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THE PATHOLOGY OF CHRONIC CYSTIC MASTITIS OF THE FEMALE BREAST

WITH SPECIAL CONSIDERATION OF THE BLUE-DOMED CYST *

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CONTENTS

	PAGE
Classification of Chronic Cystic Mastitis (Eight Groups).....	446
Pathology of the Eight Groups in Brief.....	446
Pathology of the Surrounding Breast.....	454
Cancer in the Surrounding Breast.....	456
Incidence of Cancer in Chronic Cystic Mastitis.....	458
Conservative Operation for Different Types of Chronic Cystic Mastitis...	459
Clinical Diagnosis	459
Palpation of Breast.....	464
Exploratory Incision	465
What to Do in Case of Doubt.....	466
The Mistake That Should Not Be Made.....	467
The Mistake That Is Made and That Produces No Harm but Mutilation	467
The Pathology of the Blue-Domed Cyst	468
The Pathology of the Cyst of the Galactoceles Type.....	481
The Pathology of the Diffuse Cystic Breast.....	486
The Pathology of the Nonencapsulated Adenoma	489
The Pathology of the Nonencapsulated Area of Chronic Cystic Mastitis, Containing One or More Minute Cysts or Ducts.....	497
The Pathology of the Diffuse Dilatation of the Ducts.....	500
The Pathology of the Nonencapsulated Cystic Adenoma.....	513
Is There Such a Tumor as Adenocarcinoma of the Breast?.....	527
The Pathology of the Diffuse Nonencapsulated Cystic Adenoma (Schim- melbusch's or Reclus' Disease).....	528
Cancer and Diffuse Nonencapsulated Cystic Adenoma.....	537
Cancer and Chronic Cystic Mastitis.....	538
Conservative Operations for Chronic Cystic Mastitis.....	539
The Microscopic Pictures of Chronic Cystic Mastitis.....	539
Classification of Microscopic Pictures.....	540
Comment on the Microscopic Pictures.....	541
Characteristic Histologic Pictures.....	541
Where Pathologists Disagree.....	542
Contributions of the Author to the Literature on Breast Lesions.....	542

* Figures 1 to 29 and 32 to 91 from photographs made by Mr. Herman Schapiro; Figures 30 and 31 from paintings by Miss Susie Hayes.

This paper will describe chiefly the pathology of the various types of chronic cystic mastitis as exposed by an exploratory incision. The more detailed clinical and other studies are reserved for a second paper.

CLASSIFICATION OF CHRONIC CYSTIC MASTITIS

For the present, I have subdivided this lesion of the breast into the following types, giving my abbreviations and nomenclature for each type:

- BB-12-1,-2,-3: Single or multiple cysts in chronic cystic mastitis, 210 cases.
- BB-13-4,-5,-6,-7,-8: Chronic cystic mastitis without large cysts, 140 cases.
- BB-12-1: The blue-domed cyst, 174 cases.
- BB-12-2: The cyst of the galactocoele type, 8 cases.
- BB-12-3: The multiple blue-domed cysts in one or both breasts (diffuse cystic disease of the breast), 28 cases.
- BB-13-4: The nonencapsulated adenomatous area, 48 cases.
- BB-13-5: The nonencapsulated area of chronic cystic mastitis, containing one or more minute cysts, or one or more dilated ducts, or both, 39 cases.
- BB-13-6: The diffuse dilatation of the ducts, chiefly in the nipple zone, rarely in the breast outside this zone, 22 cases.
- BB-13-7: The nonencapsulated cystic adenoma, 18 cases.
- BB-13-8: The diffuse nonencapsulated cystic adenoma, known in the literature as Schimmelbusch's or Réclus' disease, or senile parenchymatous hypertrophy (Bloodgood), 13 cases.

PATHOLOGY IN BRIEF

BB-12-1. The Blue-Domed Cyst.—For the gross appearance, see Figures 1 to 8; for the microscopic appearance see Figures 37, 38, 45, 46, 47, 52, 55, 59 and 73.

The characteristic gross feature is a distinct blue dome (Figs. 1 and 2). This can be recognized if, when cutting down over the tumor, one proceeds slowly, checks hemorrhage, and from time to time moves the knife from side to side. The blue dome in the majority of cases is exposed after dividing the subcutaneous fat. In a certain percentage of cases, the cyst is buried in breast tissue, and one must divide a zone of breast before exposing the cyst. Very rarely is the cyst situated behind the breast on the pectoral fascia (Fig. 4).

When the cyst wall is nicked, its color immediately disappears. The cyst wall is, as a rule, thin (1 mm.); in less than 10 per cent. of the cases it has been thicker (2 to 3 mm.). The contents of the cyst have never been hemorrhagic—they are either clear or cloudy; in four cases (all from outside surgeons) they have been noted as "brown." In all of my own cases, they have been clear or cloudy. The inner wall of the cyst is smooth, without papilloma, and there may be partial partitions or septums.

BB-12-2. The Cyst of the Galactocoele Type.—For the gross appearance, see Figures 9 and 10; for the microscopic appearance, see Figure 44.

Fig. 1 (Path. No. 25508. BB-12-1 [T]).—Blue-domed cyst, unopened, projecting from the surrounding breast; excised zone of breast, adenomatous. Result (1921): Well, six months after incision of cyst with zone of breast. See page 469.

In this and the following legends the abbreviations for operative procedures are: [T] excision of tumor and zone of breast only; [B] excision of one breast without exploratory incision; [BB] excision of both breasts without exploratory incision; [CC] complete operation for cancer without exploratory incision, and [Expl.] exploratory incision.

Fig. 2 (Path. No. 27762. BB-12-1 [T]).—Blue-domed cyst, unopened, projecting from zone of breast. See Figure 3 for cross-section; also see page 470.

This type is less frequent than the blue-domed cyst—as 8 cases are to 174, and differs from the blue-domed cyst in that, when its dome is exposed, it is white or gray. As a rule, the wall is a little thicker. The contents not only resemble milk in appearance, but also are coagulated by liquor formaldehydi, while the contents of the blue-domed cyst are not.

BB-12-3. Multiple Cysts in One or Both Breasts (Diffuse Cystic Disease of the Breast).—For the gross appearance, see Figures 11 and 12; for the microscopic appearance, see Figures 36, 43, 48 and 62.

The cysts are of the blue-domed type; a few may be of the galactocele type. The breast, or breasts, are riddled with cysts of various sizes. The character of the wall and the contents are identical with those of the blue-domed cyst or the cyst of the galactocele type. The frequency of this multiple cystic disease of the breast is as 28 to 210, or about 13 per cent.

Fig. 3 (Path. No. 27762. BB-12-1 [T]).—Section through blue-domed cyst and zone of breast excised, shown in Figure 2: *C*, minute blue-domed cyst; *Ad.*, adenomatous area; *S*, fibrous stroma; *F*, fat. Result (1921): Well, four months after excision of cyst with zone of breast. See page 471.

BB-13-4. The Nonencapsulated Adenomatous Area.—For the gross appearance, see Figures 13 and 14; for the microscopic appearance, see Figures 35 and 69.

When this type occurs clinically as a single definite tumor, one must explore to exclude a malignant lesion. Then the palpable tumor will appear as a nonencapsulated area of breast tissue, in which the elevated pink and gray dots representing the adenomatous lobules are more numerous than in the surrounding breast. This area resembles somewhat the fibro-adenoma, but has less stroma. When this type presents itself clinically, as multiple, somewhat indefinite, nodules in one or both breasts, each nodule is practically identical in the gross

and microscopic picture. I am inclined to the conclusion that, when multiple, the disease corresponds to that described by Warren, of Boston, as the *cobble-stone breast*, and my recent experience teaches me that operation is *not* indicated when one can make out multiple, indefinite nodules in both breasts. However, when there is a single definite tumor, it must be explored.

BB-13-5. Nonencapsulated Area of Chronic Cystic Mastitis Containing One or More Minute Cysts, or One or More Dilated Ducts, or Both.—For the gross appearance, see Figure 15; for the microscopic appearance, see Figures 32, 63, 67 and 68.

Fig. 4 (Path. No. 25560. BB-12-1 [CC]).—Blue-domed cyst surrounded by fatty senile breast. Result (1921): Well, eighteen months after complete operation for cancer. See page 471.

When this type appears clinically as a single tumor, it must be explored. It differs in the gross from the nonencapsulated adenomatous area (BB-13-4, Figs. 13 and 14) only in the presence of one or more minute cysts, or one or more dilated ducts. If the latter are present, there is liable to be mastitis (Figs. 15, 63 and 67).

This type may also occur clinically as multiple indefinite nodules, and corresponds to Warren's *cobble-stone breast*. Operation is not indicated, unless there is a single definite tumor which must be explored.

It is important to note here that among 140 cases of chronic cystic mastitis of the types BB-13 (-4,-5,-6,-7 and -8) eighty-seven, more than 50 per cent., belong to the groups BB-13 (-4-5) and in many of these cases the clinical picture was that of the cobble-stone breast of Warren, in which operation is not indicated. In this group BB-13 (-4-5) in which there are eighty-seven cases, many breasts were unnecessarily sacrificed because of the fear of cancer, inability to make a correct clinical diagnosis, or to interpret the gross and microscopic picture at the exploratory incision.

BB-13-6. Diffuse Dilatation of the Ducts Chiefly in the Nipple Zone, Rarely in the Breast Outside This Zone.—For the gross appearance, see Figures 16 to 20; for the microscopic appearance, see Figures 49, 50, 51, 65, 66 and 78.

Fig. 5 (Path. No. 10940. BB-12-1 [T]).—Section through blue-domed cyst and zone of excised surrounding breast. Note thin, smooth wall of large cyst; surrounding breast adenomatous; a few dilated ducts (DD) which contained creamlike material; also much stroma and fat. Result (1921): Well, eleven years after excision of cyst with zone of breast. See page 473.

The characteristic clinical picture when the dilated ducts are situated in the nipple zone is the palpation of a doughy, wormlike mass beneath the nipple. When explored, one can recognize large and small dilated ducts with distinct walls containing brown, green, milky or creamlike material, of various degrees of viscosity and consistency. The contents when expressed appeared as soft, wormlike masses, exposing the distinct, smooth wall of the duct—a gross picture, if carefully inspected, different from that of the comedo-adenoma.

When it occurs in a zone of breast outside the nipple area (Fig. 19), it feels like diffuse mastitis, but has not the distinct edge or border of BB-13 (-8) the diffuse nonencapsulated cystic adenoma.

My recent experience indicates that when one can diagnose this lesion by palpating the wormlike tumor beneath one or both nipples, operation is not indicated.

BB-13-7. Nonencapsulated Cystic Adenoma.—For the gross appearance, see Figures 21 and 22; for the microscopic appearance, see Figures 53, 58, 60, 64, 70, 71, 72, 74, 75, 77, 79, 80, 81, 82, 86, 87, 90 and 91.

Fig. 6 (Path. No. 27007. BB-12-1 [T]).—Section through a large blue-domed cyst and surrounding breast, showing the small dark areas in the wall of the large cyst. These are due to minute areas of hemorrhage (Fig. 46). The surrounding breast shows one minute cyst, one dilated duct without contents, and a few adenomatous areas. The breast consists chiefly of fibrous stroma and fat. Result (1921) : Well, eight months after excision of cyst with zone of breast. See page 476.

This tumor, in the gross, does not differ from BB-16, the *encapsulated* cystic adenoma. We have twenty-two examples of the *encapsulated* cystic adenoma, and eighteen of the *nonencapsulated*.

After most careful restudy of all the gross and microscopic specimens, I can see practically no difference between the two lesions, except the absence of a capsule in the *nonencapsulated* cystic adenoma, the presence of a little more fibrous tissue, and (one example) the presence of scirrhus carcinoma, in combination with the nonencapsulated cystic adenoma (Figs. 86 and 87).

In the twenty-two cases of encapsulated cystic adenoma, the surgeons removed the tumor only. When sections are submitted to many pathologists, the diagnosis of *adenocarcinoma* is frequently made. But there has been no recurrence in any of these twenty-two cases, notwithstanding the fact that only the tumor had been removed.

Fig. 7 (Path. No. 21770. BB-12-1 [T]).—Blue-domed cyst, unopened, and zone of surrounding breast. See Figure 8 and page 479.

In contrast, all the eighteen cases of BB-13-7, the nonencapsulated cystic adenoma, except one, have ultimately been subjected to the complete operation for cancer. None showed metastasis to the axillary glands; in none has there been recurrence or death from cancer.

BB-13-8. Diffuse, Nonencapsulated Cystic Adenoma (Known in the Literature as Schimmelbusch's or Réclus' Disease).—For the gross appearance, see Figures 23 to 29; for the clinical picture when associ-

ated with retracted nipples, see Figure 29; for the microscopic appearance, see Figures 39, 40, 41, 42, 54, 56, 57, 61, 76, 83, 84, 85, 88 and 89.

The characteristic clinical picture in these thirteen cases is the palpation of a zone of mastitis in which one can feel many small, shotlike masses. The edge of the involved breast is distinctly palpable. The disease may involve a quadrant, a hemisphere or both breasts. In a few cases, it is associated with intermittent retraction of the nipple; and if operation is delayed, the retraction becomes permanent (Fig. 29).

The clinical picture is so distinct and characteristic that one need not explore. The gross appearance and the microscopic picture are identical with the encapsulated and the nonencapsulated cystic adenoma (BB-13-7).

Fig. 8 (Path. No. 21770. BB-12-1 [T]).—Section through blue-domed cyst shown unopened in Figure 7, and second, small, cyst. In the surrounding breast there are a few minute cysts and a few dilated ducts; contents of the latter, grayish-brown, pastil material; also marked increase of adenomatous areas; very little fat. For microscopic area, see Figures 47 and 55. Result (1921): Well, five years after excision of cyst with zone of breast. See page 479.

In one of the thirteen cases there was a gross and microscopic area of cancer (Figs. 88 and 89). In this instance the clinical and gross picture was malignant (Fig. 28), and the patient died of metastasis after the complete operation for cancer. The incidence of malignancy is therefore less than 10 per cent.

PATHOLOGY OF THE BREAST SURROUNDING THE VARIOUS TYPES
OF CHRONIC CYSTIC MASTITIS

(BB-12-1,-2,-3 and BB-13-4,-5,-6,-7 and -8)

There is nothing in the gross or microscopic pathology of the breast surrounding these different types of palpable tumors which would allow one to distinguish the types of the tumor which lead to operation. These breasts, as a rule, show some evidence of chronic cystic mastitis in the presence of increased adenomatous areas, minute cysts and dilated ducts. The remaining breast tissue now and then is *senile*. The blue-domed cyst, BB-12-1, and the diffuse dilatation of the ducts beneath the nipple, BB-13-6, have been observed in the senile breast more frequently than any other type.

Fig. 9 (Path. No. 26803. BB-12-2 [T]).—Section through white-domed cyst of the galactoceles type. The milklike contents of the cyst have coagulated. The surrounding breast is chiefly fibrous stroma mixed with fat, a few adenomatous areas and a few dilated ducts without contents. Specimen sent by Dr. Butt of Davis, W. Va. Result (1921): Well, nine months after excision of cyst and zone of breast. See page 482.

When one cuts out the blue-domed cyst or the cyst of the galactoceles type, or one or more of the multiple blue-domed cysts, or the nonencapsulated adenoma, or the nonencapsulated adenoma with cysts or dilated ducts, or the diffuse dilatation of the ducts, or the nonencapsulated cystic adenoma, or the diffuse nonencapsulated cystic adenoma, one may see almost normal breast on the one hand, or senile breast on the other; or the breast may simply show increased adenoma-

tous areas similar to BB-13-4, or minute cysts and dilated ducts, similar to BB-13-5. If the lesion is situated near the nipple, one may expose diffuse dilatation of the ducts almost as pronounced as in BB-13-6.

The relative proportion of the various changes in the breast has no practical significance, nor is it of itself an indication for the removal of the breast. In every type, a zone has been removed, and among these cases, every possible type of chronic cystic mastitis, *except* BB-13-8, has been cut through in removing the palpable tumor, and the results have demonstrated no difference.

This is a very important observation, because many surgeons, when not influenced to remove the breast by the exposed palpable tumor, have been influenced to remove the breast because of the appearance of the surrounding breast tissue. My conclusions are that chronic cystic mastitis is not a lesion of the breast which at the present may

Fig. 10 (Path. No. 25517. BB-12-2 [T]).—Section through white-domed cyst buried in breast tissue. The contents of the cyst consisting of milk-like material, were removed at operation. The surrounding breast shows mastitis (irregular, opaque-white areas), a minute cyst, adenomatous areas, no fat. For microscopic picture, see Figure 44. Result (1921): Well, three years after excision of the cyst and zone of breast. See page 484.

be considered *precancerous*, and its presence does not demand either the complete excision of the breast, or the complete operation for cancer.

For the present, in BB-13-7 and -8 the isolated and diffuse non-encapsulated cystic adenoma, it may be safer completely to remove the breast, or to perform the complete operation for cancer because of the incidence of cancer in two out of 31 cases, less than 10 per cent.

Cancer in the Surrounding Breast.—One of my colleagues, in discussing my paper in New Orleans before the Section on Surgery of the American Medical Association, expressed the opinion that one must have the entire breast in order to exclude cancer. If this were true,

Fig. 11 (Path. No. 26139. BB-12-3 [BB]).—Section through entire breast showing multiple large and small blue-domed cysts—the typical cystic disease of the breast. Specimen sent by Dr. Royster of Raleigh, N. C. Result (1921): Well, eleven months after removal of both breasts. See page 487.

there could be no conservative treatment of benign breast lesions, and there would be no stimulation for differential diagnosis.

The results of my investigation are as follows: Among the 350 cases of chronic cystic mastitis of the various types here described,

we have had an opportunity to study the entire breast in 222 cases in which it was removed. In not a single instance have we found *gross* or *microscopic cancer*. The same is true of about 600 benign breast

Fig. 12 (Path. No. 4503. BB-12-3 [B]).—Section through breast, showing multiple small and large cysts of the blue-domed type, a few empty dilated ducts and a few dilated ducts with granular contents. This is the typical cystic disease of the breast. The breast was excised in Johns Hopkins Hospital in 1903. Result (1921): Well, eighteen years after removal of the breast. The multiple tumors in the remaining breast have disappeared. See page 488.

lesions other than those discussed here. Many of these breasts were unnecessarily removed, thus allowing complete study of the breast tissue.

Among the 350 cases recorded here as chronic cystic mastitis, I mentioned two—*the only two*—in which the microscope revealed positive cancer. One of these was an example of BB-13-8, diffuse non-encapsulated cystic adenoma (Figs. 28 and 88) and was clinically malignant, and the area of cancer was picked out *in the gross*. In the other case, BB-13-7, the area of cancer was recognized in the non-encapsulated cystic adenoma at the exploratory incision.

Therefore, as far as my experience goes with more than 900 benign breast lesions, I have no evidence that one needs more than the palpable tumor, exposed at operation, to make the differential diagnosis.

Of course, if one starts to excise what appears to be a benign tumor and finds in cutting through the surrounding breast tissue an area of cancer, one would immediately proceed with the complete operation for cancer. Up to the present, I have never had such an experience.

Fig. 13 (Path. No. 26695. BB-13-4 [T]).—Section through a zone of breast containing a nonencapsulated area of the fibro-adenomatous type. The nonencapsulated tumor is to the right; the fibrous and fatty breast to the left; there are no cysts or dilated ducts. For microscopic picture, see Figures 35 and 38. Result (1921): Well, nine months after excision of zone of breast shown in illustration. See page 491.

Among about 1,200 cases of *cancer* of the breast, we have either recognized the case clinically as malignant and performed the complete operation without exploratory operation, or, when it has been necessary to explore and we have recognized the malignancy of the tumor, the surrounding breast has not been helpful in the differential diagnosis.

Incidence of Cancer in Chronic Cystic Mastitis.—First, we must consider how frequently cancer has developed when we have removed only the tumor and left the breast. This has happened on only three occasions among 128 cases.

The development of cancer in the breast after the removal of a zone of breast, the seat of chronic cystic mastitis, is apparently not more frequent than the normal incidence of cancer in the same number of women at the same age, who had not been operated on: three out of 128 cases—about 2 per cent.

Two of these patients died of cancer, both of whom were operated on by outside surgeons; one, my own patient, is living seven years after the operation for cancer.

Conservative Operations for the Different Types of Chronic Cystic Mastitis.—Of 350 cases the tumor only has been excised in 128, or about 37 per cent. I am confident that this is too small a number, and in a second paper I will discuss this in detail.

Clinical Diagnosis.—The essential feature is the palpation of one or more distinct lumps. The diagnosis rests more on this than on any other data to be obtained from the history or examination.

Fig. 14^b (Path. No. 14923. BB-13-4 [T]).—Section through zone of breast excised, showing a nonencapsulated area of the puberty-adenomatous hypertrophy type. For microscopic picture, see Figure 32. Result (1921): Well, eight years after excision of zone of breast shown in illustration. See page 494.

Age.—If the patient is 25 years of age or under, this, for practical purposes, almost excludes cancer.

Duration of Tumor.—If the tumor has been present for two or more years and has not grown, and there is no change in the nipple or skin, the chances are that it is benign. But there are sufficient exceptions to this rule in patients over 25 years of age not to justify delay. The lump should be explored: if benign, it should be removed; if malignant, it must be followed at once by the complete operation for cancer.

Multiple Tumors.—One distinct tumor in each breast, or more than one tumor in one or both breasts, still clinically benign, practically makes the diagnosis of a benign lesion. All the types of chronic cystic

mastitis may present the clinical picture of multiple, distinct tumors in one or both breasts. This occurs most frequently with distinct cysts, and less frequently in the other types. Benign encapsulated adenoma of the three types—fibro-adenoma, intracanalicular and cystic adenoma, and lipoma occur as multiple tumors in one or both breasts.

On only two occasions have I observed cancer to begin simultaneously in both breasts. In these two instances, the clinical picture was malignant, because the patient had delayed seeking advice. In a very few cases of malignant tumor, there have been two or more palpable masses in the breast. However, in every case one or more of the distinct tumors have been clinically malignant, that is, associated with changes in the skin or retraction of the nipple. Therefore, the

Fig. 15 (Path. No. 26771. BB-13-5 [T]).—Section through nonencapsulated area of breast containing two slightly dilated ducts with yellow, cheesy, granular contents, two minute cysts, adenomatous areas and mastitis. For microscopic pictures, see Figures 63, 67 and 68. Result (1921): Well, ten months after excision of affected zone of breast. See page 499.

palpation of two or more tumors in one or both breasts, still clinically benign, may be looked on as evidence that they are pathologically benign. However, it might be safer, unless one has had a large experience, to explore and remove one of the tumors.

To make the mistake of diagnosing multiple tumors benign when they are really pathologically malignant, would, from my evidence, not be losing an opportunity to save a life. We have never cured a case of cancer in which the tumors were multiple and malignant.

Single Definite Tumor Associated With Multiple Indefinite Nodules, or Multiple Shotlike Nodules in One or Both Breasts.—This finding,

which, in my experience, is a definite clinical picture, rests on the most careful palpation of both breasts, a refined sense of touch and experience. This clinical picture does not exclude the possibility that the single tumor may be malignant. It indicates that the larger probabilities are that the entire pathologic process is benign and due to chronic cystic mastitis. The single definite tumor, unless clinically malignant, should be explored. If clinically malignant, the complete operation for cancer should be performed.

No Definite Tumor in Either Breast, but Multiple Indefinite Nodules, or Small, Shotlike Nodules in Both Breasts.—Among our 350 cases of chronic cystic mastitis, all in the groups BB-13-4 and -5, a number of patients have presented this clinical picture, and one or both breasts have been unnecessarily removed. I now have records

Fig. 16 (Path. No. 19767. BB-13-6 [B]).—Dilatation of ducts beneath the nipple. The section of the breast beneath the nipple shows a small dilated duct with thick wall surrounded by fibrous breast stroma and, in each illustration, a wormlike, brown mass of viscid granular material projecting from the breast tissue. This material represents the wormlike contents of the ducts. Result (1921): Well, five years after excision of the breast. See page 503.

of forty-four cases with the identical clinical picture in which I have advised against operation; and these patients, followed for fifteen or less years, have not developed cancer. This is a larger number than those subjected to operation in groups BB-13 (-4 and -5).

Important Facts in Previous History.—If we can obtain a definite history of a disappearing tumor, or of variation in size of the present palpable tumor, this favors the diagnosis of chronic cystic mastitis. Such a history has been obtained in less than 1 per cent. of malignant tumors, and in more than 15 per cent. of well taken histories of chronic mastitis.

The history of the previous excision of one or more benign tumors from either breast is evidence in favor of the assumption that the present tumor is benign, especially if the excised tumor was a blue-domed cyst. Also, when there is a history of excision of one breast for a benign lesion, this favors the diagnosis of benignity in the remaining breast. On the other hand, the history of operation for cancer in one breast favors the diagnosis that the palpable lump in the other breast is malignant.

Single Tumor in One Breast, the Remaining Portion of This and the Other Breast Normal.—On the whole, this is the most frequent clinical picture. If there is a definite tumor, and the patient is 25 years of age, or over, immediate operation is indicated.

Single Tumor, Clinically Malignant.—In a few cases the trained sense of palpation may enable one to recognize malignancy by touch alone. However, in the majority of cases, the diagnosis rests on retraction or fixation of the nipple, atrophy of the subcutaneous fat, dimpling of the skin, adherent or red skin.

Fig. 17 (Path. No. 24650. BB-13-6 [T]).—Dilatation of ducts beneath nipple. Section through zone of breast excised. Note the slightly dilated, tortuous, unopened duct; the large, collapsed, empty duct, and the dilated duct filled with brown, grumous material. Result (1921): Well, two years after operation. Similar condition in other breast has disappeared. See page 504.

It is true that a certain percentage of benign tumors of all types may give the sensation of malignancy to the palpating finger, or be associated with changes in the nipple or skin, which are usually associated with malignancy. Should the operator perform the complete operation for cancer in all of these benign lesions which present the clinical picture of malignancy, the number of women mutilated would be relatively small.

A large experience will be helpful in the recognition of this benign group and save the patient mutilation. When the palpable tumor is

in the nipple or in the areolar zone, changes in the nipple and skin are less significant of malignancy, than when it is situated outside the nipple zone. This important part of the diagnostic problem will be discussed in detail in a second paper.

Single Tumor Clinically Benign.—Now that women are being educated to seek advice the moment they feel a lump in the breast, this clinical picture is becoming more and more frequent; and at the present time, we have no method of diagnosis, except the palpation of the lump and its exploration. The number of benign tumors in women, more than 25 years of age, in whom it is necessary to remove only

Fig. 18 (Path. No. 27114. BB-13-6 [T]).—Dilatation of ducts beneath the nipple. Section through excised zone of breast beneath nipple shows empty and filled dilated ducts, with a definite ring (the thick wall) surrounded by fibrous breast stroma and fat. In the upper left margin of the upper picture are two large dilated ducts with brown, granular, viscid contents. Result (1921): Well, seven months after excision of zone of breast. See page 507.

the tumor, is too large to justify the removal of the breast, or to perform the complete operation for cancer without first ascertaining the pathology of the palpable lump by exploratory incision. I have records of at least 750 benign lesions of the breast in women, over 25,

of which 350 or almost 50 per cent. belong to the type of chronic cystic mastitis.

In the majority of these cases, both breasts can be saved; and these women run no more risk of cancer than any other group of women of the same age.

Palpation of the Breast.—The educational propaganda is influencing many women to seek immediate advice because of pain or the palpation

Fig. 19 (Path. No. 21192. BB-13-6 [B]).—Dilatation of ducts in zone of breast outside the nipple area. Section of breast shows chiefly the thick, cream-like material covering the cut surface of the breast, which has been expressed. This obliterates the picture of the dilated ducts. Toward the right edge of the breast one dilated duct and near it a small worm projecting from the duct may be noted. For microscopic appearance, see Figure 78. Result (1921): Well, four years after excision of the breast. See page 511.

of a lump in the breast. I have records of many patients who thought that they had felt a lump, or whose physician had thought he had felt a lump, and who on examination by me were found to have either no lump (sixty-one cases), or a lump which was one of many indefinite

lumps (forty-four cases), or one which was due to simple enlargement of the axillary portion of the breast (twenty-four cases). Here, therefore, we have 129 women who sought advice early because of the educational propaganda, whose breasts on careful palpation presented no indication for operation.

It is therefore of the greatest importance for all members of the profession who assume the responsibility of diagnosing breast lesions to improve their sense of palpation.

Exploratory Incision.—It is my rule always to examine the patient on the day of operation before the area is cleaned, to check up the previous examination and to consider again whether the lump should be explored.

Fig. 20 (Path. No. 27935. BB-13-6 [CC]).—Dilatation of ducts beneath nipple, with abscess formation in one duct: *a*, a section through the breast beneath the nipple, containing dilated ducts with thick wall. In the left margin, there is a small cavity lined by granulation tissue—an abscess due to infection of a dilated duct; *b*, a cross section through an axillary gland; this under the microscope showed no metastasis. Specimen sent by Dr. Loos of Bay City, Texas, who recognized the condition as benign from the gross appearance (recent case). See page 510.

The patient is always prepared for the complete operation for cancer and for general anesthesia. The exploration can be made under procain or gas. One should have on the operating table a medicine glass of pure phenol, one of 95 per cent. alcohol, and a third of 50 per cent. solution of zinc chlorid, with swabs.

The incision should be made directly over the lump. The moment the operator exposes the tumor and concludes that it is malignant, the exposed area should be swabbed with pure phenol followed by alcohol,

the wound packed with a piece of gauze saturated with the zinc chlorid solution, and closed. Then one should proceed at once with the complete operation for cancer.

In a few cases, the palpable lesion is so small, and the breast so large and fatty, that I have excised a zone in which the palpable lump was situated, packed the wound with an alcohol sponge, and then explored the tumor. Up to the present it has proved to be malignant in only one instance. In this case, I burned the wound with the cautery, packed it with zinc chlorid gauze, closed it, and proceeded with the cancer operation. This patient is well (1921), five years since operation.

When the operator feels that he must have a frozen section, what shall be the method? Cut out a piece of the tumor and wait, or cut out a zone of breast about the tumor and wait? I should favor the latter course, that is, to excise the tumor with a good zone of breast and temporarily pack the wound with an alcohol sponge.

Fig. 21 (Path. No. 17012. BB-13-7 [Expl. CC]).—Nonencapsulated cystic adenoma (natural size) and piece of surrounding breast tissue. This tumor has the appearance of cancer. The fine dots and lines on the cut surface may be noted. It felt and cut like cancer. For microscopic appearance, see Figures 90 and 91, which show a benign papillary cystadenoma. Operation (Bloodgood): Exploratory incision followed immediately by the complete operation for cancer. Result (1921): Well, six and one-half years later. See page 515.

Up to the present time, in my own operations, my decision as to the removal of the tumor or the complete operation for cancer has rested on the gross inspection and palpation of the explored lesion, and I have not waited for the frozen section. Each operator must choose his own method, which should be influenced by the results.

What to Do in Case of Doubt.—When one explores a palpable area of the breast and, after gross inspection, with or without the aid of an immediate frozen section, one is still doubtful as to malignancy, I believe the safer rule is to cauterize the area as described and perform the complete operation for cancer. The object of this and subsequent papers is to describe and illustrate the gross and microscopic pathology of the different lesions of the breast, so that we may reduce the number of unnecessary complete operations for benign lesions.

The Mistake That Should Not Be Made.—I am confident from the experience of Dr. Halsted's clinic in Johns Hopkins Hospital since 1899 and from my own cases, and from the tissues and records sent to me by other surgeons, that the mistake of performing an incomplete operation for malignant disease is unnecessary. Cancer of the breast is a distinct gross picture—just as distinct as that in the frozen section—and in this group any surgeon whose experience justifies him in assuming the responsibility for the operation should, and, as far as my records go, does recognize distinct cancer and performs the complete operation.

The Mistake That Is Made and Which Produces No Harm but Mutilation.—This is the complete operation for benign lesions of the breast, especially for chronic cystic mastitis.

Fig. 22 (Path. No. 1210. BB-13-7 [CC]).—Section through nonencapsulated cystic adenoma and surrounding senile breast. Gross description by Bloodgood, in 1896: "Tumors size of twenty-five-cent piece, circumscribed, in places infiltrating; large cellular alveoli divided by fibrous trabeculae. Tumor looked and felt like cancer, but a solid intracystic papilloma is considered possible." For microscopic appearance, see Figure 77, showing benign papillary cystadenoma. Because of the retracted nipple, Dr. Halsted performed the complete operation for cancer. Result: Death from apoplexy at the age of 75, thirteen and one-half years after operation. The glands in the axilla showed no metastasis. See page 513.

This is due to the fact that the relation of chronic cystic mastitis to cancer has been exaggerated in the literature. It is also due to the fact that pathologists disagree as to the histologic picture of the zone of breast about the cyst and of the group BB-13-4 to -8. Some of these nonencapsulated lesions closely resemble cancer (Fig. 21).

Until, therefore, we have established a method of differential diagnosis, the mistake of occasionally performing the complete operation for cancer for doubtful benign lesions is unavoidable.

Among our 350 cases of chronic cystic mastitis, in 210—almost two thirds—the lesion was a distinct cyst, either with a blue dome, or one of the galactoceles type. I hope that my description and illustrations will help operators and pathologists to recognize this type and at least save two thirds of the patients with chronic cystic mastitis from the unnecessary removal of one or both breasts.

Fig. 23 (Path. No. 3965. BB-13-8 [B]).—Diffuse chronic cystic mastitis of the nonencapsulated cystic adenomatous type. Copy of an original painting of a fresh section through the breast. The involved right half of the breast shows multiple minute cysts with multiple papillomas. The area marked *Carc.* was then considered to be cancer. For microscopic appearance, see Figures 54 and 83—chiefly benign papillary cystadenoma. The zone of breast to the left is adenomatous with a few minute cysts. See page 530.

THE GROSS APPEARANCE OF CHRONIC CYSTIC MASTITIS

1. *The Blue-Domed Cyst in Chronic Cystic Mastitis (BB-12-1)* (Figs. 1 to 7).—Of all the gross types of chronic cystic mastitis this blue-domed cyst is the easiest to recognize and of the most frequent occurrence.

Figure 1 (Path. No. 25508. BB-12-1 [T]) is a reproduction of the photograph of an unopened blue-domed cyst and shows the surrounding breast tissue. The dome was situated directly beneath the subcutaneous fat.

Clinical Note.—This patient was a white woman, aged 39. The lump was accidentally felt in the right breast three weeks before operation. The patient was married; but there had been no pregnancies. The palpable lump in the right breast was in the midzone of the upper and outer quadrant, the size of a twenty-five-cent piece. It was freely movable, distinctly spherical and tense. On careful palpation, definite fluctuation was elicited. At my examination, I felt a second, smaller tumor in the midzone of the upper hemisphere. This lump was freely movable and tense, but of less definite spherical shape than the larger tumor. The skin and nipple were normal. The second tumor had not been felt by the patient. There was no pain or tenderness. The remainder of this, the right, breast and the other breast were normal on palpation.

Fig. 24 (Path. No. 3965. BB-13-8 [B]).—Diffuse chronic cystic mastitis of the nonencapsulated cystic adenomatous type. Section through the involved zone of breast after it had been hardened in liquor formaldehydi, showing chiefly minute cysts with papillomas. Result (1921): Well, twenty years after excision of the breast. See page 530.

The palpation of two tumors in one breast, with the rarest exceptions, indicates benignity. In this instance, both tumors felt like cysts.

At the exploration of the larger tumor, the blue dome of the cyst was immediately exposed after division of the subcutaneous fat and was excised with a zone of breast as shown in Figure 1. The second tumor could be palpated from the wound, and was also excised with a zone of breast. It also presented a distinct blue dome and was buried in breast tissue. In dividing the breast in excising these two tumors, no other cysts were encountered and no dilated ducts. The breast tissue was firm and white, with evidence of adenomatous hypertrophy.

On opening the smaller cyst, it was found to contain clear fluid. The cyst wall was smooth and thin.

On opening the larger cyst, after it had been in liquor formaldehydi and photographed, it was found that its contents had not coagulated (in the cysts of the galactocele type the contents coagulate in the preservative).

Microscopic Note.—The breast tissue surrounding the cyst showed increase of fibrous stroma with many adenomatous areas and here and there a dilated duct. The cyst wall showed no epithelial lining, but in the wall there was lymphoid-cell reaction and adenomatous areas showing mastitis.

Summary of Path. No. 25508.—Clinically this case was considered benign on account of two palpable tumors. Each tumor on palpation suggested a cyst. Pathologically, two blue-domed cysts were found in a fibrous and adenomatous breast, with some evidence of mastitis.

Result.—One year after operation, the patient was well.

Figure 2 (Path. No. 27762. BB-12-1 [T]) is the reproduction of a photograph of an unopened blue-domed cyst and surrounding breast tissue. The thin zone of breast tissue covering the blue dome has been incised, enucleated from the cyst wall and retracted.

Fig. 25 (Path. No. 5221. BB-13-8 [CC]).—Diffuse chronic cystic mastitis of the nonencapsulated cystic-adenomatous type. Section through the breast. The left half shows minute cysts microscopically (Fig. 76) papillary cystadenoma; the right half is adenomatous. Specimen brought to the laboratory by Mr. Schloss, a third-year student. Result (1921): Well, seventeen years after complete operation for cancer. There was no metastasis to the axilla. See page 531.

Clinical Note.—The patient was a white woman, aged 51, unmarried. She was passing through the menopause. The periods had been irregular and scanty for three years. The lump was observed in the right breast three months before operation. There had been no pain. It had not varied in size, nor had there been the history of a disappearing lump. The tumor was in the upper and outer quadrant in the periphery of the breast, the size of a fifty-cent piece, freely movable, tense, smooth, like a cyst, and on most careful palpation showed slight fluctuation. The remainder of this breast and the other breast were normal on palpation.

Diagnosis.—Benign cyst.

Operation.—After dividing the subcutaneous fat, white breast tissue was exposed. The cyst could be palpated beneath. About 2 mm. of breast tissue was divided; and then the blue dome was clearly exposed. The palpable tumor was excised with a zone of breast tissue. In making this excision of breast tissue, two minute blue-domed cysts were exposed and removed. The remaining breast was adenomatous.

Figure 3 (Path. No. 27762) is a section through this blue-domed cyst and surrounding breast. The contents had not coagulated and were slightly cloudy. The wall of the large cyst was thin and smooth. In the illustration, the dark areas are minute blue-domed cysts; the gray areas are adenomatous, and the white areas fibrous breast stroma. There were no dilated ducts.

Result.—Two months after operation the patient was well.

Figure 4 (Path. No. 25560. BB-12-1 [CC]) illustrates a blue-domed cyst surrounded by fatty senile breast. The picture is of the posterior surface, as the cyst rested on the pectoral fascia and was covered with a thin zone of senile, fatty breast.

Fig. 26 (Path. No. 26439. BB-13-8 [CC]).—Section through the breast shows that the entire breast is involved—chiefly minute cysts with papillomas. For microscopic picture, see Figures 33 and 56. This case was diagnosed clinically (Bloodgood) in July, 1920, and the complete operation performed by Dr. Seegar at St. Agnes Hospital. The glands showed no metastasis. Result (1921): Well, one year later. See page 537.

Clinical Note.—The patient was a white woman, aged 65, who had passed the menopause many years before. Her attention was directed to the right breast by pain; and she felt a little lump in the periphery of the upper and outer quadrant. This patient had read of the importance of an immediate examination of a lump in the breast and was examined by my colleague Dr. Nichols, who felt the lump. At my examination, I could palpate a rather indefinite lump in the periphery of the upper and outer quadrant of the right breast. The lump did not feel larger than a ten-cent piece: it was buried deeply. Both

breasts were large and fatty, and there were no other lumps, nor indefinite indurated areas. The lump gave the sensation of being spherical and tense and suggested a cyst.

At this age, 65, so many years after the menopause, and in a distinctly fatty and senile breast, the benign cyst is rare, and cancer is the most frequent tumor. However, both Dr. Nichols and I were inclined to the diagnosis of a benign cyst.

Operation.—After dividing a great deal of subcutaneous fat, in which I could recognize only fibrous strands of breast stroma, I did not expose the tumor. Yet, I could palpate it indefinitely in the deeper tissue. After having made quite a deep wound, I came to the conclusion that it would be wiser to perform the complete operation for cancer. No glands were seen or felt in the axillary dissection.

Gross Pathology.—Figure 4 illustrates the blue-domed cyst which I exposed after operation. Later when the cyst was opened, it was found to contain a

Fig. 27 (Path. No. 26046. BB-13-8 [BB]).—Diffuse chronic cystic mastitis of the nonencapsulated cystic-adenomatous type, involving both breasts. Section through both breasts. For microscopic appearance, see Figures 39, 40, 41 and 42. Result (1921): Well, one year after excision of both breasts. See page 536.

cloudy fluid (not coagulated) and a smooth, thin wall. The breast was fatty, with here and there remains of fibrous stroma. Beneath the nipple, there were a few dilated ducts without contents.

Microscopic Pathology.—The cyst wall had no epithelial lining. The breast was composed chiefly of fibrous tissue and fat, with here and there a few senile adenomatous lobules and slightly dilated ducts.

Result.—One year and three months after operation, the patient was well.

Comment.—I am now inclined to the opinion that in this case it would have been justifiable, after the exploratory incision at the point where I stopped, to excise a large zone of fatty breast tissue surrounding the palpable lump, to pack the wound with a gauze sponge saturated in 50 per cent. zinc chlorid solution, and then to explore the tumor. But I was influenced by the rarity of the blue-domed cyst after the menopause.

Figure 5 (Path. No. 10940. BB-12-1 [T]) is the reproduction of a photograph of a section through a blue-domed cyst and the surrounding breast tissue. One can see in the surrounding breast a few dilated ducts. This photograph was taken eleven years ago and represents the first satisfactory picture. At that time, I did not feel justified in excising a blue-domed cyst unopened. Now my evidence convinces me that the blue dome is so characteristic of benignity that one may excise it with a zone of breast tissue unopened, for teaching purposes. It retains its color even in liquor formaldehydi for some days, but loses it the moment it is opened. I have been able to demonstrate the blue dome in excised specimens to a very large number of medical students and postgraduates in the last few years; and these surgeons and students, I am confident, will be able to recognize this typical benign tumor at the exploratory incision. In fact, one of the third-year students who was present at an operation for a breast tumor, performed by a surgeon in his home state, pointed out the blue dome to the

Fig. 28 (Path. No. 14115. BC-4; BB-13-8 [CC]).—Carcinoma and diffuse chronic cystic mastitis of the nonencapsulated cystic-adenomatous type. The entire breast is involved; section through breast showing a few minute cysts, many minute cysts with papillomas, great increase of adenomatous areas, and fibrous stroma. For microscopic appearance, see Figures 88 and 89, which show areas of carcinoma. The glands showed metastasis. The complete operation for cancer was performed by Dr. Finney in 1913 because of the diffuse induration of the breast and marked enlargement of the glands. Result: Death of metastasis to the brain in ten months. See page 537.

operator and apparently was the chief factor in preventing the complete removal of the breast. This specimen is in the laboratory, and its benign character has been confirmed. I have received specimens from three surgeons whom I had instructed on this tumor and who at an exploratory operation recognized the blue dome, excised the cyst with surrounding breast tissue and sent the specimen and history to my laboratory for confirmation of their diagnosis.

Clinical History.—This case is of particular interest, because, in 1910, I excised the blue-domed cyst shown in Figure 5 from the right breast and three years later removed a similar blue-domed cyst from the left breast. It is now (1921) eleven years since the first operation and eight years since the second, and there has been no recurrence. When this patient came under my observation in 1910, she was 38 years of age, and the irregular and scanty menstrual periods gave evidence that she was at an early menopause. She had observed pain and a tumor for three weeks. The tumor was in the midzone of the upper and outer quadrant, the size of a fifty-cent piece. It was freely movable, tense and spherical, and gave to the palpating fingers the sense of indefinite fluctuation. The remainder of this breast and the other breast contained many indefinite irregular nodules.

Fig. 29 (Path. No. 12586. BB-13-8 [CC]).—Diffuse chronic cystic mastitis of the nonencapsulated cystic-adenomatous type, showing retraction of left nipple, which had been permanent four months, intermittent for four years. There had been intermittent retraction of the right nipple for four months. Complete operation for cancer on both breasts (Bloodgood). No metastasis to the axilla. For microscopic appearance, see Figures 84 and 85. Result (1921): Well, nine years later. See page 534.

It is very important to note here that the palpation of multiple indefinite nodules in both breasts is very suggestive that the definite tumor is benign.

Operation.—My original notes, in 1910, describe a blue dome after division of the subcutaneous fat. It was about this time that I was beginning to believe that a blue dome was characteristic of a benign cyst. Observations in the eleven years since then have confirmed this conclusion.

This cyst, when opened, contained a cloudy fluid; the wall was 2 mm. thick (Fig. 5) and smooth. Here and there in the smooth wall of the cyst,

Fig. 30 (Path. No. 11125. BB-13-8 [CC]).—Diffuse nonencapsulated cystic adenoma with the picture of cancer clinically. Copy of painting, showing the bulging tumor, red and infiltrated skin. For gross appearance, see Figure 31.

Fig. 31 (Path. No. 11125. BB-13-8 [CC]).—Diffuse nonencapsulated cystic adenoma with infected cyst producing the clinical picture of cancer (see Fig. 30). Result: Well, ten years after complete operation for cancer.

one could recognize little brown macular areas. Recent microscopic studies have demonstrated that this discoloration is due to minute hemorrhages into the cyst wall (Fig. 46). However, I have never observed the contents of these benign blue-domed cysts to be smoky or hemorrhagic. This blood coloring, if there is no papilloma, is a sign of cancer.

In excising this cyst (Path. No. 10940), I encountered a few dilated ducts beneath the nipple from which could be expressed a creamlike material; and we could express the same material through the nipple. This had not been observed before operation.

Fig. 32 (Path. No. 14156. BB-13-5 [T]).—Normal adenomatous puberty type of chronic cystic mastitis. Section from a nonencapsulated adenomatous nodule in the axillary portion of the breast. For gross appearance see Figure 14. Exploration (Bloodgood) May, 1913; excision of zone of breast only. Result (1921): Well, eight years later. See legend for Figure 72 and page 496.

I wish to emphasize this point here. The exposure of dilated ducts in dividing the breast to remove a blue-domed cyst is not an infrequent occurrence. The contents may be like milk or cream, brown or green. Their presence is *not* an indication to remove the breast.

At the second operation on this patient in 1913, the tumor in the left breast showed a blue dome. Its contents were cloudy, with white débris; and in removing the zone of breast with the cyst, two dilated ducts with milky contents were divided.

The microscopic sections from the breast tissue of both operations in this patient showed many areas of solid adenoma, which some pathologists would interpret in the frozen section as suspicious of malignancy, and advise the complete operation for cancer, or removal of the breast (Figs. 58, 59 and 60).

Fig. 33 (Path. No. 26439. BB-14).—Lactation hypertrophy in an encapsulated adenoma, removed from a lactating breast. See page 537.

Figure 6 (Path. No. 27007. BB--12-1 [T]) shows a section through a large blue-domed cyst and the surrounding breast. The cyst has a thin smooth wall, and the little brown macular areas in the surface of the cyst wall are shown. I have described them in the previous case (Fig. 5), and microscopic sections from Path. No. 27007 demonstrated that they were due to small areas of hemorrhage into the wall

of the cyst. The breast surrounding this cyst is chiefly fibrous and fatty. In the picture, the white areas are fibrous; and in this white area, fat can be seen. There is one dilated duct shown and one minute cyst. The adenomatous areas do not show in the illustration.

Clinical Note.—This blue-domed cyst is interesting because it was larger than usual, a little larger than a silver dollar. It was in the midzone of the outer hemisphere of the right breast and filled a quadrant of the breast. The size made me suspect a malignant tumor—either a cancer cyst or a medullary carcinoma. The tumor, however, was smooth, tense, and somewhat spherical.

Fig. 34 (Path. No. 19982. BB-7).—Section illustrating the picture of a senile breast taken from a nonencapsulated area which had remained unresolved eleven years after the last lactation. The mastitis had not resulted in abscess. The thick-walled ducts indicate the old mastitis, otherwise the section resembles the senile breast. Result (1921): Well, five years after the excision of a zone of breast.

There was distinct fluctuation. It is important to note that a medullary carcinoma or a cancer cyst may give the sensation of fluctuation. I found, however, in addition, multiple indefinite nodules in the remaining portion of the right and in the left breast. This finding favored a benign cyst.

The patient was 45 years of age, and had had one child with normal lactation. The lump had been discovered accidentally nine weeks before operation, and the patient had noted no increase in size. If her observation was correct, this suggested a benign cyst. Only this type of breast tumor can reach such a size in such a short time and then remain stationary. The patient had not observed any variation in size. The skin and nipple were normal. My clinical diagnosis was benign cyst.

Fig. 35 (Path. No. 6686. BB-13-4 [T]).—Fibro-adenomatous area in section from a nonencapsulated adenoma excised with a zone of breast by Dr. Finney in 1905. For gross appearance, see Figure 13. Result (1921): Well, sixteen years later.

Operation.—The typical blue dome was exposed the moment the subcutaneous fat was divided; but on account of the size of the cyst, I immediately

opened it. Its contents were cloudy fluid. I then made a frozen section and found no evidence of malignancy in the cyst wall.

Result.—Five months after operation, the patient was well.

Figure 7 (Path. No. 21770. BB-12-1 [T]) is the reproduction of a photograph of a blue-domed cyst and surrounding breast tissue.

Figure 8 shows a section through the specimen shown in Figure 7, illustrating two blue-domed cysts with surrounding breast. The breast is very adenomatous with a few minute cysts.

Fig. 36 (Path. No. 8717. BB-12-3 [B]).—Intracanalicular-adenomatous area in a breast containing multiple blue-domed cysts. Result (1921): Well, fifteen years after excision of the breast (Bloodgood).

Clinical Note.—This patient was a white woman, aged 29. Six years previously I had removed a similar blue-domed cyst from the right breast; she was then 23, and represented one of the youngest patients in this group. There had been no recurrence in the right breast; but she had observed a lump in the upper and outer quadrant of the midzone of the left breast. The lump was about the size of a twenty-five-cent piece, tense and smooth, slightly lobular,

suggesting an adenoma, or two cysts. Both breasts contained indefinite multiple nodules which had not been noted at the previous examination six years before.

Operation.—After dividing the subcutaneous fat, a typical blue dome was exposed. In excising the tumor with a zone of breast, the breast tissue was found to be very adenomatous; and between the tumor and the nipple, I divided two dilated ducts filled with grayish-brown pastil material.

Microscopic Pathology (Fig. 47).—You will observe from this section that the breast surrounding the blue-domed cyst shows the papillary cystadenoma of chronic cystic mastitis, which is less frequently found to such an extent about

Fig. 37 (Path. No. 16133. BB-12-1 [T]).—Aberrant-adenomatous area in the wall of a blue-domed cyst. Result (1921): Well, seven years after excision of the cyst with zone of breast.

the blue-domed cyst, but is more characteristic of the type usually called Schimmelbusch's or Réclus's disease (BB-13-8).

Result.—Ten years after the first operation and four years since the second (1921), there was no recurrence.

It is interesting to note that this patient's sister had a similar condition in both breasts for which both breasts were completely removed. The tissues from these two operations were sent to my laboratory.

2. *Cysts of the Galactocoele Type (BB-12-2).*—These cysts differ from the blue-domed cysts in the absence of a *blue* dome. The dome is opaque white, and when opened the contents are milky. These cysts can be distinguished from the true galactocoele, because they have been observed in women who have never been pregnant, and the surrounding breast shows no gross or microscopic evidence of lactation hypertrophy.

In a few instances, I have observed this cyst alone in the breast. More frequently it has occurred as a smaller second cyst exposed in

Fig. 38 (Path. No. 16392. BB-12-1 [T]).—Irregular adenomatous area with a slightly dilated duct, showing duct adenoma. Section from the wall of a blue-domed cyst. Result (1921): Well, seven years after excision of the cyst with zone of breast.

excising a typical blue-domed cyst. I have already noted that the dilated ducts in chronic cystic mastitis may contain creamlike or milk-like contents (Fig. 5), which cannot be distinguished in the gross from the dilated ducts filled with milk in the galactocoele. The contents of the cyst of the galactocoele type coagulate when placed in alcohol or

liquor formaldehydi. The contents of the blue-domed cyst do not coagulate, as already noted. The chemistry of the contents of this cyst of the galactocoele type I have not studied. The microscopic appearance of its wall and the surrounding breast does not differ from that of the blue-domed cyst. Therefore, the cyst of the galactocoele type and dilated ducts filled with milklike or creamlike contents is one of the gross findings of chronic cystic mastitis, and it has no relation to lactation.

Fig. 39 (Path. No. 26046. BB-13-8 [BB]).—Cystic-adenomatous area with some small solid alveolar adenomas. Section from breast, the seat of diffuse chronic cystic mastitis of the nonencapsulated cystic-adenomatous type. For gross appearance, see Figure 27; see also Figures 40, 41 and 42, and page 536.

Figure 9 (Path. No. 26803. BB-12-2 [T]) is the reproduction of a photograph of a section through a cyst of the galactocoele type and the surrounding breast.

This specimen was excised and sent to my laboratory unopened for diagnosis. The coagula filling the cyst may be noted. The sur-

rounding breast shows no other cysts or dilated ducts and is composed of a mixture of fat and fibrous breast tissue with numerous adenomatous areas. The illustration, however, shows a few dilated ducts not noted in the description of the gross specimen. The specimen sent to the laboratory was the size of a silver dollar, and I could palpate in the center a spherical tense tumor. On incision, the dome was white, not blue. The cyst wall was a little thicker than usual, 3 mm.; the cyst was small, the size of a 5-cent piece; its contents were milklike and coagulated.

Fig. 40 (Path. No. 26046. BB-13-8 [BB]).—Section showing epithelium-lined cysts, cystic adenoma, small solid adenoma, large duct adenoma, and mastitis. See page 536.

Clinical Note.—The patient was a white woman, aged 23, and had been married one year and seven months without pregnancy. Her breasts had always been tender just before the menses. Five weeks before operation, just before her menses, the right breast was more tender than usual, and she felt a lump the size of a walnut. She immediately consulted her physician who referred her to Dr. A. P. Butt of Davis, W. Va.

The latter excised the palpable lump with a zone of breast tissue and sent it to the laboratory for diagnosis.

Microscopic Pathology.—There was no epithelial lining of the cyst wall. In the surrounding breast, there were a few dilated ducts, cystic adenomatous areas, and here and there ducts and acini plugged with proliferating cells.

Result.—Six months after operation, the patient was well.

Figure 10 (Path. No. 25517. BB-12-2 [T]) shows a section through a cyst of the galactocele type and the surrounding breast. In

Fig. 41 (Path. No. 26046. BB-13-8 [BB]).—Section showing nonencapsulated diffuse cystic adenoma. High power magnification of irregular stellate solid adenoma. See page 536.

addition, one sees a small dilated duct; the breast was very adenomatous, and there was even gross evidence of chronic mastitis.

Clinical Note.—The patient was a white woman, aged 43. A lump was accidentally discovered four months ago in the left breast. At that time the entire breast was sensitive and apparently swollen. This symptom of onset of breast tumor I have called mastitis. It is not a frequent occurrence. The

clinical picture is similar to that of the "caked" breast of lactation. I have observed it chiefly in chronic cystic mastitis, rarely in comedo-adenoma and never in cancer.¹

In this case, in a few days, the mastitis subsided and a small lump could be palpated in the periphery of the upper and outer quadrant. The lump was freely movable and the size of a twenty-five-cent piece. It was tense and spherical and suggested a cyst buried in breast tissue. The remainder of this and the other breast were normal on palpation. Her husband, a surgeon, was confident that the palpable tumor had varied in size. This is almost a positive

Fig. 42 (Path. No. 26046. BB-13-8 [BB]).—Section of diffuse nonencapsulated cystic adenoma. High power magnification of large solid duct adenoma. See page 536.

sign of a benign cyst. There had been but one child; but there was no milk in this breast. I had observed this patient four years previously because of a painful breast; but nothing could then be made out on frequent examinations.

1. A restudy of so-called acute carcinoma of the breast may reveal a few cases in which the onset suggested mastitis, but so far no example has been found.

Operation.—On dividing the subcutaneous fat, firm white breast tissue was exposed. On dividing about 4 mm. of this breast tissue, no blue dome was found, but a white opaque dome suggesting a galactoceles. On incision, the wall of the cyst was a little thicker than usual, and its contents resembled milk. In excising the breast tissue to remove the tumor, numerous adenomatous areas were encountered, but no other cyst or dilated duct. A minute cyst is seen in the illustration (Fig. 10).

Microscopic Pathology.—The cyst wall had no epithelial lining and was a little thicker than usual (Fig. 44). There was evidence of chronic inflammation, a few minute epithelium-lined cysts, adenomatous areas with ectasia, a few

Fig. 43 (Path. No. 8717. BB-12-3 [B]).—Cystic-adenomatous area (ectasia) from the wall of a blue-domed cyst. Breast contained multiple blue-domed cysts (See also Fig. 36).

dilated ducts, adenomatous areas with mastitis, and some adenomatous areas in which the acini were plugged with cells and which might be considered by some pathologists as suspicious of cancer (duct adenoma, Fig. 59).

Result.—Two years (1921) after operation, the patient was well.

3. *Multiple Blue-Domed Cysts. BB-12-3.*—The multiple cystic disease of the breast, usually bilateral, is a less frequent occurrence than

the single blue-domed cyst. The only difference in the pathology is that the breast is riddled with cysts of various types, usually blue-domed, but some—the smaller—may be of the galactoceles type.

In the few cases observed by me, there have always been, clinically, multiple tumors in both breasts, and the condition has been recognized clinically. Formerly, I excised both breasts; recently, I have not subjected these patients to operation at all—a point which will be discussed in the second paper again.

Fig. 44 (Path. No. 25517. BB-12-2 [T]).—Section from the wall of a cyst of the galactoceles type; no epithelial lining; wall thickened by chronic inflammatory tissue. For gross appearance, see Figure 10. Result (1921): Well, one year after excision. See page 486.

Figure 11 (Path. No. 26139. BB-12-3) illustrates sections through both breasts after preservation in liquor formaldehydi. One will observe that the gross character of the larger cysts resembles the single cyst illustrated in Figures 3 and 8; that in the breast tissue surrounding these larger cysts, there are more smaller and minute cysts than in the

breast tissue surrounding the single blue-domed cysts in Figures 3, 6 and 8. The breast tissue itself—not cystic—does not differ from the breast tissue illustrated in Figures 3, 6 and 8.

In this case, the breasts were sent to me by Dr. Royster of Raleigh, N. C., with a note that they were removed from a mulatto woman, aged 39. There were multiple palpable tumors in both breasts, but other details of the history were not obtained.

Microscopic Pathology (Fig. 48).—The most interesting feature is that almost every epithelium-lined duct or acinus of these breasts showed dilatation of varying degrees. The epithelial cells lining the dilated ducts and acini showed proliferation and degeneration. Papillary cyst-adenomatous areas, so characteristic of the group BB-13-7 type, are practically absent.

Fig. 45 (Path. No. 27346. BB-12-1 [T]).—Section from a portion of the wall of a blue-domed cyst showing the remains of the epithelial lining and suggesting that the cyst originated in a duct. Result (1921): Well, six months after excision of the cyst and zone of breast.

Figure 12 (Path. No. 4903. BB-12-3) shows a section through the right breast removed in 1903, almost twenty-one years ago, by Dr. Follis at Johns Hopkins Hospital. According to the history, the patient had observed only one tumor in the right breast, of but two weeks' duration. At the examination, it is noted in the history, there was one tumor in the right breast to the outer side of the nipple and a smaller tumor in the same position in the left breast. From the right nipple a few drops of slate-colored fluid could be expressed.

The patient was 39 years of age, and gave the history of a miscarriage fifteen years before observation; there were no other pregnancies, no lactations.

In the laboratory, we could palpate multiple tumors in the right breast. As one cyst could be palpated in the left breast, it is fair to assume that this breast was similarly affected. Nevertheless, at the present time this breast is normal.

This and other observations have led me to conclude that there is no relation between single and multiple blue-domed cysts and the cysts of the galactocoele type and carcinoma. If the exploratory incision reveals a cyst of this character, there is apparently no necessity for removing one or both breasts.

Fig. 46 (Path. No. 26650. BB-12-1 [T]).—Section from the wall of a blue-domed cyst; epithelial lining; dark areas beneath the lining are areas of hemorrhage. (For gross appearance, see Figure 6.) The next zone is granulation tissue, the next contains an area of cystic adenoma. This tumor was of only four days' duration. The cyst contained cloudy fluid, no blood. Result (1921): Well, one year after excision of the cyst and zone of breast. See page 475.

4. *The Nonencapsulated Adenoma in Chronic Cystic Mastitis (BB-13-4).*—In this type, in the explored palpable area there are no visible

cysts or dilated ducts. I first became familiar with its gross appearance in a group of aberrant, encapsulated, benign breast tumors which are observed in young girls at, or shortly after, puberty, and have been classed with fibro-adenoma.

Then, many years ago, before I had the evidence that there was little or no relation between chronic cystic mastitis and carcinoma, I removed both breasts from a patient, aged about 45, because of multiple indefinite nodules in both breasts, of a few months' duration. This was about the time of Warren's publication from Boston; and this case

Fig. 47.—(Path. No. 21770. BB-12-1 [T]).—Section of breast tissue from the wall of a blue-domed cyst. Group of small cysts lined by columnar epithelium; dilated duct; irregular cystic adenoma; lobules of mastitis. See Figures 7 and 8. For microscopic picture of another area, see Figure 55. Result (1921): Well, four years after excision of cyst and zone of breast. See page 480.

seemed to correspond to the bilateral lesion of the breast which he called the "cobble-stone" breast.

When these two breasts were examined, there were no dilated ducts and no cysts, even minute; but each little palpable indefinite nodule could easily be recognized from the surrounding fibrous and fatty breast by a group of elevated pink dots. I have a painting of this specimen; but it is not good enough for reproduction.

Studied microscopically, each of these nonencapsulated areas showed an increase of the parenchyma—a microscopic condition which I have called *adenomatous* (Figs. 32 and 35).

My observation, after the pathologic examination of this case, led me to the conclusion that operation was not indicated in a condition of this kind, when there was nothing to be made out but multiple indefinite nodules in both breasts.

At the present writing I have a record of forty-eight cases with a similar clinical picture in which no operation has been performed. All these patients have been followed, and the multiple indefinite nodules

Fig. 48 (Path No. 26139. BB-12-3 [BB]).—Section from breast riddled with multiple blue-domed cysts of all sizes. Both breasts were involved and removed. For gross appearance, see Figure 11; also see page 488.

ultimately disappeared. Apparently, patients in this group run no more, and perhaps less, risk of a cancer of the breast than women at the same age whose breasts are normal on palpation.

Figure 13 (Path. No. 26695. BB-13-4 [T]) shows a gross section through the zone of breast removed. To the right, one sees a zone of breast which differs from the area to the left. In the area to the right, there is more white breast stroma embedded in which are small gray areas. These in the fresh specimen were pink. To the left, the breast has more fat, less stroma and fewer of these areas.

Microscopic Pathology.—The area shown to the right in Figure 13 is filled with irregular adenomatous areas somewhat resembling the benign encapsulated fibro-adenoma. There are no cysts and no dilated ducts. There are a few adenomatous areas with ectasia and a few minute epithelium-lined cysts and two ducts with minute papillomas (in a second section) and one duct with solid adenoma.

Fig. 49 (Path. No. 19994. BB-13-6 [BB]).—Section through zone of breast beneath nipple, showing diffuse dilatation of ducts. For gross appearance, see Figures 16, 17 and 20. Result (1921): Well, seven years later.

Clinical Note.—This patient was a single woman, aged 42. For one year she had been conscious of a small lump in the left breast. There had been no pain. She was still menstruating, apparently normally.

At my examination, I felt a lump, the size of the end of the index finger, in the midzone of the upper and outer quadrant. It corresponded to the lump the patient had felt. I could not palpate in the remainder of this breast, nor in the other breast, any other definite lumps or any area of abnormality. The little lump did not feel tense and spherical like a cyst, but had an irregular outline, and not the hardness of cancer.

At the exploratory incision, Sept. 9, 1920, after dividing the subcutaneous fat, I exposed white breast tissue; but the little lump was difficult to palpate. For this reason, I excised a zone of breast the size of a fifty-cent piece, half of which is shown in Figure 13. This, when sectioned, gave the appearance shown in Figure 13, already described. In cutting this zone of breast out, I encountered no cysts and no dilated ducts. The divided breast tissue was composed chiefly

Fig. 50 (Path. No. 21192. BB-13-6 [CC]).—Section of diffuse dilatation of ducts with periductal mastitis involving a zone of breast. For gross appearance, see Figure 19 and page 511.

of fat, with here and there a fibrous strand of stroma. This picture is illustrated in Figure 13 to the left. The wound was then closed in the usual way.

Result.—This patient was well (April, 1921), seven months after operation.

This type, BB-13-4, the nonencapsulated adenoma, was rarely observed until patients were educated to seek advice quickly after the palpation of a lump in the breast. These observations seem to indicate that tumors of this character in the past have disappeared when the patients delayed examination. As noted before, I first observed them

as multiple indefinite nodules, and now, when they appear with this clinical picture, I advise against operation. As a single tumor, I first observed it in 1913, and since then the number has increased.

When the patient, 25 years of age or older, has but a single lump in one breast, operation is indicated at once, because there is no way, at least at the present time, to exclude the possibility of malignancy, except by an exploratory incision.

Fig. 51 (Path. No. 21192. BB-13-6 [CC]).—High power magnification of duct shown in Figure 50—desquamating, degenerating cells within the duct and mastitis in the wall. See page 511.

Figure 14 (Path. No. 14923. BB-13-4 [T]) is also a reproduction of a photograph of a zone of breast excised; but it shows the contrast between the nonencapsulated adenomatous area and surrounding breast tissue less distinctly than Figure 13. This is probably due to the fact that the patient was a young unmarried woman, aged 23, while the patient whose specimen is shown in Figure 13 was 42, and breast parenchyma was being largely replaced by fat, except in the tumor area.

Clinical Note.—A white unmarried woman, aged 23, complained of definitely localized pain in the axillary portion of the upper and outer quadrant of the left breast, of three and one-half months' duration. She had palpated the lump for one month.

At my examination in November, 1913, I could make out but one palpable area in the axillary portion of the upper and outer quadrant of the left breast. The remainder of this breast, and the right breast, were of the normal virginal

Fig. 52 (Path. No. 16133. BB-12-1 [T]).—Section from the wall of a blue-domed cyst. The lower lobule shows to the right the early stage of alveolar papillary cystadenoma. The left portion of the same lobule shows irregular adenoma with mastitis. The upper lobule shows an aberrant adenomatous area, the right lobule a fibro-adenomatous. Result (1921): Well, seven years after excision of the cyst.

type. The palpable area was indefinite, slightly nodular. It did not feel like an encapsulated tumor or a cyst; but I knew that encapsulated small adenoma buried in breast tissue gave this feeling on palpation.

I advised operation because the patient was about to be married, and as adenomas undergo lactation hypertrophy during pregnancy and may give trouble

by enlargement, it saves the patient discomfort and anxiety when the tumor is removed before this event.

Exploratory Incision.—The palpable area when cut into showed an increase of pink elevated dots as compared with the surrounding normal breast. The area was not encapsulated and was irregular in outline.

Microscopic Pathology.—The section showed chiefly adenomatous areas (Fig. 32). There was some ectasia, a little mastitis, and one area of cystadenoma.

Fig. 53 (Path. No. 11407. BB-13-7 [T-CC]).—Section of a nonencapsulated cystic adenoma. To the right of the lower lobule, an area of alveolar papillary cystadenoma; the remainder of the lobule, cystic adenoma; other lobule, irregular adenoma and solid small alveolar adenoma. This section was first diagnosed adenocarcinoma. First operation: excision of the tumor. Then microscopic examination and twenty-four hours later, second operation: complete for cancer. Result (1921): Well, ten years later. See page 526.

Result.—It is now (1921) eight years since the removal of the zone. The patient is married; there have been two children, and lactation in both breasts was normal.

5. *The Nonencapsulated Adenoma Containing One or More Minute Cysts, or One or More Dilated Ducts, or Both (BB-13-5).*—Clinically, this group does not differ from Group BB-13-4; but when one explores the rather indefinite palpable area, one finds, in addition to an irregular, nonencapsulated area shown in Figures 13 and 14, one or more minute cysts or dilated ducts. If the exploration is made slowly and the cyst exposed without cutting it, it has either a blue dome similar to the

Fig. 54 (Path. No. 3965. BB-13-8 [B]).—Area of papillary cystadenoma from a breast, the seat of diffuse nonencapsulated cystic adenoma. This area was diagnosed in 1901 adenocarcinoma in chronic cystic mastitis. It rested on the pectoral fascia and was removed with but 1 mm. of this tissue, as only the breast was removed. The patient had refused the complete operation. Result (1921): Well, twenty years later. See page 530.

larger blue-domed cysts (Figs. 1, 2 and 4) or an opaque white dome, as shown in Figures 9 and 10, the cyst of the galactocele type. When the cyst is nicked, the contents are either clear, cloudy or milklike. The moment it is nicked, the contents escape, and one can see the wall of the

cyst. When there is a dilated duct, one does not become aware of its presence until the duct is cut across, and one can distinguish the duct from the cyst by the fact that after some material escapes, more can be expressed like pastil material. With the exception of a duct filled with milklike material, its contents differ from those of a cyst. They are more viscid, as if they contained mucin. They have the consistency of a thin syrup. The color varies: it is usually green or brown; it may be creamlike or milklike. When brown, the contents are often granular and slightly cheesy. Then one can recognize the wall of the duct,

Fig. 55 (Path. No. 21770. BB-12-1 [T]).—Alveolar papillary cystadenoma; cystic adenoma from the wall of a blue-domed cyst (Figs. 7 and 8). This is supposed to be the microscopic picture of diffuse nonencapsulated cystic adenoma, or Schimmelbusch's disease, yet, here it is present as an isolated area in the wall of a blue-domed cyst. Result (1921): Well, four years after excision of the cyst and zone of breast. See page 479.

which is thicker than the wall of the cyst. These dilated ducts with their contents can be easily distinguished from the wormlike masses which are expressed from the comedo-adenoma.

I became familiar with this type first in the examination of breasts which had been completely removed because of a single or multiple palpable tumor. More recently, I have been able to recognize the condition at the exploratory incision, to remove the zone, and save the breast.

Figure 15 (Path. No. 26771. BB-13-5 [T]) shows a section through a zone of breast tissue excised by me, Sept. 23, 1920. It shows both minute cysts and dilated ducts in fibrous and fatty breast tissue and a few adenomatous areas. In the illustration, it is difficult to distinguish the cyst from the duct. Figure 15 should be compared with Figures 13 and 14.

Fig. 56 (Path. No. 26439. BB-13-8 [CC]).—Papillary cystadenoma in ducts. Section of breast, the seat of diffuse nonencapsulated cystic adenoma. For gross appearance, see Figure 26; also see page 537.

Operation.—On dividing the palpable area I exposed two minute blue-domed cysts and divided three dilated ducts filled with yellow, cheesy material. The surrounding breast was chiefly fibrous and fatty. A zone of breast only was excised.

Clinical Note.—The patient was a white woman, aged 50, still menstruating. Two months before operation she noticed pain in the outer half of the right breast and thought she felt a lump. Both disappeared in a few days. At the next menstrual period, one month before observation, she had less discomfort and felt the lump less distinctly. At my examination, I could palpate an indefinite

area in the midzone of the outer hemisphere, corresponding to the area of pain and where the patient had felt the lump. In the remainder of the right breast and in the left breast, I was unable to palpate any other definite or indefinite lump. The palpable lump was no larger than a twenty-five-cent piece. It did not feel like a cyst, nor did it have the hardness of cancer.

Microscopic Pathology.—Usually when there are dilated ducts, we find in the breast surrounding them marked mastitis. This was present in this section (Figs. 67 and 68).

Result.—April, 1921, seven months after operation, the patient was well.

Fig. 57 (Path. No. 20457. BB-13-8 [CC]).—Papillary cystadenoma in duct; epithelium-lined cyst to the left. Section from breast, the seat of diffuse non-encapsulated cystic adenoma (right breast). Excision of breast. Complete operation for cancer on the left breast, two years and eight months later, for diffuse comedo-duct adenoma; no metastasis to the axillary glands. Result (1921): Well, five years after second operation. See page 536.

6. *Diffuse Dilatation of the Ducts, Usually Situated Beneath the Nipple, Rarely Outside the Nipple Zone (BB-13-6).*—For many years, I have been familiar with the dilatation of the ducts filled with different

types of material in breasts which had been completely removed for benign or malignant tumors. The tumors were outside the nipple zone, and the dilated ducts had given no evidence of their presence, either by the palpation of a lump in the nipple zone, or by discharge from the nipple. I had always looked on this condition as a feature of chronic cystic mastitis. In about 1897, I assisted Dr. Halsted in exploring an indefinite palpable lump beneath the nipple. I recollect this lump as feeling like a bunch of worms, and my original notes confirm this

Fig. 58 (Path. No. 22778, BB-13-7 [T]).—Solid small alveolar adenoma. Section from a nonencapsulated cystic adenoma. Small nodule excised in 1915; complete operation for cancer, in 1918, for a second nodule of the same type. No metastasis to the axillary glands. Result (1921): Well, three years after second operation. See page 525.

statement. The indefinite palpable tumor proved to be a dilated duct, with a thick wall about the size of a slate pencil (5 mm.), tortuous and filled with a brown, granular mass. Within a few millimeters of this duct was a minute cyst. At that time we did not look on the condition

found at the exploratory incision as malignant, but concluded that it was safer to perform the complete operation for cancer.

On the gross study of this breast, nothing else was found. The remaining breast tissue was fatty with some fibrous stroma. The sections showed no areas which, even at that time, could be interpreted as suspicious of malignancy, and the sections of the glands showed no metastasis.

Fig. 59 (Path. No. 26650. BB-12-1 [T]).—Large alveolar duct adenoma. Section from the wall of a blue-domed cyst. This picture is frequently called adenocarcinoma. Result (1921): Well, one year after excision of tumor and zone of breast. See page 525.

This was the first case to be placed in this group. Since then, I have recognized this wormlike tumor beneath the nipple in one or both breasts, and, not feeling justified in being conservative, I have removed one or both breasts. Specimens with the identical gross and microscopic pathology have been sent to me by colleagues who had either removed one or both breasts or performed the complete operation for cancer.

Figure 16*a* (Path. No. 19767) illustrates best the character of the contents of the duct when they are granular and can be expressed like a worm. This picture also shows a few ducts from which the contents had been expressed.

Figure 16*b* (Path. No. 19767), from the same breast, shows a very much larger dilated duct, filled with brown, granular, viscid material.

Fig. 60 (Path. No. 1734, BB-13-7 [B-CC]).—Large alveolar duct adenoma. Section from a small nonencapsulated cystic adenoma. Breast explored by Dr. Halsted in 1897 and removed. The small tumor was considered benign. After microscopic study, it was diagnosed adenocarcinoma, and the complete operation for cancer was performed one month after the first operation. The glands showed no metastasis. Result: The patient was followed for sixteen years, and remained well. See page 521.

In the case illustrated in Figures 16*a* and 16*b*, one breast was removed by me in 1916, and at the present writing (1921), five years later, there is no trouble in the remaining breast.

Figure 17 (Path. No. 24650. BB-13-6 [T]) shows a section through a zone of breast beneath the nipple, which I removed in June, 1919. It shows a large dilated duct filled with brown granular material; it is practically identical with Figure 16. In the white fibrous breast to the right, unopened, dilated, tortuous ducts can be seen, and to the right, at the margin of the specimen, a collapsed, empty dilated duct is observed.

Clinical Note.—This patient was a white woman, aged 40. There had been six normal lactations. The last ceased seven months ago, and for some months,

Fig. 61 (Path. No. 13204. BB-13-8 [Expl. CC]).—Small irregular stellate solid adenoma, mixed with cystic adenoma. Section from a breast the seat of diffuse nonencapsulated cystic adenoma. Exploration, gross diagnosis cancer; complete operation for cancer; the glands showed no metastasis. Result (1921): Well, nine years later. See page 536.

she had been conscious of a lump beneath the right nipple. At first, milk could be expressed from the right nipple and then a brownish material.

Examination.—Beneath the right nipple a number of wormlike masses could be palpated. There was no induration. Slightly brownish and milklike material could be expressed from the right nipple. The remainder of this breast was

normal. Beneath the nipple of the left breast, the same condition was present to a very slight degree; but nothing could be expressed through the nipple.

Clinical Diagnosis.—Naturally one thought of galactocele, but I have no record of a true galactocele with a palpable tumor of this character. This patient was observed about seven weeks. The wormlike tumor beneath the right nipple became more distinct, and the material could be expressed from the nipple, although there was no discharge in the interval. The condition of the left breast remained unchanged.

Fig. 62 (Path. No. 8717. BB-12-3 [B]).—Chronic mastitis, alveolar, with atrophy and solid adenoma. Section from the wall of a blue-domed cyst. The breast, the seat of multiple cystic disease, was removed after exploration. Result (1921): Well, thirteen years later. The tumors in the other breast have disappeared.

Operation.—The examination on the operating table revealed a tortuous, wormlike, soft tumor, from perhaps 5 to 8 mm. in size, surrounded by smaller wormlike tumors. There was no induration, no fixation or retraction of the nipple, and nothing could be expressed from the nipple. At the exploratory incision, the larger wormlike tumor had a distinct brown capsule and not a blue

dome. On incision its wall was found to be about 3 mm. thick, and it contained thick brownish material (Figs. 16 and 17). Surrounding this larger dilated duct were other smaller ducts, some of which contained milklike, others brown material. In excising this zone and saving the nipple, the surrounding breast tissue was found to be fibrous and fatty.

It was then nine months since lactation had ceased.

Microscopic Pathology.—The sections show dilated ducts surrounded by lymphoid granulation tissue and a few adenomatous areas with mastitis; but no lactating breast tissue.

Fig. 63 (Path. No. 26771. BB-13-5 [T]).—Chronic mastitis, alveolar, with solid adenoma and atrophy; also diffuse interstitial. Section from a small nonencapsulated area of breast tissue containing a few dilated ducts and minute cysts. Result (1921): Well, one year after excision of tumor and zone of breast.

Result.—At examination in October, 1919, three and one-half months after operation, the right breast appeared normal. The operation had not interfered with the appearance of the nipple. In spite of the excision of the zone beneath the nipple, there was very little induration. Since operation, she had noticed a

slight brownish discharge from the left nipple, and on examination I found that the slight dilatation of the ducts noted at my first examination had increased.

April, 1921, one year and ten months after operation, her physician, Dr. Ries of Baltimore, reported that the patient was well.

Comment.—This is the first time that I excised only a zone of breast tissue in a condition of this kind. The observation also demonstrates that the left breast, apparently similar to the affected, has done just as well as the right breast operated on. The object of my operation in this case was to exclude carcinoma.

Fig. 64 (Path. No. 1734, BB-13-7 [B-CC]).—Periductal mastitis in upper half of section; cystic adenoma in lower. Section from a nonencapsulated cystic adenoma. See also Figure 60 from the same case, and page 521.

Figure 18 (Path. No. 27114, BB-13-6) shows a section through a zone of breast excised beneath the nipple. In the upper portion of the upper illustration, there is seen the larger duct filled with a brown material, similar to Figures 16 and 17. In the remaining portion of this section and in the lower picture can be seen the smaller dilated ducts

with thick walls. Some of the ducts are empty, some are filled. The surrounding tissue is fatty, with some fibrous breast stroma. There are no cysts and no adenomatous areas.

Microscopic Pathology.—This is similar to that in Path. No. 24650.

Clinical Note.—This patient was a white woman, aged 46. The menses were normal. There had been six normal lactations; the last ceased about four years ago. The patient had observed for about two months a yellowish discharge

Fig. 65 (Path. No. 19994. BB-13-6 [BB]).—Dilated duct, periductal mastitis: alveolar mastitis with atrophy. From section of breast tissue filled with dilated ducts beneath the nipple. For gross appearance, see Figure 18.

from the left nipple, which had produced a slight eczema and had been diagnosed Paget's disease. There had now been no discharge for one month, and all the signs of irritation had disappeared. The patient had not felt a tumor.

Examination.—Both breasts were very large and had been so since puberty. Beneath the left nipple, there were a number of wormlike, soft masses, and this nipple might be slightly pulled in, but there was no fixation. About the wormlike masses, there was no induration. The remainder of this and the other breast were normal.

Operation.—Nov. 19, 1920, on dividing the fat, numerous dilated, wormlike masses were exposed. Their capsules were brown; some were as large as a slate pencil (5 mm.). On incision, they contained brown, granular material. In cutting out the zone beneath the nipple, other, smaller dilated ducts containing the same material were cut through, and when pressed upon gave the appearance illustrated in Figure 16.

Result.—In 1921, six months since operation, I am informed that the patient is well.

Fig. 66 (Path. No. 19994. BB-13-6 [BB]).—High power magnification of area shown in Figure 65. Dilated duct; periductal mastitis; duct filled with proliferating, degenerating cells; basement membrane destroyed; basal-cell arrangement abnormal, due to inflammatory, not neoplastic, process.

After the operation I took the history again, because the patient had been very nervous before operation. I then found that the slight retraction of the nipple had been observed just before she ceased nursing her youngest child, two and one-half years ago. A clinical finding of this kind excludes retraction of the nipple as a sign of cancer. She had had pain beneath the nipple in the affected breast one year, and then, four or five weeks ago, had noticed the yellow

discharge, following which there was some excoriation of the nipple. In this stage she had been examined in three clinics, with a diagnosis of Paget's disease of the nipple.

Figures 20*a* and 20*b* (Path. No. 27935. BB-12 [6-CC]). Figure 20*a* shows a section through the zone of breast beneath the nipple which illustrates the dilatation of the ducts with their thick walls. Figure 20*b* is a lymph gland from the axilla which is enlarged, due to chronic

Fig. 67 (Path. No. 26771. BB-13-5 [T]).—Alveolar mastitis with atrophy; diffuse interstitial mastitis with zones of granulation tissue. The apparent giant cells are remains of ducts or alveoli. See Figure 68, from same case, and page 500.

lymphadenitis and shows no metastasis. This specimen was sent to me by my former resident surgeon at St. Agnes Hospital, Dr. Loos of Bay City, Texas.

The patient was a white woman, aged 51, with eight children, the youngest, aged 7 years. The menopause had occurred three years before. The onset of the trouble in the breast was sudden, of three weeks' duration. There were pain and swelling of the breast like mastitis; this disappeared at the end of one

week and then recurred. On palpation, a mass was found in the nipple zone the size of a silver dollar. The skin over this area was red. The mass gave the sensation of fluctuation, with a zone of indurated breast about the fluctuating area. There had been a discharge of pus from the nipple for three days, and the nipple was slightly retracted.

On account of this clinical picture, Dr. Loos performed the complete operation for cancer; but on gross study after operation, he concluded that it was benign and due to infection of the dilated ducts beneath the nipple.

Fig. 68 (Path. No. 26771. BB-13-5 [T]).—High power magnification of area shown in Figure 67. See page 500.

In my experience, cancer never begins as acute mastitis and never gives the clinical picture of an abscess. In this group of BB-13-6 (twenty-two cases), there have been at least three cases with this clinical picture of an abscess due to infection of a dilated duct.

Clinical Note.—In another case (Path. No. 21192. BB-13-6 [B], Figures 19 and 78), the diffuse dilatation of the ducts involved a zone outside the nipple. The onset was similar to that in Path. No. 27935. There were pain and swelling of the right breast, resembling mastitis, of ten days' duration, in a

white woman, aged 51. The menopause had occurred some years previously. The youngest child was 17. The outer hemisphere of the right breast was so hard and swollen that Dr. Hahn, her physician, applied ice. The acute symptoms subsided.

At my examination, ten days after the onset, the skin and nipple were normal. There was a mass in the outer hemisphere of the right breast which felt like "caked" breast in lactation mastitis. However, the edge of the involved hemisphere was not palpable as in BB-13-8, the diffuse nonencapsulated cystic

Fig. 69 (Path. No. 20718. BB-13-4 [B]).—Section from small organized hematoma in a small nonencapsulated adenoma. Breast removed without exploratory incision. Result (1921): Well, five years later.

adenoma, nor were there shotlike nodules to be felt. The condition was undoubtedly subsiding.

At the operation, in March, 1917, I felt it safer to excise the entire breast. The gross appearance is shown in Figure 19. The involved zone of breast is nonencapsulated and distinct from the remainder of the breast, which is fatty and senile. There are no dilated ducts beneath the nipple. The surface of the involved area is covered with milklike, grumous, gray, pastil material, shown in the illustration, which, when wiped away, exposed dilated ducts with thick

walls. The microscopic picture is shown in Figure 78. The ducts were filled with degenerating, desquamating cells, and surrounded by periductal mastitis.

Result.—Four years after operation (1921), the patient was well.

THE NONENCAPSULATED CYSTIC ADENOMA, BB-13-7, EIGHTEEN CASES

The original diagnosis in this case (Path. No. 1210. BB-13-7 [CC], Figures 22 and 77), made in 1896, was adenocarcinoma in

Fig. 70 (Path. No. 12826. BB-13-7 [B-CC]).—Area of papillary cystadenoma. In places, basal-cell arrangement abnormal; basement membrane apparently destroyed. See Figure 71, section from a nonencapsulated cystic adenoma. The operator first removed the breast without exploration; the section was diagnosed adenocarcinoma and the complete operation for cancer performed forty-eight hours later. The glands showed no metastasis. Result (1921): Well, nine years later. See page 525.

nonencapsulated cystic adenoma. But my original note does not describe carcinoma, and restudy of the section discloses no areas of cancer, as shown in Figures 87 and 88.

My original description is as follows: "The tumor (Fig. 22) is the size of a 25-cent piece, not encapsulated; chiefly circumscribed; in places infiltrating; definite fibrous trabeculae surrounding cellular alveoli; no comedones, dilated ducts or cysts." My conclusions, then, from the gross specimen were that the diagnosis rested between medullary cancer and solid intracystic papilloma. The remainder of the breast about

Fig. 71 (Path. No. 12826. BB-13-7 [B-CC]).—High power magnification of area shown in Figure 70, to illustrate the destroyed basement membrane and the abnormal arrangement of the basal cells in some areas.

this nonencapsulated tumor is not described. From what we have now left of the breast in the laboratory, it was a senile fatty breast.

The predominant microscopic picture is shown in Figure 77, papillary cystadenoma. Other portions of the tumor show cystic adenoma, epithelium-lined cysts, irregular adenomatous areas with mastitis. The axillary glands showed no metastasis.

Clinical Note.—This tumor was of ten years' duration in a woman, aged 62. It began just before the menopause, nineteen years after the last lactation. During the last year there had been pain, slight growth, and retraction of the nipple. The tumor felt like a mulberry—hard and lobular—and not like cancer. On account of the retraction of the nipple and the slight atrophy of the subcutaneous fat, Dr. Halsted performed the complete operation for cancer. This patient lived to the age of 75 and died of apoplexy, more than thirteen years after operation.

Fig. 72 (Path. No. 28138. BB-13-7 [T-CC]).—Papillary cystadenoma; basement membrane intact; arrangement of basal cells, normal. Section from a nonencapsulated cystic adenoma. The surgeon explored; the pathologist diagnosed adenocarcinoma; immediate complete operation for cancer was performed. The glands showed no metastasis. Recent case. In 1913, eight years previously, I had removed from this breast a small nonencapsulated adenoma (see Fig. 32). In the interval, there have been two normal lactations. In my opinion, the second operation, complete for cancer, was unnecessary.

I explored the tumor (Path. No. 17012. BB-13-7 [Ex CC], Figs. 21, 90 and 91) shown in Figure 21, in 1915. As it looked and felt like cancer I immediately performed the complete operation. The

glands in the axilla showed no metastasis. The patient is well in 1921, six years after operation.

Clinical Note.—My clinical impression in this case was that I was dealing with a benign tumor because of its long duration—twenty-two years, probably an old adenoma because the patient now aged 42, had felt the tumor at the age of 10. The tumor had not changed during two lactations, the last ten years ago. She came for operation, not because of any change in the tumor, but for the reason that she had read that lumps in the breast should be removed. This tumor, not larger than a ten-cent piece, was in the periphery of the upper and outer quadrant of the right breast, and felt spherical, like a cyst.

Fig. 73 (Path. No. 14539. BB-12-1 [T]).—Area of papillary cystadenoma and large alveolar duct adenoma; in places, basement membrane destroyed and basal-cell arrangement abnormal. Section from the wall of a blue-domed cyst. Excision of cyst only in 1910. Result (1921): Well, eleven years later. Histologically, this section is more suspicious of malignancy than any other picture among these illustrations. Yet, cancer has not developed since the excision of the cyst.

When exploring, I cut through white, firm breast tissue. The tumor had no capsule. On section (Fig. 21), it appeared circumscribed, opaque-white, with fine, granular dots and lines. It had the hardness of cancer and the surface appearance of cancer; yet, nothing could be expressed from its surface. It never occurred to me that it was not cancer. But, when I studied the sections (Figs. 90 and 91), I found I was dealing with a nonencapsulated cystic adenoma, partly of the solid, small and large adenomatous type; some cystic adenoma (Fig. 90) and some areas of papillary cystadenoma (Fig. 91), resembling somewhat lactation adenoma (Fig. 33).

The Gross Appearance of Nonencapsulated Cystic Adenoma.—Unfortunately among the eighteen cases, these are the only two which we were able to photograph. Of the eighteen cases, eleven have been received from outside sources, seven from the Johns Hopkins Surgical Clinic and one from my own service at St. Agnes Hospital. Of six patients operated on at Johns Hopkins, I either assisted Dr. Halsted at the operation in the early years, or saw the tumor in the laboratory.

Fig. 74 (Path. No. 12451. BB-13-7 [B-CC]).—Papillary cystadenoma; basement membrane destroyed; basal-cell arrangement abnormal. For high power magnification, see Figure 75. Section from an area of nonencapsulated cystic adenoma. The operator considered it benign and removed the breast. The pathologist diagnosed it adenocarcinoma. The complete operation for cancer was performed one month later; the glands showed no metastasis. Result (1921): Well, nine years later. One normal lactation in remaining breast since operation. See page 525.

It seems important to give a detailed description of these cases examined by me, because they represent the type of chronic cystic mastitis most difficult to distinguish from cancer.

Path. No. 468, operation by Dr. Halsted in 1894. The tumor in the upper and outer quadrant was the size of a silver dollar, circumscribed, but not encapsulated. On section, it appeared largely composed of minute cysts containing gelatinous material. Between the cysts, there were white granular alveoli separated by fibrous trabeculae. That is, it resembled Figure 22, except that the tumor contained cysts. In the center of this tumor, there was a calcified area. I might note here that I have never seen calcification in cancer, only in old fibro-adenomas. The microscopic section showed cystic adenoma, fibro-adenoma, a few areas of papillary cystadenoma, calcification and mastitis. The original diagnosis was adenocarcinoma in old adenofibroma. The glands showed no metastasis. This patient lived nineteen years and died of old age, at 74.

Fig. 75 (Path. No. 12451. BB-13-7 [B-CC]).—High power magnification of area shown in Figure 74. See page 525.

This patient presented the clinical picture of a benign lesion. In the first place, there were multiple tumors of both breasts of thirty-five years' duration in a woman, aged 55. These tumors had remained unchanged during lactation. The multiple tumors in the left breast were distinctly benign, and some gave the sensation of crepitation, due to calcification. One of the multiple tumors in the right breast in the upper and outer quadrant had shown growth during the

last six months, and the skin over it had become bluish. This tumor was diagnosed clinically cancer, and the complete operation performed without exploration. One of the multiple tumors of the left breast was excised and showed calcification.

Here we have the evidence that a benign tumor, one of multiple tumors, may grow after years of quiescence and give the clinical picture of a malignant tumor. Up to the present time, we have never seen cancer develop in one of multiple fibroadenomas. Billroth in his book pictures such an instance.

Fig. 76 (Path. No. 5221. BB-13-8 [CC]).—Papillary cystadenoma; in places basement membrane destroyed; arrangement of basal cells abnormal. Section from a breast, the seat of diffuse nonencapsulated cystic adenoma. For gross appearance, see Figure 25. The original diagnosis in this case was adenocarcinoma in Schimmelbusch's disease. See page 531.

Path. No. 1147. I assisted Dr. Halsted in exploring this tumor in 1895. It presented a small area of induration near the nipple. My original description records an infiltrating tumor about a nonencapsulated cystic adenoma, the size of a ten-cent piece. The center of the tumor contained a few cysts, gray-granular

alveoli in fibrous trabeculae from which semifluid material could be expressed. The infiltrating area about this resembled cancer of the scirrhus type, and sections from this area show scirrhus carcinoma (Figs. 86 and 87). As already noted, this is the only one among the eighteen cases of nonencapsulated cystic adenoma which presented the microscopic picture of cancer.

This patient was well (1921), twenty-six years after the complete operation. The glands in the axilla showed no metastasis.

Fig. 77 (Path. No. 1210. BB-13-7 [CC]).—Area of papillary cystadenoma; basement membrane in places destroyed; basal-cell arrangement abnormal. Section from a nonencapsulated cystic adenoma. For gross appearance and clinical history, see Figure 22; also see page 513.

This is a very important observation, and should make one suspicious of nonencapsulated tumors resembling cystic adenoma. But it is important to note that we recognized the malignancy in the gross at the exploratory incision and confirmed the diagnosis under the microscope.

Path. No. 1210 has been described (Figs. 22 and 77, page 513).

Path. No. 1734. I assisted Dr. Halsted also in exploring this tumor in 1897. The tumor was clinically benign, and at operation, it was looked on as a nonencapsulated cystic adenoma, composed chiefly of minute cysts containing brown-gray material and some milky fluid. At first, only the tumor was removed; then, after microscopic study with the diagnosis of adenocarcinoma, the complete operation was performed, one month later. The glands showed no metastasis. This patient was followed sixteen years until 1913, and there was no evidence of recurrence.

For microscopic pictures, see Figures 60 and 64.

Fig. 78 (Path. No. 21192. BB-13-6 [B]).—Section of dilated duct filled with proliferating and degenerating cells, surrounded by periductal mastitis, from a breast, the seat of diffuse dilatation of ducts outside the nipple area. For gross appearance, see Figure 19, also page 511.

Path. No. 2145. In 1898, Dr. Finney at the Union Protestant Hospital performed the complete operation for cancer without exploratory incision, and sent the specimen to me. My description was as follows: "Palpable tumor in the upper and outer quadrant the size of a twenty-five-cent piece, nodular; clinically benign; on section the tumor was a nonencapsulated area of minute cysts containing brownish fluid surrounded by dense fibrous tissue." My diagnosis then, from the gross and microscopic study, was a benign nonencap-

sulated cystic adenoma. The sections show cystic adenoma, large solid adenoma similar to Figure 60 and irregular stellate adenoma in fibrous tissue (Fig. 80). The glands showed no metastasis, and this patient is well (1921), twenty-three years after operation.

Path. No. 3842. In 1901, Dr. Mitchell, then resident surgeon of Johns Hopkins Hospital, excised a tumor from the right breast of this patient, which I described as follows: "The tumor is the size of a fifty-cent piece and is composed of many minute cysts containing milky fluid." Gross diagnosis: Nonencapsulated cystic adenoma. The microscopic sections showed all the stages

Figure 79 (Path. No. 21371. BB-13-7 [Expl. CC]).—Section of breast showing area of large solid duct adenoma and small irregular stellate adenoma. From a nonencapsulated cystic adenoma, diagnosed doubtful at exploration. Cancer operation; no metastasis to glands. Result (1921): Well, four years later. See page 524.

of chronic cystic mastitis, illustrated in this paper. Therefore, Mitchell was the only surgeon who removed only the tumor in this group of cases. Clinically, there were multiple tumors in both breasts; each breast had one distinct tumor, and, in addition, there were multiple shotlike nodules in both breasts.

Two years later, the patient wrote that another surgeon had removed the other breast. Since this date we have been unable to follow this patient.

In my opinion this is an example of multiple cystic adenoma.

Path. No. 8068. In 1907, Dr. Halsted explored this tumor, diagnosed it colloid cancer, and performed the complete operation. Dr. Porter, in the laboratory, described the gross appearance as follows: "A small, circumscribed, nonencapsulated area with many minute cysts containing drops of fluid with granular alveoli between the minute cysts." His gross diagnosis was non-encapsulated cystic adenoma with a possibility of early cancer. My microscopic description was as follows: "The tumor is chiefly a papillary cystadenoma

Fig. 80 (Path. No. 2145. BB-13-7 [CC]).—Area of small irregular stellate solid adenoma; basement membrane in places destroyed; basal-cell arrangement abnormal, but cells not of the cancer type. Other lobules show chiefly cystic adenoma. The glands showed no metastasis. Result (1921): Well, twenty-three years after the complete operation for cancer. See page 521.

with small epithelium-lined cysts and many adenomatous areas of different types. Diagnosis: Benign, nonencapsulated cystic adenoma." The glands showed no metastasis. This patient was well (1921), sixteen years later.

Path. No. 17012. This has been discussed (Figs. 21 and 90, page 515). In this case, I diagnosed the tumor as cancer at exploration.

Path. No. 21371. In 1917, Dr. Finney at the Women's Hospital explored this tumor, removed the breast and, after careful gross examination, performed the complete operation for cancer. When I received the specimen, it was much cut up, but I could recognize a noneucapsulated tumor, the size of a twenty-five-cent piece containing a few minute cysts buried in granular white tissue. This tumor, therefore, resembles Figure 21, except that it contained a few cysts. Its gross appearance was very suggestive of malignancy. The most suspicious area of the tumor is shown in Figure 79. The glands showed no metastasis. This patient was well (1921), four years after operation.

Fig. 81 (Path. No. 14094. BB-13-7 [T-CC]).—Area of solid large adenoma: basement membrane in places destroyed; basal-cell arrangement abnormal. For high power magnification, see Figure 82, in which the irregular cells are somewhat of the cancer type. The tumor was a nonencapsulated cystic adenoma. After removal and microscopic examination, the complete operation for cancer was performed in twenty-four hours; there was no metastasis to the glands. Result (1921): Well, eight years later. See page 525.

Therefore, among the eighteen patients with nonencapsulated cystic adenoma, nine, or 50 per cent., have been operated on by Dr. Halsted or his associates in his clinic; only one, or about 10 per cent., has shown

microscopically fully developed cancer. All but one were immediately or ultimately subjected to the complete operation for cancer. Up to the present time, all are well.

Nine cases, therefore, may be considered the proper proportion of this type in one large clinic in thirty years.

During the same period, nine specimens were sent to me for diagnosis, and they came from nine different surgeons in nine different

Fig. 82 (Path. No. 14094. BB-13-7 [T-CC]).—High power magnification of area shown in Figure 81. Area of small, irregular stellate adenoma; basement membrane destroyed; arrangement of basal cells abnormal; cells of the cancer type. See page 525.

states, demonstrating that the lesion is rare, excites interest, and pathologists disagree as to the diagnosis or benignity or malignancy. All of these patients were immediately or ultimately subjected to the complete operation for cancer. In none did the glands show metastasis. All have been followed, and none have had a recurrence or have died of cancer.

Photomicrographs of some of these cases are reproduced herewith (Figs. 53, 58, 59, 70, 74 and 81).

I am confident that it is this group of tumors that has given rise to the impression that it is not dangerous to excise a malignant tumor of the breast, submit it to microscopic study and then perform the complete operation for cancer some days or weeks later.

This type of tumor, when diagnosed adenocarcinoma, increases the percentage of cures of cancer, not only in this group, but the total

Fig. 83 (Path. No. 3965. BB-13-8 [B]).—Area of small irregular adenoma; basement membrane in places destroyed; basal-cell arrangement abnormal; cells of the basal, or resting, type; not of the cancer type. Section from breast, the seat of diffuse nonencapsulated cystic adenoma. For gross appearance, see Figure 23; for other microscopic area, see Figure 54; also see page 530.

percentage of operative cures of cancer of the breast. When these cases and some of those in group BB-13-8 were included in our cases of cancer of the breast, they increased the percentage of five-year cures. For example, when we considered all cancer of the breast without

metastasis to the glands and included these two groups with the comedo-adenoma, the percentage of five-year cures was more than 80; when we exclude these three groups, the percentage drops to 60.

Is There Such a Tumor As Adenocarcinoma of the Breast?—This intensive restudy has almost convinced me that there may be no such thing as adenocarcinoma. The malignant tumor should be called *carcinoma and adenoma*. I have shown here, among eighteen cases of non-encapsulated cystic adenoma, one with microscopic evidence of fully

Fig. 84 (Path. No. 12586. BB-13-8 [CC]).—Area of small solid adenoma; basement membrane in places apparently destroyed; arrangement of basal cells in areas abnormal, but cells of the resting basal type; some areas of cystic adenoma and dilated ducts. For clinical picture, see Figure 29; for high power magnification, see Figure 85; also see page 534.

developed cancer. This case should be diagnosed *scirrhous carcinoma and cystic adenoma*. The remaining seventeen cases belong to the group of benign nonencapsulated cystic adenoma. Yet all these seventeen cases have been diagnosed adenocarcinoma by one or more pathologists.

The same is true of BB-13-8, the diffuse nonencapsulated cystic adenoma. Of the thirteen cases, there is microscopic evidence of cancer in only one (Fig. 88), and this patient is dead of cancer. Yet, in the remaining twelve cases, one or more pathologists have made the diagnosis of adenocarcinoma in Schimmelbusch's disease.

I have, therefore, taken from our list of cured cases of cancer twenty-nine cases and placed them in the benign group. I am now restudying the cases heretofore diagnosed as adenocarcinoma-comedo and adenocarcinoma in intracystic papilloma, and I am confident that I will find in these two groups many cases that are not malignant. I must reserve this, however, for another paper.

DIFFUSE NONENCAPSULATED CYSTIC ADENOMA, KNOWN IN THE
LITERATURE AS SCHIMMELBUSCH'S OR RÉCLUS'S DISEASE, OR
SENILE PARENCHYMATOUS HYPERTROPHY (BLOODGOD), OR
DIFFUSE PAPILLARY CYSTADENOMA. BB-13-8,

THIRTEEN CASES

For the gross appearance, see Figures 23 to 29; for the microscopic appearance, see Figures 39, 54, 56, 57, 61, 76, 83, 84 and 88.

Dr. William Welch, Professor of Pathology at Johns Hopkins, made a clear gross and microscopic description of this breast lesion in 1892.

Path. No. 227. In 1892, Dr. Halsted performed the complete operation for cancer on this patient. The glands showed no metastasis, and the patient is well (1921), twenty-nine years later. The clinical description made at that time corresponds to that found in all subsequent cases. It is as follows: "More than one half of the left breast is indurated, and the nipple is slightly retracted." Gross pathologic description by Dr. Welch: "Nipple not retracted; one half of the breast is filled with minute cysts and dilated ducts from which material can be expressed; about these ducts and cysts there is firm, granular tissue in which there are no white points or dots. The tissue cuts smoothly and not like cancer." Microscopic description by Dr. Welch: "Alveoli of cells and dense connective tissue with inflammation; the alveoli are lined by large epithelial cells which fill the alveoli with masses of cells and papilloma; other areas, smaller, are filled with solid epithelial cells. Diagnosis: Adenocarcinoma."

Here we have described papillary cystadenoma and solid duct adenoma. There is no note on the glands; no tissue or section have been preserved.

This patient was 42 years of age, and the tumor had been observed four months.

I described this lesion in 1899.

Path. No. 2660. The patient was a white woman, aged 43. The tumor had been present in the left breast nine months. It involved a quadrant, and one could palpate, in the indurated area, one large (1 cm.) and many shotlike nodules. At the exploration, I exposed a small blue-domed cyst, with clear

contents and smooth wall. On dividing the breast to remove this cyst, I found that it was diffusely involved, with other minute cysts containing clear fluid and granular material. There were also dilated ducts filled with pastil material. Recognizing the diffuse condition of the lesion at that time, I removed the breast. The microscopic picture of this case was reproduced in my chapter on Diseases of the Female Breast in Kelly and Noble's "Abdominal Surgery," Chapter 31, page 205, Figure 455, showing the areas of papillary cystadenoma with cystic adenoma. This patient was followed ten years, and there was no recurrence.

Fig. 85 (Path. No. 12586. BB-13-8 [CC]).—High power magnification of area shown in Figure 84. Small solid adenomas are apparently infiltrating the surrounding fat; but the cells are not of the cancer type. See page 534.

The third patient was operated on by Finney (1901), in Johns Hopkins Hospital. The specimen was painted by Horn (Fig. 23), and described in the gross and microscopic appearance by me.

All of us, at this time (1901), believed that we had observed a distinct clinical entity, with a characteristic gross appearance. It was not until later that I found that Dr. Welch had described it in 1892, whereas

I had described it in 1899. The painting of Finney's case (Path. No. 3965) is reproduced in colors in my chapter on Lesions of the Female Breast (Kelly and Noble's "Abdominal Surgery," Plate I, Figure 1), and is called there the adenocystic type of senile parenchymatous hypertrophy. I reproduced this picture again in 1917 (Lesions of the Female Breast, Binney's "Regional Surgery," p. 606, Figure 339) under the title "Chronic Cystic Mastitis, No Large Cysts."

Path. No. 3965. BB-13-8 (B). For the gross appearance, see Figures 23 and 24; for the microscopic appearance see Figures 54 and 83.

Fig. 86 (Path. No. 1147. BC-3; BB-13-7 [Expl. CC]).—Section of an area of scirrhus carcinoma in a nonencapsulated cystic adenoma. For high power magnification, see Figure 87. The malignant area was recognized by Dr. Halsted in 1895. There was no metastasis to the glands in the axilla. Result (1921): Well, twenty-six years after the complete operation for cancer. See page 520.

The clinical picture was typical. On inspection the outer hemisphere of the right breast was larger. On palpation it was felt to be indurated, like a "caked" breast. The involved area had a distinct

edge, and many shotlike nodules were felt. A brownish discharge could be expressed from the nipple.

The patient was a white, unmarried woman, aged 40. She had had pain for six months, and an enlargement for four months.

The patient would allow only removal of the breast. For the gross appearance, see Figures 23 and 24. The most suspicious areas under the microscope were those shown in Figures 54 and 83. The area from which they were taken had but 1 mm. of pectoral fascia separating it from the tissue left behind.

Fig. 87 (Path. No. 1147. BC-3; BB-13-7 [Expl. CC]).—High power magnification of area shown in Figure 86, scirrhous carcinoma. The nests of irregular cells are of the cancer type. See page 520.

Nineteen years later, there had been no recurrence, but the remaining breast had been removed by another surgeon in 1920. I have been unable to obtain tissue for microscopic study.

Path. No. 5221. BB-13-8 (CC). For the gross appearance, see Figure 25; for the microscopic appearance, Figure 76. The tissue in this case was brought to the laboratory in 1904 by a fourth-year student. We were informed that the patient was 47 years of age, and had had an enlargement of one breast,

involving a hemisphere, for four months. The operator first excised the breast, and then, after microscopic study with the diagnosis of cancer, performed the complete operation for cancer.

This patient was well (1921), seventeen years later. No glands were sent for microscopic study.

Path. No. 7898, BB-13-8 (B). In 1907, I received a breast specimen from Dr. Crile's clinic in Cleveland, with the typical clinical, gross and microscopic appearance of this disease; but I have been unable to obtain the result. One of my former students, Dr. Cole, who was in Dr. Crile's clinic at that time, recognized the type, and, knowing my interest, sent the specimen to me.

Fig. 88 (Path. No. 14115, BC-4; BB-13-8 [CC]).—An area of scirrhus carcinoma and an area of aberrant or irregular adenoma in a breast, the seat of diffuse, nonencapsulated cystic adenoma. For high power magnification, see Figure 89, for gross appearance, see Figure 28; also see page 537.

Path. No. 11125, BB-13-8 (CC). For the gross appearance, see Figures 30 and 31.

This was the third case to come under my observation. The clinical picture (Fig. 30) suggests malignancy, because over the prominent lump in the midzone of the upper and inner quadrant the skin was red and infiltrated.

Both nipples were congenitally depressed. The patient, however, had been aware of trouble in the left breast only two weeks. She was an unmarried white woman, aged 45, still menstruating. First, she had observed pain, then a lump. The redness did not appear until after the application of ice. Today, I think, I would interpret this history as an infection in a benign lesion and not as cancer (see Figs. 20*a* and 20*b* for a similar infection in a benign breast lesion).

The affected breast looked larger; there was bulging in the upper and inner quadrant as shown in the illustration. About the visible lump, this entire

Fig. 89 (Path. No. 14115. BC-4; BB-13-8 [CC]).—High power magnification of area shown in Figure 88. The irregular nests of cells are of the cancer type, in strong contrast to the morphology and arrangement of the irregular adenomatous areas, some of the small adenoma type. See page 537.

quadrant felt like a caked breast and had a distinct edge; the red skin was infiltrated and dimpled when the breast was pushed forward. I am of the opinion today, ten years later, that I could recognize this clinically as an infection in nonencapsulated diffuse cystic adenoma. However, at that time, I performed the complete operation for cancer.

Gross Pathology.—Figure 30 is a reproduction of the painting from the fresh specimen. There are two cysts; the one to the right is infected, the one to the left, marked with the dissecting forceps, is a blue-domed cyst. More than one half of the breast is enlarged by increased connective tissue and riddled with minute cysts and dilated ducts, from which could be expressed a varicolored pastil material.

The microscopic sections show all the stages of chronic cystic mastitis. Papillary cystadenoma and epithelium-lined cysts predominate. The infected cyst is lined by granulation tissue, and the breast about it is the seat of mastitis.

Fig. 90 (Path. No. 17012. BB-13-7 [Expl. CC]).—Section of nonencapsulated cystic adenoma. For gross appearance, see Figure 21. Areas of cystic adenoma, a few areas of papillary cystadenoma, some solid duct adenoma. For high power magnification, see Figure 91; also page 515.

Result (1921).—After ten years the patient is well.

Path. No. 12586. BB-13-8 (CC). Figure 29 is the reproduction of a photograph of the patient; photomicrographs are shown in Figures 84 and 85.

Clinical Note.—This patient was observed by me in 1912, and represents a variation in the clinical picture which we have observed once since, that is,

intermittent retraction of the nipple as a symptom of onset, with the induration of the breast chiefly in the nipple and areolar zone. This patient, a white unmarried woman, aged 38, had observed intermittent retraction of the left nipple for four years, and permanent retraction for four months, while she had observed intermittent retraction of the right nipple for four months. On inspection, both nipples were retracted; on palpation, the left nipple remained retracted, while the right nipple bulged. There was indefinite induration beneath both nipples. I first performed the complete operation on the left breast, and then, three weeks later, removed the right breast, and then, six

Fig. 91 (Path. No. 17012. BB-13-7 [Expl. -CC]).—Section from nonencapsulated cystic adenoma. For gross appearance, see Figure 21; for other microscopic area, Figure 90. This area is a papillary cystadenoma somewhat resembling lactation hypertrophy. See page 515.

months later, removed the glands in the right axilla. The operation on the right side was an illogical one; but at my first pathologic examination, I interpreted this case as adenocarcinoma in chronic cystic mastitis.

This patient is well in 1921, nine years later.

Pathology.—In an infiltrating zone beneath both nipples there was an area of nonencapsulated cystic adenoma. The surrounding breast was senile and

fatty. The most prominent histologic picture was solid small adenoma, and I venture to describe the picture in Figure 84 as the "flower pot" lobule. These small, solid adenomas infiltrated the fat (Fig. 85).

Path. No. 13204. BB-13-8 (Expl. CC). For the microscopic picture, see Figure 61.

Clinical Note.—This patient also had had intermittent retraction of the nipple of eighteen months' duration when she was observed by Dr. Heuer, in 1912. At the examination, the retraction of the nipple was permanent. The patient was a widow, aged 49. She had observed the nipple of the left breast to pull in and then protrude, off and on for eighteen months. There had been no discharge from the nipple. She sought advice because of pain of four months' duration. On palpation, nothing very definite was made out. Dr. Heuer explored and was of the opinion that the breast beneath the nipple was the seat of cancer. He immediately performed the complete operation. The breast, when received in the laboratory, had been much cut up, but I found, similar to Path. No. 12586 (Fig. 29), a zone of nonencapsulated cystic adenoma beneath the nipple. The surrounding breast was fatty and senile. The most suspicious microscopic areas are shown in Figure 61—small, irregular stellate solid adenoma with some cystic adenoma. The glands showed no metastasis.

Result.—This patient returned two years later with a similar clinical picture in the right breast—intermittent retraction of the nipple of one year's duration, permanent retraction for the last three months. On palpation, indefinite lumps were discovered in this breast. Dr. McClure, the resident surgeon at Johns Hopkins, because the diagnosis of adenocarcinoma in chronic cystic mastitis was still unchanged, performed the complete operation for cancer. The gross and microscopic pathology of this breast was practically identical with that in the breast removed at the first operation.

This, therefore, is our second observation of intermittent retraction of the nipple as a symptom of onset of this form of chronic cystic mastitis. In both cases, ultimately both breasts were involved.

Path. No. 16431. BB-13-8 (CC). I received sections from this breast from an outside source. It had been diagnosed clinically as cancer, and the complete operation was performed. There has been no recurrence in 1921, seven years later.

Path. No. 20457. BB-13-8 (CC). For the microscopic picture, see Figure 57.

This case is interesting because the left breast had been subjected to the complete operation for cancer by me in 1914. The lesion proved to be diffuse comedo-adenoma with no areas of cancer and no metastasis to glands.

I removed the right breast in 1916, two years later, because of pain and an indefinite nodule beneath the nipple. At that time I was still calling diffuse comedo-adenoma, adenocarcinoma; and, in view of the fact that a woman who had been operated on for malignant tumor of one breast runs a greater risk of cancer (almost 10 per cent. more) in the other breast, I removed the latter. Its gross pathology was that of diffuse nonencapsulated cystic adenoma, and the predominant histologic picture was papillary cystadenoma in the ducts (Fig. 57).

This patient was well (1921), seven years after the first operation.

Path. No. 26046. BB-13-8 (BB). For the gross appearance, see Figure 27; for the microscopic appearance, see Figures 39, 40, 41 and 42.

Clinical Note.—This was my first observation of the lesion involving both breasts without retraction of the nipples. The entire breast was involved, and each presented the identical sensation to palpation. One could palpate the edge of each breast throughout its circumference. The entire breast was indurated as in mastitis, with some shotlike nodules. The nipples were not retracted. The patient was a white unmarried woman, aged 43, still menstruating. She asserted that both breasts had been lumpy for years. During the last month, the lumps had become larger and had fused, so that now she could not pick out a single lump. There had been pain in both breasts for two weeks.

I made the clinical diagnosis of this type of chronic cystic mastitis and removed both breasts.

The gross pathology (Fig. 27) is the same in both breasts, and resembles closely that shown in Figure 23.

The predominant histologic picture is minute cysts, cystic adenoma and small solid adenoma (Figs. 39, 40, 41 and 42).

Result (1921).—One year later the patient was well.

Path. No. 26439. BB-13-8 (CC). For the gross appearance, see Figure 26; for the microscopic appearance, Figure 56.

I examined this patient with my colleague Dr. Seegar at St. Agnes Hospital in July, 1920. The lesion completely involved one breast only. The nipple was not retracted, nor had there been discharge from it. I advised the complete operation, which was performed. The gross pathology (Fig. 26) was a little unusual—minute cysts and dilated ducts with yellow and green material were not so prominent a feature as in Figures 23 and 27; but the surface of the breast presented small irregular, granular alveoli, as described by Welch in 1892 (p. 528) and the predominant microscopic picture was papillary cystadenoma in ducts (Fig. 56).

CANCER AND DIFFUSE NONENCAPSULATED CYSTIC ADENOMA

Path. No. 14115. BC-4 and BB-13-8 (CC). For the gross appearance, see Figure 28; for the microscopic appearance, see Figures 88 and 89.

Clinical Note.—In 1913, Dr. Finney at Union Protestant Hospital performed the complete operation for cancer on this patient and sent the specimen to my laboratory. It was his opinion that clinically and in the gross the disease was cancer. The history sent with the specimen was very brief: "White, unmarried female, aged 39; symptom of onset enlarged glands in the axilla eleven months; lump in the affected left breast, one month; lump in the right breast, one month." A gross section of the breast is shown in Figure 28. When I examined this breast, the palpation was typical of this form of chronic cystic mastitis. The entire breast was involved, indurated, with many minute shotlike nodules; but portions of the breast felt almost as hard as cancer. On section, there were a few minute cysts and dilated ducts; but the most marked feature was increased fibrous stroma with granular alveoli, and one or two small areas which felt and looked like cancer. These areas are shown in Figures 88 and 89, and picture scirrhous carcinoma and an area of aberrant or irregular adenoma. The axillary glands showed metastasis. Other areas of the breast showed a few epithelium-lined cysts and dilated ducts, cystic adenoma, irregular adenoma, aberrant adenoma.

Result.—Death occurred in ten months from metastasis to the brain. There was local recurrence in the scar before death.

Comment.—Enlarged glands in the axilla as the symptom of onset in cancer of the breast are a very rare observation. I cannot recollect more than three cases. Apparently, Dr. Finney made the diagnosis of malignancy from the palpation of these glands. It is the only case of cancer which I have had the opportunity to observe and in which the cancer was almost a microscopic area. But this case seems to show that cancer *may* develop in this type of chronic cystic mastitis, one out of thirteen cases—about 8 per cent.—while among eighteen cases of nonencapsulated cystic adenoma (BB-13-7 occurring as a small palpable tumor), there has been one example of cancer easily recognized in the gross—about 6 per cent.

Cancer and Chronic Cystic Mastitis.—I mentioned this in the beginning of my article; but I find that I have neither time nor space to describe it in detail. We have restudied all the cases of fully developed cancer in relation to the condition of the surrounding breast; but this investigation is not quite completed, so that I am unable to give the exact figures; but I am confident that when the study is finished, the conclusion will be that the predominant picture of a breast the seat of cancer is senile.

BB-12-1.—On three occasions, we have observed blue-domed cysts and some chronic cystic mastitis in a breast removed for cancer; but in these cases neither the cyst, nor the chronic cystic mastitis was made out until after the complete operation had been performed and the breast sectioned. The cyst as a tumor had never been observed by the patient.

BB-12-2.—As yet we have not found a cyst of the galactocele type associated with cancer of the breast.

BB-12-3.—We have never observed cancer in the diffuse cystic disease of the breast. This conforms to the observations of Billroth, Velpeau, and all the older authorities, which I have read with great care.

BB-13-4 and 5.—In a large number of breasts completely removed for cancer, we have noted increased parenchyma in adenomatous areas, here and there a minute cyst, or one or more dilated ducts. But this condition of the breast had presented no clinical symptoms.

BB-13-6.—The extreme degree of dilatation of the ducts beneath the nipple, presenting itself clinically as a palpable wormlike mass beneath the nipple, has never been observed in association with cancer of the breast. On a few occasions, the ducts beneath the nipple have been slightly dilated and filled with the characteristic material; but the malignant tumor has been outside this zone, and there has been nothing to palpate beneath the nipple in these cases.

BB-13-7.—I have already noted and described one case of scirrhus cancer and cystic adenoma. There have been a few more, all of which were recognized, either clinically, or in the gross, as cancer, and treated as cancer.

BB-13-8.—I have illustrated and described one case of cancer in the diffuse nonencapsulated cystic adenoma. There are a few other observations; but in all, the lesion was clinically malignant, the complete operation performed, and this type of chronic cystic mastitis found in making a gross section of the breast.

Microscopic areas which may be called chronic cystic mastitis are not uncommon findings even in the senile breast.

Among the 350 cases of chronic mastitis, my evidence seems to show that if the palpable single or multiple lesion can be recognized in the first six groups, which include 319 cases, the breast can be saved without the patient running any more risk of cancer than is incidental in any woman at the same age.

In regard to groups BB-13-7 and -8, in the small isolated and the diffuse nonencapsulated cystic adenoma, lesions easily to be differentiated from the others, it might be safer for the present to perform the complete operation for cancer.

Conservative Operation for Chronic Cystic Mastitis of the Types 1 to 6.—As a matter of fact, among the 319 patients subjected to operation in these six groups, conservative operations have only been performed in 128 cases, about 38.5 per cent. Of these 128 conservative operations, I have performed sixty-two, or 47 per cent., while my colleagues at Johns Hopkins are credited with thirty-two cases, and outside surgeons with thirty-four cases.

The most common type of chronic cystic mastitis to be subjected to the conservative operation is BB-12-1, the blue-domed cyst—ninety-three cases (Bloodgood forty-nine, more than 50 per cent.; Johns Hopkins, twenty-five; outside surgeons, nineteen).

Further discussion as to the relation of the extent of the operation to the clinical picture and pathology at exploration will be postponed for a second paper.

The present paper deals with the most important feature of the diagnosis—pathology; and I trust that it will aid operators and pathologists to recognize more frequently the types of chronic cystic mastitis.

THE MICROSCOPIC PICTURE OF THE DIFFERENT TYPES OF CHRONIC CYSTIC MASTITIS

Classification.—The following classification is based on the study of hundreds of sections and is an attempt to describe the different histologic pictures using the simplest nomenclature which had been

previously employed in the literature and textbooks. When more than one term has been used to describe apparently identical pictures, I have tried to select the one most frequently in use.

Main Division.

- I. Adenomatous.
- II. Cysts.
- III. Dilated Ducts.
- IV. Papillary Cystadenoma.
- V. Solid Adenoma.
- VI. Mastitis.
- VII. Changes in the Basement Membrane.
- VIII. Changes in the Basal-Cell Arrangement.
- IX. Changes in the Morphology of the Cell.
- X. Changes in the Stroma.

All the histologic pictures seen in chronic cystic mastitis and in all benign lesions of the breast can be described within these nine main divisions.

Subdivisions.

- I. Adenomatous.
 1. Normal (Fig. 32).
 2. Lactation (Fig. 33).
 3. Senile (Fig. 34).
 4. Fibro-adenomatous (Fig. 35).
 5. Intracanalicular (Fig. 36).
 6. Aberrant (Figs. 37 and 52).
 7. Irregular (Fig. 38).
 8. Cystic (ectasia) (Figs. 39 and 43).
- II. Cysts.
 1. Large cysts, no epithelial lining (Fig. 44).
 2. Large cysts, epithelial lining (Figs. 45 and 46).
 3. Small cysts, epithelium-lined (Figs. 47 and 48).
- III. Dilated Ducts.
 1. Small dilated ducts, almost normal (Figs. 32, 35 and 37).
 2. Large (Figs. 49, 50 and 78).
 3. Small ducts with thickened walls, residuum from old mastitis (Fig. 34).
- IV. Papillary Cystadenoma.
 1. Isolated in lobule (Figs. 52 and 53).
 2. Diffuse, alveolar (Figs. 55, 70, 72, 73, 74, 76, 77 and 91).
 3. In ducts (Figs. 56 and 57).
- V. Solid Adenoma.
 1. Small alveolar (Figs. 39, 40, 58 and 63).
 2. Large, apparently in ducts (Figs. 59, 60, 79, 81 and 90).
 3. Small irregular stellate (Figs. 41, 61, 79 and 80).
 4. Comedo (not observed in chronic cystic mastitis).

VI. Mastitis.

1. Alveolar with atrophy (Figs. 44, 62 and 67).
2. Alveolar with solid adenoma (Figs. 62 and 63).
3. Periductal (Figs. 34, 64, 65, 66 and 78).
4. Diffuse; interstitial (Fig. 67).
5. Zones of granulation tissue (Figs. 67 and 68).
6. Giant cells (Fig. 67).
7. Tubercles (none found in chronic mastitis).
8. Organized hematoma (Fig. 69).

VII. Basement Membrane Changed.

1. Intact (Figs. 32, 33, 35, 36, 39, 45, 55, 57, etc.).
2. Destroyed or atrophied, partially or completely (Figs. 42, 62, 66, 71, 73, 74, 75, 76, 77, 79, 81, 83 and 85).

VIII. Basal-Cell Arrangement.

1. Normal in all the figures noted after VII-1, basement membrane intact.
2. Abnormal in most of the figures noted after VII-2, basement membrane destroyed; most marked in 66, 75 and 82.

IX. Morphology of the Cell.

1. Basal—resting (Figs. 32, 35, 36, 38, 59, 60, 61 and 72).
2. Glandular—active (Figs. 33, 53, 54, 55, 56, 57, 74 and 82).
3. Atrophic—degenerating (Figs. 34, 62 and 79).
4. Proliferating and desquamating (Figs. 51, 56, 66, 77 and 78).
5. Suggestive of the cancer type (Figs. 76, 77 and 82).

X. Fully Developed Cancer. (Figs. 86, 87, 88 and 89).

Comment on the Microscopic Picture.—It is important to record that the histologic pictures shown in Figures 33 to 85 and in 90 and 91 have never been observed in the breast of a patient whose glands showed metastasis, or who had definite cancer. Similar microscopic pictures are to be found in the encapsulated adenoma (fibroadenoma, intracanalicular and cystic); in the intracystic papilloma, in diffuse virginal hypertrophy; in mastitis associated with lactation, unassociated with lactation, and in tuberculous mastitis.

Most of these microscopic pictures have been observed in the breast tissue surrounding a blue-domed cyst, in which the cyst and a zone of breast tissue had been removed; and yet, there has been no recurrence nor the development of cancer after many years' observation of the patients.

In the breast surrounding the blue-domed cysts, certain microscopic pictures are uncommon such as those shown in Figures 55 and 73.

Certain microscopic pictures have been observed only in BB-13-7 and -8, the isolated and diffuse nonencapsulated cystic adenoma, for example, Figures 56, 74, 76, 77; but similar pictures have been seen in the encapsulated cystic adenoma.

Characteristic Histologic Pictures.—Figure 32 shows an almost normal breast; Figure 33 is lactation hypertrophy; Figure 34 in its thick-walled ducts indicates an old mastitis of years' duration; Figure 36 is

an intracanalicular myxoma; Figure 44 is the thick wall of a large cyst; Figure 45 is typical of a duct; Figure 48 is characteristic of the diffuse cystic disease of the breast; Figure 49 of diffuse dilatation of the ducts beneath the nipple; Figure 56 is almost characteristic of the diffuse nonencapsulated cystic adenoma in which papillary cystadenoma of the duct predominates.

Where Pathologists Disagree.—I have submitted sections of every type of chronic cystic mastitis, lactation mastitis, tuberculous mastitis, encapsulated cystic adenoma, fibro-adenoma, and intracystic papillomas to more than forty consulting pathologists, and I have their written diagnoses. In the majority of these cases, there was disagreement; the percentage of those favoring benignity varied from twenty to ninety.

In all of these demonstrations, the sections illustrated in Figures 87 and 89 were included. On these two cases of fully developed cancer, there was not a single disagreement.

During the same period, many sections and tissues have been sent to me from other surgeons and pathologists with their diagnoses. I have never received one which proved to be a fully developed cancer that had not been diagnosed cancer. But I have received many with a diagnosis of cancer which in my opinion belonged to one of the above mentioned benign groups.

It is very interesting to record here again that in breast lesions, when good pathologists disagree as to malignancy, the patient lives; when there is agreement, there is always a large percentage of deaths from cancer.

CONTRIBUTIONS OF THE AUTHOR TO THE LITERATURE ON BREAST LESIONS

Senile Parenchymatous Hypertrophy of the Female Breast. Its Relation to Cyst Formation and Carcinoma, *Surg. Gynec. & Obst.* **3**:721 (Dec.) 1906.

The Clinical and Pathological Differential Diagnosis of Diseases of the Female Breast, *Am. J. Med. Sc.* **135**:157 (Feb.) 1908; *Bull. Johns Hopkins Hosp.* 139, April, 1908.

Inflammations and Tumors of the Female Breast, Chapter in Kelly and Noble: *Gynecology and Abdominal Surgery*. Philadelphia, W. B. Saunders Company, 1907.

Cancer Cysts of the Breast and Their Relation to Nonmalignant Cysts, *J. A. M. A.* **53**:1475 (Oct. 30) 1909.

What Every Woman Should Know About the Breast, Prevention of Cancer Series, Pamphlet No. VIII, issued by the Council on Health and Public Instruction, A. M. A., January, 1916.

Cancer of the Breast: Figures Which Show that Education Can Increase the Number of Cures, preliminary report from address delivered before Western Surgical Association, Des Moines, Iowa, Dec. 18, 1915, *J. A. M. A.* **66**:552 (Feb. 19) 1916.

Lesions of the Female Breast, Sect. 23, Vol. I, in Binnie: *Treatise on Regional Surgery*, Philadelphia, P. Blakiston's Son & Co., 1917.