spiral manner and arises from the anterior superior spine of the ilium (spina iliaca anterior superior). It is inserted into the tuberosity of the tibia. Its nerve supply is from the N. femoralis.

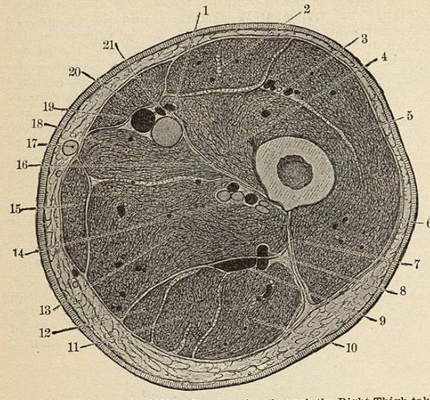

FIG. 4705.—(Toldt, Fig. 1020.) Cross-section through the Right Thigh taken Somewhat Above the Middle. Distal surface. 1, V. femoralis; 2, M. rectus femoris; 3, M. vastus intermedius; 4, M. vastus medialis (lateralis); 5, M. vastus lateralis; 6, fascia lata (ilio-tibial band); 7, septum (or ligamentum) intermusculare laterale; 8, A. perforans; 9, N. ischiadicus (sciatic nerve); 10, M. biceps femoris; 11, M. semitendinosus; 12, semimembranosus; 13, M. adductor magnus; 14, A. profunda femoris; 15, M. gracilis; 16, septum intermusculare mediale; 17, V. saphena magna; 18, M. adductor longus; 19, A. femoralis; 20, M. sartorius; 21, V. femoralis.

Quadriceps Femoris (M. quadriceps femoris).—This muscle consists of four portions (M. rectus femoris, vastus lateralis, vastus, intermedius, and vastus medialis).

Rectus Femoris (M. rectus femoris).—It arises from the inferior anterior spine of the ilium (Spina iliaca anterior inferior). It is inserted in common with the other divisions of the muscle into the common tendon.

Vastus Medius (M. vastus intermedius).—It arises from the anterior surface of the shaft of the femur and is inserted into the common tendon.

The *Vastus Externus* (M. vastus lateralis) arises from the intertrochanteric line, the lateral surface of the trochanter major, and the lateral lip of the linea aspera. It is inserted into the common tendon.

Vastus Internus (M. vastus medialis).—It arises from the inner lip of the linea aspera (labium mediale lineæ asperæ femoris) and is inserted in common with the other muscles into the common tendon that is attached to the patella. The four parts of the quadriceps femoris are all supplied by the anterior crural nerve (N. femoralis).

THE INNER GROUP OF MUSCLES.—The *pectineus* (M. pectineus) arises from the superior ramus of the os pubis and is inserted in the pectineal line on the lower part of the lesser trochanter of the femur. It is supplied by the anterior crural nerve (N. femoralis) and the obturator (N. obturatorius).

The *gracilis* (M. gracilis) arises from the interior ramus of the os pubis and is inserted into the tuberosity of the tibia. It is supplied by the anterior branch of the N. obturatorius.

The *adductor longus* (M. adductor longus) arises from the superior ramus of the os pubis and is inserted into the inner lip of the linea aspera. It is supplied by the anterior branch of the N. obturatorius.

The *adductor brevis* (M. adductor brevis) arises from the anterior surfaces of the rami of the os pubis and is inserted into the inner lip of the linea aspera.

Adductor magnus (M. adductor magnus) arises from the anterior surface of the tuber ischium and the inferior ramus of the ischium. It is inserted into the inner lip of the linea aspera. It is supplied by the posterior branch of the obturator nerve (N. obturatorius) and the internal popliteal nerve (N. tibialis).

Scarpa's triangle (Trigonum subinguinale).—Scarpa's triangle is bounded above by Poupart's ligament, externally by the sartorius muscle and internally by the adductor longus muscle. It is important surgically on account of the number of important structures which it contains. Its apex is the point of election for ligating the femoral artery. It is here that digital pressure is applied in treating popliteal aneurism, and that a turniquet is applied in amputations involving parts of the limb below; a psoas abscess usually points here and femoral hernia appears in the upper part of it.

From the apex of Scarpa's triangle (trigonum subinguinale), on the surface of the upper part of the adductor magnus and piercing the lower part of it, we have a canal formed that carries the femoral artery, the femoral vein, and the long saphenous nerve. It is known as Hunter's canal (canalis adductorius). It is about 5 cm. long, and the upper opening is a crescent-shaped tendinous fold of the adductor magnus with the concavity directed upward. The inferior opening lies in the fleshy part of the adductor magnus, which aids in forming a tendinous border that forms a foramen known as the "adductor foramen." This opening serves to transmit the vessels to the popliteal space.

Femoral artery (A. femoralis) begins at the lower part of Poupart's ligament (Lig. inguinale) and ends at the adductor foramen, where it enters the popliteal space. For convenience of description the femoral artery is divided into three parts: (1) A superior segment in Scarpa's triangle; (2) a middle portion covered by the sartorius muscle, and (3) an inferior portion in Hunter's canal (canalis adductorius). Its general direction (see Fig. 4707) can be mapped out by a line drawn midway between the symphysis pubis and the superior anterior spine of the ilium to the posterior surface of the intercondylar process of the femur.

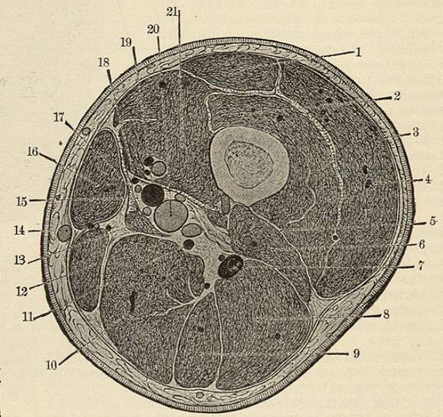

FIG. 4706.—(Toldt, Fig. 1021.)—Cross-section through the Right Thigh taken Somewhat Above the "Adductor Foramen" through Hunter's Canal. Distal surface. 1, M. rectus femoris; 2, M. vastus intermedius; 3, fascia lata; 4, M. vastus lateralis; 5, septum intermusculare laterale; 6, M. biceps femoris; 7, N. ischiadicus (sciatic nerve); 8, M. biceps femoris; 9, M. semitendinosus; 10, M. semimembranosus; 11, A. perforans III.; 12, M. gracilis; 13, M. adductor magnus; 14, V. saphena magna; 15, canalis adductorius; 16, M. sartorius; 17, aponeurosis; 18, N. saphenus; 19, A. femoralis; 20, V. femoralis; 21, M. vastus medialis.

Superior Segment.—The superficial arteries given off from this division of the femoral have already been mentioned. The artery is covered here by the skin, the subcutaneous fascia and fat, the superficial lymph vessels and glands, and the fascia lata. The thickness of the fat in this region varies within rather wide limits, and this should be remembered in ligation. At the apex of Scarpa's triangle the artery lies just below and to the inside of the sartorius muscle, which is a good guide to its location. In ligating near the base of the triangle the femoral vein lies to the inside of the artery, but gradually comes to lie under it by the time it reaches the apex. No large nerves accompany this portion of the artery. The femoral nerve passes under Poupart's ligament in the sheath of the ilio-psoas muscle. The femoral artery is most easily compressed just where it emerges from under Poupart's ligament. The pressure should be downward and slightly upward to bring it against the bone. It can also be controlled at the apex of the triangle, and here the pressure should be downward and outward to bring it against the femur.

The *middle segment* of the femoral artery is the longest and is covered by the sartorius muscle throughout its length. The long saphenous nerve accompanies it, and although it is not in its sheath it must carefully be separated from the artery in ligation. The femoral vein lies under and to the outside of the artery. The position of the artery under the muscle makes it hard to control hemorrhage by digital pressure.

The *inferior segment* lies entirely in Hunter's canal (canalis adductorius). The femoral vein lies behind and to the outside and in the same sheath. The long saphenous nerve accompanies it and lies above and toward the inside, but not in the sheath.

The points usually selected for ligation of the femoral artery are, first, just below Poupart's ligament (ligamentum inguinale); second, at the apex of Scarpa's triangle (trigonum subinguinale); and, third, in Hunter's canal (canalis adductorius). In these operations the avoidance of the vein is the most important matter, although in Hunter's canal the long saphenous nerve must also be borne in mind. The muscular landmarks have already been given. The results of ligation of the femoral artery have been as follows:* In 31 cases in which the common femoral was ligated the mortality was 40 per cent.; hemorrhage 60 per cent. The superficial femoral has been ligated 204 times with a mortality of 50 cases.

Collateral Branches of the Femoral Artery.—The superficial branches of the artery have already been described. In addition to those enumerated it gives off the deep external pudic (A. pudenda subaponeurotica), but the largest artery supplying collateral branches is the profunda (A. profunda femoris). A knowledge of its exact position is very important in order that, in ligating the femoral artery, this branch may, if possible, be left undisturbed. It springs from the lateral and posterior side of the femoral artery from 3 to 10 cm. below Poupart's ligament and runs parallel with and outside of the more superficial femoral artery. It lies upon the iliacus, pectineus, and adductor brevis muscles, and then between the adductor longus and abductor magnus. It finally pierces the latter just above the adductor foramen as the fourth perforating artery (A. perforans IV.). A vein that empties into the femoral vein accompanies it for a short distance. It branches, soon after leaving the femoral, into the external circumflex (A. circumflexa lateralis), the internal circumflex (A. circumflexa medialis), and the three perforating arteries (Aa. perforantes). The external circumflex arises usually about 2 cm. from a point where the profunda leaves the femoral artery, but in a few cases it may come directly from the femoral. It divides into an ascending and a descending branch. The former goes to the upper part of the femur and anastomoses with the inferior gluteal (A. glutæa inferior), the superior gluteal (A. glutæa superior), and the deep circumflex iliac arteries (Aa. circumflexæ iliacæ profundæ). The descending branch supplies the vastus externus (M. vastus lateralis) and the vastus medius (M. vastus medialis intermedius).

The *internal circumflex artery* (A. circumflexa medialis) winds around the inner side of the femur at the height of the trochanter. It is first between the psoas and the pectineus and then between the obturator externus and the adductor brevis, and finally between the adductor magnus and the quadratus femoris. In this latter situation it anastomoses with the sciatic artery (A. ischiadica), the external circumflex and the superior perforating to form the crucial anastomosis. It also sends a branch that pierces the capsule of the hip-joint and supplies the joint. In case of intracapsular fracture it is this branch which furnishes nutrition for the superior fragment.

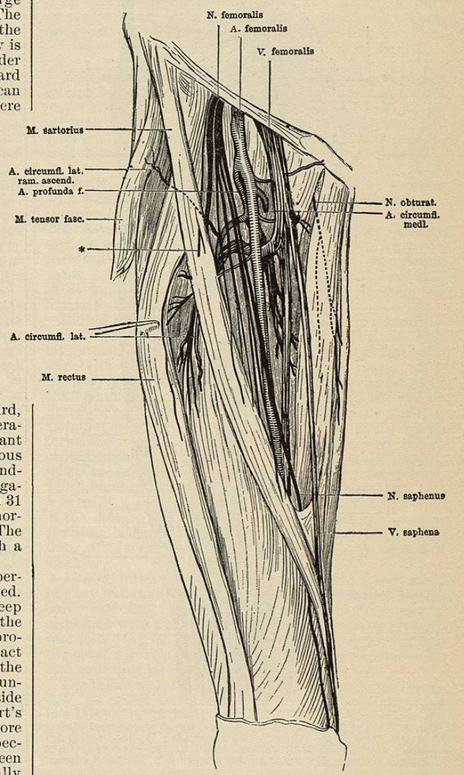

FIG. 4707.—The Surgical Anatomy of the Nerves, Veins, and Arteries on the Anterior Surface of the Thigh. (From Merkel-Henle.)

The perforating arteries are usually three in number and pierce the adductor muscles near the linea aspera to supply the muscles on the posterior aspect of the thigh. The second one usually supplies the nutrient artery of the bone.

The inferior division of the femoral gives rise to the

*Joseph D. Bryant: "Operative Surgery," second edition, vol. i.

anastomotica magna artery (A. genu suprema) just before it pierces the adductor foramen. This artery divides into a superficial and a deep branch. The former runs on the vastus internus (M. vastus medialis) and aids in forming the plexus on the front of the knee. The deep branch penetrates the substance of the vastus internus and anas-

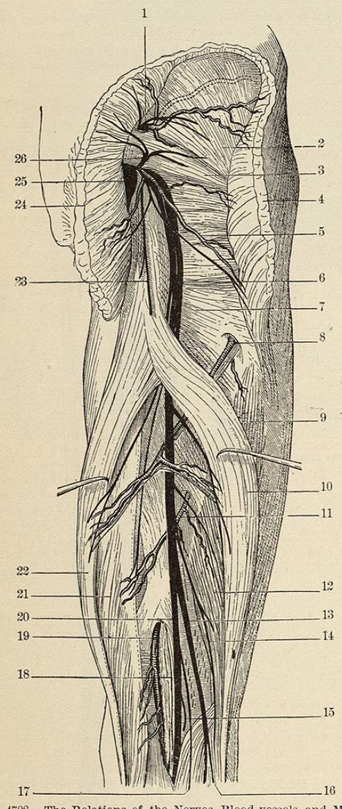

FIG. 4706.—The Relations of the Nerves, Blood-vessels, and Muscles of the Back of the Thigh. (Merkel-Henle.) 1, Superior gluteal artery and nerve; 2, M. gluteus medius; 3, M. pyriformis; 4, M. gluteus magnus; 5, inferior gluteal artery; 6, N. ischiadicus (sciatic nerve); 7, adductor muscles; 8, A. perforans I.; 9, M. biceps (short head); 10, M. biceps (long head); 11, A. perforans II.; 12, M. biceps; 13, N. peronæus communis (external popliteal); 14, superior articular branch from the external popliteal nerve; 15, inferior articular branch from the internal popliteal nerve; 16, N. cutaneus suræ lateralis; 17, N. cutaneus suræ medialis; 18, V. saphena parva (not well shown. It is represented by a part of the light area between the artery and nerve); 19, popliteal artery and vein; 20, N. tibialis (internal popliteal); 21, M. semimembranosus; 22, M. semitendinosus; 23, N. cutaneus femoris posticus (small sciatic nerve); 24, M. gluteus magnus; 25, pudic artery and nerve; 26, inferior gluteal nerve.

tomoses with the internal inferior articular branch of the popliteal (A. articularia genu superior lateralis) and supplies with them the knee-joint.

The *obturator artery* properly belongs to the pelvis, but it anastomoses with the internal circumflex artery (A. circumflexa medialis), and through the sciatic with the inferior gluteal. Through these connections it forms one of the most important channels of the circulation after ligation of the femoral.

Femoral Vein (V. femoralis).—The femoral vein lies to the inner (Fig. 4707) side of the artery and in the same sheath as it emerges from under Poupart's ligament (L. inguinale). As it passes through Scarpa's triangle (trigonum subinguinale) it passes spirally around the artery until at the apex it is directly posterior to it. In the lower part of the thigh it is below and somewhat to the lateral aspect of the artery. Two venæ comites are often present, and may be strongly developed.

Braun* has collected the following figures in regard to ligation of the vein: In 17 cases with the vein only ligated just under Poupart's ligament, 8 cases recovered and gangrene resulted in none. In 6 cases in which the ligation was concomitant with a removal of part of the vein, recovery resulted in 3 cases, gangrene in 2, and death in 1 case. In a series of 15 cases in which both the artery and the vein were ligated gangrene followed in 7.

Anterior Crural Nerve (N. femoralis).—The anterior crural passes below Poupart's ligament to the outside of the femoral artery (Fig. 4707). From this it is separated by the strong fascia iliaca. At a distance of from two to three centimetres under Poupart's ligament it divides into a number of branches to supply the skin and muscles of the anterior portion of the thigh (Figs. 4703 and 4707). The superficial branch runs under the sartorius, pierces and supplies that muscle, and pierces the fascia lata as the middle and internal cutaneous nerves. The deep branches supply the four portions of the quadriceps femoris muscle, and a small branch accompanies the internal circumflex artery to the pectineus. The anterior crural nerve also gives rise to the long saphenous nerve which accompanies the femoral artery through Hunter's canal.

Obturator nerve (N. obturatorius).—The obturator nerve reaches the inner side of the thigh by passing through the obturator foramen. It divides into a superficial and a deep branch. The superficial sends a small branch also to the pectineus, which thus obtains a nerve supply from two sources. It also supplies the adductor brevis and the abductor gracilis, and usually supplies the cutaneous branch to the skin over Hunter's canal and the lower part of the adductor longus muscle. The deep branches supply the obturator externus muscle and the adductor magnus. The obturator nerve thus supplies all of the muscles of this group except the part of the pectineus supplied by the anterior crural.

POSTERIOR SIDE OF THE THIGH.—The skin and fascia are sufficiently like those on the anterior side to need no special description. The small sciatic nerve (N. cutaneus femoris posterior) is found just under the fascia, and is distributed to the skin and fascia of the posterior aspect of the thigh, popliteal space, and leg.

The muscles found on the posterior side of the thigh have already been mentioned. They are the Mm. biceps, semitendinosus, and semimembranosus.

The *biceps* (M. biceps) springs from two heads. The long head takes origin in common with the semitendinosus from the tuber ischii. The short head has its origin in the middle third of the outer lip of the linea aspera. The two unite and are inserted into the head of the fibula. The long head is supplied by the internal popliteal nerve (N. tibialis), and the short head by the external popliteal (N. peronæus communis).

The *semitendinosus* (M. semitendinosus) has its origin on the tuber ischii and is inserted into the inner tuberosity of the tibia. It is supplied by the internal popliteal nerve (N. tibialis).

The *semimembranosus* (M. semimembranosus) arises by a long flat tendon from the tuber ischii, and is inserted into the inner tuberosity of the tibia beneath the semitendinosus. It is supplied by the internal popliteal nerve (N. tibialis).

The *great sciatic nerve* (N. ischiadicus).—This is the

*Braun: Archiv f. klin. Chirurgie, Bd. 37, Heft 3.

largest nerve in the body. It emerges under the gluteus maximus muscle and runs downward to the middle of the popliteal space (Fig. 4708). After emerging from under the gluteus maximus it is covered by the long head of the biceps. Between these flexor muscles it is buried in loose fatty connective tissue, which forms an easy path for burrowing pus from abscesses that have their origin usually in the pelvis. In this way the pus may reach the popliteal space. A line drawn from a point a little toward the median side of the centre of a line drawn from the great trochanter to the tuber ischii, to the middle of the popliteal space will lie over the nerve, and it is available as a guide in operations below the gluteofemoral crease. The nerve divides a little below the middle of the thigh into two branches, the internal (N. tibialis) and the external (N. peronæus) popliteal branches. The great sciatic nerve supplies the muscles of the back of the thigh, as has already been described. Its size and the number of its sensory fibres make it an important nerve in causing shock. Operative procedures involving this nerve may be made less serious by the use of cocaine locally, or by manipulations that reduce the mechanical irritation to a minimum.

Arteries and Veins.—The superior portion of the back of the thigh is supplied by the inferior gluteal artery (A. glutæa inferior) (Fig. 4708). It anastomoses with the internal and external circumflex arteries and the perforating arteries. The perforating arteries (Fig. 4708) are usually three in number and supply the muscles on the back of the thigh. The deep veins of the posterior side accompany the artery.

The Skeleton of the Thigh.—The shaft of the femur is bent in the form of a bow anteriorly. This outward and anterior curve gives the adductor muscles (the adductor magnus especially) a greater angle, and this arrangement of the muscle is the cause of the lower fragment often being pulled upon the inner one in fracture. In old age the spongy bone in the neck of the femur often undergoes fatty degeneration and disappears. This is the cause of the increased frequency of fracture at this part of the bone in old age. It occurs oftener in women than in men, owing to the fact that the angle is more obtuse in women than in men, and so the strain has a greater mechanical advantage. *Mervin T. Sudler.*

THILANIN.—This title is given to a compound of sulphur and lanolin, which is said to contain three per cent. of sulphur, but whether in combination with the cholesterin or with the fatty acids is undetermined. It was introduced by Dr. Edmund Saalfeld, at the third Congress of the German Dermatological Society, as being devoid of any irritating properties and useful in cutaneous affections. *Beaumont Small.*

THIOCOL, guaiacol-sulphonate of potassium, $C_6H_3.OH.OCH_3.SO_3K$, is a white, odorless crystalline powder with a faintly bitter taste. It is soluble in water or diluted alcohol, but not in strong alcohol, ether, or the fatty oils. Its aqueous solution is turned violet-blue by ferric chloride.

Thiocol, being a soluble compound of guaiacol, has the medicinal properties of this substance; but its taste is not disagreeable, it is unirritating to the stomach, and it does not "repeat" after ingestion. Being soluble it is easily administered and rapidly absorbed. Schwarz states that 15 gm. (℥ ss.) a day have been taken with no unfavorable symptoms. The results in tuberculous patients, as noted by Mendelssohn, Braun, Moir of Edinburgh, and many others, are increased appetite, lessened cough and sputum, disappearance of night sweats, moderation of the diarrhœa, and general improvement. The employment in whooping-cough and respiratory troubles other than tuberculosis has met with ardent advocates. In enteritis Schnirer studied its action in thirty-eight cases, and placed it among the valuable antidiarrhœic remedies. For children he recommends ℞ Thiocol, 0.5 c.c. (♏ viij.); syrup of orange peel, 10 c.c. (℥ iiss.); water to make 60 c.c. (℥ ij.). Sig.: A teaspoonful every two hours. For the adult, thiocol may be administered in capsule, cachet, tablet, or solution. The dose is 0.5 gm. (gr. viij.) three times a day, gradually increased.

A ten-per-cent. syrup of thiocol is marketed under the name of "*Sirolin.*" *W. A. Bastedo.*

THIOCYANATES. See *Sulphocyanides.*

THIOFORM is a basic bismuth di-thio-salicylate. It is a yellow, odorless powder containing seventy-two per cent. of bismuth oxide, and is used as a dusting powder or ten-per-cent. ointment in place of iodoform. There are good reports of its employment in eczema.
W. A. Bastedo.

THIOGENOL is a compound of sodium sulphonate containing ten per cent. of sulphur. It is readily soluble in water and alcohol and is used by Jaquet in two-per-cent. solution as an injection in gonorrhœa, and both pure and in twenty-per-cent. ointment for dermatitis and prurigo. It is an ichthyol substitute. *W. A. Bastedo.*

THIOL.—An artificial ichthyol, prepared by treating with sulphur the hydrocarbons having a specific gravity between 0.890 and 0.900, that are obtained from coal tar. The latter differs from ichthyol by the absence of much organic matter that supplies its objectionable qualities, their presence, it is claimed, being of no therapeutic value. After the thiol has been separated it is evaporated to an extract—*thiolum liquidum,* or to complete dryness—*thiolum siccum.*

Liquid thiol is a thin, brownish, neutral liquid, with a specific gravity of 1.080 to 1.082 at 60° F. It has a feeble bituminous odor, not disagreeable. It forms a clear solution with water, especially if glycerin be added. It is not very soluble in alcohol or ether. Aqueous solutions froth abundantly when shaken; they are not affected by the addition of strong alcohol, but soda, dilute acids, or metallic salts cause a precipitate. Dry thiol, which forms forty per cent. of the liquid form, is a dark brown or blackish mass, sometimes formed in scales, which, when heated, burns away entirely, leaving no residue. The advantages claimed for thiol over ichthyol are, that it is really a purified form of the latter, that it is devoid of the disagreeable odor, and does not stain the linen or clothing, is less irritating, and more definite in composition. The therapeutic use of thiol is the same as that of ichthyol.

Although the pure drug may be applied without causing any irritant action, a ten-per-cent. preparation is generally sufficient for all purposes. The powder may be combined with powdered starch; or aqueous or glycerin solutions may be prepared. For wounds a five- or ten-per-cent. solution in collodion is very serviceable. An ointment may be made with vaselin or lanolin.

For inflammatory diseases, and in gynecological practice, its action is increased by internal administration in addition to its local use. The dose is one grain and a half, which may be repeated up to five times a day. It is given in cachets, in pill form, or in solution in wine.
Beaumont Small.

THIOLINIC ACID, sulphurated linseed oil, thiolin, is a dark green semi-solid mass of peculiar mustard-like odor, containing about fifteen per cent. of sulphur. It is insoluble in water and soluble in alcohol, and is employed as a succedaneum for ichthyol. *W. A. Bastedo.*

THIOPHENE.—C_4H_4S. This is a sulphur-holding hydrocarbon, contained in coal-tar benzin. In the pure state it is a colorless, clear, volatile oil, boiling at 184° F., of slight odor, and will not mix with water. Thiophene itself is not employed as a therapeutic agent, but two preparations have been introduced—*sodium thiophensulphonate* and *thiophene di-iodide.*

Sodium thiophensulphonate, $C_4H_3SNaSO_3$, is a white crystalline powder, containing thirty-three per cent. of