

eral small, short branches to the caudal segment and posterior surface. The above vessels, taking a sinuous course, break up into numerous branches which anastomose freely and ramify in the fascia surrounding the gland. From the wide-meshed, irregular network of the ventral surface two sets of branches are given off: one very small to the skin, the other much larger to the gland proper. These latter, situated in the stroma, divide and subdivide on the connective-tissue framework.

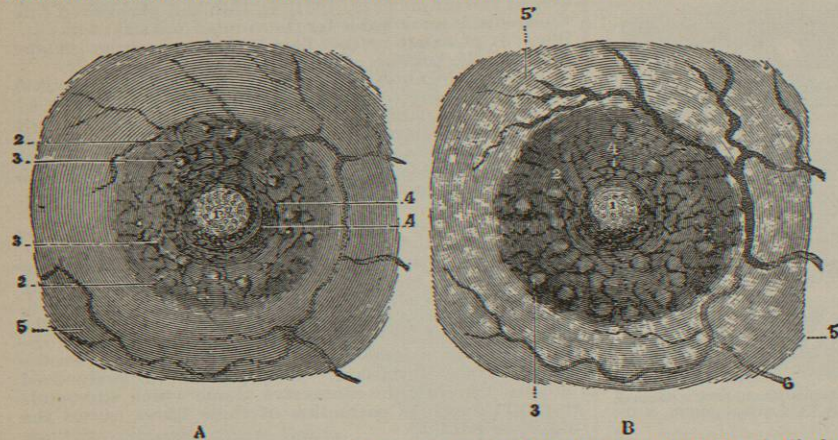


Fig. 1051.—The Nipple and its Areola. A, in a non-pregnant; B, in a pregnant woman. 1, Nipple; 2, areola; 3, tubercle of Montgomery; 4, sulcus at the base of the nipple; 5, skin of breast; 6, venous circle of Haller.

They finally form a close capillary network which surrounds the acini. The arterioles of the nipple do not form cavernous sinuses, and its erection is due entirely to the muscular tissue.

Veins.—From the arterial capillary plexus around the acini a venous plexus arises. This proceeds toward the ventral surface of the gland and forms beneath the skin a large-meshed plexus. During the period of lactation these vessels are seen through the skin as blue lines. Around the nipple, these subcutaneous veins form a more or less complete ring, the venous circle of Haller (Fig. 1051, B).

The superficial network communicates freely with the superficial veins of the neck above, with those of the abdomen below, and with the thoraco-epigastric vein laterally. These carry the blood into the subclavian, the intercostal, the internal mammary, and the axillary by branches which parallel the arteries.

Lymphatics.—The following description of the lymphatics is in the main that given by Stiles, and differs somewhat from that of other authors. There are five sets of lymphatic vessels: (1) superficial or cutaneous, including those of the nipple, areola, and surrounding skin; (2) subareolar plexus (Sappey); (3) intramammary; (4) those of the circummammary fat; (5) retromammary.

The cutaneous lymphatics are similar to the cutaneous lymph vessels elsewhere. It is to be noted that those of one side of the body communicate with those of the other; thus explaining the occurrence of axillary infection on one side from a tumor of the opposite. Upon the skin of the nipple and areola the network formed by these vessels is very close, being particularly rich upon the nipple. They open mainly into the subareolar group.

The subareolar lymphatics consist of very large vessels, forming a wide-meshed network running horizontally in the loose areolar tissue around the lacteal sinuses. As noted above, the cutaneous vessels open into this plexus, as do also many of the intramammary vessels. It thus serves as a means of communication between the two. From the subareolar plexus of lymphatics Sappey states that there are two and sometimes three large trunks which open into the axillary lymph nodes.

The intermammary lymphatics begin as a plexus of small channels consisting of a single layer of endothelium supported by stroma. Each mesh of the network surrounds one or more of the ultimate lobules of the gland, and receives its lymph from the interacinous spaces. From this layer vessels parallel to the milk ducts proceed to the subareolar plexus into which they empty.

These periductal as well as the perilobular lymphatics anastomose with others which are closely related to the blood-vessels. The larger blood-vessels are accompanied by two or more lymphatics which occupy their sheaths. The smaller vessels are usually accompanied by only one lymph channel, which is larger than the vessel and more or less completely surrounds it.

The circummammary set receives branches from the skin and the ventral surface and circumference of the breast. It is merely a part of the general lymphatic system of the ventral chest wall. From this set larger lymph vessels proceed between the layers of the deep fascia. They soon pierce the deep layer of this fascia and proceed, as large muscular-walled lymph vessels, to the lymph glands.

The retromammary lymphatics include those of the pectoral fascia. They receive branches from the posterior surface of the gland. Either

directly or indirectly some of the lymph from all other sets passes into these lymphatics of the deep fascia which accompany the mammary blood-vessels and thus reach the lymph nodes.

The lymphatics of the inner part of the gland accompany the branches of the internal mammary artery through the chest wall and empty into the sternal lymph nodes situated along this artery. A great many accompany the branches of the axillary artery to empty into the axillary lymph nodes. The retromammary lymphatics of the two breasts communicate.

During the activity of the breast the lymphatics are filled and the lymph nodes are red, solid, and composed almost entirely of lymphoid tissue. During inactivity the lymph vessels are but slightly filled and the nodes appear to take on a fatty change. This is particularly marked in senility.

Nerves.—The nerves of the breast, excluding those derived from the sympathetic, which enter the gland with the arteries, are derived from three sources: first, from the second, third, fourth, fifth, and sixth intercostals; second, from the cervical plexus; third, from branches of the brachial plexus. The intercostals supply the breast by twigs from their anterior and lateral cutaneous branches. The third and fourth cervical nerves of the cervical plexus give off the suprasternal, supraclavicular, and supra-acromial. Twigs from the middle of these groups, the supraclavicular, supply the upper part of the breast. From the inner and outer cords of the brachial plexus the internal and external anterior thoracic nerves take origin and pass forward to supply the pectoralis major and minor muscles. Twigs from these nerves pierce these muscles to supply the breast on its under surface. These nerves receive their fibres from the anterior primary divisions of the sixth, seventh, and eighth cervical and first thoracic nerves. They proceed to the gland proper, to the skin, to the muscle fibres below the areola as well as to the blood-vessels. On and around the areola some of the nerves end in Pacinian corpuscles, and in the nipple they may end in tactile corpuscles in the papillae.

Stimulation of the mammary nerves causes an erection

of the nipple, dilatation of the vessels, and secretion of milk. After section of the cerebro-spinal nerves erection of the nipple does not occur, but the secretion of milk is not interfered with. It seems probable that there are special nerves, aside from those of the blood-vessels, governing secretion; but this has not been proved. Emotional disturbances (anger, fear, and so forth) arrest secretion.

From 500 to 1,500 c.c. of milk is daily secreted. To remove this from the gland there is not only the mechanical action of sucking, but also the activity of the gland itself. This latter consists in the contraction of the muscle fibres beneath the areola. By these the nipple is erected and by their rhythmical contraction the milk ducts and sinuses are emptied. The sucking not only stimulates the muscle to act, but also excites the sensory nerves of the nipple, thus causing a reflex stimulation of the gland acini and an increase of the secretion. During activity the vessels of the gland are dilated. The amount of the secretion appears to be influenced by blood pressure. Frequent and rapid emptying of the gland causes a greater flow, possibly through secretion pressure within the cells. The oftener the breasts are emptied the richer the milk becomes in casein. The last milk obtained at any time is always richer in fat, as it comes from the acini.

Human milk is always alkaline. Cow's milk may be alkaline, acid, or neutral. The milk of carnivora is always slightly acid. Various substances, when eaten by the mother, are secreted in the milk. Such are anise, vermouth, garlic, etc.; chloral, rhubarb, opium, iodine, mercury, lead, etc. Some substances, such as atropine, arrest the secretion of milk.

Milk contains large amounts of casein, lactose, and fat, also certain inorganic constituents. Neither the casein nor the lactose occurs in the blood, and fat is found only in small amounts. The inorganic salts in the milk are in different proportions from those found in the blood. Food rich in proteids increases the amount of milk, but the relative amount of fat is increased more than the other constituents. With a pure flesh diet, the milk contains a very large amount of fat. Fat added to the food, if not accompanied by an addition of proteid material, rather diminishes than increases the amount of fat in the milk. It appears, therefore, that the fat in the milk is not obtained from the fat taken with the food, but is the result of the decomposition of the proteid. Increasing the carbohydrates of the food does not increase the amount of sugar in the milk. The greatest part of the sugar is therefore also derived from the proteids; so too is the casein. Both the milk sugar and the casein are probably formed by the action of ferments which remain in the cells and do not pass into the milk. It is clear that milk is a chemical product, and that it is due to the activity of the cells in the mammary gland. Concerning the specific chemical source of the constituents, nothing is known with certainty. The relative proportion of the various constituents of the milk varies in the different months after delivery. The cause of this variation is not known, but by it those substances best suited to the child during its different periods of growth seem to be supplied.

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BREAST, FEMALE, DISEASES OF THE.—**AMAZIA.**—Entire absence of mammary glands is extremely rare, and is accompanied by other deformities usually incompatible with life. Absence of one breast is more often met with, and the corresponding ovary is found to be wanting as well (Scanzoni), or the great pectoral muscle of the same side. Probably absence of one breast and deformity of the other is the nearest approach to amazia found in the adult. A rudimentary breast may be so small as to justify the term micromazia.

POLYMASTIA.—Supernumerary mammae are not uncommon. Bruce,¹ in 4,000 examinations, found this deformity present in 1.54 per cent., a ratio greater than usual, I believe. He also finds men more often affected than women, in the proportion of 4 to 1, a result contrary to that obtained by Godfrain.² I have seen the deformity more often in females. Axillary prolongations are not infrequently met with, and may be mistaken for lymphatics. They undergo the usual development during pregnancy, the secretion escaping by the nipple. Supernumerary mammae occur most frequently in pairs, and are situated below the normal glands, rather nearer to the middle line of the body; the situation next in frequency is above the normal glands and further from the middle line, i.e., toward the axilla. When the deformity is unilateral, the left side is most often chosen. Supernumerary glands below the normal mammae are larger and better supplied with nipple and areola than when situated on the side toward the axilla. They of course follow the evolution of the natural gland, becoming most apparent during lactation, and undergoing atrophy after the menopause. Klob has recorded an additional mamma, on the shoulder, the size of a nut; it was provided with a nipple. Two examples have been noticed on the back. Robert reports an instance upon the thigh; Percy, one upon the epigastrium. Multimammae are not over fecund, and may or may not be provided with nipples for the additional glands, or the secretion may escape by a small opening. Functionally also there may be great variation. Ross³ reports a mulatto with a third breast beneath the normal left one. It was six inches in circumference, was provided with nipple, follicles, and areola, yielded milk, and if not attended to was painful from overdistention. The nipple was too small for the child to nurse. Lynceus⁴ reports a woman with four breasts in two vertical lines. All gave milk abundantly. Gardner⁵ mentions a similar case in a negress, the supernumerary glands being in the neighborhood of the axilla. Percy⁶ reports the case of a vivandière who had four mammae in two vertical lines, and a fifth five inches above the umbilicus, in the middle line. This latter resembled the breast of an impubic girl; the other four secreted milk.

Alexander⁷ records the case of a mulatto male with six nipples in two vertical lines, there being a distance of four inches between the nipples vertically. The subject of the report stated that his mother was malformed in like manner, four of her nipples giving issue to milk;

also, that, of several brothers and one sister, all save one brother were provided with four supernumerary breasts. Unfortunately, these statements could not be verified by an examination. Robert's case, already referred to, is as follows: A woman, whose mother had three breasts, herself had a supernumerary mamma upon the outer surface of the left thigh, four inches below the great trochanter. Her own child sucked the additional mamma for twenty-three months. Four foster-children nursed from it during six years. Robert examined this mamma and found it atrophic like the (pectoral) others, the menopause being past. Handyside⁹ reports three brothers each with four mammae. The parents were normal. Variations, both as regards nipples and areolae, are observed to occur, not only in connection with additional breasts, but also with mammae in the usual situation and otherwise normal. G. Honnauß saw five nipples to one breast. Imperfectly developed nipples, or indeed entire absence of nipples, is more common, and this condition is the cause of much pain and inconvenience, owing to the infant being unable to nurse properly, and so inducing engorgement, with consecutive inflammation of the corresponding mamma. Congenital abnormalities of the mamma are hereditary. They have been seen, according to my experience, more often in the negro and mulatto than in the white race.

HYPERTROPHY OF THE MAMMA.—Hypertrophy of the mamma is seen in both sexes, occurring in one or both glands. Lymphatic and scrofulous persons are more likely to be so affected. As a sequel of mumps, it may accompany atrophy of the corresponding testicle. Olphan¹⁰ quotes from the records of the Société de Biologie the case of a man who lost a testicle from cancer, and subsequently died from a recurrence of the disease. One breast was enlarged, and showed, on microscopic examination, colostrum and milk globules. Gorham¹¹ records the following case: The patient, a soldier, acquired injuries in battle, and acquired Pott's disease of the upper dorsal and lower cervical vertebrae. Atrophy of the testes was observed, and coincidentally progressive enlargement of both breasts took place. Sexual desire was in abeyance after the spinal injury. Four and a half years subsequent to the accident, Gorham says: "Each breast is at this period the size of an orange, glandular to the touch, and pendulous." Prior to the spinal hurt, the patient had three children by his wife; subsequently, his figure and appearance changed, resembling that of an eunuch. This case appears to be the one previously reported by Thompson.¹² Unilateral hypertrophy has not been noticed coincidentally with non-descent of one testicle. Petrequin (Labarraque: *Thèse de Paris*, 1875) saw a man with a pendulous mamma, 48 cm. long; no cause discoverable. Enlargement of one breast in young boys has been noted as occurring without cause, but such increase may be simulated by retromammary lipoma, as in the instance recorded by Lobker.¹³

Hypertrophy of the mamma in the female has been noticed a number of times. Inasmuch as there are physiological variations in the size of the mamma, it is not easy to say just when enlargement becomes pathological. The breasts have been found to weigh many pounds, constituting enormous tumors pendent from the front of the thorax, sufficient, indeed, to prevent locomotion, to any extent, on the part of their unfortunate possessor. In Huston's¹⁴ case the right breast weighed twelve pounds, the left twenty pounds. Demarquay¹⁵ removed a left mamma, after second pregnancy, weighing 8 kgm. (about 17½ lbs.). Skuhersky¹⁶ records mammae of eighteen pounds and nineteen pounds. Esterle,¹⁷ in a case which came under his observation, judged the breasts, in the third month of pregnancy, to weigh from twenty-six to thirty pounds, confining the patient to bed. Chassaing and Richelot report an instance of a breast which weighed thirty pounds, and hung down as low as the knee. Durston¹⁸ made an autopsy of a girl whose right breast was supposed to weigh forty pounds, and whose left actually did weigh sixty-four pounds. The skin covering such enormous masses as these will, of

course, be greatly stretched and somewhat yellowish in color, usually roughened also. A certain woman was married in 1853. After two pregnancies the left breast was so large that it reached to the umbilicus, and was removed in 1858. After removal it was found to weigh sixteen and a half pounds. The following statement in regard to it is from Schmidt's *Jahrbücher*, t. cvi., p. 51, 1860: About 2 litres of milk, very white, flowed from the tumor, showing here and there a streak of blood, without odor, alkaline, thick, resembling good cream; specific gravity, 0.98 to 0.99. A certain quantity, analyzed by Professor Schlossberger, showed: Water, 67.52; fat, 28.54; sugar and extractive matters, 0.75; casein, 2.75; salts, 0.41.

The tumor was examined microscopically, and from this examination it appeared that "the stroma was made up of fibrous connective tissue split roughly, the cells communicating with each other by numerous projections containing here and there fatty granulations. The small vesicles of the acini, pear-shaped, rounded, or elongated, . . . were slightly longer than normal, and enclosed, as did the commencing excretory canals, many small bodies having a well-defined outline, and containing shining nucleoli and a large number of fatty globules. The larger excretory canals presented the usual structure. The lumen walls were made up of compact fibrous connective tissue, mixed with cells, but without trace of glandular elements. Epithelial lining was lacking. The origin of these cavities was due very probably to a partial dilatation of the tissue by accumulation of its contents, which had brought about, on the one hand, destruction of gland substance, and on the other, a new formation of connective tissue." Demarquay's case, already referred to, showed on microscopic examination fibrous degeneration. There existed, in the extirpated breast, a central cavity containing a serous fluid in which were small oil globules, granular globules, and blood cells.

Cause.—Nothing certain is known as to the cause of this increased growth; menstrual irregularity or actual suppression has seemed to be the exciting cause. Increase with each succeeding pregnancy is noted. In Huston's case the ovaries were found diseased. If we consider how close are the relations between the different parts of any system in the human economy, it is fair to infer some general disturbance of the generative apparatus prior to the onset of mammary hypertrophy; but of what character such disturbance is, we are, for the present, in doubt.

Between the ages of fourteen and thirty the affection under consideration is most likely to occur. While it has been established that both breasts may become hypertrophied, the left seems to show a greater predisposition to such hypertrophy. An extremely interesting example of temporary¹⁹ increase in bulk,—the erection of the mamma,—during a paroxysm of intermittent fever, is noted by Ferrus (*Gaz. des Hôp.*, 1846, No. 90, p. 358); it yielded to quinine. At the onset of the trouble the mammae are large and firm; subsequently, however, they are pendulous, and thus appear pedunculated; the lobes are easily distinguished, the areola is large, sensibility is lessened, and perhaps there may be some oedema at the depending portion. The beginning of the disease is insidious, and its progress is characterized by alternations of rapid increase and apparent quiet; entire retrocession is not observed. Durston's²⁰ case followed a very rapid course, death closing the scene in three and a half months. After delivery, should hypertrophy commence during pregnancy, growth ceases. In Huston's case, gangrene followed a blow, death ensuing. MacSwiney²¹ relates a case in which removal of one breast made the other grow faster.

The prognosis is not grave, except when the mammary increase is accompanied by general emaciation, with frequent pulse. Esterle²² met with such a state of affairs, and found opium to give relief up to the time of confinement, when improvement took place. It is possible that the induction of a miscarriage would be necessary, other means failing, but this should be done only when the life of the mother is gravely imperilled.

The indications for treatment are both local and general. If menstruation be absent, induce it; if it be too profuse, diminish it; if it occur during lactation, arrest it; should arrest of lactation be the exciting cause, then re-establish the secretion—in other words, keep the generative apparatus normal. Iodine and iodide of potassium, to be administered internally and by friction, are indicated. Locally, support and compression by rubber bands will be found useful. Other means failing, removal of the ovaries, or the ovaries and tubes, might, by establishing the menopause, bring about a cure of the trouble under consideration. I am not aware that this last treatment has ever been adopted; it is, however, physiological and worthy of trial.

Other means failing to arrest growth, amputation is called for. Prior to removal of the breasts vascularity may be diminished by suspending the organs, as in elephantiasis of the scrotum. The use of Wyeth's pins is to be thought of also.

DISEASES OF THE NIPPLE.—The nipple, save in lactation, rarely attracts notice; during the active life of the mamma, however, it is far otherwise. Its physiological perfection is a matter of extreme moment, not for the mother only, but for the health of the infant. A well-formed nipple of sufficient size, not buried deeply in the areola, but standing out from the skin surface, is to be secured before the end of pregnancy. Should this development not occur during the last months of gestation, gentle traction upon the nipple, with pressure backward on the areola, will be of use in aiding protrusion. Suction by means of an air pump has also been tried.

After the termination of labor, two causes are paramount in causing nipple disease: (1) Lack of development; (2) lack of cleanliness. The first offers an obstacle to the emptying of the breast, while the effort of the child to suckle excites the mamma to active secretion; as a result there will be retention and engorgement. The second, lack of cleanliness, conduces to an unhealthy condition, with a long catalogue of skin diseases, erosions, fissures, etc. Not only then is the protrusion of the nipple to be assisted in the manner described above, but the tender skin covering it and the areola should be hardened by frequent cool bathing during the eighth and ninth months of gestation, or perhaps by the employment of a slightly astringent lotion.

After the child nurses, the nipple and areola are to be gently and thoroughly cleansed, in order that the baby's saliva or a little milk, etc., may not rest in the natural rugae of the part, and so induce irritation or a worse condition. Erythema and eczema present no symptoms not seen elsewhere; ecchymoses, from the child's suction and chewing while suckling, are recognized by the ordinary signs. Paget has described a chronic eczema which has its starting-point in the nipple; after destroying the latter, the disease gradually extends both over the surface and into the substance of the mamma, and finally terminates in carcinoma. Investigation seems to negative the simple character of this eczema, and it is known as malignant papillary dermatitis. The prominent characteristics are: a bright red raw surface, slightly raised, with a well-defined border; to the touch, a certain firmness or parchment induration; secretion scanty; existence very chronic. The areola and nipple are affected; the latter disappears. The disease is recognized as epithelioma histologically and requires similar treatment. Removal of the nipple only is useless; complete removal of the breast, as for other carcinomata, is called for.

Fissures, erosions, etc., when first established, are best treated by slightly astringent applications, afterward by emollient washes. Later, after the child has nursed, the breast may be washed, dried, and powdered with bismuth subnitrate, lycopodium, etc. I have seen excellent results follow the application of pure rubber dissolved in chloroform to the fissures, before the child is allowed to nurse. The application of a four-per-cent. solution of cocaine is reported as giving excellent results. Shields and artificial nipples of one kind or another may give good results, or the secretion of milk may require sup-

pression in order to bring about healing. Abscess of the nipple is infrequent, and, according to Velpeau, occurs in a milk channel most often; under such conditions milk will escape after the discharge of matter. Rarely more than a drop or two of pus is formed.

Chancre of the nipple and areola is usually acquired by inoculation from a mucous patch, and resembles chancre of the lip. The amount of induration is very marked, not, however, appearing suddenly; parchment-like at first, the induration spreads to subjacent tissues, and may involve an area equal to that of a silver dollar. If the breast is being nursed, a scab is not allowed to form; otherwise a covering crust is not unusual. The primary lesion of syphilis may appear as an erosion, fissure, or ulceration. An axillary bubo will develop in connection with it, more often just under the edge of the great pectoral muscle than deep down in the axilla. The progress of the chancre is slow and painless, changing, with the advent of secondary accidents, into a mucous patch. During the early stage only of the disease will there be room for doubt; absence of pain, however, and the presence of a raw surface are to be looked upon with grave suspicion. In the event of a nursing woman being affected, the mouth of the infant she nurses is to be scrutinized closely.

Hyperesthesia of the nipple, accompanying a rigid condition of the organ, has been noted, and will probably depend upon disturbed function of the uterus and appendages.

A similar hyperæsthetic condition of one or both breasts may be met with, and is likewise dependent upon an artificial mode of life, inducing defective menstruation.

NEURALGIA OF THE BREAST.—Neuralgia of the breast, the so-called irritable mamma, is to be classed with the two preceding affections, and is the outgrowth of incomplete or deranged sexual life. The subjects are usually unmarried, but not always; young, under twenty-five years, slender, with pale complexion, of lax muscular fibre, and not dependent on their own exertions for a livelihood. They will show strong predilection for trashy literature and laziness, rather than for the standard authors and exercise; the idleness of the day will prove a subject of absorbing interest to them. Other hyperæsthetic spots or lines generally exist upon the skin of such individuals,—along the spine, for instance, or over the intercostal nerves,—and certain attitudes or motions will be complained of as liable to induce great suffering. Some sorrow may have been experienced, and the subject of it, from overmuch thought, gradually develops sympathy for herself, changes her mode of life, and generates a mammary pain. Physical examination of the breast shows no cause for suffering.

Treatment consists in regulating menstrual life and causing the patient to pursue an active and useful existence. In my hands, far more success has been thus attained than by resorting to, and relying largely upon, drugs. Menstruation, whether excessive or deficient, is to be rendered normal by appropriate means. An action of the bowels once daily is to be secured; the diet should be simple, nutritious, and not in excessive quantity; the clothing should be warm and loose, not confining natural movements; the function of the skin should be assisted by cold sponging; regular exercise should be insisted on; the patient should retire to bed early and rise early; dime novels should be put aside and the classics read, so that both mind and body may gradually be led to a normal healthy condition;—under which régime the mammary pain is likely soon to depart. Briefly, the treatment may be stated in the old saying, "Live on sixpence a day and earn it."

CONTUSIONS AND WOUNDS.—Contusions of the mamma are of interest as having given rise to malignant disease in a certain number of cases. In order properly to estimate violence as a factor in the etiology of carcinoma or sarcoma, the number of bruised breasts not the seat of malignant growths should be known. This is manifestly impossible, and with our present knowledge we must remain in doubt concerning violence as a factor in the etiology of malignancy. Ecchymoses without traumatism

have been observed in women menstruating with difficulty, blood also oozing from the nipple, perhaps.

Wounds of the mammary gland bleed freely; parenchymatous hemorrhage and much oozing follow. Pressure with sponges or cloths wrung out in hot water is the most efficient hæmostatic: healing is not rapid and pus formation is usual.

MASTITIS.—Inflammation of the breast may occur at any age, but is found far more often during the early days of a first lactation than at any other time. It is no uncommon circumstance for the mamma at birth to be somewhat swollen and to give exit to a small amount of discharge more or less milky in character; if let alone, no harm follows. Injudicious handling on the nurse's part, to "work out the milk," is almost always indulged in with the result of causing an abscess somewhat often. Up to and including early puberty mastitis is rare, and when present is apt to be chronic rather than acute. The subjects are girls of feeble muscles, pasty complexion, torpid bowels, etc., and they present those symptoms which are generally grouped under the term strumous. Early opening of the abscess, general tonics, and out-of-door life, with regular hours, suffice for a cure. During pregnancy and the normal mammary development consequent thereon, abscess—save from traumatism—is very rare; but with labor the scene changes. The mammary inflammation and abscess which occur most frequently during the first month of lactation depend, in the great majority of cases, upon a defective development of, or morbid condition of, the nipple. The nipple is so small that the child grasps it with difficulty, suckling is imperfect, and the mamma is not emptied; or a cracked and fissured nipple is so painful, when grasped by the baby's mouth, that suckling is again imperfect; or, from the inflamed nipple as a starting-point, trouble extends to a distance, through the lymphatics. The inflammation and abscess met with in early lactation are recognized as occurring, first, in the subcutaneous connective tissue outside the gland proper—subareolar; second, beneath the gland in relation with the thorax—submammary; third, in the connective tissue of the mamma—interlobular. To these three classical situations there should be added a fourth: in a lacteal sinus. The latter form of abscess, although not met with so soon after birth as the others, is worthy of recognition.

The cause of mammary abscess is not difficult to find. Pregnancy calls into life a hitherto comparatively rudimentary organ for the performance of an active function, and failure of any part of the organ determines an accident. The nipple, a healthy condition of which is essential to proper escape of the mammary secretion, is subject to violence, etc., from the infant, and an infection follows. Lack of cleanliness is the cause most frequently met with.

A subareolar abscess, not larger than a filbert, is found in the connective tissue of the locality indicated by the name, and is recognized by the usual signs. An early incision is indicated, in a direction radiating from the nipple to the periphery. I have never been able to appreciate the humanity of waiting until a mammary abscess "points"; great pain is thereby entailed upon the unfortunate woman, and the function of the breast is kept in abeyance, or perhaps permanently impaired. The many means for obtunding suffering now at the surgeon's command render procrastination most injudicious from a pain-saving point of view, if from no other.

Submammary abscess is rare; a collection of pus forms in the connective tissue which attaches the breast to the great pectoral muscle. Inflammatory fever is apt to run high, movement of the arm and chest muscles increases pain, and the whole breast is pushed forward, is tense, retains its contour and imparts to the examining hand a sensation as though the mamma rested upon an elastic cushion; fluctuation at the periphery of the breast may sometimes be felt late in the affection. Large veins will be seen wandering through the skin which covers the breast. This variety of abscess may be caused by an interlobular mastitis, by an axillary abscess, by a carious rib, or by the

bursting of an empyema through the chest wall. An opening is best made, in the absence of some special indication, below and to the outer side. The incision should be of moderate length, and a director should be introduced into the wound as a guide for the dressing forceps, which should be withdrawn open in the usual manner. The use of a drainage tube is expedient, and, should free exit for inflammatory discharge not be afforded by one opening, then another should be provided. The breast should be well supported and pressed against the chest by a bandage or by strips of adhesive plaster. Should an empyema or carious rib exist, treatment proper for it is to be instituted. A carious rib will generally be tuberculous. Inflammation of the gland proper or of the interlobular tissue follows engorgement consequent upon a cracked or excoriated nipple, or, indeed, upon any cause preventing free discharge of milk. A sense of discomfort is soon followed by pain, etc., and fever is very marked. Occasionally a chill ushers in the disease. The interlobular tissue is first attacked, and the inflammation may extend between several lobes, or to the sublobular tissue. The strong capsule of the mamma opposes extension toward the skin, and pointing occurs late, pending which the glandular tissue may become involved and suppuration in it occur, permanently impairing the affected lobe or lobes. Fluctuation is not found early, and should not be awaited; acute pain somewhat localized, hardness, and elastic tension, will suffice for a diagnosis, and will justify a puncture, followed by incision if matter escape. In this form of abscess, as well as in others, a sensitive and enlarged gland may be met with in the axilla. Should artificial opening be deferred, the matter slowly approaches the surface and then points rather suddenly. Successive abscesses may form in the mamma, as the inflammation slowly extends from one place to another.

Successive formations of pus dépôts, following acute mastitis, are indications of a too limited opening, with incomplete discharge of matter. During acute inflammation a mamma should not be nursed by the infant, but lacteal engorgement must be carefully prevented by the diligent use of a breast pump; it is usually not necessary entirely to arrest milk formation by drugs, etc., unless a discharge of pus by the nipple is chronic or the abscess shows no disposition to heal. Acute inflammation of a lacteal sinus is infrequent, occurs usually long after the puerperal condition, is met with in anæmic patients, and follows interlobular mastitis, or more often, perhaps, obstruction of the outlet through the nipple. Probably a catarrhal inflammation of the mucous membrane is present. The prominent symptoms are: pain over the sinus, which increases with distention; discomfort on pressure usually; and, during quiescence of the gland, pressure will cause pus to exude from the nipple. The two instances in which I have recognized this condition were treated in various ways; the mammary secretion disagreed with the nurslings and it became necessary to arrest lactation in order to effect a cure.

It has been already said that the incision to evacuate pus from a mammary abscess should be made in the direction of a line drawn from the nipple toward the periphery of the gland.

Chronic abscess is sometimes, though rarely, met with, and is more apt to be confounded with scirrhus carcinoma than with any other morbid condition. It begins deeply in the gland, and incorporates surrounding parts by firm exudation; later, the nipple may be somewhat retracted, the skin dimpled, reddened, and adherent; also the axillary lymphatics may be enlarged and tender. Women whose health is poor and nutrition defective are usually affected. A local tuberculous is to be suspected and the bacillus sought for. A diagnosis, differential, between chronic abscess and scirrhus is sometimes so difficult as to require an incision. The treatment is free incision, generous diet, and general tonic regimen. Port, beer, or porter will assist recovery by strengthening the patient. Tuberculosis of the mamma, with our present knowledge, would probably escape early recognition. A tumor slowly suppurating, leading to the formation of

sinuses with undermined edges, in a subject of tuberculous tendencies, would excite suspicion which the microscope would be called upon to confirm, by disclosing the bacillus. Extirpation will be, of course, the proper treatment; sinuses should be "spooned" and iodiform applied. In a certain number of women a breast which has been the seat of abscess becomes the seat of malignant disease subsequently. I have not been able to see that the two conditions bore to each other the relation of cause and effect. For, while carcinoma is found in a breast which has been the seat of mastitis, yet many mammae, which have been similarly affected, do not develop carcinoma. I have noted a carcinoma in one mamma which had always been healthy, the other breast having suffered from inflammation after confinement. It is natural to suppose that, if much induration remains permanently after mastitis, malignant disease would be more apt to develop in it than if no such induration were present.

MAMMARY TUMORS.—*Classification.*—With our present knowledge of mammary tumors, it may be safely said that any classification is but provisional, and will need modification from time to time, as additional facts are added to those already known. Tumors may be considered as indicating new formations and cysts, alone or in combination, and are best grouped according to their anatomical elements. It is unfortunately a fact that the clinical history of a growth cannot be stated so soon as the histology is known, but it can be done far more accurately now than was possible some time since, and more accuracy is daily being attained. I submit the following classification:

- I. Cysts.
- II. (a) Tumors resembling fully developed connective tissue: fibrous tissue, *fibroma*; adipose-tissue, *lipoma*; mucous tissue, *myxoma*; bone, *osteoma*.
- (b) Tumors resembling embryonic connective tissue: *sarcoma*.
- III. Tumors resembling epithelial (secreting) tissue: *carcinoma*.
- IV. Tumors resembling the more complex higher tissues: gland tissue, *adenoma*; nerve tissue, *neuroma*; vascular tissue, *angioma*; the two latter so rare as to be disregarded.

Of the foregoing tumors, sarcoma and carcinoma are classed as malignant, the others as non-malignant or benign. Carefully kept clinical records, supplemented by accurate anatomical research, are greatly needed in the study of mammary growths, and the absence of such records renders much experience in the past quite useless at the present time. Probably no one word has brought about this result so much as the term "cancer," which is used either clinically, or anatomically, or as a means of concealing ignorance, by different observers. Clinically it means malignant, anatomically it means carcinoma; to avoid misunderstanding, the term will not be employed.

Cysts are sacs enclosing fluid more or less thick. A lacteal cyst—galactocele—is a tumor containing milk, normal perhaps, but more often having undergone changes during retention. A sinus or duct becomes closed, and is gradually dilated by milk as fast as it is secreted. The tumor begins, as a rule, beneath the areola, without inflammation and with little pain, and extends toward the periphery, usually in a nursing woman. Should the occluded duct be in a lobule, the tumor will commence deeply, and at a distance from the nipple. Increase at first is rapid; later, however, if lactation cease, diminution in bulk occurs; the cyst parting with its fluid and becoming more solid; its contents will then be curd-like, consisting of epithelium and fatty matters. Lacteal cysts of enormous size have been recorded; they are usually single, and do not involve the overlying skin unless inflammation supervene. When subcutaneous they are darker under direct illumination than is the adjacent skin. In a case observed by me, tension of the cyst varied with the active or passive state of the gland. Pain is very rare, and the patient complains only of the size of the breast. The general outline of the cyst is oval and smooth, more rarely lobulated. This latter shape is due

to rupture of the wall at some point, and escape of contents which become encapsulated in connective tissue. The diagnosis offers difficulty only when, from long retention, the cyst-contents have become more or less solid; but even then the previous history enables the surgeon usually to avoid mistakes.

In a nursing woman, puncture or aspiration relieves temporarily, but does not cure, for the cyst refills quickly; injection with iodine tincture is equally inefficient. A free incision, followed by suppurative of the sac, or extirpation of the cyst, are the most reliable methods of cure; of the two, probably extirpation is the less painful. In a non-nursing woman aspiration, followed by injection of iodine tincture, offers more chance of cure, and should be tried, but the more radical measures mentioned above will probably have to be resorted to.

Non-lacteal cysts occur before and after the menopause, and result from the obstruction and subsequent dilatation of one or more ducts. Such cysts are usually multiple, not large, scattered through the gland, and contain a fluid more or less thick, secreted by the lining membrane of the dilated duct. This fluid may be clear or colored; and these colored cysts, in which the colors red and yellow predominate, are found more often in advancing years than at an earlier period (about puberty). In the nursing woman the cysts under consideration are rare: they are met with in sterile women, or in those who have long ceased to bear children and approach the menopause. Pain is exceptional, but weight and discomfort are complained of. Increase is slow and gradual; lymphatic implication is never seen. The diagnosis is made with difficulty; and, after all, that is a matter of small importance, since extirpation alone promises relief, if multiple cysts exist. Discharge from the nipple is a not infrequent accompaniment of cystic growths. Large single cysts are usually found near the centre of the mamma; multiple cysts, generally small, occur more often near the periphery. Both breasts are sometimes affected, but never to the same degree. Obstruction of a duct, causing the cyst, occurs in the old, probably from contraction of the fibrous stroma, while in youth defective evolution—excessive—of an acinus is invoked as a cause; hence the terms "involution cysts" and "evolution cysts," as they are called. The diagnosis rests on the slow growth, shape, consistence, and multiplicity, on the absence of glandular enlargement in the axilla, and, in case of puncture, on the escape of contents. When many cysts exist removal of the breast is the only procedure that will afford relief. In the case of a single cyst the sac may be opened, suppurative induced, and a cure by granulation obtained. Hydatid cysts of the breast are extremely rare, and, the growth being slow, this variety will usually be confounded with a retention cyst. On incision, daughter cysts may be seen, or hooklets may be found with the microscope. Healing by granulation, after discharge of the hydatid, is to be expected.

Cysts in relation with tumors will be found under the heading of the appropriate new growths.

Extravasation of blood, which may become encysted, has already been referred to. The ordinary wen—sebaceous cyst—occurs rarely in the breast, and attains but small size.

Tumors Resembling fully formed Connective Tissue.—*Fibroma, Lipoma, Myxoma, Enchondroma.*—Of these the first named is much the most frequently met with; indeed, it is much the least rare of benign mammary growths. It is composed of hyperplastic connective tissue, together with glandular elements, more or less imperfect. It is this latter circumstance which has given rise to confusion, the terms adenoid, fibro-adenoma, adenocoele, being used by various observers. The fibroma may enclose one or more cysts, from dilatation of contained ducts, or it may project into a duct which becomes dilated, thus appearing as an intracystic or intracanalicular tumor. More precise information will be found under the headings *Adenoma*, and *Tumors*.

Fibrous tumors are observed during the period of active menstrual life, preferably between the ages of sixteen and