cell is organized which presents the characteristics of animal life.

If this review of the progress of matter from the conjugation of atoms to the organization of a living cell has been thorough and true, we will have realized but one energy. The force of chemic affinity in atoms is the same as vital activity in the amœba—nothing added, nothing lost.

It has already been shown that the primal animal cell presented potentially every tangible attribute of man, and that in traversing the wide range of mental force from amœba to man, even by the most enlightened, no new element nor new energy was discovered—simply more cells and higher differentiation of function.

It is the consideration of these patent facts and the logic of affiliated events that enables us rationally to investigate the somatic human mind in its diversified compartments as manifested to us by the countless centers of the brain, and leads us without a peradventure to the conviction that by exciting one set of centers and inhibiting other centers, we may induce hypnosis, and by a parity of reasoning it is easy to convince ourselves that by the same token we have the *open sesame* to the understanding of the whole physiology of the encephalon, and its pathology as well.

TUMORS OF THE MAMMARY GLAND.

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There is no surgical subject the literature of which is less satisfactory, than that of mammary tumors. This is not due to a lack of writers, but rather to their contradictory positions.

In the first place the nomenclature of the subject could not well be in a worse condition. The American, English, German and French schools each has a classification peculiar to itself. The general reader finds himself hopelessly at sea, in endeavoring to reconcile the teachings of standard authors.

The only true classification—one based upon accurate pathology—has not been followed. Growths considered by some as benign, are by others treated as malignant. This confusion, noticeable as it is with malignant neoplasms, is much greater with benign affections. Take, for instance, the most common of benign tumors, and we find it described under the same name by only two recognized authors. It has at least a dozen names. The fibroma of Gross, Labbe and Coyne is the adenoma of Broca, the adenofibroma of Billroth, the fibro-adenoma of Cornil and Ranvier, the mammary glandular tumor of Paget, the chronic mammary tumor of Cooper, the pancreatic sarcoma of Abernethy and the lobular imperfect hypertrophy of Birkett. Many of the English writers also call this growth "adenocele." Could confusion be greater?

Further, villous papillomata which are innocent and never repullulate when properly removed, are by some authors described as tubular or duct cancers. They are admittedly somewhat similar pathologically, yet withal very different in a most vital feature. The duct is a perfect capsule to the papilloma, beyond which it never extends. The cancer defies the barrier and proliferates beyond its confines. Therefore one must be somewhat arbitrary and follow the author whose position seems to him best chosen.

Operators are in a large measure responsible for this confusion. The gross or macroscopic appearance of a tumor after removal is of great value, and is at times scarcely secondary in importance to a careful microscopic examination. I have seen many distinguished operators who never touched a tumor after its excision, but felt that their duty was performed when an assistant was told to take a part of it to a microscopist. The latter, however experienced, may get a very incorrect idea of the growth from an isolated portion of it removed at random. The most careful microscopist will often properly refuse an opinion when asked for one under such circumstances. He is entitled to the entire growth, with a full clinical history of the case. The presence or absence of a capsule, secondary degenerations, cystic transformations, whether it was central or peripheral, growing from the upper or lower surface, adherent or not to the surrounding tissues, are all facts rightly his, before a growth is prepared for the microscope. Should one do this in all cases, I am sure he will have less cause to dissent from the final verdict of the microscope, which must be our court of last resort.

According to a recent and excellent authority, Mr. Raymond Johnson, of London, the general opinion that breast tumors originally benign are prone to degenerate into malignancy, is incorrect, and can not be proven. In a series of lectures delivered at the Royal College of Surgeons, of England, in June, 1894, Mr. Johnson devotes considerable time to combating this well-nigh universally accepted view. He asserts that adenoma, which is by most authors supposed to be exceedingly liable to cancerous change, never does so, and says that no one has ever reported a case where an encapsulated tumor as the adenoma, has been seen bursting through its capsule and infiltrating the surrounding tissues. Until he has seen such specimens and examined them macroscopically and microscopically, he can not believe they are of common occurrence, if indeed they exist at all.

ETIOLOGY.

Notwithstanding their frequency, it is surprising how little is known of the causes of mammary neoplasms. S. W. Gross showed very clearly by a most patient and careful analysis of a large number of cases, that many opinions more or less well fixed in the minds of professional men were absolutely untenable. The social condition—hitherto supposed to play such an important rôle in the etiology of breast tumors—is absolutely without influence. Single and married, sterile and fruitful women are equally liable. Trauma plays the same rôle in the production of innocent and malignant growths—11.94 per cent. of the former, 11.70 per cent. of the latter. Disordered menstruation, hysteria, etc., cut no figure whatever. Heredity perhaps has an influence, but it is slight. Gross concludes that heredity can not be shown in non-carcinomatous growths, while it exists in one case out of every nine carcinomas. Eczema and psoriasis of the nipple and areola—usually spoken of as "Paget's disease"—were thought by Gross and others to cause both innocent and malignant growths. Recent investigations by Raymond Johnson, W. Roger Williams and others on villous

or duct cancer, are in line with the teaching of Thin who some years ago stated it as his belief that the so-called Paget's disease instead of being the cause of tumors was simply the result of tubular growths, the discharges from which caused the irritation and angry condition of the areola. This position, I am satisfied, is undeniably correct in the vast majority of instances.

Puerperal mastitis seems to leave lumps in the breast, which are followed by innocent neoplasms in less than 2 per cent. of all cases, while malignant tumors follow such conditions in rather more than 8 per cent. In many instances, however, the neoplasm does not follow for five, ten, twenty or even thirty years—about fifteen on an average. We may, therefore, with propriety doubt that such influence is great.

RACE.

I have not seen it stated in any work on mammary tumors that race exerts any influence. That it does, so far as malignant disease is concerned, I have no doubt. The negro is relatively immune from cancer. In twenty years' experience passed in the South, where the negro population is as 1 to 5, I have encountered malignant disease in the breast of the full-blooded African but once. During ten years of this time I have been constantly on the staff of the Louisville City Hospital, and in charge of the surgical clinic of my college, where our patients are largely negroes. Prof. J. M. Holloway, of Louisville a surgeon of forty years' experience, doing for twenty years a very large business, tells me that after a careful examination of his case-book, he has seen 170 breast cancers, and only 2 were in negroes.

At a recent meeting of a Louisville society I asked the Fellows present to speak upon this subject. Two members, each of whom have been in practice over thirty years, had never encountered malignant disease in the breast of the negro. All agreed that it was rare.

Young, also Livingstone, in his book of travels, and Walshe in his famous work on cancer as geographically distributed, emphasize the relative immunity of the African from malignant disease in general. Billings has recently made the same observation. Therefore, we should not be surprised at the difference we find in the relative frequency of breast tumors in the two races. I believe, however, that the same disproportion will not be found to exist in other regions of the body.

In the white woman, cancer of the breast and the uterus is on a parity, for, according to Herbert Snow, "of 467 cases of cancer at the London Cancer Hospital in one year, 115 suffered from malignant disease of the breast and exactly the same number from that of the uterus." Each organ represents about 25 per cent. of all cancers in women. So that one-half the cases of cancer in females affect the breast and uterus. Other regions of the body furnish the same number of cancers in the male and female; therefore the disease is twice as common in the latter.

Diagnosis.—The superficial situation of the mammary glands, the frequency with which they are affected with neoplasms of a destructive nature, would presuppose a more exact knowledge of their diagnosis than we can truthfully lay claim to. That mistakes in diagnosis are common, more so than with tumors of any other region of the body, few, I think, will deny. There are, however, trustworthy data, in so far as they go.

The age of the patient is a valuable guide. In general, young subjects have benign growths and sarcoma, whereas middle and advanced life are most obnoxious to cancer. Malignant growths are by far more common than benign, the proportion being rather more than 10 to 1. During the rudimentary state of the gland, benign growths (usually fibroma) may be encountered. Gross in an analysis of 777 cases taken largely from reports of German surgeons, did not find sarcoma under the fourteenth year. I have seen journal reports of cases in children under 10; one in an infant. The average age of patients with benign growths is rather under 30. They constitute less than 10 per cent. of mammary tumors (9.5).

Sarcomas occur from the beginning of menstruation to the seventh decade of life, the average age being 35 years. They constitute less than 9 per cent. of breast neoplasms.

Cancer has been seen at 21, by Henry, though it is rare under 30. The average age for carcinoma has been placed by Gross at 48. It has been seen after 90.

Villous or duct cancers, according to Roger Williams occur at an average at 53½ years. Cancer claims about 82 per cent. of all mammary neoplasms. Undoubtedly the most valuable guide in diagnosis, is the presence or absence of enlarged lymphatic glands.

For convenience of comparison, we may group sarcomas with benign growths, as the former are little if any more liable to cause enlargement of the neighboring lymphatic glands. Non-carcinomatous tumors cause enlargement of the axillary glands in less than 3 per cent. of all cases. The supra-clavicular glands are never enlarged. The enlargement of the axillary glands is largely due to irritation, and not the result of infection. They are soft and not adherent to the peri-glandular tissues. Carcinoma, *per contra*, practically always causes enlargement of the neighboring lymphatic glands, first the axillary, then the supra-clavicular.

It may be noted here that villous cancer caused enlargement of the axillary lymphatic glands in only five out of eighteen cases seen by Roger Williams, due, according to Labbe and Coyne, to a barrier of fibrous tissue between the cancer and the nearest glands.

In 65 per cent. of all cases the axillary glands are enlarged when patients first apply for relief—an important fact to remember when operative measures are undertaken. The glands are hard, manifest a tendency to coalesce, and soon become adherent to adjoining structures.

Of the remaining differential diagnostic points, the location of the tumor and whether it be mobile or not are the most important. Benign affections as a rule are movable, the malignant soon become fixed. Benign growths are usually located in the upper and inner portion of the gland, while malignant disease is more liable to affect the upper and outer quadrant and to be situated behind the areola. The latter circumstance explains the frequency of retraction of the nipple in cancer. Gross found it in 52 per cent. of his cases, a larger proportion than other observers have seen.

Non-carcinomatous tumors cause a displacement of the nipple in less than 6 per cent. of all cases. In the early stage of breast tumors when any diffi-

culty of diagnosis might be expected, such symptoms as pain, enlarged veins, discharge from the nipple, history of trauma and heredity are practically valueless.

To conclude, age, location of the tumor, its mobility, and the condition of the axillary glands are our surest guides. Doubt as to whether or not a growth is solid or cystic will be settled by aspiration. True cysts are rare, making less than 2 per cent. of all cases. Cystoid degeneration of solid growths is common, particularly so in non-carcinomatous tumors. Cystic degeneration of the acinous varieties of cancer rarely occurs, though it is more frequent in the tubular or villous growths.

An aseptic incision into the tumor for diagnostic purposes is proper, and is advised by Bull of New York, Keen of Philadelphia, and others.

Treatment.—Little need be said concerning the treatment of benign tumors, solid and cystic, as all are practically agreed. They should be removed along with their capsule, and in such a way as to leave the nipple when it is practicable. When a tendency to rapid growth is shown, and the patient is past 40, it is far safer to excise the entire gland, for it should always be remembered that mistakes in diagnosis are common, and in patients of this age the chances are 13 to 1 in favor of malignant disease.

How shall we treat malignant disease, and is it curable? Reports from many distinguished sources during the past year especially, leave little room for doubt that one of the brightest chapters in the history of operative treatment for malignant disease is now being written. The day for pessimism has passed. American operators have so far secured the best results, with the Germans a close second. The English, with whom the complete or radical operation as practiced to-day originated have, strange to say, fallen behind. This is, no doubt, due to the fact that some of their best authorities as Butlin, Treves, Sutton and others have thrown all their influence against radical measures. The writings of these gentlemen have evidently to a great extent fashioned professional sentiment throughout Great Britain.

In 1867 Moore, of London, first advocated the complete operation as it is understood at the present time. He advised thorough extirpation of the entire mamma, removal of the pectoral fascia in all instances, supplemented by cleaning out the axilla. His teaching passed unheeded for a time, but was soon taken up by Banks in England, many of the Germans and Austrians, notably Volkmann, Billroth, Langenbeck, Knüster and others. S. W. Gross, of Philadelphia, was quick to see the possibilities of the radical operation, and was its first champion in this country. I was an interne in Jefferson Hospital during the time he was writing his "Monograph on Breast Tumors," and assisted him in many of the complete operations reported in this work. No one who ever heard him lecture, or saw him operate upon breast cancer, can forget his intense earnestness born of deep conviction, at a time when all of his colleagues —his great father included—to draw it mildly, looked upon him as a misguided optimist. In the lecture room, wards of the hospital, and his own private office, I have heard him say a hundred times that no surgeon however experienced, could rightly affirm that the axillary lymphatic glands were not enlarged, until the axilla was opened and inspected from base to apex. This is now accepted of all men. All honor to this brainy, aggressive, prescient surgeon!

Excellent as were Gross' results—12 to 15 per cent. of cures—they have been improved upon by subsequent workers in this line, aided by more modern methods. The present occupant of his chair at Jefferson, Prof. W. W. Keen, is doing work equal to the best. Weir and Dennis, of New York, each report a series of cases, 125 and 33 respectively, the former getting in round numbers 20 per cent., the latter 25 per cent. of cures. By far the most valuable, instructive and encouraging report up to date is that of Bull, of New York, published in the *Medical Record* of August, 1894. No one has followed up cases so methodically as he has done. Only 3 out of 118 cases operated upon between 1880 and 1894 remain unaccounted for; 115 were followed to their death or to Jan. 1, 1894, when their condition is fully set forth. Excluding cases operated upon since 1891, as a three year limit has been generally agreed upon before a cure can be reasonably claimed, there are left seventy-five cases submitted to the complete operation as defined by Moore. Of this number four died from the operation, two from erysipelas, one from sepsis and one from pneumonia; fifty succumbed to recurrences or metastases; two are living with recurrence; four died of intercurrent affections after having passed the limit, and the remaining sixteen are in perfect health. Counting the four dying of intercurrent disease after passing the limit, there are twenty cures or 26.6 per cent., the best showing yet made by any surgeon. Deducting five cases which should not have been included and Bull has nearly 29 per cent. of cures. Of the sixteen still living it may be said that there has been an average of six years since operation—twice the usual limit.

It is also of great interest to note that 40 per cent. of Bull's cured cases had cancerous involvement of the axillary lymph glands, as demonstrated by microscopic examination. Therefore, a complete operation is able to cure, even after lymphatic involvement has occurred.

This series further shows that where no lymphatic glands are involved, 54 per cent. are permanently cured. This sounds strangely enough, I know, to those who remember that such men as Sands of New York, and Agnew of Philadelphia, each said at the close of an illustrious career in surgery that he had seen no successful case of operation for breast cancer.

Results are getting better, year by year, month by month, almost day by day. The trend is in the direction of a still more complete operation, and the value of it is shown by a brilliant series of fifty cases recently reported by Halsted of Johns Hopkins Hospital. In every case he removes the larger portion of both pectoralis major and minor muscles. He also removes the axillary and supra-clavicular glands in all cases. This seems necessary in a certain per cent. of cases to get beyond the invisible zone.

Volkmann's observation, that infiltration of the muscles sometimes occurs, has been verified by Heidenhain after the most careful investigation. For a time, fortunately, the pectoral fascia arrests the march of cancer.

Willy Meyer, of New York, has proposed an operation even more radical than Halsted's, as he removes all of the great and lesser pectoral muscles from origin to insertion. Both Halsted and Meyer assert that such radical measures add nothing to the dan-

ger of the operation and, further, do not leave the patient with an arm materially less useful. Halsted has reported seventy-six such operations without a death, and with only 6 per cent. of local recurrences. It is too soon to estimate his percentage of cures.

If statistics prove one thing, it is that partial operations should no longer be practiced. They do little good and are almost as dangerous as the complete method—where the axilla is invaded and all glands and fat removed—vessels and nerves only being left behind. The space of Mohrenheim—between the upper border of the tendon of the small pectoral muscle and clavicle—is to be systematically inspected and cleared in every case. If the two pectoral muscles are not removed, the space between them must be carefully examined for outlying gland tissue and fat.

What is the mortality of such operations? Taking the reports of six American operators recently given to us and we find that in 630 operations for cancer there have been 6 deaths. In nearly all of these cases the complete operation was practiced. W. W. Keen reports 200 cases with 1 death. Bull 118 with 4 deaths and Dennis 71 with a single death. Weir, Halsted and Powers have reported series of 125, 76 and 50 respectively, without a death. Curtis gives the average mortality of the leading German surgeons as 6 per cent. though many operations done before modern methods were practiced are included.

The English (Butlin, Treves, Williams and others) place the mortality as high as 10 per cent. This can only be reconciled with the rather less than 1 per cent. of six American surgeons, on the score of many operations being included which were done at a time when breast excision was properly ranked as a dangerous measure. Erysipelas, sepsis, secondary hemorrhage, etc., claimed their victims by hundreds. The matchless Billroth years ago admitted a death rate in his own practice of 23 per cent.

We can only contemplate such figures now with feelings akin to horror—as an aseptic operation in skillful hands is to-day practically devoid of danger. We conclude with the following summary:

1. Mammary cancer, submitted to operation before infection of the axillary glands, should promise 50 per cent of cures.

2. Although the axillary glands seem not to be involved, the axilla should be opened in every case and thoroughly cleared of glands and fat.

3. Infected axillary glands are of bad prognostic import, but a radical operation which removes them and at the same time the supra-clavicular glands may cure 11 per cent. of such cases.

4. The complete operation should be practiced in every case of malignant disease.

5. The mortality following the complete method is doubtless somewhat greater than it is in partial operations. The difference in results, however, is so conspicuous when the question of "cure" is considered, that the radical operation is the only one to be countenanced.

6. Statistics gathered many years ago are as valueless as those made use of in estimating the mortality after amputation of the extremities.

7. The mortality will probably be not more than 2 or 3 per cent. with the average operator. We have shown it to be less than 1 per cent. in over 600 cases operated upon by six American surgeons.

EXTIRPATION AND COLOTOMY IN CASES OF CANCER OF THE RECTUM.

Read in the Section on Surgery and Anatomy, at the Forty-sixth Annual Meeting of the American Medical Association, at Baltimore, Md., May 7-10, 1895.

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Colotomy and extirpation are two recognized procedures for the relief of malignant disease of the rectum. Both operations offer to the patient a chance of prolonging life; and, in addition, extirpation holds out the possibility of effecting a radical cure, in selected cases.

The choice between these two methods is a question of uncertainty only in a relatively small group of cases, and extirpation is not to be considered in the majority of instances, for the reason that the disease is usually an incurable malady, and by virtue of its concealed position within the rectum its presence is not revealed or even suspected until the growth has existed for some time. Furthermore, it is rare for cancer of the rectum in its incipiency, to manifest itself by any symptom pointing to a lesion within the bowel. This is a familiar observation to all surgeons.

It frequently happens that a patient comes to us complaining of some slight diarrhea or other mild rectal trouble, and an examination unexpectedly reveals the fact that cancer is present to such an extent that it is obvious the neoplasm has existed for a considerable period. Consequently, its complete removal is often rendered impossible. Again, the patient's vitality is such that so grave an operation and one requiring the length of time for its performance, as an excision, is contra-indicated.

In arguing thus, I would not convey an impression that I am opposed to extirpation for malignant disease of the rectum in suitable cases; on the contrary, I firmly believe it to be a perfectly justifiable operation when the growth is circumscribed and confined to the lower five or six inches of the bowel; provided, however, that the tumor does not involve all the coats of the intestine, that it has not attacked the visceræ which are intimately associated with the anterior wall of the rectum, that it has not invaded the pelvic glands, or, by metastasis any of the other organs of the body, and finally, that its growth be not rapid or have a tendency to spread widely. From these considerations, it naturally follows that the number of patients who can be benefited by excision of the disease is comparatively small.

Colotomy, on the other hand, is indicated in a large number of instances, where it is quite impracticable to attempt an excision. The advantages of the operation lie partly in the relief it affords to symptoms and partly as a means of retarding the growth of the neoplasm.

To indicate the relief afforded such patients by a colotomy, I can not do better than quote the opinion of Kelsey on this subject as, expressed in the fourth edition of his work: "Diseases of the Rectum and Anus."[1]

This authority is not only a strong advocate of the operation, but is also in a position to judge of its merits by reason of his large experience. He thus states his views: "As to the benefits arising from the

[1] Pp. 409 and 410.