RESEARCHES UPON THE ERECTILE ORGANS OF THE FEMALE,
AND UPON THE TUBO-OVARIAN MUSCULAR APPARATUS, IN
THEIR RELATIONS TO OVULATION AND MENSTRUATION.

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[Translated for the Bos. Med. and Surg. Journal. by WM. READ, M.D.—Continued from p. 483, Vol. LXII.]

OBSERVERS of established reputation have gone so far even as to throw doubts upon the muscular nature of the parietes of the tube, or at least their continuity with the muscular system of the uterus. With much more justice, is there nowhere a doubt of contractile fibres in the appendages of the large ligament, which are immediately connected with the tube and the ovary (edge of the tube, edge of the ovary), and has it never been suspected that we could find in the human female something analogous to the superior round ligament or lumbar, as developed in the majority of the mammalia? Nevertheless, in this particular, no more than in the rest of his organization, man does not depart from the type common to the nearest related species; the muscular systems which we have pointed out in the other mammiferæ exist in the woman, and have the same connections and the same use.

But those anatomists who have directed their studies to human anatomy, have concentrated all their attention upon the structure of the muscular parietes proper, of the uterus, which, in the human female, acquire an extraordinary development. That ingenious anatomist, Deville, who, first of all, gave a good description of the muscular coat of the uterus, and pointed out the prolongations which it sends into the large ligaments, did not think there was either interest or utility in investigating the connections and the insertions of these processes.

As to comparative anatomists, who have made out muscular fibres very plainly, in the large ligaments of the mammiferæ, particularly at the end of gestation (see Pappenheim, in Muller's Archiv., 1840, p. 346), they have only studied the relations of these fibres with those of the uterus itself, overlooking the connections, in other respects very important in a physiological point of view, with the essential organs of generation, the ovary and the first part of the oviduct (the Fallopian tube), so particularly pointed out under the name of appendages to the uterus.

Besides, it is necessary to mention that our ignorance relative to the histological character of contractile tissues, has been the chief cause by which observers have been deceived. I do not speak of the period when we doubted the muscular nature of the true tissue of the uterus in a state of vacuity, but at the present time even, when the microscopic character of the muscular elements seems so clearly established, what anatomist is there, who, without being directed by reflection, or by scientific induction, would dream of finding muscular fibres in the peritoneal mem-

branes, thin, diaphanous, and homogeneous, the true type, apparently, of the coats of serous, conjunctival tissue? And yet comparative anatomy demonstrates, in the plainest manner, that such membranes, more transparent and less resistant than the arachnoid, can not only contain muscular tissue in their substance, but often even are entirely made up of it.

In almost all young vertebrated animals, or those of a small size, to whatever species they belong, a microscopic examination only, allows us to recognize the existence and arrangement of the muscular apparatus which I have pointed out, and in nearly every instance the contractile fibres are very easily distinguished by a series of club-like nuclei, very numerous and close together, and by the action of nitric acid of the strength of 1-100, which, leaving untouched the vessels, the nerves, and the contractile fibres, dissolves the fibrous conjunctival tissue which often cover the last.

In this way, in the full-grown domestic fowl, we can see plainly, by the naked eye, the muscular fibres which radiate themselves in the broad ligament; but in the female pigeon, the young especially, the oviduct is embraced by a *serous* membrane (see Martin Saint-Ange, *Appareils reproducteurs des vertebres*, in *Mem. des avant étrangers*, vol. xiv., 1856) exceedingly thin and diaphanous, and destitute of every kind of striæ or visible fibres. Now place this peritoneal coat under the microscope, and examine with a power of from 250 to 300 diameters, and you will find it to be entirely made up of the same kind of muscular fibres as the broad ligament of the fowl. I will mention also the peritoneal membranes attached to the internal organs of generation of reptiles and the majority of the mammalia; the muscular fibres are very plainly distinguished in them; the study of their arrangement and their connections only presents any difficulty.

In the human female it is altogether different, and an observer, a trained one even, would probably overlook the presence of muscular fibres in the *peritoneal* ligaments of the organs of generation, if he was not prevented by certain important peculiarities. The muscular tissue does not there form a continuous membrane, but a sort of web, with large intermingled meshes of muscular network and nerves, the whole covered and disguised by the fibres of fibrous conjunctival tissue. These contractile fibres are so bound down by this last tissue that it is impossible to isolate them in their fresh state by mechanical force, without altering their texture, to a degree that their elements become entirely irre recognizable, and are necessarily confounded with the filaments of the fibroid conjunctival tissue. There is actually no need of looking to find these fibro-cellules, the pretended characteristics of muscular fibres;* it is difficult enough already to fabricate them in the

* The result of my researches is that these fibro-cellules are an artificial production, arising from alterations and ruptures of the true elements of riband-like muscles, which are nothing more than tubes continued throughout the entire length of a fibre, and made up on an anhistous envelope with

true fibres of the uterus; it would become altogether impossible in the fibres of the *peritoneal* ligaments.

It is to these very fibres that the investigation should be directed. For this purpose it is necessary to take a small scrap taken from the very surface of the membranous ligaments (between the two layers which form this source we find but little except cellular tissue, vessels and nerves), then moisten the preparation with a few drops of weak acetic acid, or what is better, water acidulated with a one-hundredth part of nitric acid. The conjunctival tissue, transformed into homogeneous transparent jelly, permits us to see there, independent of vessels and nerves, a system of fibres from 0^{mm} , 02 to 0^{mm} , 05 in diameter, anastomosing, forming plexuses and intersecting each other in two principal directions. In the infant and the woman who has never had children, it is not easy to determine the nature of these muscular fibres. We there have them evidently confounded, as in very many other points of the economy, with fibres of conjunctival tissue or fine elastic fibres. Their aspect, in reality, is very similar, especially when they have been treated with weak acetic acid, to that which the fibres of tendons or aponeuroses present under the same conditions. It appears homogeneous, indistinctly striated longitudinally, and traversed in all directions by indistinct wavy filaments; the nuclei, elongated and much more separated from each other than in the muscular tissue of the intestine or the bladder, resemble the corpuscles of conjunctival tissue (nuclei of Henle, plasmatic cellules of Virchow). But we notice, in the first place, that after remaining many days in very much diluted nitric acid, these fibres detach themselves with perfect distinctness, whilst all the conjunctival fibrous tissue has disappeared. Moreover, in examining with care, with a power of from 400 to 500 diameters, in a good light, we make out that the striation of the fibres is due to certain fibres or parallel tubes of 0^{mm} , 004 to 5 in diameter, in which there shows, very clearly, here and there, the granular contents characteristic of muscular elements. The obscure wavy filaments are, in the majority of instances, nothing more than folds of the enveloping membrane of the tubes, altered by the preparation and the action of the reagents. By adding to the preparation a few drops of nitric acid, one-fifth strength, and heating to the boiling point, the conjunctival tissue is entirely destroyed, and the nature of the muscular fibres, which are colored deep yellow, becomes more and more evident.

We add, finally, that during pregnancy, and for some time afterwards, there can be no possible doubt of the nature of this system of fibres; the granulations of the contractile substance have be-

a granular filling, in the midst of which are often, but not *always*, disseminated at variable distances, nuclei elongated into a club-like form, perfectly distinguishable wherever they exist. (See *Comptes Rendus de l'Acad. des Sciences*, December, 1856.) These investigations, extended through all the contractile tissues of the animal series, will be published in the next numbers of the *Journal of Physiology*.

come more distinct; we notice, also, an increase in diameter of the fibres (on an average to double), and a considerable augmentation of the number of the nuclei, at that time as near to each other as they are in the intestine; but this twofold change results from one and the same cause, because the new elements have developed themselves in the midst of the old, in the very substance of the fibres; their number and arrangement, however, are not diversified.

After having demonstrated that these fibres, which form the frame-work of the so-called *peritoneal* ligaments, have the same nature in the human female and in the mammalia, it remains to demonstrate that they have the same arrangements, the same connections, and that in the internal muscular generative apparatus of the woman we find the same type as in ruminants, rodents, &c., the type of ovario-tubal membranes in reptiles, in birds and in ornithodelph mammalia, modified by a double intersection.

For the study of the muscular system of the organs of generation in the woman, we usually choose the period of pregnancy. It seems to me that the great development which then takes place ought to render the examination more certain. But if it is true that at that time, everywhere, in the great ligaments as well as in the uterus itself, the essential characteristics of muscular tissue may be more easy to demonstrate, it is not equally so in regard to the general arrangement of the whole. The enormous enlargement of the body of the uterus, the progressive obliteration of the great ligaments, which to a great extent it encroaches upon, the distortions, the displacements which are simultaneously produced, bring about this result, that the organs of generation in the human female, at the epoch of pregnancy, depart more than ever from the normal type, from the type common to all mammalia.

At the moment of birth, on the contrary, and even up to the time of puberty, the organs retain the marks of the primitive forms; we still distinguish the cornua of the uterus under the thin layer of muscular tissue which covers and tends to make them indistinct; the true tissue of the body of the uterus is little developed, the connections of the superficial layers with the membranes near by are more marked; in a word, these membranes themselves, thin, transparent, and free from those filaments of adipose tissue, which, at a later period, encroach upon them, present themselves to the observer under the most favorable conditions.

Wherever it seems to make its appearance during pregnancy, there muscular tissue existed at birth, and when one is familiar with the characters of its constituent elements, a study of the general arrangement presents but few difficulties.*

* By means of low powers (from 6 to 15 diameters), and even by the naked eye, at some points, we can observe the course, and the direction, of the contractile fibres, which the order and regularity of their arrangement distinguish from the confused felting of the conjunctival tissue.

The most convenient method consists in spreading on a glass plate the whole of the organs of

It is there easy to make out that, just as in the other mammalia, the uterus and its appendages are included within the thickness of a large muscular membrane, of which the assumed *peritoneal* ligaments are nothing but dependencies. In the arrangement of the fibres of this membrane, scarcely modified by the slight differences in the form of the uterus, and in the direction of the tube, we recognize the order I have set forth by taking for a type the organs of generation of a she-goat.

The fibres belonging to the system of the round *pubic* ligament spread themselves out in a fan-like form through the whole height of the uterus, and intersect with those of the opposite side; a certain amount of traction, made at the pubic extremity, brings into view their direction. In the utero-sacral ligaments, and the posterior layer of the great ligament, we find insertions on the sacrum and in the sacro-iliac region.

The fibres belonging to the system of the ovarian ligament (*mesoarium*), pass principally to the posterior face of the uterus. We can easily trace them from where they begin to decussate on the median line. Descending at the superior portion, and ascending at the inferior, they converge towards the rounded cord which we designate by the name of ligament of the ovary: but very numerous at this point only, they occupy the whole extent of the muscular membrane (*serous* of authors), to which the ovary is attached. They do not terminate abruptly at the internal extremity of the ovary. These fibres, with numerous and elongated nuclei which interlace themselves in the stroma of the gland, and enclose the Graafian vesicles in the meshes of their reticulated structure, are probably nothing else than the continuation of those of the ovarian ligament (*mesoarium*), just as they are, without question, in the ovary of the scaly reptiles and birds. Besides, we can prove, in the most direct manner, that the majority of the fibres of the pretended ligament, just at the corpus spongiosum, run along the inferior border of the gland, and, arrived at the outer extremity, unite in the formation of the muscular cord (*serous ligament* of authors), which connects the fimbriated extremity with the ovary. And again, from the superior border of the utero-ovarian ligament, fibres detach themselves which interlace in the muscular web of the tip of the tube, and go on to terminate themselves on this canal and in the fimbriated extremity.

The study of the fibres which make up the system of insertions for the muscular membrane in the lumbar region, and which are represented in the mammalia by the *anterior and superior round ligament*, presents much more difficulty.

generation of a little girl (uterus, tube, ovary, great ligaments, round ligaments, and the cord of the ovarian vessels, with the peritoneum which covers them.) We first examine the whole with a lens, in a good direct light, then by transparency, with the assistance of magnifiers of from 20 to 200 diameters, after having wet the preparation with diluted nitric acid of the strength of 1-100, in order to obliterate the fibres of conjunctival tissue.

We there look in vain for a muscular cord similar to that which we so easily perceive in animals, elevating the thin and transparent peritoneum, and running along parallel to the ovarian vessels. Nothing has ever been described, nor, perchance, even ever found analogous to it in the human female. The only difference which in reality there is, however, is that in this case the muscular fibres, instead of being condensed into bands, are spread out into a membrane; and instead of going separately for the length of the vascular cord, they cross it, envelope it, mount with it towards the lumbar region, and gradually become lost in the *fascia propria*, by means of which they are fixed to the posterior parietes of the trunk.

The existence of these fascia being determined, if we now seek to follow their course and their connections, we see that a certain number of them radiate upon the posterior layer of the great ligament, and go in front towards the uterus; that others, raising the peritoneum in the form of a fold, are reflected off towards the top of the ovary and fix themselves to the fimbriated extremity, whilst the greater number, accompanying the vessels as far as the umbilicus of the ovary, a part seem to penetrate the parenchyma of the gland, and a part, crossing the erectile bulb and continuing their way to the extremity of the tube, appear to lose themselves in the contractile envelope of this canal. In the last part of their course, these fibres intersect with those which come from the ligament of the ovary.

[To be continued.]

PASSAGE OF A LARGE STONE THROUGH THE URETHRA OF A BOY TWO YEARS OLD.

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ON the night of the 29th ult., I was sent for to see a boy who, the woman told me, was suffering from retention of urine. The case was under the treatment of Dr. Weldon Claiborne, of this city, and the woman who called me brought a request from Dr. C. to carry a catheter with me and endeavor to get away the urine; he, the Doctor, being compelled to go into the country before returning to his office, and he had, unfortunately, no catheter with him. I went, and found for my patient a handsome little boy (colored), about 27 months old. He was lying on his back, moaning most piteously—his countenance betraying acute suffering. The pulse was both frequent and quick, ranging in beats to the minute from 125 to 135. Before proceeding to explore the region of the bladder, I was led to examine the chest by the circumstance of accidentally placing my hand over the right lung, and feeling a decided vibratory thrill. Applying my ear for auscultating purposes, I detected a pneumonia in the upper lobes of both lungs,