Pus Organisms

by

N.L.Towne.

Pus Organisms.

Bacteriology as a science, though comparatively in its infancy occupies a foremost position, and the world is fast recognizing it as an important and powerful factor in health and disease. Therefore a fundamental knowledge of bacterial growth and action is of utmost importance. to every one - however it is not the propart of this thesis to treat such a large subject, but rather to bring out some of the important facts associated with pus producing organisms.

Associated with nearly all forms of infectious diseases is a well recognized class of organisms, known as pus producers. To the casual observer the mere mention of pus-organisms brings to mind a certain offensive, ill smelling substance called pus, with no thought of its mode of formation or effect or importance in medicine or disease. Pus is a white, yellowish-white, or creamy looking opaque liquid of varying consistancy, produced by the liquefactive necrosis of inter-cellular substances of tissues-the nucleated cells themselves floating in the clear liquid and undergoing fatty degeneration. Most of the pus producers are of the cocci form - the most important ones being Staphlococcus pyogenes aureus and Streptococcus pyogenes, however some bacilli can produce pus.

Pus organisms have a very detrimental effect in surgery, as there is constant danger of infection from the air, hands and instruments of the operator - therefore great care must be taken to prevent the entrance of these germs. To do this the field of operation must be thoroughly disinfected, and protected from infection; the instruments; bandages, clothes ects., as well as the hands of the operator must be absolutely sterile and free from all organisms. In all forms of disease the vitality of the individual is lessened, e.g. the natural forces are weakened, therefore the patient is more

susceptible to infection by the organisms and the system is unable to repel their action - hence it is very important that the sick room be kept absolutely sanitary and thoroughly disinfected.

Pus organisms are found very widely distributed throughout the universe except at very high altitudes and at great depths in the sea and earth. They are associated with various forms of contageous diseases - Streptococcus pyogenes being commonly found with the Bacillus of Diptheria in the white Diphtheritic membrane in the throat. They are common on the skin of sick persons;are found in abundance under the finger nails;are not infrequently found in the healthy human eye where they produce no irritation;and in the dust of living rooms. Many experimenters have found them in mucous from nasal chambers. Of eighty one examinations of nasal mucus Staphlococcus pyogenes aureus was found fourteen times and Streptococci were found seven times and of twenty seven species isolated from viginal and cervical mucus more than one half were pus producers;they are very common in air,dust,water and near surface in soil,also very frequently found in the healthy human mouth, but never in the blood or stomach of healthy persons;also found in nearly all collections of pus and associated with the germs of typhoid fever.

When the inflammatory exudates,in an affected tissue,consists of leucocytes there is an infiltration of the tissue with small cells,which sometimes become so numerous as to obscure the tissue. If these with their fluid exudate appear on the surface of a mucus membrane or an external wound a white fluid is found which is called pus. This pus collecting within the cavities of the body forms purulent effusions,and the lympocytes collecting with this pus cause it to become more and more turbid,white and purulent and finally resulting in a pustule. The so-called pus-corpuscles or poly-nuclear leucocytes pass between the epithelial cells both before and after disinte-

gration of the epithelium and even may penetrate the external skin in this way. The pus corpuscles become so numerous in the tissue that it turns white or yellowish-white in color, taking on the character of a purulent infiltration and finally when liquefaction and dissolution of the tissues takes place suppuration or abscess formation occurs, e.g. formation of cavities filled with pus. Such suppurative infiltration on the surface of an organ or tissue causes a superficial loss of substance - resulting in an ulcer. Sometimes pervious cavities or fistulus tracts are formed. Sero= purulent= exudates occur occur when there is an abundance of liquid associated with the pus-corpuscles and this infiltrating the tissue cause purulent oldema, which when spread over a large surface is known as phlegmon.

Suppuration takes place only after the death of the tissue, caused by the specific action of the inflammation producer, however the tissue may die during the course of inflammatory infiltration and then liquefy. Suppuration, abscess and ulcer formations are caused by bacteria the most common ones being Staphlococcus pyogenes aureus, streptococcus pycgenes and gonococci, however some bacilli produce pus. The Staplococcus forms produce localized inflammation, while the Streptococci produce phlegmonous inflammation.

It is remarkable to note the many devises, of the human and animal body, which tend to prevent the entrance and further the removal and hindrance to the action of those that enter, The ciliated epithelium; the minute hairs of nasal and bronchial passages; the secretion of mucus from the membranes lining all organs and cavities; the tears in the eyes; the wax in the ears and the epithilial scales of the skin are all striking examples of such protection. The secretion of mucus and tears surround and float the germs thus preventing their penetration of the membrane until they are removed from the organ. Pus germs are frequently formed in the healthy human mouth, but never

but never in the healthy stomach, the gastric juice kills them in a very short time. There are always present within animal tissue certain antitoxin substances which by their chemical powers are poisonous to bacteria and cause them to die, after which they are absorbed and removed from the body. These substances are always present in the animal body but upon infection and formation of toxin by bacteria more of this antitoxin is formed to neutralize the poison formed by the germs. The organs of the body also play an important part in overcoming the action of these germs by removing the poisons produced by them. The artificial or scientific methods of removing pus and other germs from animal tissue are internal and external disinfection, cauterization and the surgeons knife. Carbolic acid is used as an internal antiseptic and externally next to corrosive sublimate is the most powerful disinfectant and antiseptic. The removal of germs by actual cauterization, or direct application of hot iron to affected tissue is not much practiced, however potential or cauterization by caustic medicines is extensively practiced and a very effective method. Removed by means of the surgeons knife is perhaps quite effectual but this leaves a wound which must be practiced against infection, this method is little used except in extraordinary cases.

Pus organisms have a detrimental effect in all forms of medical practice and therefore infection must be guarded against. Infection of wounds and association with disease prevent ready healing and retard recovery. In the case of poorly drained wounds the fissure will not close as long as pus remains, at any rate the healing is but temporary and on outside, and in a short time the pus becomes so abundant that the sore again opens. Failure to remove these germs often results in a chronic running sore or fistula. The cause of a disease may be removed and other conditions favorable, but unless the pus germs are destroyed, in some way, a complete recovery will not result. But on

the contrary the disease, through the weakening of the tissue by suppuration, may break out in a more extensive and chronic form.

In making a bacteriological examination, of a diseased tissue, it is important that the utmost care be taken in every particular that contamination may be prevented. I first removed all scales and dried pus from wound or abscess then was particular to obtain fresh pus from interior of affected tissue. With a sterile platimum wire an innoculation of a tube of beef bouillion was made with one loop of the pus. This culture was allowed two or three days growth and then an agar plate was made by following method. Three tubes of sterile water were numbered 1 - 2-3. In all cases the culture or innoculated tube of water were thoroughly shaken and platinum wire sterilized in gas flame before innoculating another tube. One loop of culture was put in bottle(1);(2);from bottle (2) three loops were put in bottle (3) and from this one loop was put in a tube of agar at 42° - 45°C. This innoculated agar was taken to hood and poured into a sterile petri-dish, which was kept at ordinary room temperature. In from twenty four to fourty eight hours when colonies began to grow a detailed description, as to color, size, shape ects., was kept also a full set of sterile culture media, consisting of potato, agar, milk, litmus milk, bouillion, gelatin, glucose, glycerine lactose and saccharose agar, was innoculated from each colony and a record of growth on each kept. From this data the organisms is traced out and named with the aid of Chester's Manual of Determinative Bacteriology.

Specimen A was taken from fresh pus in the nasal sinus of a horse. The pus was the result of an ulcered upper molar. The horse is owned in Manhattan and had been discharging pus from one nostril for some two years.

Specimen A.

Colony 1. Micrococcus tetragenus.

Morphology-cocci round oval;single,irregular clusters.

Potato-thick,wrinkled,opalescent growth.

Slant Agar-flat,thick,grayish white growth.

Milk-not coagulated.

Litmus Milk-no change.

Bouillion- medium clear- sediment.

Gelatin - not liquefied,line of puncture noduse.

Agar Plate - irregular,flat,opalescent,surface colony.

Habitat - isolated from pus in nasal sinus of horse.

Specimen A.

Colony 2. Micrococcus pyogenes albus.

Morphology - cocci small..8 μ.occur singly and in clusters.

Potato - raised,thick,porcelaneous growth.

Slant Agar - raised,porcelaneous growth.

Milk - coagulated.

Litmus milk - acid reaction.

Bouillion - turbid,pellicle,white sediment.

Gelatin - crateriform liquefaction.

Agar Plate - undulate,opalescent,colony.

Habitat - isolated from pus in nasal sinus of horse.

Specimen A.

Colony 3. Micrococcus liquefacieus.

Morphology - cocci round eliptical,occur singly,clumps and chains.

Potato - raised,rugose,whitish growth.

Slant Agar - flat,soooth,opalescent growth.

Milk - not coagulated.

Litmus Milk - No change.

Bouillion - turbid, with pellicle.

Gelatin - saccate liquefaction.

Agar Plate - raised, translucent colony.

Habitat - isolated from pus in nasal sinus of horse.

Specimen B was taken from pus formed in a felon on the thumb of a Manhattan resident. This felon occured in a seige of boils.

Specimen B.

Colony 1. M. Pyogenes Group. Not named.

Morphology - Cocci round, singly and in clusters.

Potato - No visible growth.

Slant Agar - raised translucent growth.

Milk - not coagulated.

Litmus milk - No change.

Bouillion - clear, with pellicle.

Gelatin - stratiform liquefaction.

Agar Plate - entire, convex, whitish colony.

Habitat - isolated from pus in felon.

Aerobic, Stains easily.

Specimen C was taken from pus formed in a boil on the neck of a resident in Manhattan. The beginning of a series of boils.

Specimen. C.

Colony 1. Bacterium tenue.

Morphology - bacilli small, vary in length, square ends, twos in short chains.

Potato - rugose, butyrus growth.

Slant Agar - raised, butyrus growth.

Milk - not coagulated.

Litmus Milk - no change.

Bouillion - clear,granular sediment.

Gelatin - not liquefied,beaded.

Agar Plate - round,yellowish,surface colony.

Habitat - isolated from boil on man's neck.

Specimen C.

Colony 2. Micrococcus tetragenus.

Morphology - cocci round oval. 1 u.variable,occur singly and in clusters.

Potato - slow,limited,whitish growth.

Slant Agar - thick,grayish white growth.

Milk - not coagulated.

Litmus Milk - no change.

Bouillion - clear,with sediment.

Gelatin - not liquefied,filiform.

Agar Plate - convex,whitish colony.

Habitat - isolated from boil on man's neck.

Specimen D was taken from pus formed in boil on neck of a student at college. The first of several boils.

Specimen D.

Colony 1. Micrococcus careus.

Morphology - cocci variable size,in clumps and chains.

Potato - bullate,lemon yellowish growth.

Slant Agar - raised,yellowish growth.

Milk- not coagulated.

Litmus milk - no change.

Bouillion - turbid, with sediment.

Gelatin - no growth.

Agar Plate - raised creamy white colony.

Habitat - isolated from pus in boil.

Specimen E was taken from pus formed in a farcy bud on the leg of a horse. Said to be affected with chronic form of glanders. The horse was owned near Winfield, Kansas.

Specimen E.

Colony 1. Micrococcus pyogenes albus.

Morphology - cocci .8 μ. single and in clumps.

Potato - raised, limited, whitish growth.

Slant Agar - rugose, opalescent growth.

Milk - coagulated.

Litmus milk - Acid reaction.

Bouillion - turbid,, pellicle, with sediment.

Gelatin - saccate liquefaction.

Agar Plate - round, opalescent surface colony.

Habitat - isolated from pus in farcy bud.

Specimen F was taken from pus formed in an epithelial tumor on the eyelid of a horse owned near Anthony, Kansas.

Specimen F.

Colony 1. Micrococcus pyogenes group. Not named.

Morphology - cocci small, occur singly and in masses.

Potato :- resinous, scanty growth.

Slant Agar - opalescent growth.

Milk - not coagulated.

Litmus milk - no change.

Habitat - isolated from pus in epithelial tumor on horse's eyelid.

Specimen H was taken from pus formed in boil on a student's neck. This was a very large boil, and one of a series.

Specimen H.

Colony 1. Mocrococcus .

Morphology - cocci, singly and in masses.

Potato - dull white growth.

Slant Agar - dull or brownish white growth.

Milk - not coagulated.

Litmus Milk - No change.

Bouillion - turbid, pellicle, slight sediment.

Gelatin - liquefied.

Agar Plate - depth of media, ameboid, opalescent colony.

Habitat - isolated from pus in a boil.

Specimen K was taken from pus formed in a very rare disease attacking the lips of sheep. The disease is described by Dr. N.S. Mayo in the March number of the American Veterinary Review.

Specimen K.

Colony 1. Micrococcus.

Morphology - cocci, singly and in clumps.

Potato - raised, opalescent growth.

Slant Agar - raised, glistening opalescent growth.

Milk - not coagulated.

Litmus Milk - no change.

Bouillion - turbid, sediment.

Gelatin - not liquefied, surface growth.

Agar Plate - round, whitish surface colony.

Habitat - isolated from pus in epithelial tumor on horse's eyelid.

Specimen H was taken from pus formed in boil on a student's neck. This was a very large boil, and one of a series.

Specimen H.

Colony 1. Micrococcus .

Morphology - cocci, singly and in masses.

Potato - dull white growth.

Slant Agar - dull or brownish white growth.

Milk - not coagulated.

Litmus Milk - No change.

Bouillion - turbid, pellicle, slight sediment.

Gelatin - liquefied.

Agar Plate - depth of media, ameboid, opalescent colony.

Habitat - isolated from pus in a boil.

Specimen K was taken from pus formed in a very rare disease attacking the lips of sheep. The disease is described by Dr. N.S. Mayo in the March number of the American Veterinary Review.

Specimen K.

Colony 1. Micrococcus.

Morphology - cocci, singly and in clumps.

Potato - raised, opalescent growth.

Slant Agar - raised, glistening opalescent growth.

Milk - not coagulated.

Litmus Milk - no change.

Bouillion - turbid, sediment.

Gelatin - not liquefied, surface growth.

Agar Plate - round, whitish surface colony.