one in which the cerebrospinal fluid was sterile throughout the course of the disease. He remarks (January, 1911): "We are accustomed to place so much reliance on lumbar puncture that the possibility of the existence of acute meningitis with a normal fluid is rather difficult to grasp."

In casting about for an explanation of the failure of the cerebrospinal fluid to show the characteristic changes, it would not be necessary to assume a shutting off of the spinal canal. The thick and tenacious character of the pseudomembrane covering the brain with almost no liquefaction of this exudate is sufficient to explain the reason for the failure of the cerebrospinal fluid to reveal the actual condition.

From what has been said above, the following conclusions seem justified:

1. The positive diagnosis of pneumococcus meningitis may be impossible during life.

2. A normal cerebrospinal fluid may be obtained throughout the disease.

3. Anatomic changes (encephalitis, meningitis) occur oftener than usually believed and are the explanation of symptoms from the side of the nervous system which we have regarded in the past as functional (meningismus).

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THE GRAFTING OF PRESERVED AMNIOTIC MEMBRANE TO BURNED AND ULCER- ATED SURFACES, SUBSTITUT- ING SKIN GRAFTS

A PRELIMINARY REPORT

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The use of this tissue for grafting to denuded areas finds its justification in that it is essentially an embryonic offshoot of the skin and is histologically built up of dermal elements.

It is more logical for this purpose than tissues of other animals, being "human" and, as just stated, of skin derivation and hence homologous. It also seems better than freshly cut skin-grafts, eliminating the use of the razor and anesthetic as well as the entailed secondary wound with its numerous inconveniences. Besides these advantages, should this method be found as useful to others as I have found it, there is a negative advantage of inestimable value in that there is no harm done should there be no "take."

Dr. Nicholas Sabella, who cooperated with me in my early efforts to perfect this plan of treatment has been using the amniotic covering of the umbilical cord and that portion of the amnion immediately adjacent to its fetal attachment where it is found to present "amniotic caruncles" which comprise islands of stratified epithelia closely resembling true skin. His results have also been gratifying in the extreme.

The histology, in brief, is that of a smooth, glistening membrane made up of two layers loosely connected and freely movable between the thumb and index-finger. The outer layer, of chorionic origin, is mucofibrous, and the inner, of true amniotic origin, is made up of a single layer of cuboidal epithelia. It is this side of the sac with which we are most concerned, as it is the one which

will adhere to the denuded surface, being simply an extension of embryonic skin.

The technic of preserving and fixing the grafts was suggested to me by Dr. Alexis Carrel, who also described his method in a recent paper.¹ In this paper he deals with the preservation in latent life of various tissues, including skin-grafts removed from an infant which had died during labor, and describes his experiments with various mediums such as isotonic sodium chlorid solution; Locke's and Ringer's solutions, defibrinated blood, serum, confined human air and petrolatum. The last and Ringer's solution were chiefly employed, and in these mediums the tissues were placed immediately after their removal from the organism and maintained at a temperature between -1 and $+7$ C. (between 30.2 and 44.6 F.). The color and consistency remained normal for several weeks and even after from seven to ten months the microscopic appearance of the arteries was not markedly modified.

In my experiments I have adhered to the above technic but have employed petrolatum and also liquid petrolatum for jars from which parts of an entire amniotic sac were being cut from day to day for cases as they presented, thus avoiding the necessity of reheating the jars after each session, which would have been necessary were I using the thicker medium. Individual tubes of petrolatum containing small specimens are, however, better for stock purposes keeping much longer, as they are exposed to the air for the first time—except before their immersion—just when needed.

Another important aid from the same source was the recommendation of a wax dressing—mixture of paraffin, beeswax and castor oil—to hold the graft in close apposition to the granulatory surface and cause it to conform accurately to the minute inequalities thereof.

The freshly obtained amniotic sac is washed of all blood in a normal saline solution, dried between layers of sterile gauze and immediately immersed in petrolatum which has been raised to the melting point over a water-bath. Liquid petrolatum will serve well when a specimen is to be cut many times and used up within a few weeks. The receptacles are stored on or near ice as soon as possible.

When the denuded surface has been thoroughly cleansed of all secretion and bits of tissue, a section of the graft is spread smoothly, care being taken to press out all air-bubbles. Care should also be exercised that the amniotic or glistening side be placed in apposition to the wound.

The wax, having been warmed to just the degree necessary to liquefy, is now applied with wooden applicators wound with cotton so that a whisk of nearly an inch in length may be saturated and then drawn across the graft without disturbing its position. A fresh applicator is used for each dip to prevent contaminating what remains, and also because the wax hardens immediately on exposure, and the cotton would soon become covered with hard wax and no longer be a soft brush. An outer dressing of cotton and bandage is all that is necessary for protection and absorption.

After two days when the dressing is removed it is found that what seems to be the entire graft is adherent to the wax. This, however, is not what happens. On microscopic examination of this adherent tissue it is found that only the outer or chorionic layer has come away. The two layers have separated and the inner or

1. Carrel, Alexis: The Preservation of Tissues and Its Applications in Surgery, *THE JOURNAL A. M. A.*, Aug. 17, 1912, p. 523.

true amniotic cellular tissue has been taken up by the raw surface.

Thus far the conditions treated have not held closely to any one group but have included varicose ulcers, burns, scalds and denudations of traumatic origin.

Ulcers.—These were generally varicose ulcers of the leg of all stages of infection and depth of erosion, and in nearly every instance it was necessary to "clean up" before grafting could be thought of. Iodin or strong solutions of potassium permanganate followed with a wet dressing of mercuric chlorid solution 1:2,000 left on two days generally sufficed to subdue the odor and encourage a more healthy appearing surface. After this procedure it is often found useful to stimulate by rubbing briskly with dry gauze, thus removing all sluggish granulations and detritus. The application of the graft and wax with a thick and smoothly applied outer dressing was usually done as described, but occasionally the wax covering was extended over the entire leg below the knee for the better maintenance of the circulation. While the results were much better than anything seen in our experience with other methods, there was not the diffuse even take over the ulcerated surface which occurred in other cases. There were numerous spots or islands of skin and edges which were healthy and grew in rapidly.

Burns and Scalds.—When all bits of dead skin and all foreign matter had been carefully removed and the tissue applied and left on two days, there was almost without exception an even and diffuse adaptation of the graft. In this group, however, there were only eleven cases; these included all degrees, but none more extensive in area than 9 square inches, approximately, and none situated on the face.

Traumatic Denudation.—One case was treated with so satisfactory a result as to justify a more complete description. In this instance the left hand of a laundry worker was caught in a machine and then quickly pulled out, denuding the palmar aspect of the ring and middle fingers throughout the length of the two terminal phalanges. The raw surfaces were grafted but once and after two days were found diffusely and entirely covered with healthy skin so that no further treatment was necessary other than a dry protective dressing, the skin being yet delicate. This case demonstrates the action of this mode of treatment at its best advantage, there being no unhealthy condition of the underlying tissue. In spite of the fact that there is but one case in this group I am encouraged to believe that the result could not have been obtained in any other way, and that the graft took immediately.

In conclusion it is proper to acknowledge that the experiments have been limited to such cases as herein described and that electric, x-ray or extensive burns of any sort have not been tried.

Should the amniotic graft do as well or nearly as well as true skin, it must commend itself for general use, obviating, as it seems, the necessity of an anesthesia and the production of a secondary wound with no certainty of the outcome for its justification.

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Newspaper Medicine.—The recording by the lay press of a heroic deed or wonderful act on the part of a physician or surgeon is highly desirable, for it increases the respect in which the profession should be held; but there is no excuse for assisting a writer to project a half-baked truth or an incomplete discovery on the necessarily ignorant public.—B. Joseph in *Vermont Med. Monthly*.

MEDICAL EDUCATION AND THE HOSPITAL.*

ARTHUR DEAN BEVAN, M.D.

CHICAGO

Mr. President and Members of the Æsculapian Club: I am delighted to have the opportunity of meeting you and honored by the invitation to address you on the subject of medical education and the part the hospital takes or should take in the making of the modern physician. I accept the fact that this invitation is not extended to me as a personal honor, but because for ten years as chairman of the Council on Medical Education of the American Medical Association, I have been on the firing-line in the battle to elevate the standard of medical education in this country; and I take it that you desire to hear the story that these swiftly moving years have written; to hear what has been accomplished, what the existing conditions are, and what still remains to be done in order to place medical education in America on an acceptable basis; and especially what part the hospital will play in this development.

I shall not deal with statistics or with the rehearsal of ancient history, but I shall attempt to draw a rough sketch of medical education as it was when many of us began to study medicine, in order that we may compare it with the opportunities offered and the courses required in our better schools to-day. In the early eighties, a medical student could graduate after attending two courses of lectures of from twenty-six to thirty weeks each. In many schools an additional year's preparatory reading with a preceptor was required, making three years in all, but as a matter of fact the year with the preceptor too often meant little or nothing in the way of medical education. Once in a while, however, this preceptor year under some old Hippocrates of a general practitioner was the best of all and molded and directed the student's medical career. These courses of lectures were repeated year after year, the second year of the course being a repetition of the first. They were given, in the better schools at least, by masters of their subjects, men who knew the medicine of their time and who knew how to impart this knowledge as well as it could be imparted by lectures. Little was done in the way of laboratory work or in the dispensary or hospital. Read the clinical lectures of Trousseau, the lectures of Paget, the surgical pathology of Billroth; and those of you who did not live through this period can form some idea of the character of the medical teaching done in America by their contemporaries, by such men as Samuel D. Gross, Austin Flint, Marion Sims, Henry Bigelow, N. S. Davis, Moses Gunn and a host of others. It has become rather the fashion to belittle the early American medical schools and the medical teachers who taught in them. Surely this is not warranted by the facts. Medicine was not as yet a science. These old masters taught well what was then known. They struggled under a heavy load; many things which seem clear to the first-year medical student to-day were dark, unsolved problems to them. Do not criticize these men; they were great men. Do not criticize their medical schools and their methods of teaching; they were in keeping with the knowledge of their day.

The truth is that in thirty years a revolution has occurred; a new and great science, the science of medicine, has been born; and the change has been so rapid and so great that even those of us who are not old can

* Address before the Æsculapian Club of Harvard University at Boston, Dec. 7, 1912.