records as early as 1827. The development of clinical teaching in the latter part of the nineteenth century, instead of mere didactic instruction, has been one of the most powerful factors in increasing the number of dispensaries and improving their work. Oliver Wendell Holmes wrote a report to the Boston Dispensary in 1837, after he had been one of its district physicians, and urged the establishment of a clinic, saying:

"A consulting-room well attended is one of the most valuable schools for students, as well as practitioners of medicine, since many cases of disease may be seen within a very limited time; and, being thus collected, may be compared with and illustrate each other. This is one of the legitimate ends of all medical charities."

Very much more recently we see the charitable motive and the teaching motive balanced in the utterance of Sir William Osler, in his address at the opening of the new out-patient building of the Cardiff Hospital, in 1908:

"That an out-patient department is simply for the relief of the poor—the common idea—is to take an altogether too narrow view of its functions. . . . Of course the first and most important (function) is the relief of the poor. . . . In acting as the training school for the younger members of the profession, the out-patient department fulfills its second great function. . . . With sufficient staff, there is no reason why just as careful notes should not be taken in these rooms as in the wards; and let me remind the younger physicians in the audience that some of the most brilliant reputations in the profession of this country have been built up upon the solid foundation of notes taken in out-patient departments. Let me urge you to make ample provision for your medical students in the out-patient department, where they see the patients in their native state, so to speak, before they have been scoured and cleansed by the nurses in the ward."

The two motives we have thus analyzed, to do charity and to advance medical knowledge and education, are responsible for the establishment and development of probably a thousand dispensaries in the country today. During the last fifteen years, a new force or motive has supervened—from the public health field. Each of the chief militant public health movements of late years has led to the establishment of a number of dispensaries as part of its program to

prevent, treat or control some disease or group of diseases. The movements to combat tuberculosis, infant mortality, mental disease, venereal disease, are instances in point, and about 1500 public health dispensaries have been founded as a result. From small beginnings, the dispensary movement has assumed much larger proportions in recent years. In 1800 there were three dispensaries in the United States. In 1900 there were about 100. The number is 25 times as great today.

THE RELATION OF THE DUCTLESS GLANDS TO GYNECOLOGY: PHYSIOLOGICAL AND THERAPEUTIC.*

BY ALICE H. BIGELOW, A.B., M.D., BOSTON.

THE present paper owes its origin to a burst of enthusiasm over an impressive and fascinating book on the ductless glands by Falta of Vienna, translated by Meyers of Philadelphia. I have tried to gather from its substantial pages the material which bears on gynecology, and to this I have added modifications and suggestions found in recent magazine articles by American authorities in the same line of research.

One by one, the organs comprising this system have been recognized as having some function other than their obvious ones; their removal or overactivity has caused symptoms uniform enough to lead to laws, till at last they have been grouped into a family of recognized standing. Some of them produce secretions that can be seen and recognized; and, in addition, other forces that are known only by their results. These latter are known as the internal secretions, or, better, by the picturesque Greek *hormones*, or messengers. They are passed directly into the blood stream, and hence are not seen at work, but are judged as to efficiency only as the goods they carry are, or are not, delivered. Adrenalin—product of the medulla of the suprarenals—is the only hormone that has been isolated.

The members of this glandular family are as follows: thyroid, parathyroid, thymus, pituitary or hypophysis (anterior and posterior lobes), pineal or epiphysis, ovaries and testicles, suprarenals (cortex and medulla), and the islands of Langerhans in the pancreas. The in-

* Read before the New England Women's Medical Society, April 18, 1918.

teraction of this chain of glands is amazing. Some work at the same time directly with some of the others and directly against the rest. Any given one will coöperate with some of its family and inhibit the others; or—to put it in familiar mathematical terms—vary directly with some, vary inversely with the others. Classification of their activities is based on their effect on metabolism. Some are acceleratory and, by hastening the body processes, make for katabolism. These are the thyroid, ovaries and testicles, posterior lobe of the pituitary, medulla of the adrenal. Others retard the constant breakdown of the tissues and so are classed as anabolic. These are the parathyroid, anterior lobe of the pituitary, suprarenal cortex, and probably thymus and pineal. To save this classification from being purely academic, look at a few familiar examples. The thyroid is classed as katabolic because it accelerates body processes; shown easily because its hyperfunction in goiter gives excitability and tachycardia. In this katabolic class is placed also the medulla of the adrenals. It excites the sympathetic system and breaks down glycogen, hence the fleeting glycosuria of students in examination, and soldiers going up for medical inspection. In the anabolic class is placed a substance now in the white light of scientific inspection,—that of the pancreatic islands of Langerhans. It is known to conserve glycogen; and, when on strike, to lose it; hence the charge laid upon it of a share in the diabetic process. The reader of this classification notes, perhaps with surprise, that portions of some of the organs named work at variance with each other. We cite the anterior and posterior lobes of the pituitary and the cortical and medullary parts of the suprarenal.

The ductless gland system is supplied chiefly by the sympathetic nervous system, and its nervous influence is, in turn, mostly upon the sympathetic system. The hormones tend to accelerate the sympathetic nerves, and each shows predilections for special nerves—the most familiar affinity being that of the posterior lobe of the hypophysis for the innervation of the uterus. The increase in the general vitality of the individual at the time of ovulation, especially if the ovum become fertilized, is set down as a sympathetic stimulus by the internal ovarian secretion; and the vasomotor disturbances of the menopause are laid to the loss of the same regulating hormone. The so-called

climacteric changes that sometimes occur in the male are placed in the same class.

The last general remark concerning this system regards its determining relation to the general make-up—to avoid the more subtle term “diathesis”—of the person. Where the sympathetic nervous system is sluggish, there the activities of these glands are minimized, and we find an asthenia, with sluggishness of most of the organs, enteroptosis, and constipation. With an irritable sympathetic system we are apt to find definite manifestations of glandular activity, such as swelling of the thyroid with pregnancy, almost amounting to Graves’ disease, to short and sudden changes in body weight, to functional dysmenorrhea. For those in whom the balance throughout this system is well maintained, the author reserves the happy phrase, “enviable equilibrium.”

I will now deliberately narrow the field to the influence of these interesting glands upon conditions of a gynecological nature, with the object of deducing, later, some practical therapeutic conclusions.

An important and complicated relation of these glands is with the secondary sex characteristics. These are accepted as meaning all differential points of sex anatomy and physiology except those immediately concerned with reproduction. Attention was first called to this relation by the obvious body changes following castration and oöphorectomy. Bodies other than the testicle and ovary are now known to share in determining these characteristics.

To begin with the less important members of the series, we may make a few interesting notes. First: that the parathyroids control nerve and muscle activity to such a degree that their inactivity is now held responsible for many forms of tetany, especially that which occurs in pregnancy. Administration of the gland, however, has not cured the condition, leaving the theory still in laboratory form. Second: that the thymus, largest at birth, atrophies at puberty. Its function seems to vary indirectly with sexual activity, because it ceases to act when this begins and, on the other hand, in eunuchs it is large and presumably active. In the condition of acromegaly, caused by hyperfunction of the pituitary, external sex markings are exaggerated. Body hair becomes heavy and profuse, virile in women, and the external genitalia are hypertrophied. Colostrum sometimes appears. Menstruation and

conception may or may not take place. Conversely, with hypofunction of the pituitary, we find a loss of body hair, an increase of fat which blurs the characteristic body outlines of sex, and a retrogression of sex functions and glandular tissue. In the female dwarf, when the cause lies in the pituitary, we find, as we should expect, infantile genitalia and amenorrhea.

The more familiar thyroid is placed physiologically in the class with the ovary; but the neat classification which we are tempted to make, of excessive menstruation on the one hand, and amenorrhea on the other, according as the gland is over- or under-active, is not supported by clinical facts. Everyone admits that thyroid disturbance shows in menstrual phenomena. Osler says that there is no uniformity in the menstrual disturbance as to regularity or amount. In some instances the thyroid is known to vary directly with pelvic activity, when it enlarges during pregnancy and with the periods. Novak of Baltimore says of it that, taken by and large, menstruation is more apt to be scanty or absent with thyroid hypertrophy in Graves' disease, and increased by its atrophy in myxedema. Hence we must add thyroid disturbance to our list of causes for amenorrhea as we meet it clinically. That list stands as follows: pregnancy, menopause, anemia, recent immigration, tuberculosis. If we bear the thyroid in mind, we may find an obvious goiter and its syndrome of tachycardia and tremor, or a myxedema, with dry, shiny, hairless skin, and a bloated body outline. In the latter case thyroid extract by mouth tends to act with charming accuracy.

An allied form of functional amenorrhea is due to pituitary insufficiency. These patients are frankly fat, often distressingly obese. The condition staggers under the technical description of "adiposo-genital dystrophy," or Froelich's syndrome. We are accustomed to associate obesity with amenorrhea. Once its relation was supposed to be causal; now both are known to reach back to some deeper cause common to both. This discovery has put a ban on the emmenagogue drugs, which can cause only pelvic congestion and distress, and thrown the thoughtful physician back on the logical use of gland tissue. Administration of the pituitary body itself has not helped much, but the thyroid gives a reliable preparation which is favored by Novak in conditions where the

pituitary is deficient, as well as the ovary or the thyroid itself. He considers thyroid extract the safest and most stable gland preparation, and uses it in doses of gr. V a day, watching for tachycardia, tremor, or serious loss of weight. Sometimes he supplements it with corpus luteum.

Before discussing the ovary as a ductless gland, one statement must be made as a summary of the foregoing, namely, that the ovary is a less important member of the family than has been supposed, and owes much to its coadjutors, the thyroid and portions of the adrenals and pituitary.

Even more recent and precise than the work we have been reviewing is the research on the ovary published by Graves of Boston in the *Journal of the A. M. A.* of Sept. 1, 1917. He begins with a frank statement of the facts concerning the ovary which we should like to know and don't; its relation to menstruation; the relation, in turn, of menstruation to ovulation; the function of the internal secretion, whether it be direct or only regulating; the portion of the ovary creating that subtle product; and the very reasonable question as to whether there may not be two of these products.

That the corpus luteum does make an internal secretion is so generally accepted that it is called by many "an organ of internal secretion." This phrase, Dr. Graves points out, is histologically inaccurate, because the secreting cells of the corpus luteum are duplicated in cells scattered throughout the body of the ovary and known as the interstitial cells. Hence he argues that the entire ovarian tissue takes part in producing the hormone; and because ovarian activity is seen in youth, before the corpus luteum is mature, it seems likely that the primary source of the secretion lies in the interstitial cells rather than the special cells usually credited with it. The similarity of these interstitial cells to the cells of Leydig in the testicle, which is admitted to have its own hormone, is another argument against the exclusive activity of the corpus luteum.

He has not found therapeutic preparations of the corpus luteum stable or uniform because made during different stages of its life. They have been inert on the one hand, and toxic on the other, giving nausea for a week or more. Preparations from the whole ovary, however, have been found more reliable and have given good results, especially when taken from a

pregnant animal. He has used them successfully in the vasomotor disturbances of the menopause, natural and artificial; in functional amenorrhea; in amenorrhea of thyroid origin; menstrual headache; kraurosis, and senile pruritus. Success with kraurosis is interesting because it supports the theory that the interstitial cells are the trophic control for the genital tract.

Armour's preparation of the whole ovary in five-grain capsules was the form used.

Dr. Graves' contribution consists in shifting the emphasis of value from the corpus luteum to the cells in the body of the ovary, and he has supported his theory still further than the above description by giving ovarian preparations with the corpus luteum excluded, with results as satisfactory as those procured by the whole organ.

Reflection on these considerations seems to urge the physician who handles many women to look at the pelvis no less carefully, but to look also at the patient as a complicated whole; to avoid chemical interference with body processes of an origin deeper than we used to think; to listen at the laboratory door for suggestions as to how we may catch nature at work and imitate her. If, as teachers of women, we can attack the ancient tradition that centers their thought of themselves too strongly in the pelvic organs, we shall help them greatly toward that happy condition, named adequately by Falta an "enviable equilibrium."

Book Reviews.

A Text-Book of Organic Chemistry. For Students of Medicine and Biology. By E. V. McCOLLUM, Ph.D., Professor of Agricultural Chemistry, University of Wisconsin. New York: The Macmillan Company.

In a comparatively brief work, though not approaching the meagerness of the Quiz Compend, the author has attempted to present the subject of organic chemistry for students of medicine and biology. Beginning with the simplest of the organic compounds, consisting of two elements only, he has built up the more complicated structures much as a child builds houses from blocks.

The subject of isomerism, that "pons asinorum" of all medical students, has been treated

by the author in a new and rather novel way, which ought to deprive the subject of some of its difficulties.

The alcohols, ethers and esters are considered largely from a purely scientific standpoint, with very little reference to their enormous importance in biochemistry. It would seem only fair that a work which assumes to be adapted to medical students, should at least show more intimately the relation between organic chemistry and medicine, and not leave it to the reader to make these inferences and draw his own conclusions. Then, again, much material has been included which has little or no relation to medicine and biology. Whether the persistent, continuous use of formulae in place of verbal explanation is a desirable one for young students will still remain somewhat in doubt. No laboratory work is included, and the perusal of this work for the acquisition of knowledge would be about as interesting as the perusal of Webster's Unabridged.

On the whole, apart from its brevity, it does not seem to be any improvement over the numerous other works on organic chemistry which do not contain this special appeal to devotees of medicine and biology.

The Sex Complex. By W. BLAIR BELL, B.S., M.D., Lond. New York: William Wood and Company.

According to its sub-title, this monograph, based on the author's Arris and Gale lectures of 1913, is "a study of the relationships of the internal secretions to the female characteristics and functions in health and disease." It aims to demonstrate "that the reproductive functions are directed and controlled by all the organs of internal secretion acting in conjunction, rather than by the gonads alone, as formerly thought." This correlation of the internal secretions with regard to the sex functions is indicated by the term "sex complex."

The work is divided into two parts, the first dealing with morphologic, physiologic, and psychologic; the second with pathologic considerations. The author discusses successively the primary and secondary female sex characteristics, the function of the ovaries, and the relations of the thyroid, pituitary, suprarenals, and pancreas to the genital system. The outbreak of the European War prevented the completion of work on the parathyroids, pineal, and thymus, which are, therefore, but briefly considered. The second part deals clinically with derangements in the structural and functional development of the genital organs and of the fully established female characteristics and functions, as well as with sexual and reproductive psychoses and neuroses. An appendix states briefly the physiological effects of extracts of the endocrine organs. The volume is a valuable contribution to the philosophy of their action.