

Novak's Textbook of Gynecology

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EIGHTH EDITION

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Preface to the Eighth Edition

THIS TEXTBOOK IS now in its eighth edition, and has had wide usage for nearly thirty years, which should suggest that we are "doing something right". If this is true, the credit unquestionably belongs to the original format devised by the late Emil Novak, and there has been only scant deviation from his style since the 1941 inception of his textbook. The reviews of our previous edition were so uniformly favorable that it has seemed wise to adhere to the same approach to a textbook that has been so successful in preceding years.

By a schematic discussion of the different diseases and lesions of the genital tract which follow such fundamental chapters as anatomy, physiology, embryology, etc., we have made every effort to avoid duplication and repetition which is found in any panoramic study of the female. We have, however, attempted to be complete and thorough, and when we have, of necessity, treated certain uncommon diseases and problems in rather cursory fashion, we have attempted to compensate for this by providing an extensive and up to date bibliography. This has on occasion necessitated deletion of certain archaic, if important, references which may generally be located, if desired, by perusal of earlier editions. In short, we have tried to provide a text that is adequate for the practicing gynecologist yet will not overwhelm the interested medical student, who cannot be expected to really learn anything much of our specialty by cursory perusal of various atlases, synopses and other casual texts that are available.

In this current edition our main intent has been to completely "up date" our edition of five years ago, and we have added such new and sometimes controversial sections as sex education, family planning, the status of therapeutic abortion, etc. The treatment of trophoblastic disease has changed considerably in the last half decade, and this chapter has been completely modernized. Many controversial facets of genital cancer have been re-evaluated, and the everchanging highly dynamic subspecialties of endocrinology, cytogenetics, and cytopathology have been brought into a more modern focus. We have, however, avoided the so-called TNM classification as proposed by the Joint Committee for cancer staging since we feel that for gynecological cancer, it is often impractical, cumbersome and inaccurate.

No textbook is better than its pictures and illustrations, and we are constantly trying to improve these via our own photographic department ably staffed by such competent professionals as Mr. Chester Reather and Mr. Raymond Lund. Yet on occasion we are forced to use certain illustrations sent in by many cooperative friends, too numerous to mention. Consequently certain very unusual lesions may be represented by a technically unsatisfactory photograph; at the

same time a few depict a uterus removed at only the supracervical level. Lest the horrified reader exclaim, let us assure him that this is probably an "outside" print, a very old but appropriate one, or else the cervix has been removed separately after fundectomy.

We authors are sincerely grateful to Dr. John K. Frost for his truly remarkable chapter on cytopathology, which has received highly laudatory remarks in reviews of previous editions. Dr. J. Donald Woodruff has been responsible for the chapters on the vulva and vagina, as well as generally invaluable by means of various suggestions and criticisms, and to this truly fine clinician and pathologist, who is an even better friend, go our sincere thanks. Cooperation and helpfulness by The Williams and Wilkins Company in the preparation of this and every edition has been superb; we express our appreciation to them and to the W. B. Saunders Company, both of whom have kindly permitted generous interchange of various prints, plates, and tables without always specific notation. Lastly, sincere thanks go to Miss Helen Clayton in our office, and Miss Eva Hildebrandt in our pathology laboratory, for without their frequent and unselfish efforts, preparation of this edition would have been impossible. Our whole motif in the preparation of this text has been that although we like to think we are number one, we are going to keep trying harder to further improve the quality.

Preface to the First Edition

SINCE THE PLAN and scope of this book represent something of a departure from those followed in other textbooks of gynecology, the author feels impelled to state the ideas which furnished the incentive for the preparation of this work, and which dictated its character and scope.

First of all, no especial apology seems necessary for the combined title. While gynecology was formerly often spoken of as a branch of surgery, this is certainly not its present status. Only a small proportion of gynecological patients require surgical treatment. On the other hand, the biological aspects of gynecology have assumed vast importance, chiefly because of the amazing developments in the field of reproductive physiology and endocrinology. Many of these advances find daily application in the interpretation and management of functional disorders in women. In other words, female endocrinology is now an integral and important part of gynecology, and it is so considered in this book.

Secondly, it has always seemed to me that the great majority of readers of textbooks on gynecology must be not at all interested in the details of operative technique, to the consideration of which most authors have devoted many pages. Certainly this applies to the general practitioner, while medical educators are now generally agreed that the medical student should not be burdened with such details in his undergraduate years. Since this book is designed for these two groups primarily, the indication seemed clear to omit the consideration of operative details. The plan followed is to carry the patient up to the point of operation, and to discuss the indications, scope and purpose of the latter, without going into descriptions of the technique itself.

Diagnosis and treatment have been accented throughout the book, as I believe most readers would wish. The traditional chapters on anatomy, history-taking and methods of examination have been boiled down to the essentials. On the other hand, functional disorders, including especially the large group of gynecological endocrinopathies, have been treated rather elaborately, in keeping with the avowed plan of covering the combined fields of gynecology and female endocrinology. The list of references appended to each chapter makes no pretense of exhaustiveness, and preference has been given to publications most worth while, those most recent, and those written in English. The pathological aspects of gynecological disease, so fundamental to a proper understanding of the whole subject, have received adequate but not disproportionate consideration.

In the consideration of various endocrine disorders a disturbing problem presented itself. In the discussion of endocrine preparations which might be indicated in treatment, there is no doubt that the mention of various products by

their commercial names would have had some advantages. On the other hand, these have appeared to be definitely outweighed by the disadvantages of such a plan, apart from its questionable delicacy. These proprietary preparations are constantly multiplying, and their commercial names are being changed from day to day. For example, there are now well over forty estrogenic preparations on the market. It would be almost impossible, in any enumeration of such therapeutic products, to avoid omission of some of them, and this might be very unfair to products perhaps just as effective as those which might be included. A complete list published today is quite likely to be very incomplete within a few months.

The sensible plan seemed to be to rely on the intelligence and initiative of the reader, who should have no difficulty in ascertaining good commercial preparations of estrogen, progesterone, chorionic hormone or any other hormone principle to which reference is made in the treatment of various disorders.

It will be noted that the work is devoted to "straight" gynecology and female endocrinology, and that it does not include a consideration of disorders in allied fields which concededly obtrude themselves frequently into the practice of the gynecologist. For example, many gynecologists include female urology in their practices, while anorectal and abdominal surgical problems are often encountered, as may be problems in almost any field of medicine. For textbook purposes, however, the line must be drawn fairly sharply, and the reader will naturally expect to go to the proper sources for information in any of these allied fields.

In short, the purpose of this book is to present to the reader as much information as is possible in as practical a fashion as possible on the subjects of gynecology and female endocrinology. Whether right or wrong, the ideas behind the book represent the crystallization of many years of teaching and practice in gynecology. The author's goal has been to produce a book which would not only be suited to the needs of the medical student, but which could be carried with him into the practice of his profession.

It is a pleasant obligation to express my indebtedness to those who have been helpful to me in the preparation of this book. To a number of my friends, especially Dr. R. B. Greenblatt, of Augusta, Georgia, I am grateful for the loan of illustrations; to Dr. E. L. Krieg for the excellent colored illustrations as well as for other photographic work; to Mr. Chester Reather, for most of the photomicrographs; to Miss Eva Hildebrandt, technician in the Laboratory of Gynecological Pathology at The Johns Hopkins Hospital and to Sister Mary Lucy, technician at Bon Secours Hospital, for help in the preparation of sections for microscopic illustration; to my artist, Miss Frances Shultz, for many of the illustrations; and to my faithful secretary, Miss Helen L. Clayton, for much help throughout the project. For permission to use illustrations which have appeared in previously published articles of my own I am indebted to the publishers of the Journal of the American Medical Association; the American Journal of Obstetrics and Gynecology; Surgery, Gynecology and Obstetrics; and the Bulletin of The Johns Hopkins Hospital.

Certain illustrations which appeared in one of my previous books, Gynecological and Obstetrical Pathology, do not have a credit line in the caption. For permission to use these I wish to thank W. B. Saunders Company, the publishers.

Finally, it is a genuine pleasure to acknowledge the efficient and wholehearted cooperation of the publishers, Little, Brown and Co., throughout the preparation of this work.

EMIL NOVAK

Baltimore

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The Front Cover

Masaccio (1401-1428)

Masaccio, born Tommaso di Ser Giovanni di Mone, "was the first and arguably the greatest of the succession of great masters in fifteenth century Florence". In a lifetime of twenty-seven years he introduced to art the use of perspective, realism and solidity of form basic to modern painting.

In 1427, commissioned by Antonio Brancacci, Masaccio painted his major surviving work, the frescoes of the Brancacci Chapel in the Church of the Carmine in Florence (Sta Maria Del Carmine). One of the most famous of his frescoes, *The Expulsion From Paradise*, vividly portrays Eve's anguish and sudden awareness of shame and despair.

Bibliography

1. Berti, Luciano, *Masaccio*, The Pennsylvania State University Press, University Park and London, 1967.
2. Janson, H. W., *History of Art*, Harry N. Abrams, Inc., New York, 1962.
3. Murray, Peter and Linda, *A Dictionary of Art and Artists*, Penguin Books, Baltimore, 1959.
4. Procaccio, Ugo, *All the Paintings of Masaccio*, Hawthorn Books, Inc., New York, 1962.

The vestibule is the boat-shaped fossa which becomes visible on separation of the labia. In it are seen the vaginal orifice and anterior to this, the meatus urinarius. In the

1

Anatomy

The female reproductive organs are divisible into two groups, the external and internal. The former comprise the vulva and vagina; the latter the uterus, tubes, and ovaries.

THE VULVA

The vulva, representing the part of the genital apparatus visible externally, is a composite structure, its constituent parts being the following: (1) the labia majora, (2) mons pubis or mons veneris, (3) labia minora, (4) clitoris, (5) vestibule, (6) meatus urinarius, (7) vaginal orifice, (8) hymen (in virgins), and (9) vulvovaginal or Bartholin's glands.

Labia Majora

The labia majora are two longitudinal raised folds of adipose tissue covered by skin which, especially in brunettes, is rather heavily pigmented. They are markedly developed at puberty, as one of the secondary sex characters. Before puberty the vulva is rather flat, and the labia minora are much more conspicuous than the labia majora. In the postpuberal female, the latter extend posteriorly toward the perineum. On separating them posteriorly, a slightly raised connecting ridge, the *fourchette*, is seen. Just anterior to this, between it and the vaginal orifice, is a shallow, boat-shaped fossa, the *fossa navicularis*. The external surface of the labia shows a heavy growth of hair, usually curly, but the hair on the inner surface is much more sparse.

The substance of the labia majora is

adipose tissue, although it contains also a light fascial layer which is the analogue of the dartos in the male. The labia themselves are to be looked upon as corresponding to the scrotum of the male. Mistakes in the diagnosis of the sex of pseudohermaphrodites have not infrequently been made because of the resemblance of the split scrotum to the labia majora of the vulva.

Mons Pubis

The mons pubis is a mound of fat covered by hair, situated just above the level of the symphysis pubis, at the lowest portion of the anterior abdominal wall.

Labia Minora

The labia minora are two firm pigmented folds which extend from the clitoris posteriorly to about two-thirds of the distance toward the perineum. Anteriorly they subdivide, one fold covering the glans clitoridis to form its prepuce (preputium clitoridis), the other passing beneath the glans to form, with its fellow of the opposite side, the frenulum clitoridis.

The skin covering the labia minora is devoid of hair follicles, but is very rich in sebaceous glands. Sudoriferous glands are exceedingly sparse, and, according to some, completely absent. The substance of the labia minora is described as being of the erectile type, though the degree of erectility is not comparable to that of the clitoris. It contains many venous spaces with much involuntary muscle tissue.

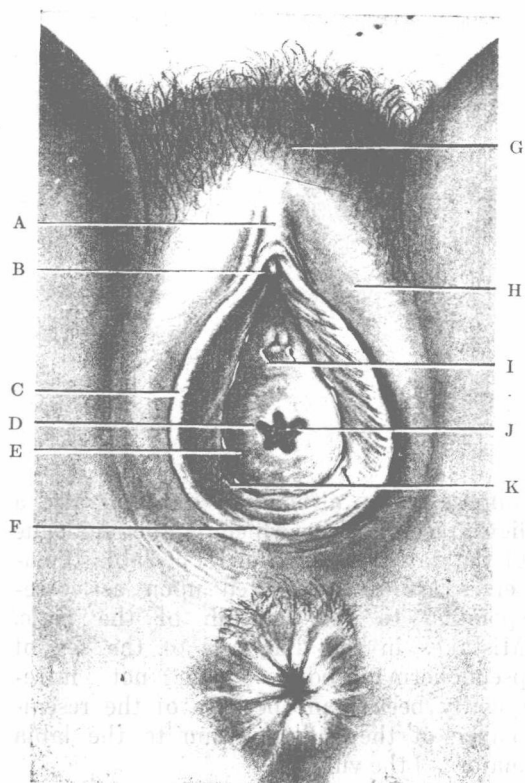


Figure 1.1. The vulva. A, prepuce; B, clitoris; C, labia minora; D, hymen; E, vestibule; F, posterior commissure; G, mons pubis; H, labia majora; I, opening of Skene's ducts; J, vagina; and K, vulvovaginal (Bartholin's) glands.

Clitoris

The clitoris is a small, cylindrical, erectile organ corresponding to the male penis. Like the latter it consists of a glans, a corpus or body, and the crura. Only the *glans clitoridis*, about 6 to 8 mm. in diameter, is visible externally between the two folds into which the labia minora bifurcates anteriorly, the upper fold forming the *prepuce* and the lower the *frenulum* of the clitoris. The *body* extends upward toward the pubes beneath the skin dividing into two *crura* which are attached to the pubic bones. The clitoris is made up of erectile tissue, with many large and small venous channels surrounded by large amounts of involuntary muscle tissue. The erectile tissue is arranged in two corpora cavernosa, and there is no corpus spongiosum as in the case of the male organ.

Vestibule

The vestibule is the boat-shaped fossa which becomes visible on separation of the labia. In it are seen the vaginal orifice and, anterior to this, the meatus urinarius. In the

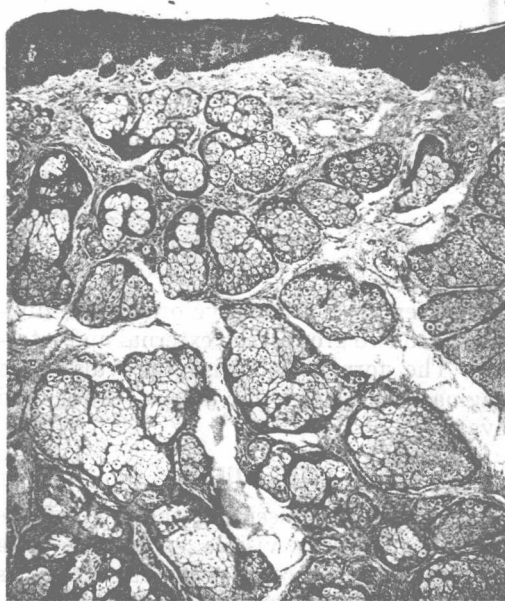


Figure 1.2. Histological structure of labium minus, near clitoris, showing large number of sebaceous glands.

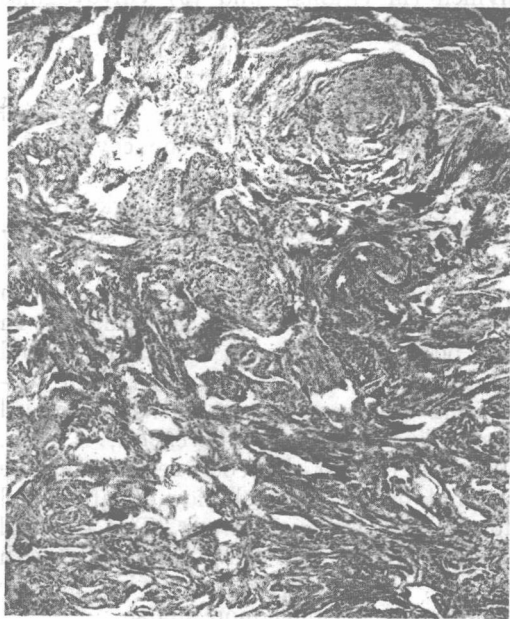


Figure 1.3. Microscopic structure of clitoris

virgin the former is partly occluded by the *hymen*, a rather rigid membrane of firm connective tissue covered on both sides by stratified squamous epithelium. It is most frequently of annular crescentic shape, but it may be cribriform or sievelike. Under abnormal conditions it may be imperforate, occluding the vaginal orifice completely and leading to retention of the menstrual discharge.

Meatus Urinarius

The urethral meatus is the small slitlike or triangular external orifice of the urethra. It is visible in the vestibule, at about two-thirds of the distance from the glans clitoridis to the vaginal orifice. At each side of the meatus one usually sees a small pitlike depression in which there are a number of mucous glands, called the lesser glands of the vestibule, to distinguish them from the greater glands, which are the glands of Bartholin.

Just below the outer part of the meatus are the orifices of the *paraurethral* or *Skene's ducts*, which run in a tortuous fashion below and parallel to the urethra for a distance of about 1.5 cm. Except near the orifice, where one finds stratified epithelium, the paraurethral ducts are lined by a transitional type of epithelium.

The *female urethra*, opening externally at the meatus, is lined proximally by a stratified transitional type of epithelium, whereas its distal portion is covered with stratified squamous epithelium which extends into the canal for a variable but considerable distance. The studies of Huffman have shown that the canal is surrounded by a labyrinth of *paraurethral glands* which he considers to be the homologues of the male prostate. Some of these paraurethral canals enter into the urethra and some into Skene's ducts which open just below the urethral meatus. Their chief clinical importance lies in the fact that they frequently harbor the *Gonococcus*, the infection often being intractable to any treatment except excision or destruction of the ducts. In addition, *suburethral diverticula* may occur as a sequel to infection and cystic enlargement of these glands.

Vulvovaginal or Bartholin's Glands

The vulvovaginal or Bartholin's glands are lobulated racemose glands situated one on each side of the vaginal orifice, at about its middle, and placed deeply in the perineal structures. They are frequently the seat of gonorrheal or other infections.

The main duct of the gland is lined by a stratified transitional type of epithelium, except for a very short distance within the orifice. As the ducts become smaller and smaller, the epithelium is flatter and flatter, so that in the finest branches it consists of a single layer of flat cells. The acini are lined by a layer of cuboidal cells with basal nuclei. The function of the gland is the secretion of mucus for lubrication of the vaginal orifice and canal, especially during coitus.

THE VAGINA

The vagina is a musculomembranous canal which connects the vulva with the uterus. It is about 9 or 10 cm. in length, and, in the erect position of the woman, its direction is in general upward and backward from its vulvar to its uterine end. Its upper end expands into the cup-shaped *fornix*, into which the cervix uteri is fitted. The portions of the fornix in front of, behind, and at the sides of the cervix are designated as the anterior, posterior, and lateral fornices. The posterior fornix is of special surgical interest because it gives ready access to the peritoneal cavity, as the

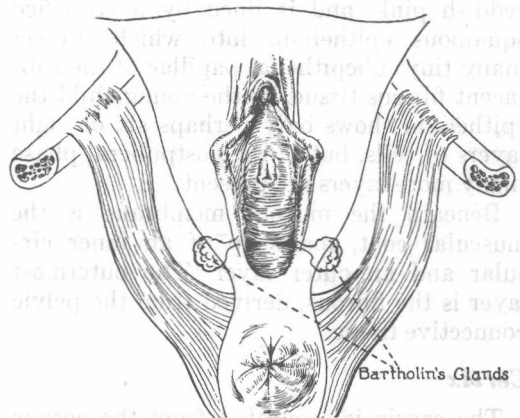


Figure 1.4. The deep relations of Bartholin's glands.

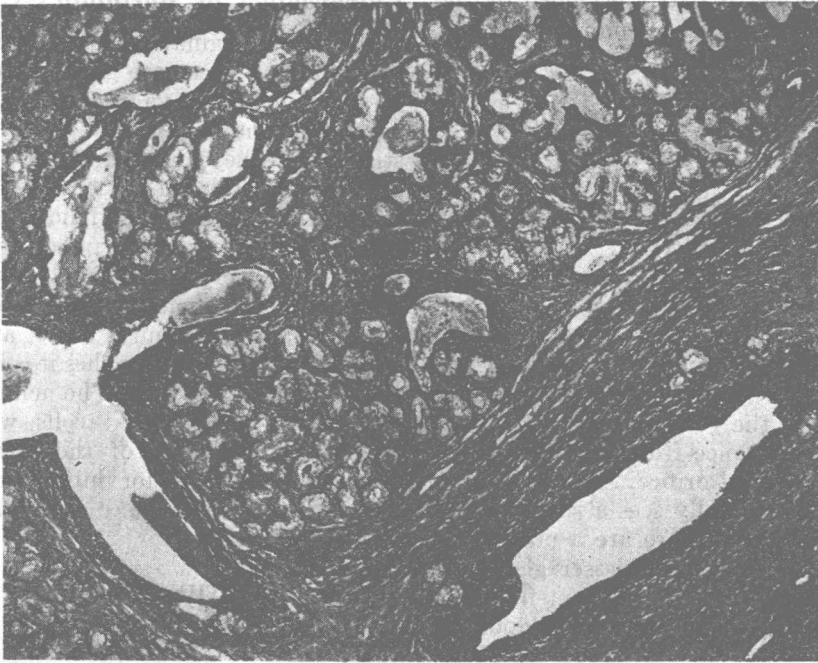


Figure 1.5. Microscopic appearance of normal Bartholin's gland. Note the transitional epithelium in the large ducts, the flattened epithelium in the small ducts, and the cuboidal secretory epithelium in the gland acini.

upper fourth or so of the posterior wall of the vagina is covered by peritoneum.

In the virgin, the *mucous membrane* of the anterior vaginal wall is horizontally corrugated, with a central vertical ridge, thus producing the *arbor vitae* appearance. These ridges are absent in the widened canal of the woman who has borne children.

The mucous membrane of the vagina is reddish pink, and is lined by a stratified squamous epithelium into which project many tiny subepithelial papillae of the subjacent fibrous tissue. In the young child the epithelium shows only perhaps six or eight layers of cells, but in the postpubertal phase many more layers are present.

Beneath the mucous membrane is the muscular coat, made up of an inner circular and an outer layer. The outermost layer is the fibrous, derived from the pelvic connective tissue.

Cervix

The cervix is separated from the corpus externally by a slight constriction corresponding to the region of the internal os.

The portion of the cervix above the level of the vagina is the supravaginal portion, that protruding into the vagina is the *pars* or *portio vaginalis*. The *cervical canal* is somewhat spindle-shaped, terminating below at the *external os*, a small round or transversely slitlike opening averaging in the nulliparous woman about 5 mm. in diameter. At its upper end the cervical canal communicates with the uterine cavity through a constricted orifice called the *internal os*.

The *mucous membrane* covering the external or vaginal surface is of the stratified squamous variety, a continuation of that covering the adjacent vagina. From it arises the squamous cell or epidermoid carcinoma of the cervix, the most common of all gynecological forms of cancer. The cervical canal, on the other hand, is lined by an entirely different type of mucous membrane, the endocervix, which is distinguished by the following features.

(1) A tall, "picket" variety of columnar epithelium, with deeply stained nuclei placed close to the basement membrane,

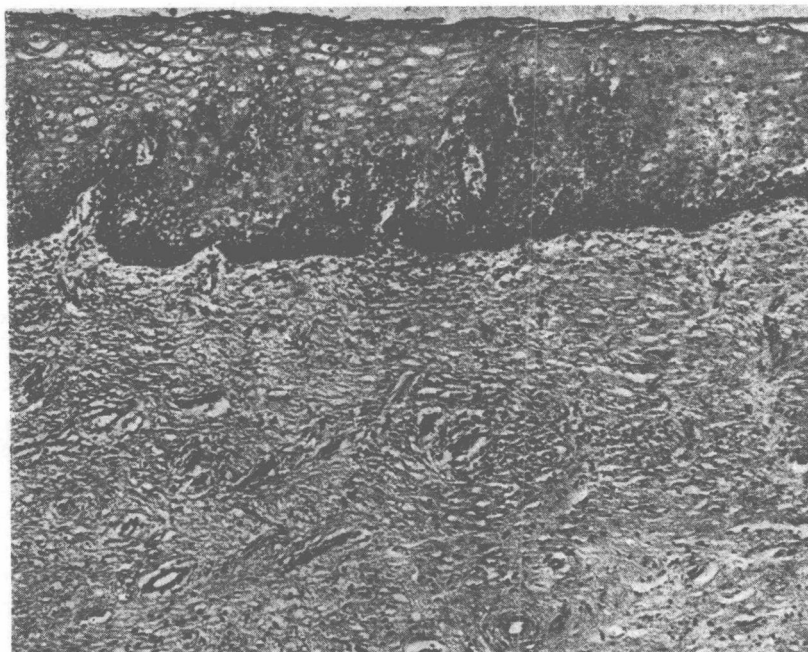


Figure 1.6. Histological structure of normal vagina

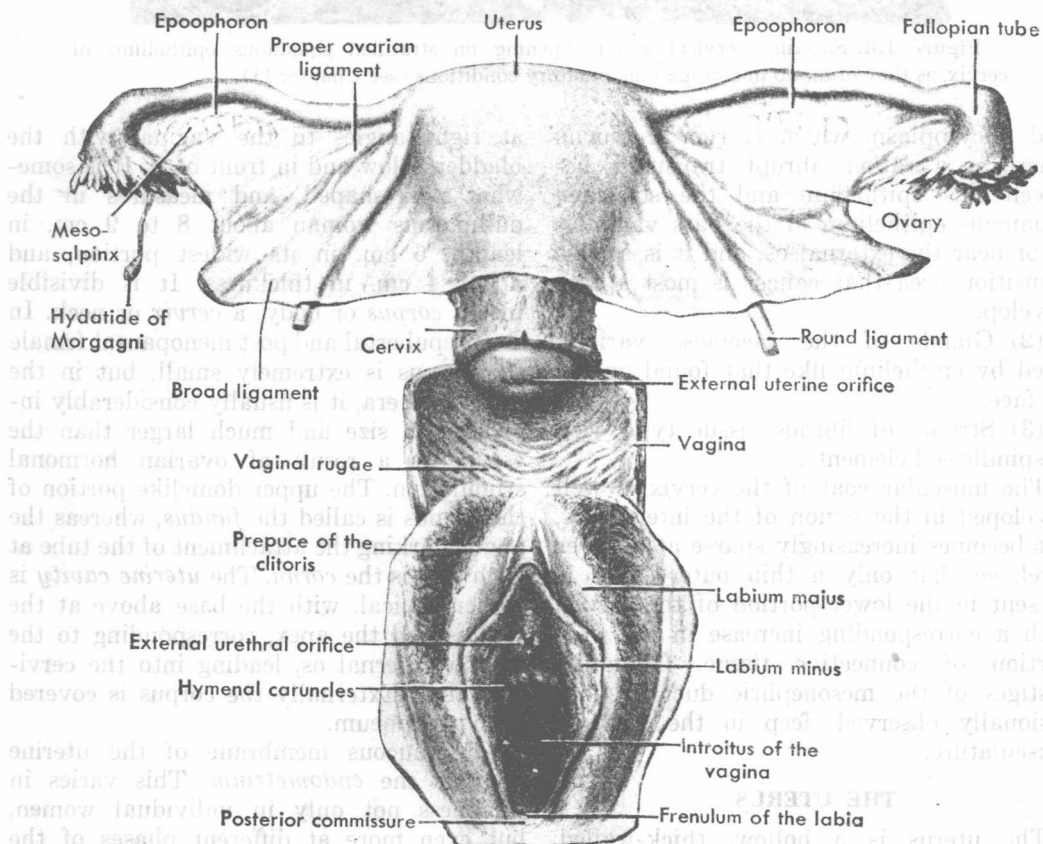


Figure 1.7. The female reproductive organs. (From Rubin, I. C., and Novak, J.: *Integrated Gynecology, Principles and Practice*, Vol. 1. Blakiston Division, McGraw-Hill Book Company, Inc., New York, 1956.)

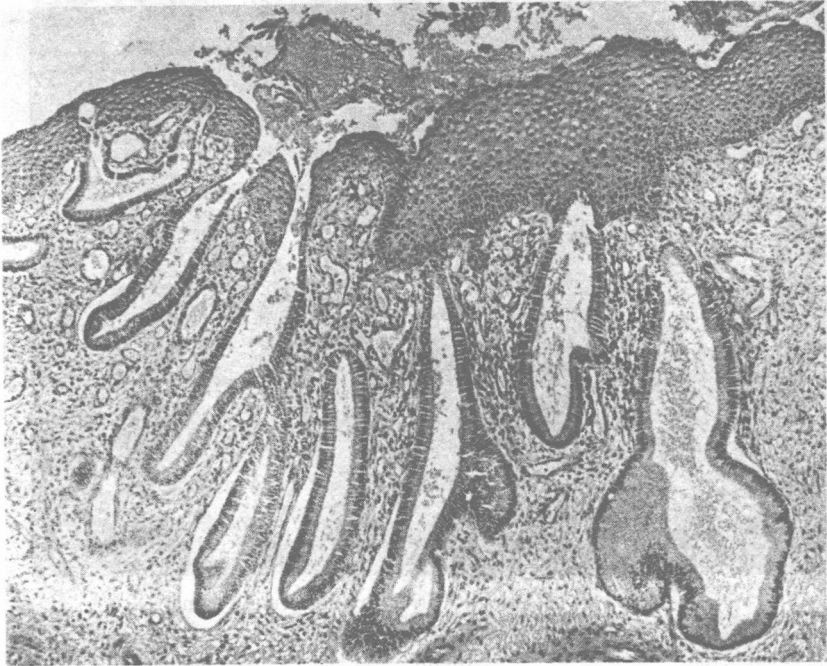


Figure 1.8. Showing cervical glands opening on stratified squamous epithelium of cervix, as they often do in chronic inflammatory conditions (see Chapter 11).

and a cytoplasm which is rich in mucin. There is a rather abrupt transition between this epithelium and the stratified squamous epithelium of the pars vaginalis at or near the external os, and it is at this transition area that cancer is most apt to develop.

(2) Glands of the racemose variety, lined by epithelium like that found on the surface.

(3) Stroma of fibrous tissue type, rich in spindle cell elements.

The muscular coat of the cervix is well developed in the region of the internal os, but becomes increasingly sparse at a lower level, so that only a thin outer layer is present in the lower portion of the cervix, with a corresponding increase in the proportion of connective tissue. Glandlike vestiges of the mesonephric duct are occasionally observed deep in the cervical musculature.

THE UTERUS

The uterus is a hollow, thick-walled muscular organ which is situated in the pelvis, between the bladder anteriorly and the rectum posteriorly. It is placed almost

at right angles to the vagina, with the bladder below and in front of it. It is somewhat pear-shaped, and measures in the nulliparous woman about 8 to 9 cm. in length, 6 cm. in its widest portion, and about 4 cm. in thickness. It is divisible into a *corpus* or body, a *cervix* or neck. In the prepubertal and post menopausal female the corpus is extremely small, but in the menstrual era, it is usually considerably increased in size and much larger than the cervix as a result of ovarian hormonal stimulation. The upper domelike portion of the corpus is called the *fundus*, whereas the angle marking the attachment of the tube at each side is the *cornu*. The *uterine cavity* is rather conical, with the base above at the fundus and the apex, corresponding to the narrow internal os, leading into the cervical canal. Externally the corpus is covered with peritoneum.

The mucous membrane of the uterine body is the *endometrium*. This varies in thickness not only in individual women, but even more at different phases of the menstrual cycle. In general it is thinnest just after the periods, gradually increasing in thickness until just before the begin-

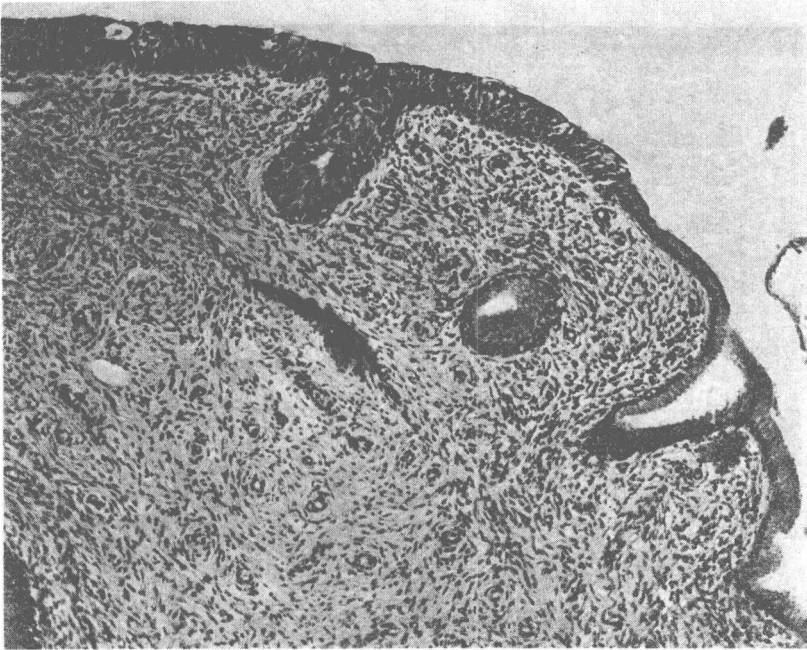


Figure 1.9. Showing rather abrupt transition between columnar and stratified squamous epithelium of cervix in vicinity of external os.



Figure 1.10. Microscopic appearance of cervix, showing characteristic "picket" gland epithelium, racemose glands, and spindle-celled fibrous stroma.

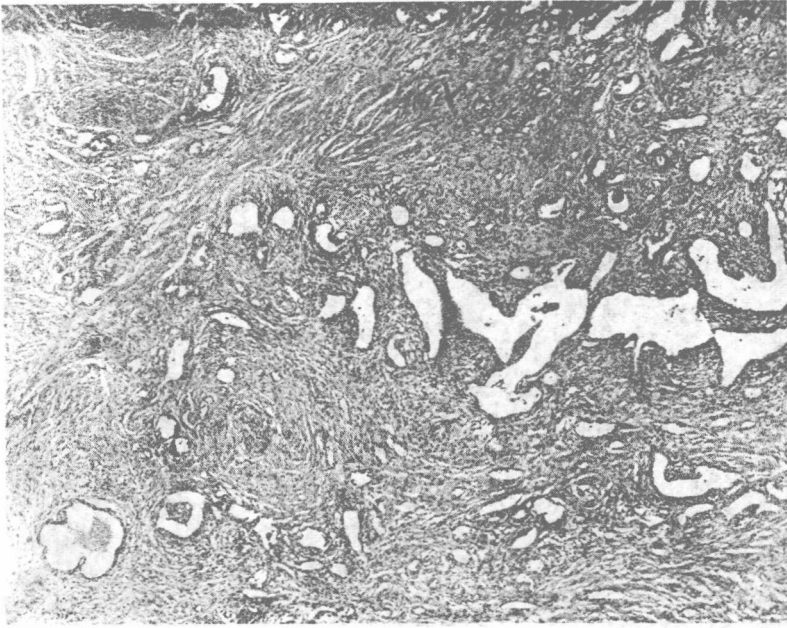


Figure 1.11. Mesonephric tubules deep in the cervical substance

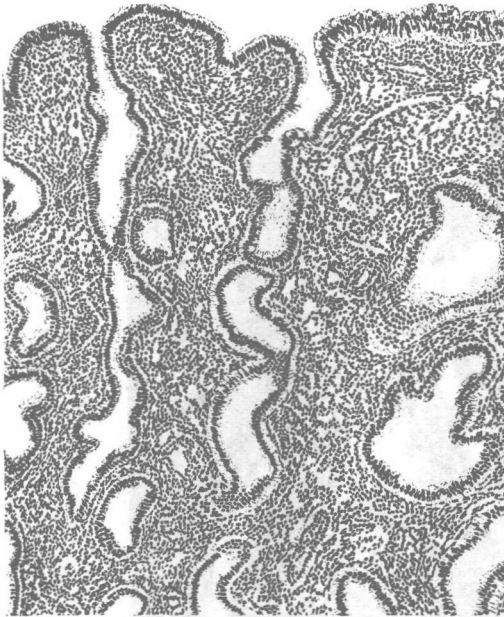


Figure 1.12. Histology of endometrium. This, however, undergoes striking cyclical changes, which are described and illustrated in Chapter 4.

ning of the next menstrual period, as will be described subsequently.

The *stroma* is a characteristic immature type of connective tissue, made up of a

homogeneous mass of small cells with round or slightly oval nuclei and, in the early stages of the cycle, almost no cytoplasm. They are supported by an almost invisible light fibrillary supporting structure. The vascular supply of the endometrium is through two sets of vessels, the spiral or coiled arterioles and the basal arterioles. The latter are the chief nutritional vessels, supplying especially the basal layers. The spiral arterioles, on the other hand, play an important part in the mechanism of the menstrual cycle and especially in menstrual bleeding.

The *muscular* coat of the uterus is made up of involuntary muscle fibers arranged in an interlacing fashion which, at least in the nonpregnant woman, is not disposed in any definite layer pattern. The serous coat consists of the peritoneum, which covers the entire corpus uteri.

The Ligaments of the Uterus

These are three in number on each side, as follows.

Broad Ligaments. Each of these consists of a broad double sheet of peritoneum which extends from the lateral surface of the uterus outward to the pelvic wall. At