hal web or of the fungous mass as it comes from the ear, will, if placed in a glass box, continue to grow and to retain the microscopic appearance of *Aspergillus nigris*.

From the fact of this retention of form, it would seem that this is a specific fungus, and not ordinary mould modified by growing in the ear.

It may be said, then, that in general there are found with the aid of the microscope, four distinct elements in a fungous mass of aspergillus taken from the human ear, viz.:

1. The mycelial web, composed of the so-called tubules, rootlets, or filaments.
2. The fruit stalk or hyphen, and
3. Its head or the sporangium.
4. The free spores.

The first, the filaments or tubular rootlets, are composed of sections, and are hence described as septate. The component cellulose are from 0.020 mm. to 0.030 mm. in length.

The fertile hyphens or fruit stalks vary in diameter from 0.009 mm. to 0.013 mm., and their length is 0.770 mm. These terminate in the so-called *receptaculum*, the placenta of Micheli, which has a diameter of 0.028 mm. (Robin.) On this grow the sterigmata and spores, the three together forming the so-called capital or head, 0.050 mm. in diameter, the third of the elements named above.

The spores are spherical and measure 0.003 mm. in diameter. By careful fine adjustment of the lens, their surface is seen to be echinate. Some idea of the immense number of these spores in any case may be gained by Paccini's estimate, quoted by Robin, that there are *nineteen thousand* spores on each fruit head.

Macroscopic features.—The macroscopic appearances of a mass of this fungus, as found in or washed from the ear, are worthy of attention. For, although the microscope must in every case decide the presence of aspergillus in a suspicious object coming from the external auditory canal, nevertheless the microscopic features of a plug or membrane composed of this aural fungus are of a nature to lead the surgeon to suspect that he has to deal with a case of aspergillus in the ear. If an ear containing a mass of aspergillus be examined by means of an ear mirror and ear funnel, it will present most usually an appearance which leads to the supposition that the ear is occluded not by wax, but by a foreign matter of an organic nature.

If the fungus has not been growing long in the ear, merely a patch of pale yellow, pollen like matter, of varying diameters, will be detected at the fundus of the auditory canal. This small colony of spores just developing into filaments, for such it is, is usually situated on the membrana tympani or very near it. In any case, whether the first deposition of spores occurs there or not, the tendency of the aspergillus is to grow over the drum head first, and from that point it spreads outward, covering the wall of the meatus, until a hollow cast of the canal is formed by the vegetable parasite. The pollen-like appearance is seen only in the very earliest stages of a growth of that which is finally a so-called lardaceous looking or false membrane, either partially or entirely filling the external auditory canal.

In some cases the fungous mass looks like a ball or plug of wet newspaper, and in others the ear may seem to be plugged with a substance looking like wool. An inexperienced eye might conclude that the occluding plug thus formed is of ear wax; but ear wax looks more solid, shining, and drier, and it never excites pain and inflammation in the ear like the fungus aspergillus.

Another important point in differential diagnosis is that a mass of aspergillus does not lose its coherence when subjected to immersion in water or glycerine; but a lump of ordinary hardened cerumen soon melts, and is diffused throughout the water or any other fluid in which it is allowed to lie.

Finally the microscope would immediately show whether such a mass washed from the ear were aspergillus, or the peculiar laminated, epithelial plug, the so-called *Keratitis obturans* of Wreden.

[We omit the recital of the cases, a large number of which are given by the author].

GENERAL REMARKS.

Symptoms.—The symptoms of the growth of this parasitic fungus in the external ear may be briefly given as stinging, itching, with dullness of hearing, some pain, and a watery but scanty discharge. The patient may finally complain of great pain and deafness, if the membrana tympani should become inflamed.

An ear thus affected will show on examination, the presence in it of a grayish, sometimes mottled, flaky mass, or if examined in the earliest stages of disease, it reveals the presence of a false membrane neatly adapted to the membrana tympani and the inner part of the auditory canal. From this point the false membrane may—sometimes does—extend along the canal until it projects from the orifice at the concha of the auricle. When seen in its early stages of growth, the false membrane over the drum head looks dry and downy, and somewhat shining; later it looks crumpled, and resembles a piece of wet newspaper. Any free edge of the membrane visible will appear much thicker than flakes of epithelium. Once seen, this parasitic membrane is easily recognized again. The diagnostic features of such a false membrane or fungous mass may be learned from what has already been said under the head of *Macroscopic Appearances*.

If any doubt should exist about the presence of aspergillus in the ear it is usually dissipated in a day or two, on the return of the patient, for unless the treatment has been the proper one and very successful, the false membrane will have formed again. This, of course, removes all doubts, and should prompt us to great activity and watchfulness, or we shall have a stubborn disease to combat.

The microscope will remove all doubts as to the nature of any suspicious looking flake or lump removed from the ear.

Etiology.—It must be evident to the reader of the details of the twenty cases here presented, that this disease is not confined to those living in poverty and squalor. In fact my experience is the reverse of this. Only three cases could be said to have occurred in the poor and unclean. As long as the secretion of ear wax is unimpeded and, when secreted, if the cerumen is not scraped away, no one is likely to be affected by aspergillus in the ear. If the ceruminous secretion is disturbed in any way, especially if now the skin of the auditory canal be abraded, anybody may be, probably will be, attacked by this parasite. The chief causes of the growth of this parasitic fungus in the ear, I find to be undue picking and scratching of the ear, and dropping in and

leaving there oils and fats of various kinds and pieces of vegetable matter. These becoming rancid or putrescent, a fitting soil for the aspergillus is given.

Next to these causes is the neglect to wash the ear after it has been the seat of boils or any inflammation, which may leave behind it small particles of pus, serum, blood, etc. It is needless to say that all of the latter, when putrid, may become the nidus of a colony of aspergillus.

If the patient should be living in damp apartments, of course this must be ended, if possible, either by cleansing and drying his dwelling, or by removal from this probable source of disease. If any other excitant can be shown to be the probable cause of the growth of the fungus in the ear, of course it must be removed if possible.

I must repeat here what I have written elsewhere concerning the protective function of cerumen. There is no evidence that the aspergillus grows on the natural ceruminous secretion of the auditory canal. It appears, indeed, that but for the presence of the cerumen in the canal, the ear might be invaded more frequently by the aspergillus, since the latter seeks a secluded spot for growing. The protection of the cerumen in this particular is shown in the fact that in an ear, the canal of which is sheathed with ear wax, aspergillus is rarely found at all, and never in a flourishing condition, while in an ear invaded by aspergillus, cerumen is rarely, if ever, found in a normal quantity or condition.

On this point of contagion I am very careful, for it would be very easy to convey aspergillus from one person to another, not only by the syringe, but by specula, cotton holders, etc.

Treatment.—The treatment of aspergillus in the ear consists in killing and removing all parts of the plant, and especially all its germs. The syringe is the best means of removing the parasite, after it forms into false membrane, but if the latter be adherent, other mechanical means may be necessary. Hence I find it useful, if the fungous membrane has reached any size, or if it be visible as whitish flakes or spots, to wipe these traces of it away from or off the walls and membrana tympani, by means of the cotton dossil on the cotton holder. This is easily done and causes no pain to the patient. If these patches should be very adherent, they must not be forcibly removed. They are to be loosened then either by time or by the use of a parasiticide. Experience shows me that these false membranes are not usually adherent but easily detached. I have never employed but two parasitides, viz., alcohol, usually pure, but sometimes in various proportions with water, rarely weaker than one of the former to two of the latter, and hyposulphite of soda.

My solitary experience with hyposulphite of soda, three grains to the fluid ounce of water, leads me to place it next to alcohol, as a destroyer of the aspergillus. In the future I propose to use it more frequently than in the past. I have found it of advantage to let the patient use the drops which are to destroy the parasite, without subsequent syringing on his part. Of course this omission of syringing on the patient's part can only be permitted when he can be seen by an aurist daily. The greatest gentleness is requisite in all cases of aspergillus in the ear, lest eczema be excited, since in all these cases the ear seems to possess a readiness to slip into the eczematous state.

Of course, should this complication arise in the parasitic disease, it must be combated on general principles. If possible, all fatty matter should be excluded from the treatment of eczema in these cases, since oleaginous substances feed the fungus.*

In conclusion, it may be said the ear thus diseased should be carefully examined by means of the ear mirror and speculum every day, and the treatment modified according to the stages of the disease. The least irritation of the ear, combined with the most efficient destruction and mechanical removal of the parasite, will give the most satisfaction to both surgeon and patient.

DETERMINATION OF POTASSA AND SODA IN MINERALS.

By W. KNOP and J. HAZARD.

The authors dissolve in hydrofluoric acid, evaporate, drench the residue with concentrated sulphuric acid, thus removing the bulk of the silica as silicon fluoride. The sulphuric acid is then evaporated off, the dry residue moistened with five or six drops of concentrated sulphuric acid, heated, drenched with 150 c.c. water, and barium hydrate added till red litmus paper is turned distinctly blue. The mixture of barium sulphate, silica, alumina, magnesia, and ferric oxide is then filtered off and well washed. The filtrate is evaporated to dryness, adding, when it is concentrated down to about 200 c.c., a few grammes of dry ammonium sesquicarbonate. When perfectly dry the residue of barium and calcium carbonate is extracted successively fifteen times, each time with 20 c.c. water, the liquid being each time filtered through a small filter of 3 to 4 c.m. diameter into a platinum capsule, and evaporated to dryness. The residue is drenched again with 20 c.c. water, the water is decanted through a similar fresh filter, and the solution—after it has deposited a little barium carbonate with some alumina and iron, is collected along with the washings in a fresh platinum capsule. The alkaline carbonate, to which a few more granules of ammonium carbonate have been added, is again dissolved in 20 c.c. water, observing that no residue remains. The liquid is then neutralized with hydrochloric acid, evaporated, the chlorides dried strongly, and the potassium and sodium separated by means of platinum chloride.—*Chem. Central Blatt.*

FERRIC HYDRATES.

By DR. D. TOMMASI.

It appears that all these hydrates may be arranged in two series, respectively isomeric, the red and the yellow. The former are obtained by precipitating a ferric salt by potassa, soda, or ammonia. When calcined they present the phenomenon of incandescence; they dissolve readily, even in the weakest acids. Ferric chloride dissolves them in quantity, and the solution gives a precipitate of ferric hydrate on the addition of potassium sulphate or sulphuric acid. They are dehydrated on boiling with water. The yellow hydrates are obtained by oxidizing ferrous hydrate or carbonate, or magnetic hydrate. If these hydrates are calcined they do not display incandescence; they are sparingly soluble in acids, whether dilute or concentrated; they are not attacked by ferric chloride; if boiled in water they only lose two molecules of water, retaining the third, even if boiled in a con-

* The investigations of Bezold, of Munich, have fully confirmed the fact that the use of oleaginous matters for the cure of ear diseases is very often the cause of the growth of aspergillus in the ear.

centrated solution of calcium chloride. It is possible that not merely the ferric salts, but also the compounds of chrome and aluminum, may exist in these two modifications. If the two ferric chlorides are treated with silver nitrate, the one precipitates all its chlorine, whilst the other gives up four atoms at first and the two others afterwards. In a similar manner the blue chromium chloride gives up all its chlorine at once, whilst the green chloride gives up two thirds at first and the remainder afterwards. There ought to exist two ferric sulphates corresponding to the two chromic sulphates. The two latter are distinguished not merely by their color, but by the fact that the blue sulphate gives up all its acid to baryta, while the green sulphate retains a part.

ACTIVE MATTER OF MALT, OR MALTIN AND DIASTASE.

By M. DUBRUNFAUT.

The author ascribes the following properties to the diastase of Payen. It exists in malt to the extent of one to two thousandths; it liquefies 2,000 times its weight of starch; it is free from nitrogen, and saccharifies 2,000 times its weight of starch (according to Guerin only 15 times). It has no rotatory power; is soluble in weak alcohol, but insoluble in anhydrous alcohol, and not affected by this liquid. It is not altered on solution in water at 75°, but is modified at 100°. Its maximum of activity is at 75°. Maltin, on the other hand, exists in malt to the extent of one part in 100; it liquefies 200,000 times its weight of starch; it contains from 0.07 to 0.08 of nitrogen, saccharifies 100 times weight of starch, and possesses a strong levo-rotatory power; it dissolves in alcohol at 40 to 50 per cent., but is insoluble in, though modified by, strong alcohol. Its maximum activity is below 50°, and it exists not merely in cereals, but in many potable waters.

TEST FOR TRACES OF MERCURY.

By ED. TEUBER.

The material, dry and finely powdered, is mixed with well ignited iron filings and a little red lead. The mixture is placed in a crucible upon a layer of red lead and covered with a layer of iron filings. The lid of the crucible is so arranged that all the fumes given off on heating the capsule must impinge upon the bottom of a small gold capsule filled with cold water. Traces of mercury down to 0.0001 gm. may thus be detected.—*Oest. Zeitschrift Berg und Hüttenw.*

[COUNTRY GENTLEMAN.]

HORTICULTURAL NOTES.

CURL IN THE PEACH.

PROF. BURRILL, of Illinois, has recently made a thorough examination of the minute fungus which had long since been known to cause the curl in the leaf of the peach, and states that the name appropriately given to this fungus is *Ascomyces deformans*. He has traced this fungus to the unopened buds. As the leaf expands it is carried along, and finally produces the well-known deformity. The young bark of a diseased twig is filled with the threads of the fungus, and is sometimes distorted with ridges and swellings and blister-like excrescences. Prof. B. therefore recommends the pruning away in winter of such twigs as may be found to be thus diseased, and committing them to the fire. To this we would add the importance of keeping the trees in a vigorous state of growth, as feeble ones recover less rapidly. The appearance of the curl is usually most conspicuous after a cold snap just after the leaves are expanded, this condition of the weather favoring the development of the fungus, just as certain kinds of weather in summer develop the rust in wheat, the young rust plants existing previously within the stalks.

LATE PEACHES.

The importance of a continuous supply of peaches through the entire season of the year, while they may be had, is obvious to every one; and now that several very early varieties have been raised, we may have, with a little care, plenty of ripe ones every day from the end of July till hard freezing in autumn, in latitude as far north as Rochester. Much inquiry has been made for good late sorts. M. B. Bateham, of Northern Ohio, secretary of the State Horticultural Society, gives, as the result of much observation, the following names: The Smock, quite reliable in Northern Ohio, has been widely planted there, and, we may add, ripens well in New York in warm seasons. After the Late Crawford has gone, and before the ripening of the Smock, he recommends Hill's Chili, which is a few days later than Crawford's Late. This variety originated in Western New York, but appears to succeed better in Ohio and Michigan. Next after Hill's Chili he names the Brandywine of New Jersey, which slightly precedes Smock, while it exceeds it in size and fine appearance. The Salway follows the Smock, and does well a little farther south.

EARLY FREESTONE PEACH.

Nearly all the very early varieties which have been brought before the public within a few years are alike in a strong adhesion of the melting flesh to the stone; and one in which the flesh separates freely from the stone has been sought. The *Canadian Horticulturist* describes a new sort, known as the Early Canada, in which this desirable characteristic is quite distinct. The fruit ripens about the first of August, possibly a little after the Amsden, and it is described as of fair size (rather indefinite), bright in color, of excellent quality, and nearly a perfect freestone. It is certainly worthy of trial.

GOOD CULTURE OF AN ORCHARD.

Charles A. Green, of Ontario county, N. Y., furnishes the *Rural Home* a statement of his excellent management. He had an apple orchard which had been in sod many years. In the autumn of 1878 he plowed it quite shallow, and gave a thorough cultivation with a two-horse cultivator the following spring and early in the summer. The fruit the past season was larger and finer in appearance, and, what is still more important, was less injured by the codling worm. No attempt was made to plow close to the trees, as not being necessary, and avoiding injury to the bark. The quick grass and thistles in the orchard were nearly extirpated by the treatment thus given. Mr. G. remarks: "Old apple trees exhibit marvelous vitality under proper treatment, and may be made attractive in appearance by pruning." To which we may add, that we have known trees, so old that nearly half their branches or shoots were dead when standing neglected in grass, restored to great productiveness by cutting out dead and feeble limbs, and treating with a wide and copious top-dressing of manure.