

cient quantity to be easily discernible upon entering the room from the outer air, is useful. Creolin, carbolic acid, and various coal-tar and coal-oil products under proprietary names, have been advised for use in a similar manner, and all of them have proved beneficial in a certain number of cases. Toxic effects may be produced by the absorption of such drugs, and the same care must be observed as in the case of internal administration. Formaldehyde solution (formalin) has been advised for inhalation, well diluted, from an inhaler on the plan of a Wolff bottle. The terebinthines, of which eucalyptol is best, may be dropped on a sponge suspended like a locket from a tape about the child's neck, or held over the nose and mouth by the Yeo respirator, and thus the respired air be continuously medicated.

A new preparation of fluorine, difluordiphenyl, has been advised in the form of an ointment, under the proprietary name of antitussin, and the reports in its favor are accumulating. My own experience with it, however, has not been brilliant.

As to internal medication, the collateral bronchitis should be treated on general principles, and to allay cough, bromoform seems on the whole the most useful of all the drugs that from time to time have been recommended, of which the name is legion. To a child two years old gtt. ij. bromoform in glycerin and sherry wine, or in aromatic elixir, may be given every two, three, or four hours, as may seem necessary. In every instance, however, the dose must be adjusted to the age and susceptibility of the patient and the severity of the case. Hydrogen dioxide has, in my hands, proved useful in doses of from  $\text{m} \text{xx.}$  to  $\text{lx.}$ , diluted with glycerin and water, and given every third or fourth hour. Sulphurous acid, sodium hyposulphite, and Hope's nitrous acid mixture seem also to have some usefulness. Sprays of adrenalin have been advised, but I have as yet had no opportunity to gain experience with this measure.

Laryngismus stridulus is usually an accompaniment of rhabdismus, the constitutional treatment for which must be instituted. In addition, amyl nitrite inhalations may be used to relax the spasm, and care is necessary to guard against strangulation of the child by incarceration of the epiglottis. Nitroglycerin or sodium nitrite given internally for prolonged periods, in doses appropriate to the age of the patient, sometimes has a beneficial effect in diminishing the frequency and severity of the paroxysm. Tumors and foreign bodies are to be removed if possible.

Retropharyngeal abscess is to be treated surgically, and the associated cough will disappear. Enlarged bronchial glands are not as yet susceptible to direct treatment, but crystallized calcium chloride, given internally in some suitable vehicle, in doses of gr. x. or xv. three or four times daily for a child of seven or eight years, and proportionately larger doses for older persons, often exerts a beneficial influence upon glandular enlargements in general. So, too, the so-called alterative treatment with preparations of iodine, of arsenic, and of mercury, is often useful. When glandular enlargements are due to syphilis, tuberculosis, or other recognizable cause, that will furnish the indication for treatment.

The cough of asthma is rather to be encouraged than diminished, as free expectoration will sometimes assist in cutting short the paroxysm. Otherwise the treatment is that for the underlying condition, and need not here be discussed. The cough of hysteria can be controlled only by psychic influence, the physical medium of which may be an electric application, a blister, or other means, according to the individuality of the patient and of the physician. In my own observation painful electric applications to the larynx or over it have been the most successful; though these should be made only with great caution, and never by those inexperienced in the use of electricity in the neighborhood of the pneumogastric nerve. *Solomon Solis Cohen.*

**COUNTER-IRRITATION.**—(See also *Cauterization.*) This is a remedial measure the object of which is to pro-

duce a congestion of the vessels at the surface of the body for the purpose of relieving a disturbance of some remote tissue or organ.

The principle of counter-irritation is followed in many therapeutic methods of a general character, all of which relieve internal, or more or less localized, congestions. Those best known are hot baths, steam baths, hot foot baths, heat to the extremities, blood-letting, etc. These general methods, however, are not known as counter-irritants; the term is commonly restricted to such as are more local in their action and which are employed to accomplish a definite object. For this purpose various irritant drugs are utilized, as well as the actual cautery, dry-cupping, and other similar means which cause a local irritation.

The irritation produced by counter-irritants varies in degree, and the difference is expressed by the terms rubefaction, vesication, and pustulation, according as they simply redden the skin or produce a blister or a pustular eruption. These terms do not imply sharply defined groups, as one may merge into the other, and a single drug may cause one or all of these effects according to the strength of the preparation or the length of time it is applied.

**RUBEFACTANTS** are such as produce a reddening and congestion of the skin, the vessels becoming dilated and the supply of blood increased. The effect is immediate, but of short duration, as it rapidly disappears when the irritation is removed. When the application is prolonged it causes a severe inflammation of the skin which may result in vesication or ulceration. For this reason rubefaciants require to be applied with some care to children and others whose skin is thin and sensitive, as the irritation may be unnecessarily severe. The same caution is necessary when they are applied to the skin of those who are unconscious or in whom the sense of pain is impaired.

Mustard, ammonia, turpentine, camphor, and iodine are the best known of this group.

**VESICANTS.**—In vesication there is a deeper and more severe inflammation of the skin which results in an effusion of serum beneath the cuticle. If the application is prolonged the effusion of serum may be very great. The counter-irritation may also be prolonged for days or weeks, by the application of irritating substances to the denuded surface, after the effused fluid has been removed. In selecting a site for the application of a vesicant it is advisable to avoid any bony prominence, as there may be trouble afterward as regards the healing of the spot. A depressant effect is apt to accompany blistering, and this may become a serious affair if the patient is weak or if the blistered surface is very extensive.

*Cantharides* is the one drug that is almost entirely used for this purpose. The cerate, spread in the form of a plaster, is the preparation generally employed. It is slow in its action and requires to be kept applied for about eight hours. To increase its action, camphor, ether, acetic acid, and the powdered drug may be applied to the surface. Hot linseed poultices may also be applied after the removal of the plaster, to promote the effusion of serum. Some caution is necessary during the employment of cantharides, on account of the liability of its being absorbed and exerting an irritant effect upon the kidney. If there is any tendency to kidney disease this caution is particularly required. Acetic acid is a very efficient solvent of cantharidin, and the *Liquor epispasticus* of the British Pharmacopoeia possesses a much more rapid action than any other preparation, one application being generally sufficient to cause a blister in the course of an hour. Cantharidal collodion is also an effective preparation, but less rapid in its action than the above.

*Ammonia* is sometimes employed as a vesicant, but it is less effective and very painful. A piece of lint is saturated with the water of ammonia and kept in contact with the part.

*Hydrochloric acid* is also sometimes used, the pure acid being applied to the surface.

**PUSTULANTS.**—Croton oil and tartarated antimony are typical representatives of this group. Their application

results in a pustular eruption accompanied by much inflammatory action. The course of the eruption is similar to that of the rash of smallpox, the formation of pus persisting for several days and leaving the part deeply pitted and scarred. On account of the severe effect which they produce, pustulants should not be extensively applied, nor should they be applied to any exposed part for fear of causing disfigurement.

*Croton oil* is the pustulant generally employed. When pure the oil is too strong to be used undiluted, and olive oil or spirits are added until the croton oil is reduced one-half.

*Tartar emetic* in the form of an ointment, one part to four, was formerly much used. It is now rarely employed, as its action is slow, and severe depression may result from absorption of the drug.

The *actual cautery* is particularly serviceable, as by its careful use the physician may establish any degree of counter-irritation. By simply passing the heated iron over the surface of the skin, but not in actual contact with it, he may produce the mildest rubefaction; and if a more severe effect is required, he has only to bring the point of the cautery lightly and quickly in contact with the skin. Very little experience is required to enable one to produce almost any degree of counter-irritation immediately, and readily to control the action of the heated instrument. Any form of actual cautery may be used, but the thermo-cautery is that usually adopted. A very old and simple method is to place an ordinary metal spoon in hot water for a few minutes and then to apply it to the part. It is stated that if the spoon, which has been heated in water at 120° F., is kept in contact with the skin for three seconds, the part will become red and congested, and that if it remains for ten seconds, vesication will follow.

*Dry-cupping* is a means of counter-irritation that is still frequently resorted to. It produces a rapid and intense rubefaction which persists for some time (see *Blood-Letting*).

Formerly a prolonged counter-irritant effect was produced by the use of *setons* and *issues*. These are not resorted to at the present day, although an occasional reference is made to their value by the older surgeons.

Setons were artificial sinuses formed by pinching a fold of skin and subcutaneous tissue, and, with the aid of a seton needle, passing through it one or more strands of silk, cotton, hair, or some such material. This was left in place and each day moved back and forth. The object was to promote suppuration, and, in order to increase the irritation, some caustic preparation was often applied to the material.

Issues were wounds artificially produced and maintained for the purpose of securing a continuous discharge of pus. When a small issue was desired, the wound was simply an incision made by a knife. When a more marked effect was required, caustics and moxa were resorted to to destroy the part. Various methods were adopted to maintain the discharge, such as the introduction of peas and beads, irritating drugs, and caustics.

Counter-irritation is resorted to for three purposes: to relieve pain, to lessen congestion and inflammation of deep-seated organs, and to promote the absorption of the products of inflammation. In selecting the particular counter-irritant by means of which it is hoped to attain these ends, the degree to which it acts must be the guide for its employment. If the trouble is of recent origin, or if the organ is simply a little congested, a mild counter-irritation will usually prove sufficient; but if the disturbance is of longer duration and especially if structural changes have begun, then a more severe and prolonged effect is required. The immediate effect of rubefaciants is much greater than that of vesication and other more active irritants, but the remote effect is much less. For this reason they are selected at the onset of pleurisy, bronchitis, pulmonary, and renal congestion, neuralgias, colic, and gastric pains; the extensive reddening of the surface in the neighborhood of the part affected affording

immediate relief. On the other hand, when the inflammation is established as in advanced bronchitis, pleurisy, endocarditis, peritonitis, sciatica, inflamed joints, and such serious affections, vesicants, pustulants, and the actual cautery produce a prolonged and more effective counter-irritation.

Although the beneficial effect of counter-irritation is very evident, the manner in which it is produced is as yet undetermined. It has been thought to depend upon a direct vascular relation between the affected organ and the adjacent skin surface. This explanation is applicable to superficial and intercostal neuralgias, to inflammation of the costal pleura, and to many joint affections, when there is a blood supply common to both parts; but it is not sufficient to explain the relief afforded to deeper parts which have an independent circulation. The more recent and probably the more correct explanation is that which looks to the sensitiveness of the cutaneous nerves and their reflex action upon the deeper parts. The activity of the superficial reflexes is evident to all, and experimental work has shown that a similar influence is exerted on the deeper organs, as where an irritant to the skin over the kidneys causes a contraction of the renal vessels, or where, in an exposed pia mater, the vessels are similarly affected by irritating the scalp. Further evidence of this relation between the deeper parts and the surface is furnished by the many reflected pains that arise when the organs are diseased. Starting from this explanation as a basis, we may maintain that a careful mapping out of the skin areas most intimately associated with the various organs becomes necessary; and when such a scheme has been prepared, it will at once be possible to employ counter-irritants in a more rational and effective manner. *Beaumont Small.*

**COWPER'S GLANDS.**—These glands were discovered by Cowper in 1700. They are two in number and have a genital function the exact nature of which is not definitely known. Probably their function is to lubricate the urethra during sexual excitement, at the same time adding somewhat to the volume of the seminal fluid at the moment of ejaculation.

It has been demonstrated that their activity is much increased by sexual excitement. In a case of a cyst of one of Cowper's glands which was opened externally, the fluid excreted through this opening was markedly increased at the time of erections. It is not believed, however, that these glands have an important part in propagating the species. They are believed to be entirely accessory in their function and that their absence would not particularly influence the sexual act or its results. I cannot find any statement in the literature of the subject which would tend to disprove the above belief.

The subject, however, has not been very thoroughly studied, either as regards the function or as regards the pathological conditions of these little glands. I am of the opinion, from my own experience, that they are diseased more frequently than is generally supposed, but that the resulting pathological conditions are not always recognized. Owing to the position of these glands and their ducts they are frequently in the path of a gonorrhoeal infection, and an infection of these bodies may be so mild as to make a differential diagnosis extremely difficult until possibly, by urethral or external irritation, one of the glands becomes acutely inflamed, producing a characteristic swelling and train of symptoms.

I believe that in certain cases of chronic relapsing urethritis of a gonorrhoeal origin, where no focus for the discharge can be found and where the urethra, seminal vesicles, prostate, and other parts are normal, a disease of one of these glands is the cause of the persistent discharge. I have seen a few cases of the kind, and in one of these a most prolonged discharge was cured by the enucleation of Cowper's gland during a period of acute exacerbation produced by urethral instrumentation. This case had been stirred up by sounds on several occasions, the inflammation being accompanied by increased discharge and pain in the perineum. I saw the patient in one of

these relapses, and found an inflammation with the usual symptoms of a suppurating Cowperitis of a relapsing character. An operation, as above stated, cured the patient. Such a case demonstrated the importance of considering a case from all sides and getting at the root of the trouble. We should give up the empirical method of treating a discharge by the invariable anterior injection. Instead, we should find the focus of the trouble, treat that, and the discharge will subsequently cease. In cases of Cowperitis of the chronic, low-grade character just described, it can readily be seen how ridiculous and unsatisfactory it would be to use an anterior urethral injection.

I have spoken of diseased conditions of these glands only in a general manner, but I will presently take up their special disorders, with their appropriate treatment. Before doing this, however, I shall refer to the anatomical position of these little bodies.

They are about the size of peas, placed one on each side of the median perineal line beneath the forepart of the membranous urethra, between the two layers of the perineal fascia, and close behind the bulb. They are enclosed by the transverse fibres of the compressor urethrae muscles. Each gland is made up of large acini with wide lumina invested by a fine connective-tissue capsule and with much involuntary muscular tissue in their parenchyma. These acini are lined by clear columnar cells and they open into one common duct, where, combining with the ducts of the other lobules, they form a single excretory duct. These ducts, one for each gland, are slender and whitish in appearance, run forward obliquely for about one inch beneath the urethral mucous membrane, and open by minute orifices into the floor of the bulbous portion of the urethra.

These glands are present at all periods of life, but they diminish in size in old age.

Their pathological conditions have not been studied as thoroughly as have those of other parts of the genito-urinary tract. In the literature of the subject an occasional case has been reported. During the past five years, in private and dispensary practice, I have met with only half a dozen cases of Cowperitis of a type pronounced enough to be recognized.

Cowper's glands may be involved in the course of an urethritis of any kind, but more frequently in the course of one of a gonorrhoeal origin; they may also be affected by trauma, by tuberculosis, by cysts, and by malignant disease.

Cowperitis as a complication, either direct or indirect, of a gonorrhoeal urethritis is the form usually seen. This complication is not likely to occur before from three to four weeks after the commencement of the gonorrhoea, and may not appear until much later.

The disease usually begins with considerable pain in the perineum, accompanied by a tumefaction in the mid-perineal region, slightly to one side. I have never seen both glands involved at the same time, although in a severe case, if the condition has been present for some time, there may be a general tenderness and swelling over the whole perineum, and only very obscure indications of the fact that the gland was the original starting point of the infection. Besides the tumefaction, which is apparent both externally and upon exploration by a finger introduced into the rectum, there will be more frequent periods of urination with probably considerable pain at the end of the act, owing to the pressure on the involved gland by the compressor urethrae muscle. There usually will be a diminution in the size of the stream. There is fever in many cases, particularly if suppuration is present or impending. An attack may, however, begin and then gradually subside before there is any pus formation. In all cases, sitting or walking becomes extremely painful, and any pressure on the perineum causes much discomfort.

At the beginning of the trouble a finger introduced within the external sphincter of the rectum will enable the surgeon, with the other hand placed over the perineum, to recognize this condition. The fact of the swelling being on one side of the perineum is a matter of importance in the differential diagnosis.

When suppuration occurs the symptoms are much aggravated. There are severe throbbing in the perineum, fever, much difficulty in urination owing to mechanical obstruction, and occasionally retention, all combined with extreme pain. The abscess may break into the urethra, or externally. It is, however, more likely to break externally. In some cases a troublesome cicatrix remains. In rare cases the abscess breaks into the urethra, but urinary extravasation in such cases is unusual. In patients in whom these glands become involved following gonorrhoea and in whom after being inflamed they subside without suppuration, they are liable to relapses of the old trouble on slight provocation; as after slight injury of the perineum, a gonorrhoeal urethritis, the introduction of urethral instruments, deep injections or irrigations, excessive sexual excitement, indulgence in alcohol, high living, and the like. In such cases, with a dormant focus of gonorrhoea in one of Cowper's glands, the patient will have an occasional discharge which resists all forms of treatment directed toward other parts of the genito-urinary tract. The inflammation in the intervals may be so slight that the cause of the trouble in Cowper's gland is not recognized. In fact, I am confident that some chronic discharges of a relapsing character are due to disease of one of these little glands. It is an extremely difficult matter to diagnose a chronic condition of this kind owing to the position of the glands and their ducts and also owing to the small amount of local disturbance in such cases. This condition may be called a relapsing Cowperitis, indirectly caused by an old gonorrhoeal urethritis. The gland, of course, has never recovered entirely from the first acute infection, and unless the disease is stirred to activity by some chance cause, as instrumentation, it may not be recognized for years; the discharge, which is obstinate to all treatment, being the only evidence of any disease. I also believe that stricture may follow a severe Cowperitis of this character.

By obtaining a careful history of the case as to any acute attacks of Cowperitis, by making a thorough examination of the seminal vesicles and prostate with a finger educated to the rectal feel for any disease of these organs, by instituting a urethral examination with sounds, and by the employment of the endoscope we should be able to form an opinion in many cases as to the part diseased. The treatment should, of course, be adapted to the conditions thus ascertained. If one of Cowper's glands is enlarged and is demonstrated to be the cause of this relapsing discharge, it should be enucleated without further delay.

Fuller, in his book on "Disease of the Genito-Urinary System," says, "The prognosis as regards suppurative cases if treated expectantly is not very favorable. In many of them a sinus persists marking the path of exit of the original abscess. From such sinuses there is usually a slight urinous leak, that fluid finding its way into the path of the duct which previously connected the gland with the urethra. In some cases a sinus persists because the original abscess cavity is filled with unhealthy granulation tissue developed chiefly from the remains of the glandular structure. Such tissue continually secretes pus, and should the sinus furnishing the vent become closed, then a chronic burrowing will occur and another sinus will eventually be established. In this manner at times the perineum may become filled with cicatrix and fistulae."

The treatment of non-suppurative cases should be the external application of ice or of soothing lotions, over the perineum, and rest in bed, with all pressure removed from the perineum.

No hot applications should be used, as such treatment might tend to promote suppuration. All urethral treatment should be discontinued. It is well to give some drug by the mouth to render the urine bland; acetate of potash, gr. v. to x. every three or four hours, is often serviceable. If there is very severe pain, anodynes had better be employed. A very efficient method of employing them is in the form of a rectal suppository having the following composition: Ext. opii, gr. i.; Ext. bel-

ladonna, gr. ʒ. A second such suppository should be introduced at the end of from four to six hours if the pain continues to be severe. The bowels should be thoroughly moved, but the use of rectal irrigation is not usually desirable in acute Cowperitis, as the introduction of the nozzle is liable to cause considerable pain, thus stirring up an already very sensitive region, and probably doing more harm than good.

In other cases, in which we are convinced, from an increase in the severity of the signs and symptoms—viz., a more pronounced tumefaction in the perineum, more severe pain of a throbbing character, the presence of fluctuation in the swelling, the rise in body temperature, etc.—that suppuration is present, it will be evident that an incision should be made. This should be done with the usual surgical care. After evacuating the pus the remainder of the diseased gland should be removed and the wound packed lightly with gauze; then a soft-rubber catheter should be introduced through the penis into the bladder and left there for permanent drainage. As the discharge gradually becomes less the edges of the wound should be drawn together.

In cases in which there is an extravasation of urine into the perineum and surrounding tissue, free incision should be made as early as possible. If, after the acute symptoms subside, a permanent urinary fistula should remain, a radical operation will have to be performed and the old inflammatory tissue removed, a urethral soft-rubber catheter being left in place till the wound heals. If there is no communication between the wound and the urethra, the diseased area lying entirely outside the latter, it will be found desirable to introduce a sound into the urethra as a guide during the operation. No radical operation should be undertaken while there are any remains of an acute gonorrhoeal urethritis.

Cowperitis may be produced by trauma, as a blow over the perineum, horseback or bicycle riding, and the like. However, most of the disturbances arising from such causes are the indirect result of a gonorrhoeal urethritis of long standing, which has been roused to renewed activity by the injury. The treatment is the same as that already described above. In one case of mine the patient was not seen for some days after the injury and the whole perineal region was found to be tumefied and extremely sensitive. The case was one of an old gonorrhoea of Cowper's glands which had been of a relapsing character. The injury had been produced by the use of large steel sounds.

A tuberculous condition of Cowper's glands may occur, and Fuller, in his book, refers to a case in which severe horseback riding was followed by a non-suppurative Cowperitis with suppuration of the inguinal glands. The removal of these by an operation revealed the fact that they were tuberculous. The Cowperitis subsided without operation, but Dr. Fuller believed that this affection also was of a tuberculous nature.

In a patient with a predisposition to tuberculosis an inflammation of Cowper's gland produced by mild trauma, with no previous gonorrhoea, should cause us to suspect tuberculosis.

If the disease does not go on to suppuration, constitutional treatment and change of climate are indicated. On the other hand, if suppuration should occur, the removal of the diseased gland will be clearly indicated.

A few cases of cyst of Cowper's gland have been reported; they projected into the urethra and thus diminished its calibre. If such a cyst is large enough to obstruct noticeably the flow of urine, it is clear that it should be removed by operative interference. This can be done by making an incision through the perineum into the urethra, and then closing the wound after the removal of the cyst.

Very few instances of malignant growths of Cowper's glands have been reported. They appeared in the form of a hard, movable nodule in the region usually occupied by the gland. In structure they usually presented the appearances of a cylindroma.

Such a growth may in a short time obstruct the flow of

urine. The growth is rapid and at first painless, but as the tumor increases in size the patient notices pain in defecation, difficulty in sitting or walking, and in all positions which cause pressure upon the growth. The inguinal glands become involved. A combined rectal and abdominal examination will indicate the position of the tumor as readily as it does in cases of simple swelling of the gland. An early removal of the gland and other involved parts is the only form of treatment which offers any hope of success.

Follen Cabot, Jr.

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**COWPOX.**—(Synonyms: Vaccinia, Vaccine Disease, Kinepock.) Cowpox is a specific contagious disease, occurring in the cow, horse, and possibly in other domesticated animals, characterized by an eruption which closely resembles in anatomical structure and successive stages of development the eruption of variola.

The disease known as *grease* in the horse is believed to be identical with, and capable of producing, by inoculation, vaccinia in the cow. Vaccinia chiefly affects young cows, and the eruption is nearly always limited to the udder and teats. It rarely, if ever, occurs more than once in the same individual.

Cowpox occurs sporadically and as an epidemic. It is susceptible of propagation by inoculation, but is contagious in no other way.

The disease prevails more extensively in the herds of Europe than in those of this country, but is far from common anywhere; in fact, previous to the discovery of the Cohasset stock in 1881, no perfectly authenticated case of natural cowpox had ever occurred in America.<sup>1</sup>

The constitutional symptoms are mild, and the malady would possess little practical importance were it not that, reproduced in man, it either confers absolute immunity from smallpox, or greatly modifies its course and mortality. After a period of incubation lasting from five to eight days, the udder becomes hot, tender, slightly swollen, and small, red papules appear upon the udder and teats. The papules, about five days after their appearance, are changed into vesicles, distinctly umbilicated, and filled with transparent, amber-colored lymph. When not influenced by location or surroundings, the vesicles are circular in form, and vary in size from one line to five lines. They are encircled with a rose-red areola and a well-marked zone of induration.

On section each vesicle is seen to be multilocular; its interior is divided into several distinct chambers containing lymph, and separated from one another by delicate partitions.

The transformation into pustules is fully completed by the eleventh or twelfth day, the central depression disappears, and the external contour is conoidal. The local inflammation soon abates. Desiccation advances rapidly, and by the fourteenth or fifteenth day crusts of a dark mahogany color are fully formed. These fall off about ten days later, and whitish scars, more or less deeply pitted, mark the site of the vesicles.

The lymph and crust may be used in inoculating other

heifers or in human vaccination: but the former, collected when the vesicles are from seven to nine days old, is, for obvious reasons, greatly to be preferred.

Vaccinia may be produced in the cow by inoculation with lymph from animals affected with the disease, with humanized virus, and with the lymph of variola.

The essential features are the same by whatever method produced, but vary in intensity.

At one time retrovaccination, or the inoculation of heifers with humanized lymph, was extensively practised, especially in Italy, in the belief that the supposed deterioration of human vaccine virus could in this way be prevented and all contaminations removed. The practice is now justly abandoned.

The true nature of cowpox has given rise to much discussion in professional circles and this discussion cannot yet be considered closed. It is questionable whether the disease ever originates spontaneously. The weight of opinion tends strongly to support the view originally advanced by Jenner, that the vaccine disease is variola modified by transmission through the system of the cow. The French school still indorses the conclusion of the well-known Lyon Commission (1865) as to the dual nature of the two diseases. It is, however, very difficult to produce the disease by inoculation with smallpox virus. But few of the many experimenters have succeeded, and at times very lamentable results have followed the attempt. In several instances widespread and fatal epidemics of genuine smallpox have been kindled by the use of virus obtained from bovine variolation.

In confirmation of this statement we may cite the experiences of Martin in Attleboro, Mass. (1836), Reiter in Munich (1839), and the Lyon Commission (1865). In determining questions of this kind, one successful experiment rebuts the negative testimony of many failures. Mr. Ceely, of England, than whom there is no higher authority, Hime (1892), Voigt, Simpson of Calcutta (1892), and others have succeeded in cultivating a stock of virus which afforded perfect protection from subsequent inoculations of variolous matter. It may be stated, then, in summing up our present knowledge, that while vaccinia is very probably variola modified in some mysterious manner by its passage through the system of the cow, the difficulties of inoculation and the sad results which attend the use of spurious virus render bovine variolation impracticable as a source of vaccine supply. It is but right to add, however, that the experiments of Dr. Voigt,<sup>2</sup> Superintendent of the Vaccine Institute of Hamburg, lead to a different conclusion. He has experimentally demonstrated that where bovine variolation is practised the product of the first inoculation retains nearly all of the virulence of the original seed, but by successive transmissions from one animal to another it is so modified and reduced in activity as to correspond perfectly in its effects upon the human economy with lymph obtained from spontaneous cowpox. According to Voigt, true smallpox virus must be passed through not less than six heifers before it becomes properly transmuted and safe for human vaccination. The undue violence, both local and constitutional, induced not only by original cowpox virus, but by the earlier human removes from it, seems to offer some confirmation of the above statement. This theory is also strongly supported by the more recent researches of King, of Madras, Hime, of England, and of Haccius and Eternod, of Switzerland (1892). The latter deduce as one of their conclusions: "Smallpox inoculated in the heifer becomes transformed into vaccine in the course of several generations by transmission through the animal."

<sup>1</sup> The Medical News, vol. xl., p. 498.

<sup>2</sup> The Medical Times and Gazette, September, 1882.

**COXA VARA.**—(Synonym: Incurvation or depression of the neck of the femur.)

In the normal femur the neck projects slightly forward, and upward to form an angle of about 125° with the shaft. In childhood this angle is generally somewhat greater, and in later years it may be somewhat less than

this; in fact, a variation between 110° and 140° may be within the normal limit.

When the neck of the femur is depressed to a degree that causes disability, the affection is called coxa vara. Coxa vara, like genu varum and genu valgum, is one of

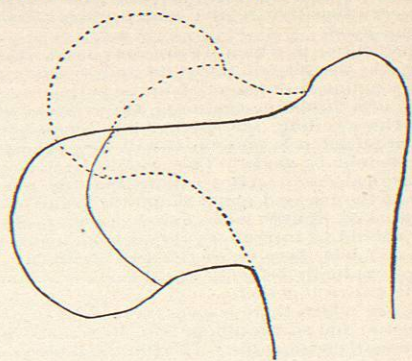


FIG. 1528.—Outline of the Depressed Neck of the Femur in Müller's Specimen, Contrasted with the Normal Position shown by the Dotted Line.

the group of so-called static deformities of the lower extremity, that more often appear at two periods of life: in early childhood, as a direct result of rachitis; and in adolescence, when, with the weakness and the increased weight incident to this period of rapid growth, is combined, in many instances, the strain of laborious occupation (Fig. 1528).

Genu varum and valgum are common in childhood, but rarely develop in adolescence; coxa vara, in comparison, is not only an infrequent deformity, but it differs also in that it more often attracts attention in later childhood or adolescence than at an earlier period, doubtless because the neck of the femur is, at the age when rachitic distortions are common, very short and is relatively stronger than the shaft, while in adolescence the conditions may be reversed. The distortions at the knee are self-evident, but the neck of the femur is concealed from view so that the diagnosis of its depression may be somewhat difficult, and, in fact, it is only in very recent years that its symptoms have been recognized.

Fiorani first described the deformity as it had been observed by him in childhood (*Gazzetta degli Ospitali*, Nos. 16, 17, 1881), but E. Müller first called attention to the affection as one of the deformities of adolescence which, until that time, had been mistaken for hip disease (*Beiträge zur klin. Chir.*, 1889, Bd. iv.).

**PHYSICAL SIGNS AND SYMPTOMS.**—The nature of the symptoms is explained by the physical effects of the deformity. The neck of the femur is depressed, and it is usually twisted somewhat backward in its relation to

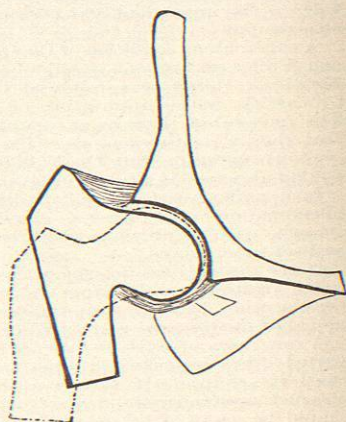


FIG. 1529.—Cross Section of the Pelvis and the Deformed Femur. A scheme to show the effect of the deformity in limiting abduction of the limb. The dotted outline shows the normal relation.

the shaft, following the line of least resistance. Thus the limb is actually shortened and is rotated outward; the trochanter is elevated above Nélaton's line, its prominence is increased, and it is displaced somewhat forward toward the anterior superior spine in compensation for

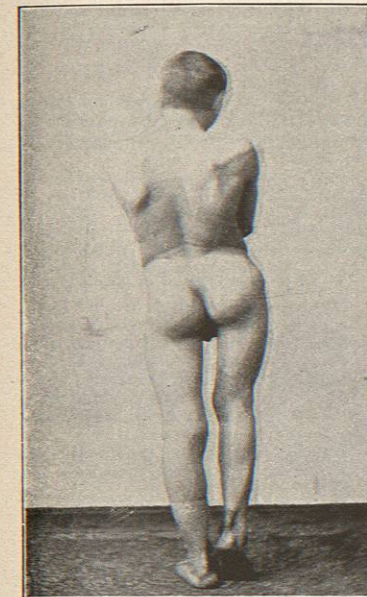


FIG. 1530.—Unilateral Coxa Vara of an Extreme Degree. Showing great apparent shortening due to the adduction of the limb.

the loss of the normal forward projection of its neck. A secondary effect of the distortion is limitation of the normal range of motion. Abduction is checked by the tension upon the lower border of the capsule, by the adaptive shortening of the adductor muscles, and by the direct contact of the femur with the upper border of the acetabulum (Fig. 1529). Inward rotation and flexion are limited because of the backward displacement of the neck, but the range of extension is not restricted and it may be increased even.

In rare instances the depression of the neck of the femur may be directly downward, in which case the range of motion is but little affected except in abduction; or the distortion may be downward and forward, when extension and outward rotation are limited in the place of flexion and inward rotation. These cases are, however, exceptional, and they are practically never seen in the adolescent type of deformity. The most noticeable symptom of coxa vara is a persistent limp, due primarily to the shortening of the limb caused by the depression of the neck of the femur. The actual shortening, which is not often more than an inch, is, in well-marked cases, increased by an upward tilting of the pelvis on the affected side, in compensation for the restriction of abduction, similar to the so-called practical shortening of hip disease. This practical shortening may be from one to three inches (Fig. 1530). Thus, as in genu varum and genu valgum, the direct effects of the deformity are the most characteristic symptoms, although in coxa vara there is usually greater discomfort than in the latter affections, because the interference with the function of the joint is more marked. The patient usually complains of sensations of weakness and discomfort after long standing or walking, and of stiffness on changing from a position of rest to one of activity. This discomfort, usually referred to the thigh and the neighborhood of the joint, may be increased to actual pain by overexertion or injury; in such instances there may be attendant muscular spasm which disappears with the subsidence of the acute symptoms.

**DIAGNOSIS.**—On physical examination, the shortening is apparent and its cause is explained by the elevation of the trochanter. There is the characteristic limitation of motion that has been described, but as a rule pain on manipulation and muscular spasm are absent. There are slight atrophy, more marked in the thigh than in

the leg, and in most cases persistent outward rotation of the limb also is present.

There are but three affections with which coxa vara is likely to be confounded. These are:

1. Fracture of the neck of the femur.
2. Congenital dislocation of the hip.
3. Hip disease.

1. *Impacted fracture of the neck of the femur*, or simple united fracture, causes deformity practically identical with coxa vara. It must therefore be distinguished from it by the history of injury and subsequent disability.

2. *Congenital dislocation of the hip* is a disability that is apparent when the child begins to walk, while coxa vara does not, except in very rare instances, develop until a later period. In congenital dislocation the head and neck of the bone may be palpated beneath the gluteal muscles when the thigh is flexed and adducted, while in coxa vara only the prominent trochanter can be felt. There is also an absence of the abnormal mobility that characterizes the former affection.

3. *Hip Disease.*—In hip disease there are discomfort on manipulation, muscular spasm, and limitation of motion in all directions; while in coxa vara muscular spasm is usually absent and the limitation of motion is irregular. In hip disease shortening is a late symptom, in coxa vara it is present from the first; and finally, in hip disease there is usually some evidence of the local destructive process, in swelling, sensitiveness, and the like, symptoms that are of course absent in coxa vara.

**BILATERAL COXA VARA.**—Bilateral coxa vara is far less common than the unilateral form. The limp is replaced by a

waddle or swaying of the body from side to side, resembling the gait of knock-knees. The awkwardness and weakness are of course correspondingly increased, and in the extreme cases, in which the thighs are adducted, the limbs may be crossed so that walking is extremely difficult. The pelvis appears to be abnormally broad because of the elevated and prominent trochanters, and the lumbar lordosis is diminished (Fig. 1531) because of the loss of the normal inclination of the pelvis due to the forward displacement of the supporting femora. In the rare cases in which the femoral necks are displaced forward as well as downward, the lumbar lordosis is increased and the appearances are somewhat similar to those of congenital dislocation of the hips (Fig. 1532). Bilateral coxa vara is not

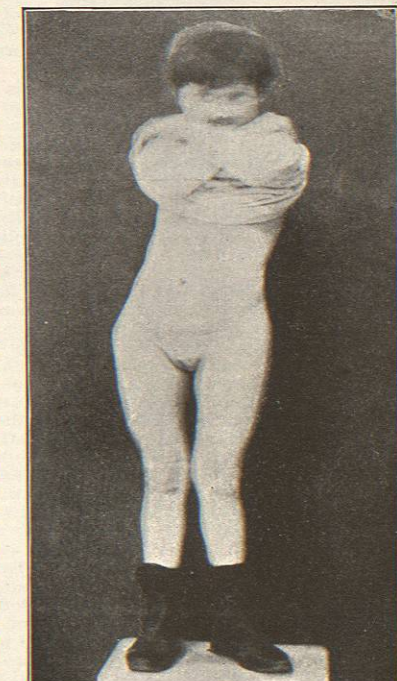


FIG. 1531.—Bilateral Coxa Vara, more Marked on the Right Side. Complete loss of abduction on both sides.