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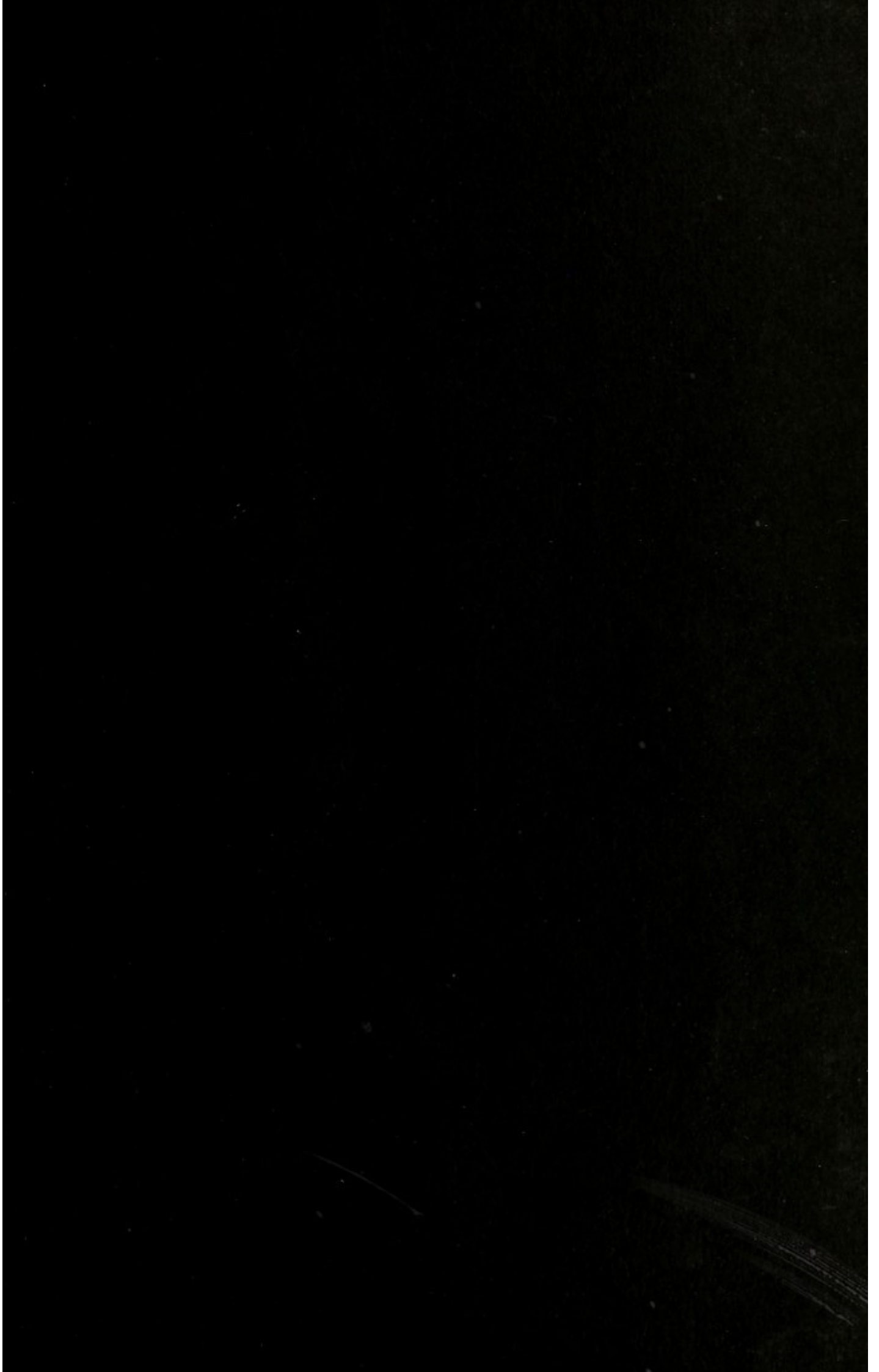
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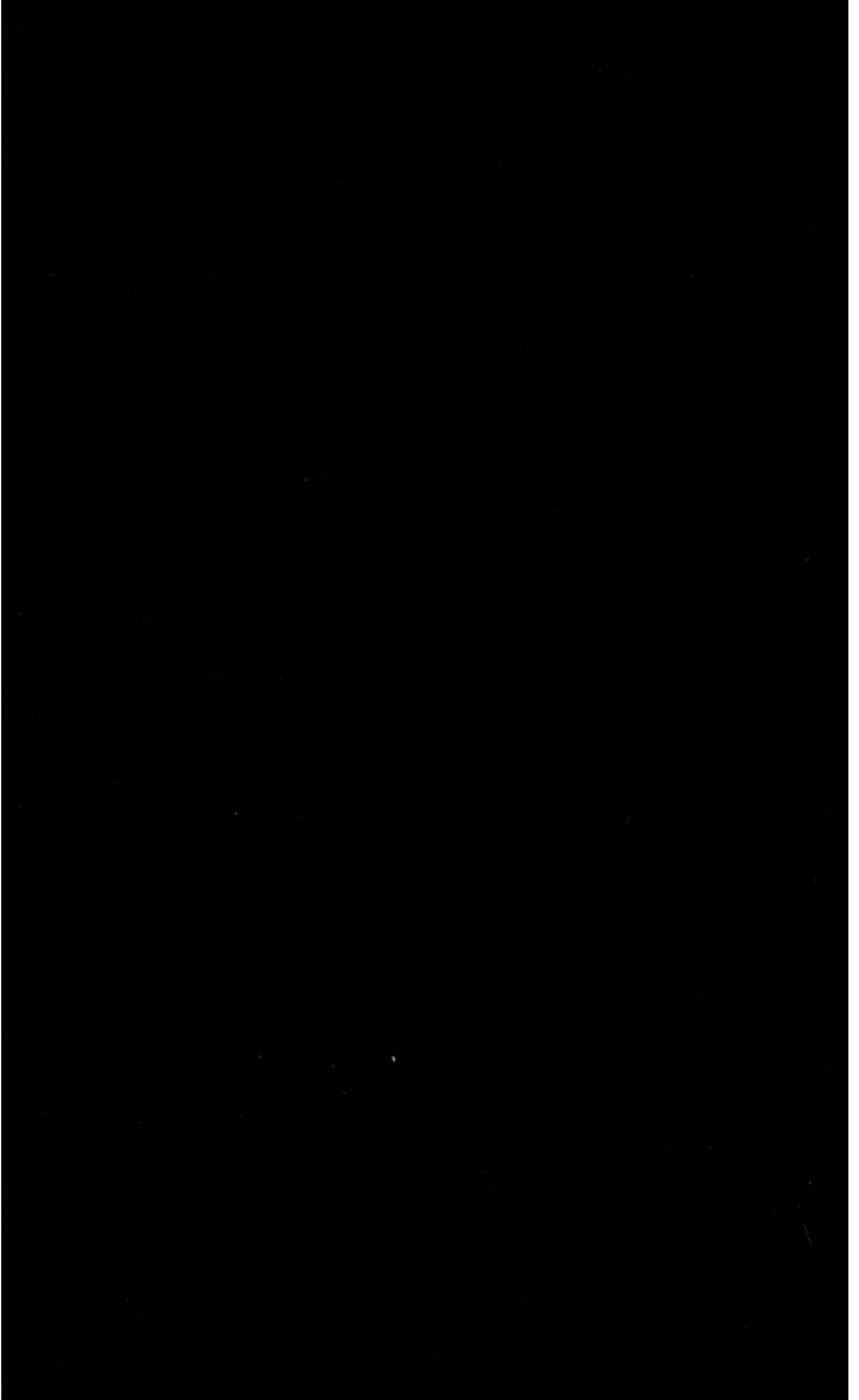
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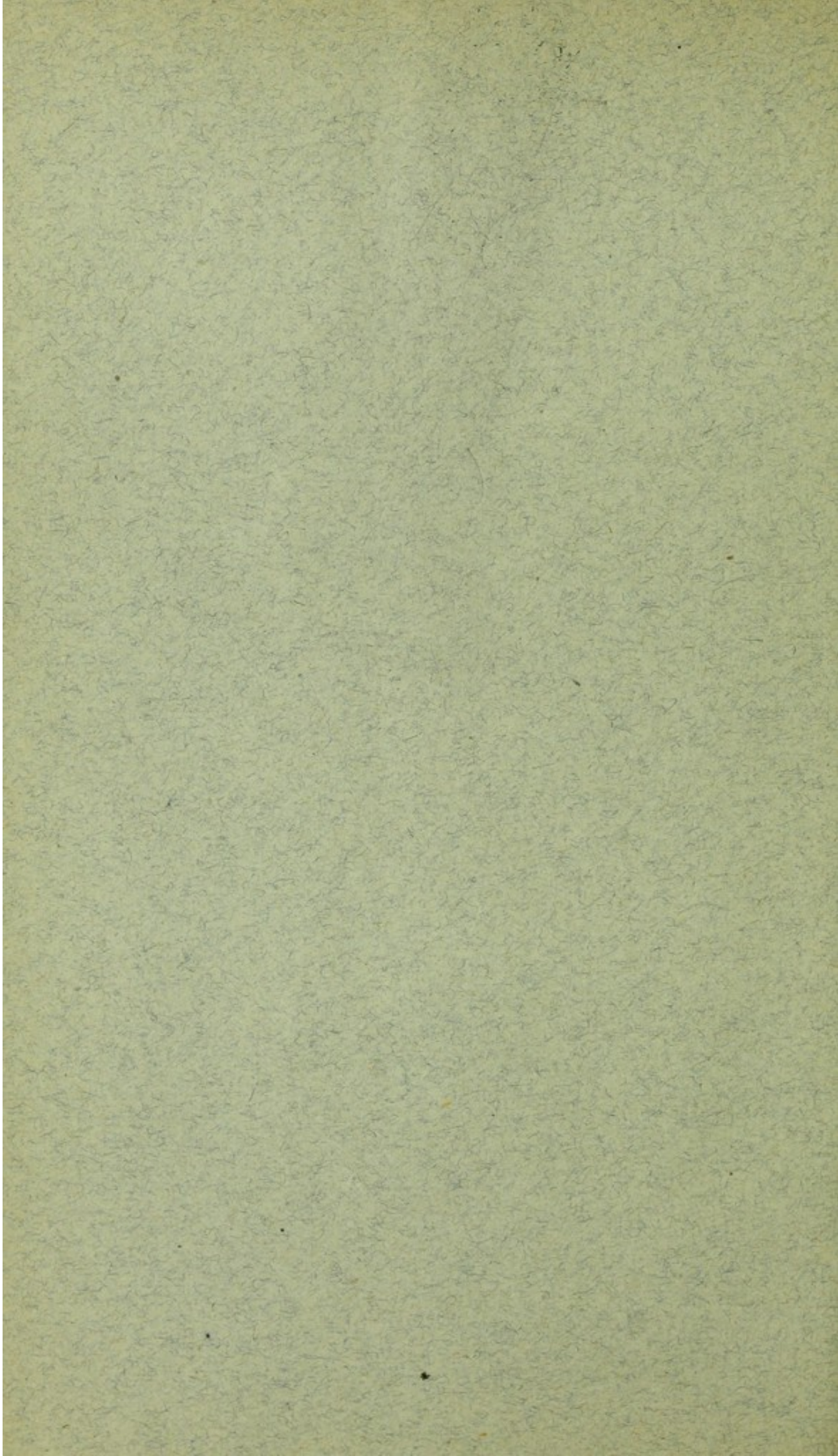
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A CASE OF EPIBULBAR ECHINOCOCCUS,
WITH A REVIEW OF THE LITERA-
TURE ON ECHINOCOCCUS CYSTS OF
THE ORBIT

BY

DR. J. E. WEEKS, NEW YORK

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A CASE OF EPIBULBAR ECHINOCOCCUS, WITH
A REVIEW OF THE LITERATURE ON
ECHINOCOCCUS CYSTS OF THE ORBIT.

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CASES of echinocoëcus¹ cysts in the orbit are of such rare occurrence (none having been reported in this country), that their clinical histories are of value as an assistance in the diagnosis of cystic tumors of the orbit, and in the prognosis and treatment of echinococcus cysts that occur in this region. For these reasons I have thought it best to report somewhat in full the following case of epibulbar echinococcus, and also to append a short review of all the authentic cases that I have been able to find reported in English and other literature, together with a few remarks. To the report of cases compiled by M. Dieu, Paris (*Rec. d'Ophthal.*, 1883 and 1884), I have added six others, five of which were reported subsequent to the appearance of his article. When possible the original articles have been consulted.

M. G., age twenty-two years. Austrian Jew. Tailor. Has been in the United States five years. Observes the precepts of the orthodox Jews in regard to his diet. Has no pet dog, nor is there

¹ Echinococcus hominis. A small cestoid helminth, about $\frac{1}{4}$ inch long, which inhabits the intestinal canal of the dog, wolf, and cat. The mature terminal link (proglottis) contains about 5,000 ova; each ovum contains an embryo (proscolix). On entering the stomach of the host the embryo is liberated from the ovum by the action of the gastric juice, and bores its way through the stomachic or intestinal walls, and by the blood-vessels or lymph-channels finds its way into some solid organ, where it develops into a cyst (scolex). From the internal germinal wall of the scolex, or mother cyst, daughter cysts are formed.—(Cobbold on Entozoa.)

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any kept in the family with which he resides. Patient presented himself at the clinic at the N. Y. Ophthalmic and Aural Institute, on September 14, 1888. Eight days previously he had experienced a slight dull pain in the right eye, and the eye became red. Two or three days afterward the patient saw double when looking downward or to either side. The pain gradually increased, and the right eyelids, particularly the upper, became swollen. Very slight headache; no constitutional disturbance.

Status præsens: The right upper lid is considerably swollen, causing obliteration of the natural depression below the margin of the orbit. The palpebral and the ocular conjunctiva to within about 2 mm of the margin of the cornea are injected; a scanty muco-purulent secretion is present. The movements of the globe are restricted in all directions. The margin of the cornea moves to within 4 mm of the outer and inner canthus. Movement upward almost normal, but does not go below the horizontal plane. Nystagmus exists in both eyes, and vision has always been below the normal. The present condition is: R V = $\frac{20}{100}$; L V = $\frac{20}{100}$; very little improvement with glasses. R = +T₂; L = T_n. Aside from a possible slight rarefaction of the choroid, there is no pathological change in the interior of either eye. The right eye is a little more prominent than the left. On palpation over the right upper lid, a firm, elastic tumor is felt, situated in the orbit to the median side of its perpendicular meridian. The tumor moves with the movements of the globe, becoming more prominent if the cornea is rotated downward. When the upper lid is raised, and the cornea is rotated downward as far as possible, the tumor projects, pushing the fornix conjunctivæ before it, and putting the conjunctiva on the stretch. The apex of the tumor extends a little anterior to the equator of the globe, and appears to be about $\frac{2}{3}$ of an inch wide; its extent posteriorly cannot be determined. The apex of the tumor at its outer angle presents a yellowish appearance, suggesting the presence of pus; its inner angle is translucent, and of a bluish tint. Careful testing shows the tumor to be slightly movable on the sclerotic. The nature of the tumor was not at first determined; as it was attached to the globe it was thought that it might be connected with the interior of the eye, but its slight mobility on the sclerotic, and the absence of intra-ocular changes, excluded this possibility. Its elasticity and the indistinct sense of fluctuation imparted to the finger narrowed the diagnosis down to abscess or cystic tumor. It was thought best to

explore the tumor, which was done by passing the needle of a hypodermic syringe through the ocular conjunctiva into its interior. On aspiration, a few drops of a clear liquid were obtained, accompanied with a drop of pus. The opening was then made larger, by means of a Gräfe knife, permitting of the escape of a small amount of clear liquid and a few drops of pus. On pressure, a little more pus escaped, accompanied with seven transparent vesicles, which proved to be the daughter cells of an echinococcus cyst. This manœuvre caused the tumor to collapse. The opening was made still wider, but no other cysts escaped. The probe entered the cavity to the depth of about one inch; average width of cavity, $\frac{2}{3}$ inch. No attempt was made to remove the wall of the mother cyst. The cavity was syringed with a bichloride solution $\frac{1}{5,000}$, and the eye bandaged. The immediate effect on the movements of the eye was not marked.

September 15th.—Free discharge of pus; opening patent; membrane of cyst visible at the opening, but little pain referable to the eye. The eye moves freely in all but the downward direction. + T_I; gave eserine $\frac{1}{2}$ %. Washed the cavity with bichloride $\frac{1}{2,000}$ and replaced the bandage.

Sept. 16th.—Pus less in amount. Movements as before. + T_I. No pain. Dressed as before.

Sept. 17th.—Eye movable in all but the downward direction. No pain. + T. Size of cavity diminishing.

Sept. 25th.—Wound closed; a very slight epibulbar thickening may be felt at the site of the tumor. T_n.

Oct. 13th.—Eye white; movement free in all but the downward direction, in which it is limited to the horizontal meridian. No pain; nothing can be felt of the tumor.

The size of the daughter cells ranged from 17 by 9 *mm* down to 2 by 1 *mm*. A small yellowish mass projects into the interior of each, which probably represents the head of the entozoön. However, I have not been able to make out any hooks or suckers on these processes. On examining a daughter cyst with the microscope shortly after its removal, I discovered three hooks; but during the process of mounting, these disappeared.

The limitation of movement which persists in the case above reported, is undoubtedly due to the formation of connective-tissue bands which are attached to the globe and

to the intraorbital tissue. The formation of a connective-tissue capsule about the hydatid is commonly met with. (See Zehender's case.)

The following is a short review of all of the cases of intraorbital echinococcus that I have been able to find reported in medical literature :

SCHMIDT, J. A.—(From review by M. Dieu, in *Rec. d'Ophthalm.*, Paris, 1883.)

CASE 1.—W. P., male adult, age twenty-six years. In January, 1801, patient experienced a feeling of distension at the back of the right(?) eye. Three weeks later the sense of distension had increased, with pain in the eye and in the same side of the head. The globe protruded, and the patient saw flashes of light. Patient slept but little. At the end of the fourth week the pain was intense. The globe, which was pushed entirely from the orbit and toward the nose, was slightly red ; cornea clear, V = 0. Patient was admitted to the hospital Feb. 4, 1801, in the above-described condition. On palpation a hard tumor was found at the outer angle of the orbit, extending behind the eye. Probably a steatoma ; opium and hot applications. Death on the following day. Autopsy : death from cerebral venous thrombosis. On opening the orbit a fluctuating tumor was seen, filling the posterior portion, and extending forward beyond the outer and upper margins. The muscles, nerves, globe, and lachrymal gland were adherent. The membrane of the sac gave the characteristics of a hydatid cyst. No hooklets nor daughter cells were found.

SCHMIDT, J. A.—(From review by M. Dieu, in *Rec. d'Ophthalm.*, Paris, 1883.)

CASE 2.—Patient, adult female, presented herself for treatment in May of 1802. Some time before applying, patient had experienced a severe pain in the right(?) eye and right side of head. The eye became inflamed a few days previous. A few days after seeing me the inflammation increased. Exophthalmus was marked ; the cornea became completely infiltrated with pus, and perforation with protrusion of the iris quickly followed. Hemicrania became intense ; parotid painful to the touch. Tumor of the lachrymal gland was diagnosed, and the patient was sent to a surgeon, who introduced a trocar, directed toward the lachrymal gland through the upper lid. One ounce of a clear liquid was evacuated. The pain ceased a few hours after the

operation, and the exophthalmus diminished from day to day, until the eye resumed its normal position. On the 4th day after the operation a large daughter cyst was discharged. Healing complete in 14 days.

V. DELPECHE.—(From review by M. Dieu, in *Rec. d'Ophthal.*, Paris, 1883.)

CASE 3.—Male, twenty-five years. Noticed some pain in the right eye in 1820. Partial failure of vision occurred during the next year. In April, 1822, patient noticed that the eye was prominent, and the eyelids were swollen. Admitted to the hospital Nov. 8, 1822. At this time the eye was prominent, but could be covered by the lid; cornea hazy. A tumor extending back of the globe and giving an obscure sense of fluctuation could be felt above and below the eye. Nov. 13th, operation. The external commissure was divided, and a portion of the lachrymal gland which presented was excised. It was then found that the tumor could be best reached from above, and it was cut down upon through the upper lid. The scalpel entered the tumor and about three ounces of a clear liquid escaped. The cyst wall was readily detached and was removed entire. Examination of this membrane showed it to be the wall of a hydatid cyst. Recovery after suppuration, complete in fifteen days. The eye returned to its normal position and its function was almost completely restored.

LAWRENCE.—(Mackenzie on the Eye, Phila., '55, p. 1006.)

CASE 4.—Patient, male, aged forty-two years. Admitted to the Lond. Oph. Infirmary, January 3, 1820. The growth had been developing for seven years. *St. pr.*: Globe pushed completely out of the orbit by a deep-seated growth, which could be felt as a firm elastic tumor just below the superciliary arch. Ocular conjunctiva thickened by inflammation consequent on exposure; globe uninjured. Pupil immovable, medium size; V = 0. The patient had suffered great pain during the progress of the growth, and was pale and emaciated. Operation—The tumor was punctured, permitting about $\frac{1}{2}$ oz. of a clear liquid to escape, which caused a diminution of the pain. Two days later Mr. Lawrence found a soft white substance in the opening made, which proved to be a hydatid; others escaped on pressure. The opening was enlarged the next day, and half a teacupful of hydatids removed. Inflammation and suppuration, with slight

pain, followed. The eye returned to its natural position, and the opening closed in about one month.

HOLSCHER.—(From review by M. Dieu, *Rec. d'Ophthal.*, 1883.)

CASE 5.—Male of seventeen years. First observed by Holscher, March 9, 1832. One and one half years before, patient noticed that the right eye protruded. The exophthalmus had increased until it had become very marked. V good; but little pain; no nausea; no vertigo. On palpation an elastic tumor was found. Diagnosis: Hydatid cyst. An incision was made through the lower lid at the margin of the orbit, the knife passing in about ten lines. About one drachm of a clear liquid was evacuated. The eye resumed its normal position; no inflammation followed. March 12th: The tumor is again firm. The operation was repeated, but less fluid was obtained. Suppuration was encouraged, and was accompanied with fever, chill, and intense pain. March 15th: Warm compresses applied; fever and inflammation less. March 19th: A large hydatid was discharged. March 25th: Fluctuation back of globe; exophthalmus. April 3d: Incision repeated, liberating a clear liquid. A seton was introduced, followed by very intense reaction, fever, pain, vomiting, delirium, chills. Calomel and quinine were administered, and cold applications made. April 18th: A second hydatid, the size of a pigeon's egg, escaped. After this the suppuration ceased and the patient recovered without a trace of deformity. Discharged from the hospital May 12th.

TAVIGNOT.—(From review by M. Dieu, *Rec. d'Ophthal.*, 1884, p. 7.)

CASE 6.—Child, four and one half years. Observed in 1848. Three months before the patient was seen the eye became prominent and vision failed. *St. pr.*: Exophthalmus very marked; iris immovable. Media clear. V = o. A tumor protrudes at the outer side of the eye, which is hard, regular, and elastic, the exposed end of which is about the size of an almond. Operation.—An incision was made into the exposed end of the tumor, after which considerable clear liquid of a citron color escaped, together with about twenty small cysts averaging the size of peas. These small cysts were contained within a common sac. Panophthalmitis and phthisis of the globe followed.

WELDON.—(Reviewed by M. Dieu, *Rec. d'Ophthal.*, 1883.)

CASE 7.—Patient, adult female. Two years before, the patient had experienced severe pain in the eye, the movements of which

were impeded. Eyelids rigid. Protrusion of the eye developed. The pain became intense, and produced mild delirium. When seen by Mr. Weldon the globe was almost entirely outside of the orbit, was turned toward the nose, and was immovable. $V = o$. Lids discolored and immovable. General engorgement of surrounding integument. The pain in the head and eye was intense and without remission. Palpation of the tumor over the lower lid gives an obscure sense of fluctuation or a feeling resembling that imparted by adipose tissue. The tumor was punctured with a cataract knife through the lower lid at the margin of the orbit, and a little clear liquid expressed. The incision was carried to the external commissure. At the end of four or five days a large daughter cyst was removed. The eye returned to its normal position, and recovery was completed in three weeks. $V = o$.

GOYRAND.—(*Annal. d. l. Chirurg. française et étrang.*, vol. viii.)

CASE 8.—This case is not reported in full. It occurred in a child, and came under Goyrand's observation in 1843. There was some exophthalmus and great swelling of the conjunctiva, which was ulcerated. The tumor was incised, permitting the escape of a hydatid cyst. Recovery was complete.

DORNBLÜTH.—(From review by M. Dieu, *Rec. d'Ophthal.*, 1883.)

CASE 9.—Patient, female, aged twenty-two years. In August of 1840 patient had an inflammation of the left eye; lids swollen; pain severe. Leeches were applied. This condition persisted until October, at which time the patient entered a hospital where she was treated a long time without benefit. When seen by Dornblüth, in February, 1841, the pain was so severe that the patient could not sleep. The globe was forced toward the temple, was almost outside of the orbit, and was but slightly movable. Cornea clear and covered by the lids, which were much swollen. Anterior chamber normal; $V = \frac{1}{2}$. Ectropium of lower lid. A large tumor filled the orbit and protruded at the inner angle. Diag.: Hygroma of orbit. Operation—An incision was made through the lower lid into the tumor, from which a large amount of clear liquid escaped. The tumor diminished in size and the pain immediately subsided. A sound could be passed nearly to the apex of the orbit. A piece of charpie was inserted. On the ninth day a dense membrane was observed at the wound, which was withdrawn entire, and proved to be the wall of the sac, with

a capacity of 2 oz. Suppuration profuse. The globe returned to its normal position and retained its normal size. $V = 0$. Recovery favorable.

GRACIA ROMERAL.—(From review by M. Dieu, *Rec. d'Ophthal.*, 1883.)

CASE 10.—Patient, girl of sixteen years. Was first seen in July, 1845, at which time the left eye protruded slightly; no pain. Intra-orbital tumor diagnosticated. Pain in the orbit about the last of August; $V = \frac{1}{2}$ at which time the exophthalmus was excessive, refracting media clear, conjunctiva swollen. At the internal angle of the eye a tumor is seen, which apparently fills the orbit, extends to the lachrymal sac, and presses on the internal rectus and optic nerve. Tumor slightly movable; fluctuates. The pain is continuous, but is most marked at night. Diag.: Cystic tumor of orbit. Operation—Incision through the lower lid one inch in length; tumor denuded and incised. A clear liquid escaped. The eye regained its normal position almost at once. Some hours afterward, an attempt was made to introduce a piece of charpie, when a whitish membrane was encountered which was removed entire. It was found to be a large hydatid cyst. The charpie was then introduced to the fundus of the cyst cavity. Erysipelas and suppuration followed. On recovery the vision became normal. (?)

BOWMAN.—(Mackenzie on the Eye, Phila., 1855, p. 1007.)

CASE 11.—J. W., male, age twenty years. Prominence of the eye noticed three years previously. A tumor is present in the upper inner angle of the orbit, which pushes the globe downward and outward and gives an obscure sense of fluctuation on palpation. Globe collapsed; cornea sunken and flaccid. The appearance accompanied with the pale emaciated condition of the patient suggested malignant growth. Pain in and above the eye has been experienced ever since the tumor was first observed. $V = 0$, Aug. 27, 1852: An exploratory puncture was made by raising the upper lid and passing the knife through the conjunctiva. Some clear fluid escaped, causing a marked diminution in the size of the tumor. The opening was enlarged and the cavity found to extend to the apex of the orbit. Hydatids were searched for, but none were found. Suppuration followed. At the end of a week three hydatids were discharged, two of which were as large as marbles. Soon after this the headaches ceased, the swelling subsided, and the globe returned to its normal position.

ANSIAUX.—(*Gaz. des Hôpitaux*, 1854, p. 514.)

CASE 12.—J. P. aged eight years. Male. Came to the clinic April 12, 1846, with a tumor in the inferior external angle of the left orbit. The tumor was first noticed about the end of October, 1845. About the 1st of April it increased rapidly in size and forced the eye upward, inward, and outward. At the present time on retracting the lid the end of the tumor is exposed; it is firm, but is slightly movable in the orbital tissue. April 15th. The tumor has the appearance of a phlegmon. It was punctured and a large quantity of a clear liquid and a little pus escaped. Afterward the wound was enlarged and pressure exerted, causing the escape of a hydatid cyst. The cyst cavity closed, and the eye regained its normal position and movements.

GOYRAND.—(*Annal. d. l. Chir. franç. et étrang.*, vol. viii., p. 475.)

CASE 13.—Patient, aged eleven years, was seen by Goyrand about the 1st of June, 1828. Two years previously the parents had noticed a bulging of the left eye. *St. pr.*: Left eye pressed upward, inward, and outward, is but partly covered by the lids, and immovable. The cornea is opaque. V = o. Ocular conjunctiva injected. Intense pressure-pain complained of. A tumor presents at the orbital margin below and to the outer side, which is hard and elastic, giving a faint sense of fluctuation on palpation. The palpebral fissure is elongated; tumor covered with conjunctiva. *Diag.*: Hydatid cyst. Operation, June 11th—The commissure was divided and the cyst cut down upon through the conjunctiva. By a movement of the child the scalpel was caused to penetrate the cyst. A clear liquid escaped and the tumor collapsed. A piece of the cyst wall and conjunctiva was excised, and a probe was introduced which passed to the apex of the orbit without obstacle. A large hydatid (daughter) cyst was removed and the eye resumed its normal position. The wound was closed by sutures and a cold compress bandage applied. Sero-sanguinolent discharge during the day. The next morning there was marked swelling of the whole upper part of the face, accompanied with intense pain and some fever. The sutures were removed in the evening and an emollient poultice applied. June 13th: Pain and swelling much less pronounced. Sero-purulent discharge. June 16th: Suppuration has ceased; eye less prominent. Incision at commissure united. June 18th: Lids still a little swollen. Eye in normal position. July 1st: No sign of exophthalmus. The

globe has not yet regained its normal mobility. Cornea clear. Vision improving.

HULKE.—(*Lond. Ophthal. Hosp. Rep.*, 1865, p. 91.)

CASE 14.—Patient, a boy. Has noticed an increasing protrusion of the eyeball for some months. At present the eye appears to lie outside of the orbit, and is displaced upward. The lower lid is depressed, and is separated from the globe by a firm, elastic, rounded, smooth, fluctuating tumor, which protrudes between the margin of the orbit and the globe. No œdema. The outward and downward movements of the eye are abolished. Mobility slight in other directions. $V = \frac{1}{\infty}$. Patient pale and weak; has suffered great pain. April 21st: The swelling was explored with a grooved needle, when some colorless fluid escaped. An incision was then made through the lower lid, parallel to its border, into the tumor. Several drachms of a clean fluid escaped. The finger could be passed into the cavity to the apex of the orbit. No distinct separate cyst was discovered. On the following day the wound suppurated freely, accompanied with headache and fever. A hydatid cyst, about the size of a pullet's egg, was found in the poultice. The wound now healed quickly. Dec., 1862: Position and motion of eye nearly normal. $V = \frac{1}{200}$.

CARATHEODORI.—(From review by M. Dieu, *Rec. d'Ophthal.*, 1884.)

CASE 15.—Patient, fourteen years of age, has been suffering intense pain in the back part of the orbit during the last six days. Somnolence and delirium. Conjunctiva injected. Eye prominent. Orbital periostitis was diagnosticated, a purgative given, and leeches applied. Patient returned at the end of six months. Pain insupportable; the left eye protruded very much. Upper lid forcibly applied; lower lid everted, and conjunctiva covered with a membrane and profuse granulations. The tumor filled the back part of the orbit and was firm and elastic. It was punctured, and a clear liquid escaped, causing the tumor to diminish in size, but the pain remained. Erysipelas of a mild degree followed the operation. A few days later an incision was made through the outer half of the upper lid. A whitish tumor was found, which was incised, and a piece of charpie introduced. The pain disappeared and the globe regained its normal place in twelve days. Eighteen days after the operation a white mass presented at the opening, which on removal proved to be the entire wall of

the cyst. Recovery rapid. The granulations on the lower lid were burned off. Functions of the eye restored.

WALDHAUER.—(Ophthal. Congress, Sept. 5, 1865.)

CASE 16.—E. H., male, thirty-seven years. Inflammation of right eye two years previously, at which time vision was lost. Partial recovery followed. Pain in the right eye and right side of head from time to time since. A few days before the patient was admitted to the hospital, which was on Dec. 16, 1864, the pain became intense. Globe prominent, hard, and slightly movable. $V = \frac{1}{2}$; mild degree of papillitis, with choroiditis. Pain lessened by application of leeches. January 7th: Strabismus divergens, right. Pain intense; relieved by injections of morphine. July 16th: Exophthalmus more marked. Pain constant and intense in the right side of the head. Optic nerve atrophic. At the superior inner angle a soft fluctuating tumor is felt. On puncture with a trocar a clear limpid fluid, containing no albumen, escaped. The eye returned to its normal position; pain ceased. Much swelling of the lids followed, which was reduced with poultices and compresses of camomile. The author endeavored to remove the tumor through the palpebral fissure and to preserve the globe, but after the incision was made exploration with the finger showed the orbit to be filled with the tumor, which was in part hard and in part soft. Preservation of the eye was deemed impossible, and it was enucleated. On attempting to remove the tumor it was incised with the scissors, and a large number of hydatids, from the size of a lentil to that of a pea escaped. Almost the entire contents of the orbit were removed. Suppuration, granulation, recovery. Two of the recti muscles were in a state of degeneration (myositis interstitialis).

DESMARRES.—(From review by M. Dieu, *Rec. d'Ophthal.*, 1884, p. 18.)

CASE 17.—A young girl consulted Desmarres for a paralysis of the muscles of convergence of the left eye with exophthalmus. A tumor of the orbit was diagnosticated. On puncturing the tumor with a trocar some clear liquid escaped. A number of echinococcus cysts appeared later. Complete recovery resulted.

DUDON.—(From review by M. Dieu, *Rec. d'Ophthal.*, 1884, p. 20.)

CASE 18.—Male, aged thirty-eight years. Violent pain in right side of head. Right eye prominent. The tumor opened sponta-

neously two years ago, permitting a clear liquid to escape. *St. pr.* : The whole orbital region on the right side is prominent. Lids swollen and œdematous. Lower lid everted. Palpebral fissure elongated. Margins of lids separated about 1 *cm.* Cornea hazy ; vision fair. Media transparent ; movements of eye limited. On palpation the tumor is found to be elastic, firm, fluctuating, trembling. Operation—Puncture. Thirty grammes of a citron-colored liquid escaped. Diagnosis : Serous cyst of orbit. An opening was made between the globe and the inner angle of the orbit at the most prominent part of the tumor. Some liquid escaped, the tumor became smaller, and the eye less prominent. A drain was inserted and the part poulticed. Six days afterward the drain was found in the dressing, and a hydatid cyst, size of a small hen's egg, was found engaged in the wound. This was removed, and recovery became complete four days later. The cyst occupied Tenon's capsule.

MACGILLIVRAY.—(*Annal. d'Oculistique*, review, 1866, p. 172.)

CASE 19.—The tumor developed back of the globe in the inferior part of the orbit, producing marked exophthalmus and ectropium of the lower lid, and was six years in developing. Nine daughter cells were found. After the operation the globe gradually resumed its normal position, but the vision equalled perception of light only.

BILLROTH.—(From review by M. Dieu, *Rec. d'Ophthal.*, 1884, p. 17.)

CASE 20.—Child of six years, male. Exophthalmus of left eye, which has been developing for two years. Vision good ; diplopia. A fluctuating intra-orbital tumor could be made out. Diag. doubtful. Jan. 26, 1872 : The tumor was punctured, and a impid, non-albuminous fluid escaped. The tumor was again incised on Jan. 31st, at which time a large echinococcus cyst was removed. No suppuration followed ; the globe returned to its normal position. The patient was discharged, but returned to the hospital on Feb. 21st, on account of persistence of the diplopia.

VERDALLE.—(From review by M. Dieu, *Rec. d'Ophthal.*, 1884, p. 14.)

CASE 21.—Observed about the year 1872. Patient, male ; aged twenty-five years. *St. pr.* : Phthisis bulbi, right, from traumatism. Fistula from the frontal sinus, right side, discharging pus. A soft fluctuating, pulsating tumor, almost completely

encased in a shell of bone, projects from this point. It is apparently increased in size when crying is attempted. Exorbitismus very marked. The shrunken globe floats on the surface of the tumor, and imparts an obscure sense of fluctuation if the finger is placed on it. A small incision was made in the frontal tumor, and a hydatid presented at the opening. This was removed entire from the osseous orifice, and was followed by a flow of pus. Pressure on the globe caused six or eight hydatids to escape by this opening. The orbitismus disappeared; the frontal opening communicated with the orbital cavity by an opening through the roof of the orbit; the external opening was through the upper lid. Recovery complete.

BRESGEN.—(*Berl. klin. Wochenschr.*, 1874, p. 381.)

CASE 22.—V. R., aged fifteen years, male. Patient complained of headache eight days before being seen by me. *St. pr.*: Right upper lid swollen; headache and pain in right eye. Three weeks afterward the eye appeared forced downward and outward; lids more swollen; an ulcer of the lower part of the cornea existed; fever, with accelerated pulse; brain not clear. An incision through the upper lid was now made, permitting of the escape of pus. Three days later a cystic tumor was discovered in the depth of the orbit, which, as the eye had not receded much after the first operation, was cut down upon by enlarging the first incision. An echinococcus cyst was found. Shortly after this operation the cornea ruptured, and prolapse of the iris occurred. Death by meningitis closed the scene.

LAWSON.—(*London Lancet*, 1876, p. 570, vol. i.)

CASE 23.—Patient, male, aged twenty-nine years. Came to Moorfields in October, 1872. Ten weeks previously noticed that something was the matter with the left eye. *St. pr.*: Eye protrudes half an inch beyond the orbit; marked divergence; tension normal. $V = \frac{1}{200}$. Choked disc. A soft mass is felt at the upper inner angle of the orbit, which imparts a sense of fluctuation on palpation. The tumor was punctured through the upper lid, and about two drachms of a clear fluid escaped. Feb. 14th: Patient admitted to the hospital for the removal of the tumor, which has greatly increased in size. $V = \frac{1}{\infty}$. Operation under ether. The upper lid was incised to expose the tumor, which was punctured, permitting of the escape of a clear liquid, together with two or three small echinococcus daughter cysts. The

walls of the parent cyst were drawn out entire. The wound suppurated, and the eye immediately began to recede. The patient left the hospital in one week. $V = \frac{20}{200}$.

WESTPHAL.—(*Berl. klin. Wochenschr.*, 1872, p. 205.)

CASE 24.—H. B., aged seventeen, male. Was seen by Westphal Nov. 7, 1872. In the preceding May patient had suffered severely from cephalalgia, accompanied with vomiting, and was confined to the bed eight weeks. Vision much diminished; photophobia intense; right eye became blind in the course of a year; felt a sense of pressure in the right orbit from time to time, but was well in other respects. Had headache and nausea eight weeks before seen by Westphal, together with weakness of the right extremities. *St. pr.*: Patient is well nourished; no fever; pulsating headache; no pain on percussing skull; exophthalmus of right eye, not covered by the lids; movements free; tension normal; $V = \frac{1}{\infty}$; L $V = \frac{1}{200}$; temporal half of field gone; disc pale; paresis of left extremities. Diagnosis: Tumor in anterior part of the right middle cerebral fossa projecting into the right orbit. Dec. 12th: Œdematous swelling of right upper lid; chemosis of conjunctiva; no redness; pain in the vicinity of right parotid gland. Dec. 15th: Right temple and cheek prominent; soft, fluctuating. Dec. 21st: A puncture caused the escape of a few drops of blood. Dec. 23d: A hole was noticed in the frontal bone above and to the outer side of the commissure, which would admit the end of a finger. Dec. 31st: A definite fluctuating tumor was felt in this region; no fever. Diagnosis: Echinococcus cyst. A puncture was made permitting the escape of some thin pus and some small cysts without hooklets. On Jan. 3d an incision about 2 *cm* long was made, permitting of the discharge of a little fluid containing pus. Next day quite a number of hydatids escaped. Feb. 4th: On syringing, three cysts came out of the left nasal cavity. Two openings appeared on the temple. The last cyst came from the left nasal cavity on Feb. 20th by syringing. In all, nineteen cysts, some containing heads and hooklets, were discharged. The paresis, exophthalmus, and pain disappeared.

HIGGINS.—(*London Lancet*, 1876, vol. ii., p. 576.)

CASE 25.—Patient, a girl of fourteen years. The right eyeball, over which the lids could be closed, was pushed downward and outward. Upward movements of the globe restricted. Diplopia.

V = Sn. No. 10. Papillitis marked. Eye red and painful. No rigors or constitutional disturbance. Twelve days later there was a fulness of the upper lid, and an abscess was suspected. An incision was made through the conjunctiva above, permitting the escape of some blood only. A probe passed into the incision came in contact with a hard body. Two weeks later the swelling had increased. An incision was then made through the soft parts parallel to the margin of the orbit. The lachrymal gland which presented was removed and an attempt made to tear away the growth. It collapsed and was found to extend to the apex of the orbit. The cyst was detached from the optic nerve, to which it was adherent, and excised. No daughter cysts; no hooklets found. The wound was stitched up. Suppuration followed, but the patient made a good recovery. When seen, one month afterward, the eye still deviated downward. Upward motion abolished; ptosis. Patient reads Sn. 2½ readily. The papillitis has subsided.

MORELLA, P.—(*Revista Clin. e Therapeu.*, Napoli, 1882.)

CASE 26.—A. B., adult, female. Presented herself at the clinic of Prof. Gallozzi, February 9, 1876. Some time before, the patient had experienced pain in the left supra-orbital region, and had noticed a small swelling in the orbit at the upper inner angle, which pushed the globe downward and outward sufficiently to produce double vision. The pain increased. Vision diminished and some fever was experienced. The globe could be pushed back to its normal position; it presented no change. *St. pr.*: Protrusion of upper lid; conjunctiva red and swollen; movements of eye limited; iris normal; counts fingers at a short distance. Ophthalmoscopic examination shows the retina to be anæmic, nerve atrophic. On palpation, a hard elastic tumor is found at the upper inner angle of the orbit, pressure on which occasions pain. Diagnosis: Tumor springing from the inner wall of the orbit; probably malignant. The pain continued; cornea became opaque; tumor slightly enlarged. On aspiration with a Pravaz syringe, a small amount of a clear liquid was removed, which contained hooklets. Chemical examination showed an abundance of sodium chloride—no albumen. Diagnosis: Hydatid cyst. There was but little reduction in the size of the tumor after the aspiration, and as the cephalalgia and pain in the eye became intense, a radical operation was done March 24th, under chloroform. The palpebral fissure was enlarged by an incision at the commissure, and the eye and tumor, which was found to be a large hydatid cyst

containing pus and a clear liquid, were excised. Cavity washed with sublimate $\frac{1}{2}$ ‰. Healing regular.

DE LA PEÑA.—(*La Oftal. Practica*, 1882, pp. 6-12.)

CASE 27.—de Villacañas, adult, male. January 25, 1879. Pain in eye and orbit; slight exophthalmus. $V = \frac{2}{3}$. No intra- or extra-ocular change. A swelling developed just below the upper orbital margin, and the exophthalmus became more marked. Vision diminished, and an excavation of the disc, with diminution in the size of the vessels, was observed. Diagnosis: Deep intra-orbital tumor with secondary glaucoma. A sclerotomy was made, which relieved the patient of pain and caused an improvement in vision. The movements of the eye became limited in all directions; the exophthalmus increased, the globe finally protruding between the lids; cornea hazy. Continued pyrexia of a low degree was noticed. On palpation the tumor gave an obscure sense of fluctuation. Conjunctiva congested. Feb. 10th: Operation under ether. The tumor was punctured through the conjunctiva and 100 grammes of a clear liquid were evacuated. A circular opening in the conjunctiva was then made as for enucleation. The tendons of the internal and inferior recti, and the optic nerve, were divided. The globe was then dislocated, when the tumor was found to be entirely extra-ocular. The cavity was syringed with dilute acetic acid. Profuse suppuration followed, resulting in a favorable recovery in twenty-four days. The eye returned to its normal position; however, the cornea was partly lost by suppuration during the process of healing. The diagnosis of hydatid cyst was made by the microscopical examination of the cyst wall.

HARDY.—(*Australian M. J.*, Melbourne, 1879, p. 589.)

CASE 28.—R., aged twenty-two years, female. Admitted to the hospital March, 1879. Three years before, experienced pain in left eye, followed by gradual swelling. $V = \frac{1}{\infty}$. Twelve months afterward the pain became more severe. The patient suffered more in the winter than in the summer. *St. pr.*: Patient anæmic. Great protrusion of the left eye. $V = 0$. Tumor of the orbit was diagnosticated. The eyeball was removed and a cystic tumor found, a part of the wall of which was excised and a semi-solid mass removed. Nothing further was done. The wound healed nicely. The patient returned in six months, presenting an orbit which was filled with a soft elastic tumor. In attempting to

remove the tumor entire it was punctured, and six or seven daughter echinococcus cysts escaped. Patient made a good recovery. †

DIEU.—(*Rec. d'Ophthal.*, 1884, p. 22.)

CASE 29.—Patient, female of twenty years. Seen Feb. 26, 1883. Diplopia five months previous. Has experienced pain for five days, which was first referred to the point of emergence of the supra-orbital nerve, afterward it extended to the temple and infra-orbital nerve, becoming very intense. Could not sleep. Prominence of eye noticed three months previously; it increased slowly up to five weeks ago, since which time the increase in prominence has been rapid. *St. pr.*: Exophthalmus marked; movements of eye abolished. The nasal portion of lower lid protrudes, presenting a firm, fluctuating tumor, which gives pain on pressure. No pulsation or souffle. Conjunctiva red and œdematous. Ophthalmoscope shows disc a little pale, arteries small, veins full and tortuous; $V = \frac{1}{\infty}$. The patient is in a semi-somnolent condition. Diagnosis: Serous cyst of the orbit, probably hydatid. March 3d: Puncture at the most prominent part, on the lower lid; 50 grammes of a clear liquid escaped. The eye returned to its normal position; $V = \frac{2}{\infty}$. The pain stopped almost immediately. A compress bandage was applied. Examination of the liquid showed but little albumen; sodium chloride abundant. March 4th: Exophthalmus; $V = 0$; lids swollen; conjunctiva red and œdematous; pain. March 6th: The œdema extends to the cheek; pain intense; no fever. March 10th: A large incision was made at the point of the first opening. Pus escaped. A sound enters to the depth of 5 cm. Drainage; poultices. In a few days the œdema and exophthalmus diminished, and the pain ceased. $V = 0$. A compress bandage was applied. March 20th: Drain forced out; the opening was dilated with a laminaria tent, and the drain replaced. March 22d: The drain was again forced out. A large hydatid cyst presented at the opening, and was removed with the forceps. Drain re-introduced; eye bandaged. Patient discharged, April 2d. Condition when discharged: divergent strabismus; limitation in mobility; $V = 0$, nerve atrophic.

MULES.—(*Trans. Oph. Soc. United Kingdom*, 1883, vol. iii., p. 22.)

CASE 30.—The patient, a boy of six years, was seen by Mr. Mules in June of 1882. Four weeks previously the patient and

friends had noticed that the right eye protruded. *St. pr.*: Exophthalmus marked; movements of globe impeded in every direction; $V = \frac{1}{16}$. Ophthalmoscopic examination shows congestion of the veins only. Behind and to the outer side of the globe a firm lobulated tumor can be felt. Immediate operation was advised. The outer canthus was divided, under chloroform, and the growth cut down upon between the external and the superior recti muscles; the knife penetrated the tumor and a quantity of clear liquid escaped. The eye receded, and vision became $\frac{6}{8}$. Ten days later the eye again protruded. At the end of the twelfth day choked disc, with an elevation of 1 mm, existed. Operation—The cyst was cut down upon as before. The adherent external rectus was dissected off, and the cyst traced to the apex of the orbit. It was not excised, but was then opened and two drainage tubes were inserted. Suppuration, with slight fever, ensued. At the end of a week a large cyst (probably daughter cyst) was discharged. After this the wound healed favorably. Weakness of the external rectus remained, necessitating division of its opponent; $V = \frac{6}{8}$. The diagnosis of echinococcus was made by a microscopical examination of the cyst wall. No hooks were found. The discharged liquid was free from albumen.

ZEHENDER.—(*Klin. Monatsbl. f. Augenh.*, 1887, vol. xxv., p. 333.)

CASE 31.—Patient, thirty-eight years, male. Applied for treatment Nov. 3, 1886. V slightly impaired. Ophthalmoscopic examination showed the veins to be distended. Slight exophthalmus of the right eye, first noticed six weeks before. Jan. 16, 1887: Exophthalmus increased; $V = \frac{20}{60}$; choked disc. By deep pressure into the orbit, above and to the temporal side, a small elastic tumor could be felt. The globe was pushed downward and inward. Feb. 17th: Protrusion of the globe much more marked. Operation under chloroform. The commissure was divided, and the tumor cut down upon through the conjunctiva. A sharp hook was inserted, and an attempt made to pull the tumor out of the orbit; the sac wall gave way, and a clear fluid escaped, infiltrating the orbital and the sub-conjunctival tissue. The cyst wall retracted behind the globe, which receded but little. The wound was closed by two sutures, eye washed with bichloride 1 to 500, iodoform dusted on, and bandage applied. Feb. 18th: Whole of right side of face swollen; swelling of left lid with pain and ciliary injection of left eye; V , left, = $\frac{6}{8}$. Patient very sick, has

vomited repeatedly. The stitches were removed and the swelling subsided. An ulcer formed in the lower cul-de-sac to the outer side, which did not respond to treatment, otherwise the healing was favorable. As the globe did not recede, a second operation was done on May 13th. This was begun as in the previous operation. A mass of dense connective tissue, 1 in. by $\frac{1}{2}$ in., was removed, then came some adipose tissue, and, finally, a large echinococcus cyst embedded in dense connective tissue. After the removal of more connective tissue, the palpebral fissure was closed with sutures, and the eye bandaged antiseptically. Healing progressed favorably, and the cornea, which was quite opaque, became clear in three days. The conjunctival ulcer persisted and necessitated a third operation, which was done on June 6th; the ulcerated tissue was removed. At the end of fourteen days the globe had returned to its normal position. Motion outward and upward abolished. Double vision corrected with a prism. In the examination of the cyst no scolices or hooks were found; probably an acephalocyst.

No.	Author.	Age.	Sex.	Date.	Duration of Disease.	Nb. of Operations.	Contents of Cyst.	Eye.	Results and Remarks.	Original References.
1	Schmidt.	26	Male.	1801	1 mo.	None.	Clear liquid.	—	Death by meningitis.	Ue. die Krankheit. d. Thränenorgane, Wien, 1803.
2	Schmidt.	—	Female.	1802	—	One.	One daughter cyst.	—	Suppuration; perforation of the cornea, and prolapse of iris. Recovery 14 days after the operation V = 0.	Ueber d. Krankheit. d. Thränenorgane, Wien, 1803, p. 94.
3	Delpèche.	25	Male.	1822	2 yrs.	One.	Clear liquid.	R.	Suppuration. Recovery in 15 days. Function of eye restored.	<i>Chir. Clin. de Montpellier</i> , 1828, t. ii., p. 99.
4	Lawrence.	42	Male.	1820	7 yrs.	Two.	One half teacupful of hydatids.	—	Suppuration. Recovery in 1 month. V = 0.	Mackenzie on the Eye, Phila., 1855, p. 1006.
5	Holscher.	17	Male.	1832	1½ yrs.	Three.	Two hydatid or daughter cysts.	R.	Intense reaction; suppuration; fever. Recovery in 2 months and 3 days. V?	<i>Caspar's Wochenschrift.</i> , 1833, vol. i., p. 237.
6	Tavignot.	4½	—	1848	3 mos.	One.	Twenty daughter cysts.	—	Panophthalmitis; phthisis bulbi.	<i>Jour. des Connaissances Médico-chir.</i> , 1848, t. xxi., p. 12.
7	Weldon.	—	Female.	1806	2 yrs.	One.	One daughter cyst.	—	Suppuration. Recovery in 3 weeks. V = 0.	"Cases and Demonstrations in Surgery," Lond., 1806, p. 104.
8	Goyrand.	—	Child.	1843	—	One.	One daughter cyst.	—	Recovery. V?	<i>Annal. d. l. Chirurg. Franç. et Etrang.</i> , vol. viii.
9	Dornblüth.	22	Female.	1841	1 yr.	One.	Clear liquid.	L.	Suppuration. Recovery. V = 0.	<i>Offenheim's Zeitschrift</i> , 1843, vol. xxi., p. 1.
10	Gracia Romeral.	16	Female.	1844	—	One.	One daughter cyst.	L.	Suppuration. Recovery after erysipelas. V = $\frac{2}{3}$.	<i>Gaz. d. Hôpitaux</i> , 1854, p. 514.
11	Bowman.	20	Male.	1852	3 yrs.	One.	Three daughter cysts.	—	Suppuration; phthisis bulbi.	Mackenzie on the Eye, Phila., 1855, p. 1,007.

No.	Author.	Age.	Sex.	Date.	Duration of Disease.	No. of Operations.	Contents of Cyst.	Eye.	Results and Remarks.	Original References.
12	Ansiaux.	8	Male.	1846	6 mos.	One.	One daughter cyst.	L.	Suppuration. Complete recovery. V ?	<i>Gaz. des Hôpitaux</i> , 1854, p. 514.
13	Goyrand.	11	—	1828	2 yrs.	One.	One daughter cyst.	L.	Suppuration. Recovery with fair vision.	<i>Annal. d. Chirurg. Franç. et Etrang.</i> , vol. viii., p. 475.
14	Hulke.	—	Male.	1862	—	One.	One daughter cyst.	—	Suppuration. Recovery. V = $\frac{1}{20}$.	<i>Lond. Ophthal. Hospit. Reports</i> , 1865, p. 91.
15	Carathéodori.	14	—	1860	7 mos.	Two.	Clear liquid.	—	Erysipelas; suppuration. Recovery. Vision good.	<i>Gaz. d'Orient.</i> , 1860, t. iv., p. 9.
16	Waldhauer.	37	Male.	1864	2 yrs.	Two.	A large number of daughter cysts.	R.	Suppuration; enucleation. Recovery.	Ophth. Congress, Sept. 5, 1865.
17	Desmarres.	Girl.	Female.	1874	—	One.	A number of daughter cysts.	L.	Suppuration. Recovery.	Leçons cliniques s. l. chirurg. oculaire, 1874, p. 341.
18	Dudon.	38	Male.	1877	2-3 yrs.	Two.	One daughter cyst.	R.	Suppuration. Recovery in 12 days. Cyst in Tenon's capsule, V ?.	<i>Memoires d. l. Société d. Médecine d. Bordeaux</i> , 1877, p. 432.
19	MacGillivray	—	—	1866	6 yrs.	One.	Nine daughter cysts.	—	Recovery, V = $\frac{1}{2}$.	<i>Annal. d'Oculistique</i> , 1866, p. 172.
20	Billroth.	6	Male.	1872	2 yrs.	Two.	One daughter cyst.	L.	Suppuration. Recovery with fair vision.	<i>Chirurg. klin.</i> , Berlin, 1879, p. 101.
21	Verdalle.	25	Male.	1872	—	One.	Seven to nine daughter cysts.	R.	Suppuration. Recovery. Phthisis bulbi before development of cyst.	<i>Bordeaux Médical</i> , 1872, t. i., p. 226.
22	Bresgen.	15	Male.	1874	6 wks.	Two.	One daughter cyst.	R.	Slough of cornea; prolapse of iris. Death by meningitis.	<i>Berl. klin. Woch.</i> , 1874, p. 381.
23	Lawson.	29	Male.	1872	8 mos.	Two.	Three daughter cysts.	L.	Suppuration. Recovery in 1 week. V = $\frac{2}{30}$.	<i>Lond. Lancet</i> , 1876, vol. i., p. 570.
24	Westphal.	17	Male.	1872	9 mos.	Two.	Nineteen daughter cysts.	R.	Suppuration. Recovery. Tumor extended from the brain to the orbit. V = o.	<i>Berl. klin. Woch.</i> , 1872, p. 205.
25	Higgins.	14	Female.	1876	—	Two.	Clear fluid.	R.	Suppuration after second operation. Vision fair.	<i>Lond. Lancet</i> , 1876, vol. ii., p. 576.
26	Morella.	Adult.	Female.	1876	—	Two.	Clear fluid.	L.	Suppuration after second operation. Recovery. V = o.	<i>Revista Clin. e Therapu.</i> , Napoli, 1882.
27	de la Peña.	Adult.	Male.	1879	—	One.	Clear fluid.	—	Suppuration. Sec. glaucoma. Recovery in 24 days. V = o.	<i>La Oftal. Practica</i> , 1882, p. 6-12.
28	Hardy.	22	Female.	1879	3 yrs.	One.	Six to seven daughter cysts.	L.	Recovery. V = o.	<i>Australian M. J.</i> , Melbourne, 1879, p. 589.
29	Dieu.	20	Female.	1883	6 mos.	Two.	One daughter cyst.	—	Suppuration. Recovery in 1 month. Atrophy optic nerve. V = o.	<i>Rec. d'Ophthal.</i> , 1884, p. 22.
30	Mules.	6	Male.	1882	4 wks.	Two.	One daughter cyst.	R.	Suppuration. Recovery. V = $\frac{2}{3}$.	<i>Trans. Oph. Soc. United Kingdom</i> , 1883, vol. iii., p. 22.
31	Zehender.	38	Male.	1886	8 wks.	Three.	One daughter cyst.	R.	Suppuration after second operation. Recovery. Vision fair.	<i>Monatsbl. f. Augenheil.</i> , 1887, vol. xxv. p. 333.
32	Weeks.	22	Male.	1888	8 days	One.	Seven daughter cysts.	R.	Suppuration. Recovery in 2 weeks. V. good.	ARCH. OF OPHTH. xviii., p. 31.

Conclusion.

There is of course no reason why echinococcus cysts should not occur in any part of the body where the diameter of the arteries is more than the $\frac{1}{400}$ of an inch, since this is about the diameter of the prosclex of the tenia echinococcus hominis. Echinococcus cysts have been found in the liver, spleen, lungs, brain, cord, muscle tissue, osseous tissue, and subcutaneous tissue. They have never been seen in the interior of the eye. The cyst may be simple, as observed by Mules (Case 30), or it may contain a large number of daughter cysts, as in the case by Lawrence (Case 4).

Stellwag holds that the upper inner angle is the place of selection for the development of hydatid cysts in the orbit. However, this is contrary to the facts, as they have been observed equally as often in other parts.

The growth of the echinococcus cyst is usually very slow. In a case reported by MacGillivray (Case 19), the tumor was under observation six years before operative procedures were instituted. In the case described by the author, the tumor had been noticed but eight days before the operation.

The following symptoms have been observed: Pressure-pain in the eye, orbit, or corresponding side of head; delirium, fever, chills, secondary glaucoma, loss of mobility, exophthalmus, diplopia, neuritis, loss of vision in varying degree. Fever occurs only when suppuration is taking place, disastrous results occurring almost always where operative procedure was not instituted in the early stages of the development of the tumor. Partial or total atrophy of the optic nerve; partial loss of mobility, sloughing of cornea, panophthalmitis, death (Cases 1 and 22).

Diagnostic points.—Pressure-pains referable to back part of the eye, or to the temporal region, usually most severe at night. Slow progressive development of exophthalmus. Absence of fever. The presence of a firm, elastic, obscurely fluctuating, sometimes trembling tumor projecting from any part of the orbit; if connected with the brain, pulsation may be noticed; if on puncture with an aspiration-needle, some clear fluid is drawn off, found to be devoid of

albumen, but rich in sodium chloride (nitrate-of-silver test), the diagnosis of hydatid cyst is positive, even without finding hooklets, since the contents of all other cystic tumors are albuminous.

Radical operative procedure should be resorted to immediately on confirming the diagnosis, whether the tumor is confined to the orbit or not. Total extirpation when practicable, or complete evacuation of the cyst, and the encouragement of a process to destroy the genetic membrane, as the insertion of a drainage-tube and the production of a mild process of suppuration, should be resorted to. In all cases where simple puncture, resulting in evacuation of the liquid, has been done, the cyst has refilled. In all cases where a suppurative process, without removal of the cyst wall, but thorough removal of its contents, has taken place, rapid recovery has followed.

