, as shown by the fact that, in vacuum tubes filled from them, the blood putrefied and the usual mycoderms developed. But that these germs can develop and multiply, without dead organic material as a pabulum, is very doubtful.

"The fungi, which are developed from blood containing these germs, are, as might be expected, the common moulds, the spores of which are almost ubiquitous. Most frequently penicillum, next mucor, next aspergillus."

In conclusion, we think this paper totally refutes all that Hallier has written, and proves that his culture experiments afford no proof of the fungal theory of contagious diseases. He is but another added to the number of those who have been allured onwards by the glowing beauties of the theory to the waste of time and labour. Those who are desirous of obtaining *permanent* reputation will do well, we conceive, to avoid the subject; especially would we offer this caution to novices in cryptogamic botany.

H. C. W., JR.

ART. XXXIV.—*The Pathology and Treatment of Stricture of the Urethra and Urinary Fistulæ.* By Sir HENRY THOMPSON, F.R.C.S., etc. Third Edition. 8vo. pp. xvi., 336. London: John Churchill and Sons, 1869.

THE first edition of this classical work appeared in 1854, having been honoured by the reception of the Jacksonian prize of the Royal College of Surgeons of England, two years previously. An elaborate and excellent review of that edition was published in the number of this Journal for July, 1855 (pp. 87–105), the reviewer justly characterizing the work as a "beacon-light" in the special department of surgical pathology with which it dealt.

A second and much enlarged edition made its appearance in 1858, and was noticed in the number of this Journal for January of the ensuing year (pp. 201–203). In preparing the present (third) edition, Sir Henry Thompson has departed from the usual routine which makes each issue more bulky and more costly than its predecessor, and has diminished the size of his volume by upwards of eighty pages. This reduction of bulk has been effected "by removing matter which in the former edition related to controversial points under discussion at the time of publication, but since, for the most part, settled, and