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CHAPTER ONE

THE EYE *

ALAN C. WOODS, M.D.

FOREWORD

Ophthalmology is distinctly a diphasic specialty. One phase is distinctly medical in its aspect and the second phase is distinctly surgical. To treat properly diseases of the eye it is necessary to have knowledge of both aspects of this specialty and their interrelationship. Nevertheless, many of the surgical problems in ophthalmology occur constantly in the practice of the general and the special surgeon. In the following outline of surgical ophthalmology only those medical subjects are treated a mention of which is necessary to adequately explain related surgical conditions. Other purely medical subjects are excluded, however important they may be to ophthalmology itself. In describing surgical procedures no attempt is made to describe all operations for any condition. The procedures described are those which have proved of greatest value in the experience of the authors and which they generally believe to be the procedure of choice. For a complete résumé of all the special operations reference should be made to such reference works as those of Meller, Elschnig, or Török and Grout. For a more complete discussion of other phases of ophthalmology reference may be made to the standard text-books on ophthalmology, notably those of Fuchs and de Schweinitz. Numerous references to these books are made in this résumé and excerpts quoted for which the authors take this opportunity of expressing their indebtedness.

SPECIAL OPHTHALMOLOGICAL TECHNIQUE AND INSTRUMENTS

The general preparation of the patient for operative procedures upon the eye does not differ materially from that used in other branches of surgery. The same care is taken of the patient's general condition.

The patient undergoing a major eye operation should be admitted to the hospital twenty-four hours before the time scheduled for operation, allowing time for physical examination and the usual laboratory examinations, to determine or exclude such general conditions as

* Dr. Benjamin Rones collaborated in the preparation of the first section on "Preparation of the Patient, Sterilization of Instruments, etc."

Dr. Clyde A. Clapp wrote the section on "Injuries."

Dr. Jonas Friedenwald wrote the section on "Tumors."

syphilis, nephritis, and diabetes. Especial attention is paid to the examination of the teeth, tonsils and sinuses on account of foci of infection, which have a deleterious effect on healing. The ocular adnexa are examined for possible sources of infection, *i. e.*, the lids, lachrymal apparatus and conjunctivae. Cultures and smears are made from the conjunctival sac to exclude the presence of virulent organisms in the bacterial flora.

A mild cathartic is given the night before the operation and a soap-suds enema is given in the morning. If the operation is in the afternoon, tea and toast are allowed for breakfast, but no luncheon is given. A sedative is given before the patient is taken to the operating room. In cataract patients bromid is the preferable sedative, while in glaucoma patients, morphia and scopolamin are usually given. Morphia and atropin are given before general anaesthesia.

Actual preparation of the eye begins the night before the operation. The skin surrounding the eye, including the brow, is scrubbed with green soap, care being taken that no soap enters the eye, which may produce desquamation of the superficial layers of the corneal epithelium. The eyelashes are clipped short. Argyrol (10 per cent) is instilled into the conjunctival sac, which is then thoroughly irrigated with saturated solution of boric acid. The conjunctival sac is filled with 1-10,000 bichlorid ointment in a white vaseline base and an eye pad and bandage are applied for the night. This bandage is removed in the morning after breakfast. The cleansing of the lids and irrigation of the eyes is repeated and the dressings are left off the eye. Every two hours during the morning argyrol and boric irrigations are repeated. If the operation is to be performed under local anaesthesia, butyn (1 per cent) is instilled into both eyes every five minutes for one hour preceding the operation.

The patient is taken to the operating room in a wheel chair and transferred to the table. Eye operations are performed with the patient in a recumbent position. First and second assistants are usually required on the operating team. The general surgical routine of clean-up and dress is employed in eye operations. Rubber gloves, however, are not worn in intra-ocular operations where delicacy of touch is essential, but are usually used in extra-ocular operations. With the patient on the table, the skin of the lids surrounding the eye is again cleaned up with green soap. Similarly, argyrol is instilled into the conjunctival sac, which is again irrigated with boric acid. The patient's head is now draped with a sterile head towel and the body up to the nose is covered with a sterile sheet. An "eye sheet" about 90 cm. square, with an oval opening about 8 cm. in length, is placed over the head so that the eye to be operated appears through the opening.

The position of choice for the surgeon is at the head of the table, thus allowing him to operate either on the right or the left eye. This latter requires a certain amount of ambidexterity, especially in making the corneal incision in cataract cases. The first assistant stands by

the patient on the side of the eye to be operated. The second assistant stands by the instrument table, which is so placed as to be accessible to both the operator and his assistants.

Anaesthesia.—The greater number of operations can be performed under local anaesthesia. A local anaesthetic is to be preferred for the reason that coöperation of the patient in moving the eye is extremely valuable. Under general anaesthesia considerable traction is required to hold the eye in position. In intra-ocular operations such traction is definitely contraindicated.

Very satisfactory local anaesthesia is obtained by the instillation of 1 per cent butyn solution into the conjunctival sac. This is instilled every five minutes, from six to eight instillations being required to produce complete anaesthesia, which is determined by testing the sensitivity of the cornea. Butyn has a great advantage over cocain in that it does not cause drying or desquamation of the corneal epithelium. This is important, especially in older people, where the vitality of the cornea may be at a low level. Among other local anaesthetics sometimes used are eucain, holocain, acoin, stovain and alypin. The local instillation of butyn gives sufficient anaesthesia for intra-ocular operations, such as cataract, corneo-scleral trephine, and operations upon the conjunctivae and cornea. For operations on the extra-ocular muscles, subconjunctival injections of 1:100 novocain containing a few drops of adrenalin are employed to give deeper anaesthesia. Likewise, in operations on the lids, infiltration with 1:100 novocain is made along the orbital margins of the lids only. This marginal infiltration of the orbit gives complete anaesthesia of the lids without producing distortion.

In intra-ocular operations, especially in cataract extraction, to produce paralysis of the orbicularis muscle and to prevent the squeezing of the lids, it is customary to infiltrate the lids at the orbital margins with 1:100 novocain. Such paralysis may also be obtained through blocking the seventh nerve by injection just anterior to the tragus of the ear.

Block anaesthesia of the ciliary ganglion by deep orbital injections is satisfactorily employed in several operations upon the eyeball, such as enucleation, or inflammatory glaucoma (where the instilled anaesthesia is little absorbed). To this end the needle is introduced in the lower outer quadrant and carried directly back about one and one-half inches and 3 cc. of 1:100 novocain is injected. While this injection produces complete anaesthesia, it carries the danger of damage to the deep orbital structures, the ophthalmic vessels and the optic nerve.

General anaesthesia is usually employed for enucleation of the eye in operations on children and on neurotic or insane individuals.

Instruments.—A number of special instruments have been developed for eye surgery which are not ordinarily used in other surgical

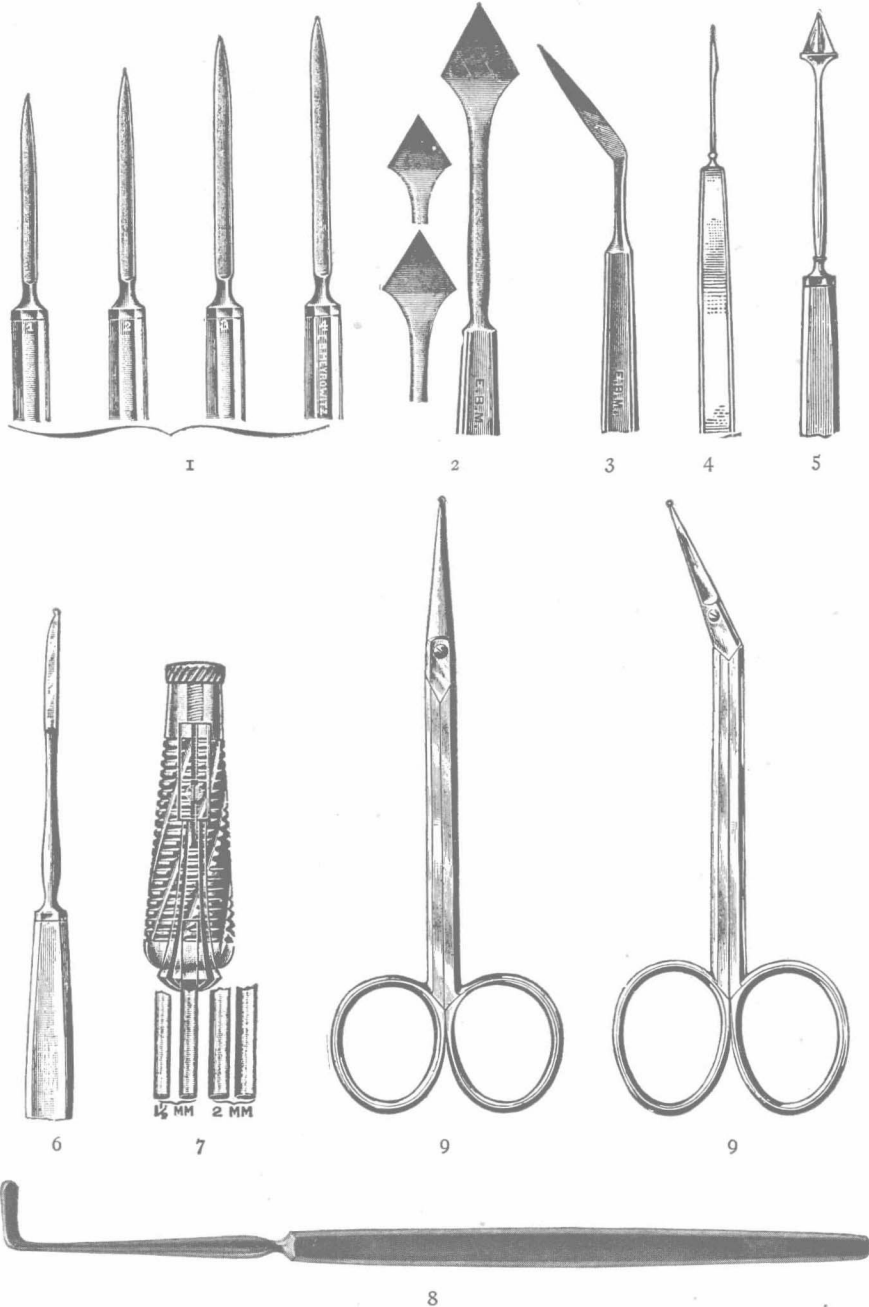


FIG. 1.—von Graefe knives. FIG. 2.—Keratomes. FIG. 3.—Agnew knife. FIG. 4.—Ziegler's needle knife. FIG. 5.—Paracentesis knife. FIG. 6.—Canaliculus knife. FIG. 7.—Trephines. FIG. 8.—Pterygium knife. FIG. 9.—Iris scissors. (E. B. Meyrowitz.)

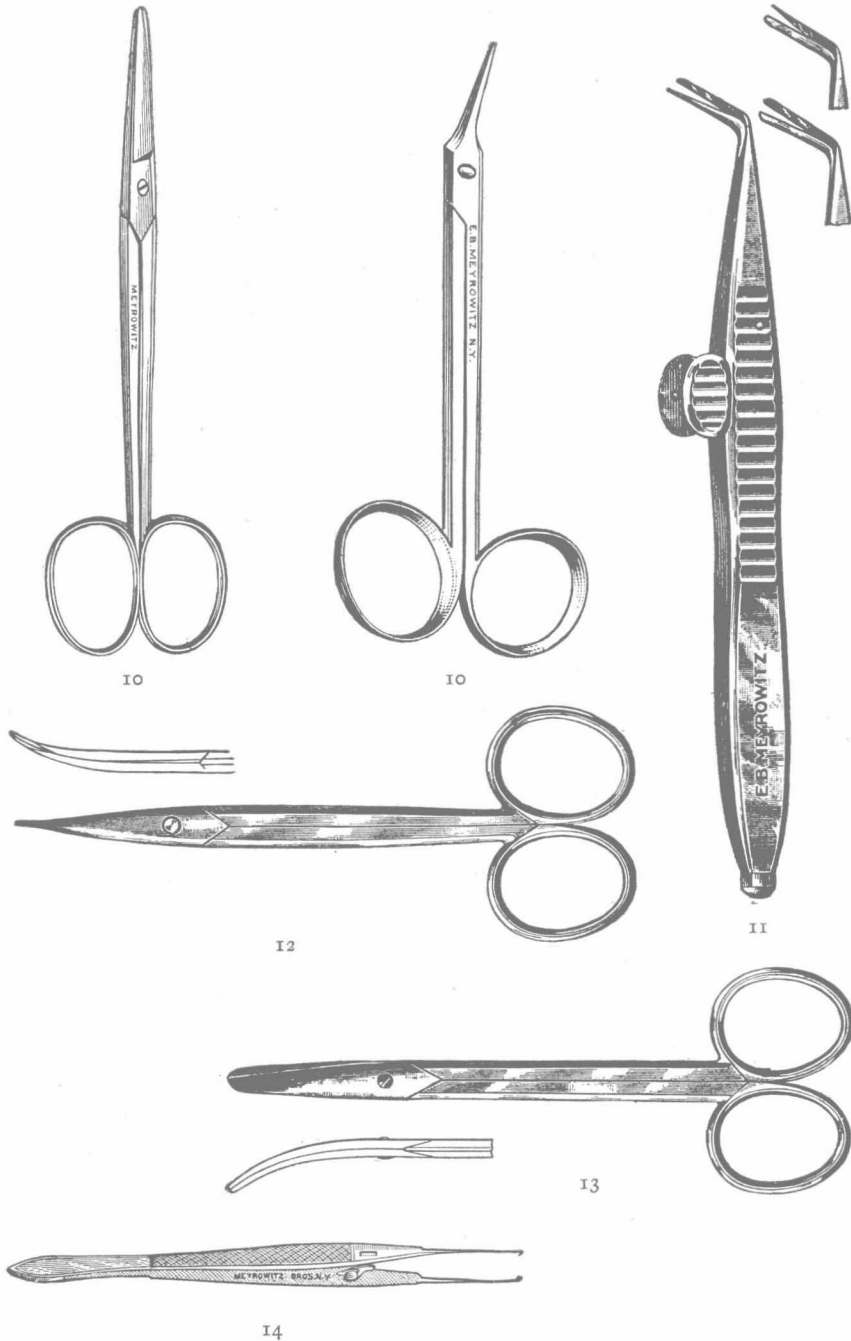
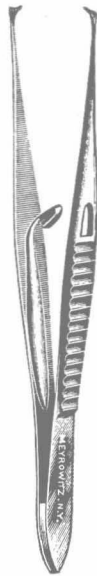


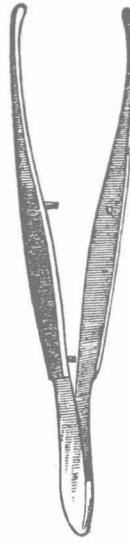
FIG. 10.—Strabismus scissors. FIG. 11.—de Wecker scissors. FIG. 12.—Tenotomy scissors.
FIG. 13.—Enucleation scissors. FIG. 14.—Conjunctival forceps. (E. B. Meyrowitz.)



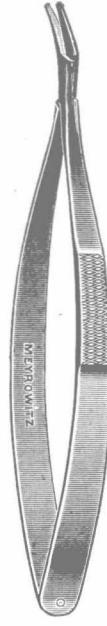
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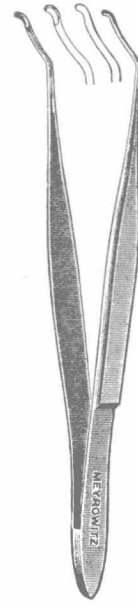
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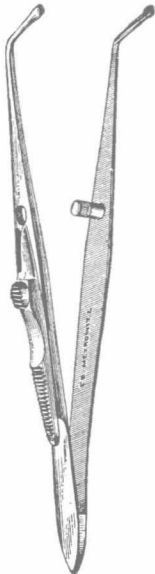
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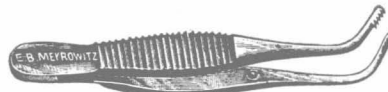
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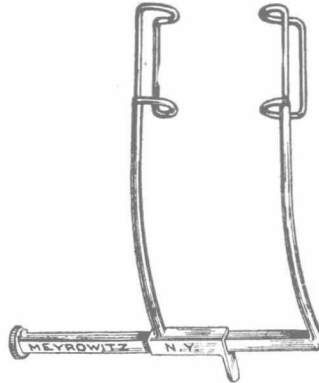
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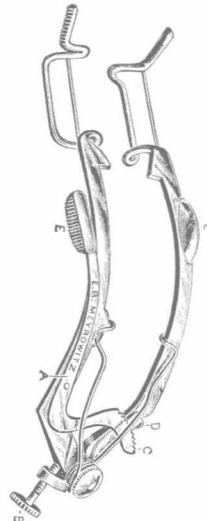
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FIG. 15.—Fixation forceps. FIG. 16.—Cilia forceps. FIG. 17.—Kalt capsule forceps. FIG. 18.—Fuchs capsule forceps. FIG. 19.—Worth's advancement forceps. FIG. 19a.—Iris forceps. FIG. 20.—Specula. (E. B. Meyrowitz.)

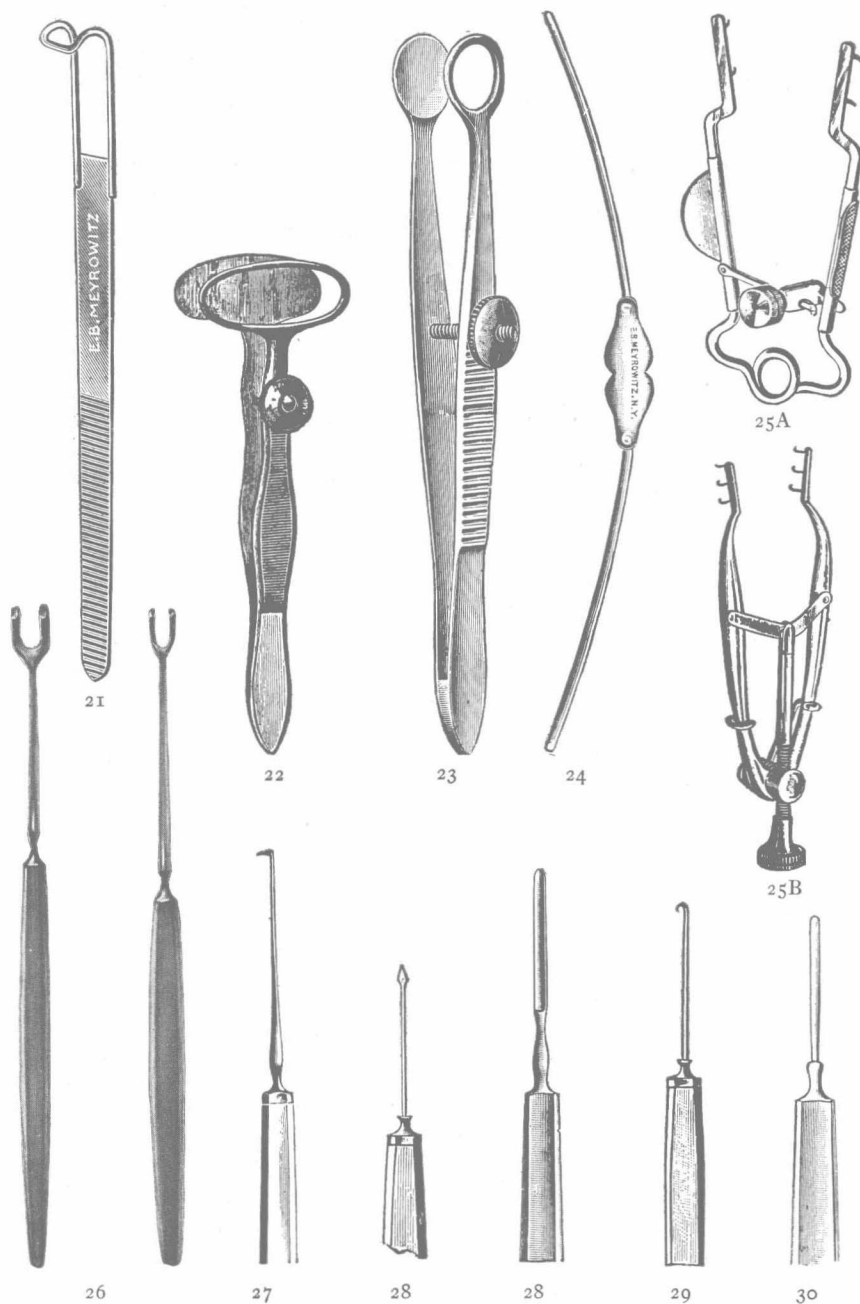


FIG. 21.—Lid retractor. FIG. 22.—Entropion forceps. FIG. 23.—Chalazion forceps. FIG. 24.—Lachrymal probe. FIG. 25.—Lachrymal sac retractors. FIG. 26.—Imre's hook. FIG. 27.—Cystotome. FIG. 28.—Foreign body needle and spud. FIG. 29.—Iris hook. FIG. 30.—Iris repositor. (E. B. Meyrowitz.)

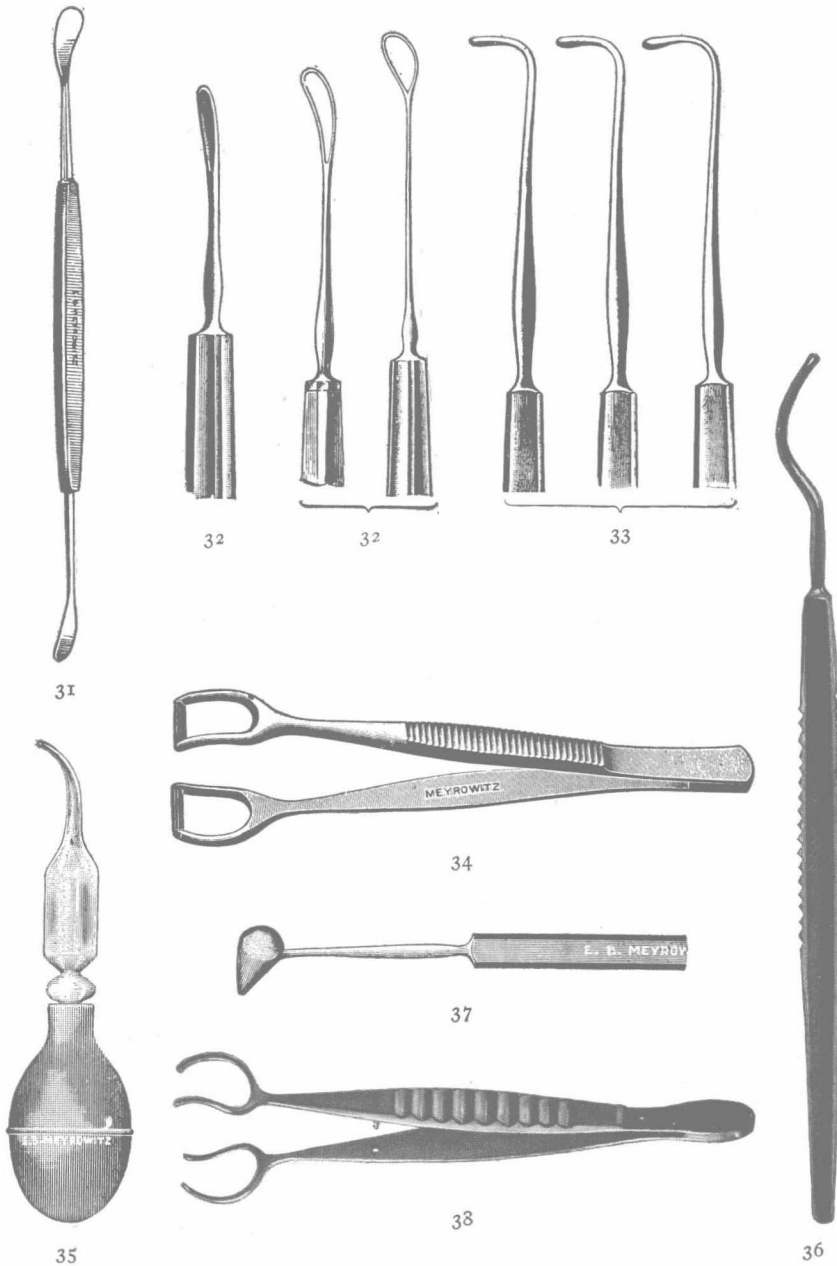


FIG. 31.—Spatula. FIG. 32.—Daviel lens spoon, wire loop, and metal. FIG. 33.—Tenotomy hooks. FIG. 34.—Knapp's roller forceps. FIG. 35.—Anterior chamber irrigator. FIG. 36.—Lens deliverer. FIG. 37.—Eye cautery. FIG. 38.—Gold ball guard. (E. B. Meyrowitz.)

specialties. There are numerous variations of the instruments described below, devised to meet the individual needs of various operators. The following instruments, however, are the chief standard instruments peculiar to eye surgery:

A. KNIVES: 1. von Graefe knife is used chiefly to make corneal section in cataract extraction. 2. Keratomes, both flat and angular, are used to make corneal incision for iridectomies, etc. 3. Agnew knife is used in operations for occluded pupil. 4. Ziegler's needle knife is used primarily for capsulotomies. 5. Paracentesis knife is used for simple puncture of the anterior chamber. 6. Canaliculus knife is used to open the canaliculus. 7. Trephines are used in the corneo-scleral trephine operation for glaucoma. 8. Pterygium knife is used to free the neck of the pterygium from the cornea.

B. SCISSORS: 9. Iris scissors are used to cut the iris in iridectomies. 10. Strabismus scissors are used primarily for conjunctival and muscle work. 11. de Wecker scissors are used primarily to introduce into the anterior chamber to cut the iris *in situ*. 12. Tenotomy scissors (with blunt points) are used chiefly for graduated tenotomies. 13. Enucleation scissors (heavy, blunt, curved scissors) are used to cut the optic nerve in enucleations.

C. FORCEPS: 14. Conjunctival pick-up forceps are used for conjunctival work when fixation is not required. 15. Fixation forceps, both straight and curved, are used to grasp the conjunctiva and underlying episcleral tissues or muscle tendons to steady the eyeball. 16. Cilia forceps are employed to grasp and manipulate the iris in iridectomies, etc. 17. Kalt capsule forceps are smooth forceps to grasp the anterior capsule of the lens in intracapsular cataract extraction. 18. Fuchs capsule forceps are toothed, and are used to bite out a piece of the anterior capsule prior to extraction of the lens. 19. Reese's advancement forceps are used to hold the severed muscle in advancement and resection operations. 19a. Iris forceps are used to grasp and withdraw the iris in iridectomies.

D. SPECULA, CLAMPS, ETC.: 20. Specula are used to hold back the lids in operations on the eye. 21. Lid retractors are used for a similar purpose and are held by the assistant. 22. Entropion forceps are used for operations on the lids. 23. Chalazion forceps are used to clamp the lid around a chalazion to be operated. 24. Lachrymal probes, assorted sizes, are used to dilate the canaliculus and lachrymal ducts. 25. Lachrymal sac retractors are used in extirpation of the lachrymal sac. 26. Imre's hook is used to hold the everted lid.

E. MISCELLANEOUS INSTRUMENTS: 27. Cystotomes are introduced into the anterior chamber to incise the anterior capsule of the lens in cataract operations. 28. Foreign body needles and spuds are used to remove foreign bodies from the cornea. 29. Iris hooks are introduced into the anterior chamber to catch the iris. They are used in place of iris forceps when the iris is bound down by posterior synechiae. 30. Iris repositor is used to replace the pillars of the iris after iridec-