

so effective as a strong solution of corrosive sublimate— $\mathcal{D}j-3j-$   
 $\frac{3}{4}iv$  of rose-water. It need hardly be observed that these strong  
solutions require very careful handling. Less than necessary will  
fail, and application to an abraded surface will induce toxic symp-  
toms.

Aurum.—Gold. *Or*, Fr.; *Gold*, Ger.

*Auri Chloridum*.—Chloride of gold. (Not official.) Needle-  
shaped prisms of a beautiful yellow color, deliquescent, freely soluble  
in water. Dose, gr.  $\frac{1}{30}$ —gr.  $\frac{1}{15}$ .

*Auri et Sodii Chloridum*.—Chloride of gold and sodium. An or-  
ange-colored salt, crystallizing in four-sided prisms, soluble in water.  
Dose, gr.  $\frac{1}{20}$ —gr.  $\frac{1}{10}$ .

ANTAGONISTS AND INCOMPATIBLES.—Eggs, albumen, milk, flour, are  
chemical antidotes. The contents of the stomach should, of course,  
be evacuated. The principles of treatment are the same as for poison-  
ing by corrosive sublimate.

SYNERGISTS.—The salts of mercury, especially the corrosive chloride,  
are very similar in action to the chlorides of gold, and are therefore  
synergistic.

PHYSIOLOGICAL ACTION.—The chloride of gold is a caustic in its  
local action. In toxic dose it excites violent gastro-enteritis, accom-  
panied by such nervous phenomena as cramps, convulsive trembling,  
insomnia, priapism, insensibility, etc. In small medicinal doses these  
auric preparations promote the appetite and the digestive capacity. If  
long continued, especially if the dose be a full medicinal one, epigastric  
pain and distress are excited, nausea is induced, and loss of appetite  
follows. Constipation is usually produced by the preparations of gold,  
and this, notwithstanding an increased secretion of the intestinal  
glandular apparatus is one of the results of their administration.  
These preparations do not probably entirely enter the blood from the  
stomach, but part passes to the intestinal canal, is there decomposed,  
and is absorbed as oxide in combination with albumen. This is, how-  
ever, conjectural. They are readily soluble and are very diffusible  
substances. What particular influence they exert on the composition  
and function of the blood is at present quite unknown. A form of  
fever, known as *auric fever*, is caused by their prolonged adminis-  
tration. This fever is accompanied by profuse sweats, a very abundant  
flow of urine, and increased salivary secretion. The salivation caused  
by the preparations of gold differs from the mercurial in that there is  
no tenderness nor ulceration of the gums.

Peculiar effects on the mental state are produced by the adminis-  
tration of the auric preparations. The functions of the mind become  
more active, and even excited, and a state of cheerfulness is induced.  
In men, marked aphrodisiac effects are produced, and the erections are

often painful; in women, increased venereal desires and augmentation  
of the menstrual flow are observed.

The elimination of the auric preparations takes place by the liver,  
the intestinal canal, but chiefly by the kidneys. The urine assumes a  
bright-yellow color.

Prolonged administration of medicinal doses induces epigastric heat  
and oppression, headache, dryness of the throat and mouth, gastro-  
intestinal irritation, fever.

THERAPY.—The chloride of gold and sodium in small doses ( $\frac{1}{20}$   
grain), three times a day, will relieve *nervous dyspepsia*. A red and  
glazed tongue, epigastric pain, increased by taking food, and a tend-  
ency to relaxation of the bowels after eating, are indications for the  
use of this salt. *Catarrh of the duodenum, catarrh of the bile-ducts,*  
and *jaundice* dependent thereon, are symptoms which may usually be  
removed by the salts of gold.

These preparations are employed chiefly in the treatment of *syphilis,*  
*secondary and tertiary*. They are indicated in the same cases in which  
corrosive sublimate is found effective. According to the author's ex-  
perience, they are especially adapted to old cases in which a protracted  
mercurial course and the large use of the iodide of potassium have  
failed to remove long-standing tertiary symptoms. He has found them  
very serviceable in recurring *syphilitic ulcerations of the throat, syphi-*  
*litic ozaena, syphiloma of bones, syphilitic phthisis, etc.*

*Amenorrhœa*, dependent on torpor of the ovaries, may be removed  
by the persistent use of auric preparations. *Chronic metritis*, with  
scanty menstruation, is often remarkably benefited by them. *Sterility*,  
dependent on these states, or due to coldness, is more certainly cured  
by these agents than by any other merely medicinal means. It is said  
by Martini that the tendency to *habitual abortion* may be averted by  
the use of chloride of gold. This authority has also found that *dropsy*  
*of the ovary* may be sometimes cured by the same agent.

*Decline of the sexual power* in man may be prevented by the use  
of gold salts, and the following are symptoms which may be removed  
sometimes by them: *diurnal seminal losses, weak and inefficient erec-*  
*tions, inability for the sexual congress, due to irritability of the sexual*  
*organs*. They increase the frequency of the nocturnal losses in those  
who are suffering from plethora of these organs. Cases that are bene-  
fited by the bromide of potassium are increased by the chloride of  
gold, and *vice versa*.

The author calls especial attention to the use of the salts of gold in  
*chronic Bright's disease*, granular and fibroid kidney, and the so-called  
*depurative disease*. He has observed remarkable improvement to fol-  
low the persistent use of the chlorides of gold in these affections. They  
are best given in pill-form, and in small doses,  $\frac{1}{20}$ — $\frac{1}{30}$  of a grain three  
times a day. It need hardly be mentioned that these preparations are

not adapted to the acute forms of Bright's disease. Further experience confirms me in the view above expressed in regard to the value of chloride of gold and sodium in the treatment of chronic albuminuria. Not only, in my own hands, but in cases thus treated by others, this remedy has proved to be a very valuable addition to our resources in this hitherto intractable malady.

Excellent results are obtained from the use of these auric preparations in certain forms of mental disorder: e. g., *melancholia*, *hypochondria*, and allied mental states, accompanied by depression. *Vertigo* and *vertiginous sensations*, when due to stomach-disorders, are often removed by minute doses of the chlorides of gold, but plethora and increased intracranial blood-pressure contraindicate their use; on the other hand, they have a high degree of utility when there is present the condition of cerebral anæmia. The author has been favored with a private communication from Dr. Bauduy of St. Louis, in which this experienced and able physician expresses his confidence in the value of this remedy in the treatment of hypochondriasis and melancholia, based on much personal experience. The modern experience is therefore in harmony with the observations of the refined and learned author of the "Anatomy of Melancholy."

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**Argentum.**—Silver. *Argent*, Fr.; *Silber*, Ger.

**Argenti Oxidum.**—Oxide of silver. An olive-brown powder, very slightly soluble in water. Dose, gr. ss—grs. ij, in pill.

**Argenti Nitras.**—Nitrate of silver. A heavy, colorless, anhydrous salt, wholly soluble in distilled water, and crystallizing in shining, rhombic plates. Dose, gr.  $\frac{1}{4}$ —gr. ss, in pill, or in solution.

**Argenti Nitras Fusus.**—Fused nitrate of silver. In cylindrical pieces. Is only used for topical applications.

**Argenti Nitras Dilutus.**—Diluted (mitigated) nitrate of silver. Nitrate of silver, 50 parts; nitrate of potassa, 50 parts. Formed in pencils or cones.

**Argenti Cyanidum.**—Cyanide of silver. Is a white powder, insoluble in water. Dose, gr.  $\frac{1}{10}$ —gr.  $\frac{1}{20}$ , in pill-form.

**Argenti Iodidum.**—Iodide of silver. An amorphous powder, yellowish in color, without taste, and insoluble in water or alcohol. Dose, gr.  $\frac{1}{10}$ —gr.  $\frac{1}{4}$ .

**ANTAGONISTS AND INCOMPATIBLES.**—The soluble chlorides and all

substances containing them are incompatible with the nitrate of silver; hence most of the natural waters decompose it, because they contain more or less common salt. An insoluble chloride of silver is the result of the decomposition. The following mineral acids and their salts are chemically incompatible: Sulphuric, muriatic, tartaric, and sulphurous. Alkalies and their carbonates, astringent infusions, and lime-water are incompatible. In cases of poisoning by nitrate of silver, common salt is the appropriate antidote. This should be given in solution very freely, to act as an emetic as well as chemical antidote.

Therapeutically the salts of silver are antagonized by all those agents which promote constructive metamorphosis.

**SYNERGISTS.**—All agents promoting waste, as mercury, iodides, etc., favor the action, therapeutically, of nitrate of silver.

**PHYSIOLOGICAL ACTIONS.**—Nitrate of silver acts chemically on the tissue to which it is applied. It combines with the albumen, and excites a superficial inflammation, producing in some subjects vesication, in all a whitish eschar. It is, therefore, an escharotic, but of very limited activity. The white eschar produced by it, subsequently—under the influence of light—becomes brownish-black.

Nitrate of silver has a strong metallic, styptic taste. A strong solution, brushed over the mucous membrane, whitens it. In the stomach, the salts of silver produce a sense of warmth at the epigastrium, and, in large (toxic) doses, excite a violent gastro-enteritis. Meeting in the stomach soluble chlorides, undoubtedly the insoluble chloride of silver is formed, but a portion of the salt, probably, at once enters into combination with albumen and peptones. That the action of nitrate of silver, when swallowed, is not that of the chloride, has been experimentally shown; hence the conversion of the nitrate salt into chloride does not suffice to explain the effects which ensue. Increased secretion from the intestinal glandular apparatus is produced by the silver salts, and the alvine dejections are softer and more frequent. Long-continued use of these agents will cause gastro-intestinal catarrh.

The salts of silver most probably enter the blood as albuminates and peptonates. They effect very important changes in the blood, which becomes darker and more fluid, the red corpuscles paler and altered in outline, the hæmoglobin converted into hæmatin. A slight lowering of the temperature is a result of these changes in the composition of the blood. Various tissues of the body undergo pathological alterations. The epithelium of the intestinal mucous membrane, of the kidneys and liver, becomes swollen and cloudy, and sometimes fatty. The amount of bile is increased, and albumen frequently appears in the urine. The nutrition of the body is impaired and a progressive diminution in weight and strength takes place. The venous system is found in a state of stasis; transudations take place, the

action of the heart is rapid and irregular, and the respiration is embarrassed.

The nervous system participates in the general impairment of structure; tetanic convulsions, paralysis, and insensibility, ensue. The paralysis is not due to alterations in the muscular system—for the muscles preserve their irritability—but is centric in origin. It is true the muscles, in poisoning by silver, become granular and their striæ obliterated, but their contractility is not destroyed.

Only a minute part of the silver administered is eliminated by the kidneys; most of it escapes by the liver and the intestinal glands; but a portion remains permanently deposited in the tissues if its administration has been protracted. Rarely is it safe to continue the use of the preparations of silver longer than six weeks, and occasional purgatives should be given to promote elimination. An olive, slate-colored, or grayish-brown discoloration of the various tissues of the body results from a deposition of silver. This is usually first seen at the margin of the teeth or on the inside of the lips and cheeks, and is an indication that the system is becoming saturated. I find in Sieveking, "On Epilepsy," the following instructive instance of argyria: "The patient, a man aged sixty, became epileptic in March, 1856, and was treated with nitrate of silver almost from the commencement; for nine months he took a daily pill containing six grains, so that, during that time, he swallowed nearly three and a half ounces. Toward the end of July the skin began to be discolored, but, in spite of gastric symptoms, the remedy was persevered in. In 1857 hæmatemesis and other symptoms of gastric ulceration supervened, while the severity of the epilepsy had abated, and, having in the mean time come to England, he was admitted to the German Hospital, where he soon died. The special interest attaching to the autopsy is connected with the extent to which the silver had been deposited in the tissues. The parts in the face which had exhibited the greatest intensity of discoloration, owing to their containing more blood, now presented a tint uniform with the rest. In the brain the choroid plexuses presented a uniform grayish-blue tint. The lungs were tuberculous and pneumonic, the heart hypertrophic. The stomach contained a large quantity of acid, brown liquid streaked with blood, and at the upper part of the posterior wall was a large ulcer, at the base of which was an orifice blocked up by the adherent pancreas. The mucous membrane of the duodenum and jejunum was dotted over with many small black granules, most closely aggregated along the folds. In the ileum these spots became more and more scanty. . . . The spleen was small, its veins had an ashen hue, which was due to a finely-granular precipitate upon their coats. The liver was small, congested, and fatty; the small branches of the vena portæ and of the hepatic veins presented the same precipitate of silver throughout, but the capillaries were free from

it. Fine sections of the hepatic tissue showed numerous black dots, each of which occupied the center of an acinus, corresponding to the point of exit of a central vein, and the color was produced by a black margin surrounding the caliber of the artery. The largest argentine deposit was in the kidneys. . . . The pyramids all exhibited a dark-gray color, which was deepest, and all but black, near the papillæ. The tubules in these parts were entirely invested with a dense precipitate. . . . Parts of the skin taken from the temporal, axillary, and digital regions, were examined. Transverse sections showed a pale, purplish streak immediately underneath the rete Malpighii, following the undulations of the cutis. . . . The glandular epithelium uniformly presented fatty degeneration."

A persistent and long-continued use of the iodide of potassium and of the hyposulphite of soda has, in a few fortunate instances, caused the absorption and excretion of the silver deposits. The action of these systemic remedies for the discoloration may be aided by baths of the hyposulphites and by the cautious use of lotions containing the cyanide of potassium, which possess a decided solvent power over the silver deposits.

**THERAPY.**—The oxide and the nitrate of silver are extremely serviceable remedies in the so-called *nervous dyspepsia*, and in *chronic gastric catarrh*. They are indicated in the following state of things: Pain after taking food, lasting for an hour or more (gastralgia), the digestion, although slow, being good; burning pain, with pyrosis, coming on after the completion of the stage of stomach digestion; eructations of food, with sour and acrid matters—the first being a gastralgia, and the other states being caused by gastric catarrh, and consequent fermentation of the starch, sugar, and fats. ℞ Argenti oxidi, grs. v; ext. hyoseyami, grs. v. M. Ft. pil. no. x. Sig.: One three times a day before meals. In *chronic gastric catarrh*, Frerichs recommends the following formula: ℞ Argenti nitrat., grs. xv; aq. destil., q. s.; ext. belladonnæ, grs. x; ol. caryophylli, gtt. x; rad. gentian pulv., ext. gentianæ, āā q. s. ut ft. pil. no. lx. Sig.: One pill three times a day. When there is much pain present, Wilson Fox highly commends the combination of nitrate of silver and opium in chronic gastric catarrh, but, as constipation so frequently attends this state, belladonna or hyoseyamus is usually to be preferred. Notwithstanding the strong opinion which Brinton has given adversely to the use of the salts of silver in *ulcer of the stomach*, the author agrees with Fox that these agents are, in this affection, next in value to bismuth. The oxide, or the nitrate, may be given in pill-form, as above, or the nitrate in solution. In these stomach-affections, as a rule, the oxide of silver—being free from the causticity of the nitrate—is preferable.

In *jaundice dependent on catarrh of the biliary ducts*, especially when there are present considerable pain and stomach-disorder, the

salts of silver not only give relief to some of the more distressing symptoms, but assist materially in restoring the functional activity of the liver. As respects these hepatic disorders, silver has an action similar to arsenic, manganese, mercury, and some other mineral remedies.

Frequently nitrate of silver is remarkably beneficial in *cholera infantum*, after the acuter symptoms have subsided. The following is an excellent formula for a child a year old:  $\mathcal{R}$  Argenti nitrat., gr. j; acid. nitric. dil.,  $\mathfrak{m}$  viij; tinct. opii deod.,  $\mathfrak{m}$  viij; mucil. acaciæ,  $\mathfrak{z}$  ss; syrup. simplicis,  $\mathfrak{z}$  ss; aquæ cinnamomi,  $\mathfrak{z}$  j. M. Sig.: A teaspoonful every three, four, or six hours. The nitrate of silver is also an efficient remedy in that form of *diarrhœa in children* in which the stools are white, pasty, and offensive, and the urine is high-colored and acrid. In *dysentery*, both of children and adults, after the acute symptoms have ceased, and in *chronic dysentery*, the nitrate of silver is a most efficient remedy. In some epidemics of *acute dysentery*, when the constitutional condition is one of depression, it is equally effective. In these maladies it is better to prescribe the nitrate in pill-form (gr.  $\frac{1}{4}$ —gr. j) combined with opium. With the stomach administration of the nitrate may be conjoined its local application to the rectal mucous membrane, and even in favorable instances to the descending colon. In using nitrate of silver by enema, the application, to be effective, should be made through a flexible tube passed cautiously to the sigmoid flexure or beyond. The bowel, previous to the introduction of the silver solution, should be as thoroughly washed out as possible by tepid water. From ten to twenty grains of the nitrate of silver, to a pint of water, is a suitable proportion for an enema.

Obstinate *dysenteric discharges*, either alone or mixed with healthy-formed fæces, are not unfrequently caused by an *ulcer of the rectum*. The most effective treatment for such an ulcer consists in the application to it, through a suitable speculum, of the solid stick of nitrate of silver.

The author's experience justifies him in asserting that the most effective remedy for the *diarrhœa of phthisis* is nitrate of silver combined with opium. When the *diarrhœa of typhoid fever* resists bismuth, Hope's mixture, and laudanum enemata, a satisfactory result may often be obtained by nitrate of silver, as follows:  $\mathcal{R}$  Argenti nitrat., grs. iij; pulv. opii, pulv. ipecac.,  $\mathfrak{a}\mathfrak{a}$  grs. vj. M. Ft. pil. no. xij. Sig.: One every four or six hours. The nitrate of silver is one of the numerous remedies which have been used in the treatment of *cholera*.

Formerly nitrate of silver was much employed in the treatment of *epilepsy*, but it has justly fallen into disuse, for, besides the danger of tinting the skin, it is not as effective as much less objectionable remedies. Iodide of silver has proved very useful in the treatment of *whooping-cough*, in the hands of Dr. Bell, of Glasgow. He gives one eighth of a grain. Since proposed by Wunderlich, this agent has been

fairly tested in the treatment of *posterior spinal sclerosis* (progressive locomotor ataxia), and seems to have some influence in retarding the progress of the disease.

LOCAL USES.—Nitrate of silver is largely used as an external application. A case has recently been reported in which argyriasis was produced by the free application of this salt to the fauces, hence some care should be exercised in applying it to the mucous membranes. For external use, the cylinder and solutions of various strengths are employed. The "mitigated" stick is used chiefly by ophthalmologists. The most satisfactory solution for local application to the skin is obtained by dissolving the salt in nitrous ether (gr. v— $\mathfrak{D}$ j— $\mathfrak{z}$ j of ether). This solution acts more energetically than the aqueous solution, and will readily vesicate.

Solutions of nitrate of silver are much less frequently applied than formerly to *inflamed tonsils*, *diphtheritic affections of fauces*, *acute laryngeal troubles*, *œdema of the glottis*, etc. In the incipiency of tonsillitis, a strong solution ( $\mathfrak{D}$ j— $\mathfrak{z}$ j— $\mathfrak{z}$ j) may sometimes avert the attack, but if the inflammation be well established the irritant action of the caustic increases the morbid process. The most enlightened modern authorities (Oertel) condemn the use of caustics in diphtheria; forcible detachment of the exudation only increases the chances of systemic infection, and injury done to the surrounding healthy mucous membrane invites the extension of the false membrane. A sufficient quantity of silver solution, to be effective, can not be applied to the larynx, nor even to the aryteno-epiglottidean folds, without the aid of the mirror, and this manipulation is hardly available when a state of acute inflammation exists. *Follicular pharyngitis* is one of the affections which can be successfully treated by systematic local applications of silver solution. *Catarrh and ulceration of the posterior nares* may be cured by persistent use of the same remedy, the application being made by a suitable sponge probang, or brush, passed behind the veil of the palate. The appropriate strength for these purposes will depend, in part, on habit (grs. v— $\mathfrak{D}$ j— $\mathfrak{z}$ j). Very weak solution of nitrate of silver (gr. j— $\mathfrak{z}$ j) is sometimes used by the spray-douche (glass tube) in *chronic inflammation of the pharynx, larynx, and trachea*. Besides the ineffectiveness of this method, it is objectionable because the silver spray stains the face and clothing of the patient, unless a shield is very carefully used. To *ulcers of the tonsils, tongue, syphilitic and otherwise*, the solid nitrate is often used. It is a very painful application, and possesses but slight, if any, advantages over carbolic acid, which is anæsthetic after the first contact.

A strong solution of nitrate of silver, especially in nitrous ether, is a most efficient application to check inflammation in superficial parts, e. g., *boils, felon* (paronychia), *theccal abscess, orchitis, synovitis*, etc. It is essential to the success of this treatment that the application be

made early. According to the method of Mr. Furneaux Jordan, it is better to make these applications to the adjacent "vascular territory," than to the inflamed part directly. To illustrate: In the case of orchitis, instead of painting the silver solution over the testicle, it is better to apply it along the groin and inner face of the thigh, over the course of the great vessels.

Mr. Higginbottom, who is the author of this method of treatment, says that "we have no therapeutic agent so safe, powerful, or efficacious, as the nitrate of silver in subduing external inflammation when properly applied. It has been invariably successful in my hands for nearly the last forty years." Such unstinted praise from so eminent an authority deserves our most respectful consideration. As the proper application of the remedy is so important, it were better to follow literally the method of Mr. Higginbottom: "The affected part should be well washed with soap and water, then with water alone, to remove every particle of soap, as the soap would decompose the nitrate of silver; then to be wiped dry with a soft towel. *The concentrated solution of four scruples of the nitrate of silver to four drachms of distilled water is then to be applied two or three times on the inflamed surface and beyond it, on the healthy skin, to the extent of two or three inches.* The solution may be applied with a small piece of clean linen, attached to the end of a short stick; the linen to be renewed at each subsequent application. . . . In about twelve hours it will be seen whether the solution has been well applied. If any inflamed part be unaffected, the solution must be immediately re-applied."

The method of Mr. Higginbottom is extremely effective in *traumatic erysipelas*. The common *facial erysipelas* rarely requires anything but the simplest application. The concentrated solution of nitrate of silver should be thoroughly applied to *malignant carbuncle of the lip*, and to the adjacent healthy skin for a short distance. The *pitting of small-pox* may be prevented by rupturing each pustule and inserting into it a sharply-pointed pencil of the nitrate of silver. According to Mr. Higginbottom, the same result may be accomplished, and with greatly less labor, by applying his solution in the manner above indicated.

The solution of nitrate of silver in nitric ether ( $\text{℥ij} - \text{℥j}$ ) is recommended by Fox in the chronic forms of *erythema*, *eczema*, *psoriasis*, and *ringworms*. *Indolent ulcers*, *discharging sores with flabby granulations*, are improved in character and made to heal by application of Higginbottom's concentrated solution, or of solid caustic.

*Ulceration of the cervix uteri*, *endo-cervicitis*, *granular cervicitis*, *endo-metritis*, are effectively treated by nitrate of silver applications. The solid caustic may be quickly brushed over the mucous membrane, or a concentrated solution may be applied with a suitable "applicator."

There is no doubt that solid caustic may be applied with safety in chronic cases to the interior of the uterine cavity, after preliminary dilatation of the cervical canal. This is a most effective treatment, but injury is often done by over-stimulation and too prolonged contact of the caustic. Induration of the cervix and narrowing of the cervical canal are sometimes produced by injudicious use of the solid caustic. That troublesome affection, *pruritus of the vulva*, may often be removed, even when due to pregnancy, by washing the neck, and the cervical canal so far as it is accessible, with a strong solution of the nitrate of silver ( $\text{℥j} - \text{℥j}$ ). When the pruritus is due to a vesicular eruption on the genitals, the application should be made to the affected part. *Gonorrhœa* (vaginal) of the female is most quickly removed by applying through the speculum, and to every part of the canal, a concentrated solution of silver nitrate ( $\text{℥j} - \text{℥j}$ ). In the male, *gonorrhœa*, at its first appearance, may sometimes be aborted by a strong injection ( $\text{℥j} - \text{℥j}$ ), but unfortunately the period is usually past when this violent practice may be advised. Weak solutions (gr.  $\text{j} - \text{grs. v} - \text{℥j}$ ) are, as a rule, more efficient, as they are unquestionably safer. *Cauterization of the prostatic part of the urethra* was at one time vulgarized in the treatment of *spermatorrhœa* by the influence of Lallemand, but this dangerous practice is rarely necessary. The author coincides with Mr. Furneaux Jordan in the expression of the belief that a vesicating solution of nitrate of silver applied to the perinæum is as generally useful and, of course, entirely without danger.

Solutions of nitrate of silver are much used in ophthalmic and auricular surgery. To *granular lids*, a strong solution ( $\text{℥j} - \text{℥j}$ ) is applied; to *acute conjunctivitis*, a weak solution (gr.  $\text{j} - \text{grs. iv} - \text{℥j}$ ); but generally ophthalmologists prefer the zinc and copper salts in the treatment of these affections. The incautious use of silver salts, when there are corneal ulcers, may result in unsightly deposits and opacities. *Otorrhœa*, *eczema of the external auditory meatus*, and *chronic inflammation of the external ear*, may be cured by silver solutions properly applied. A commencing *furuncle* of the external canal may sometimes be aborted by application of Mr. Higginbottom's solution.

The stains made by nitrate of silver on fabrics or on the hands may be removed as follows: Moisten the spots and drop upon them a few drops of tincture of iodine, and wash with a solution of hyposulphite of soda ( $\text{℥ss} - \text{℥j}$ ). These stains may also be removed by washing them with the following solution: Cyanide of potassium,  $\text{℥ijss}$ ; iodine, grs.  $\text{xv}$ ; water,  $\text{℥ij}$ .

Besides the above-mentioned external applications of nitrate of silver, this salt is also used according to the method of Luton, entitled "parenchymatous substitution." This consists in injecting, with a hypodermatic syringe, a few drops of a concentrated solution into the parenchyma of organs—an irritant injection. *Cystic tumors* (wens),

*small fatty tumors, abscesses, and hydrocele*, may be cured by injecting five to ten drops of a strong solution (℞j—3ij). In the case of cysts and hydrocele, the contents may be allowed to escape through the needle, and then the irritant solution be injected. More or less active inflammation follows, and the sac, after a variable stage of supuration, becomes entirely obliterated.

Old and intractable cases of *sciatica* that resist other means, including hypodermatic injection of anodynes, are sometimes permanently relieved by injecting deeply into the neighborhood of the affected nerve ten to twenty drops of a solution of nitrate of silver. Suppuration usually follows, and the local inflammatory process terminates the previously-existing nerve-lesion (parenchymatous substitution).

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**Cuprum.**—Copper. *Cuivre*, Fr. ; *Kupfer*, Ger.

**Cupri Acetas.**—Acetate of copper. Deep-green, prismatic crystals, yielding a bright-green powder, efflorescent on exposure to air, odorless, having a nauseating, metallic taste and an acid reaction. Soluble in 15 parts of water, and in 135 parts of alcohol at 60° Fahr. Dose, gr.  $\frac{1}{10}$ —gr.  $\frac{1}{4}$ .

**Cupri Sulphas.**—Sulphate of copper. Blue vitriol. In blue crystals, slightly efflorescent in the air, and soluble in 2.6 water at 60° Fahr. Ammonia throws down from the solution a precipitate, which is wholly dissolved when the alkali is added in excess. Dose, gr.  $\frac{1}{8}$ —gr. ss.

**Cuprum Ammoniatum.**—Ammoniated copper. (Not official.) A deep, azure-blue powder, having an ammoniacal odor, and a styptic, metallic taste. It is soluble in water. Dose, gr.  $\frac{1}{8}$ —gr. j.

**ANTAGONISTS AND INCOMPATIBLES.**—Alkalies and their carbonates, lime-water, mineral salts (except the sulphates), iodides, and most astringent vegetables, are chemically incompatible with the salts of copper. In cases of poisoning, white of eggs and milk should be given freely, but evacuation of the contents of the stomach is necessary, for the albuminate of copper is not devoid of toxic power. The most

effective chemical antidote is said to be the ferrocyanide of potassium, forming the insoluble ferrocyanide of copper. Magnesia has also been proposed, but it should not be relied on to the exclusion of albumen and ferrocyanide of potassium, nor should any antidote be used without evacuating the stomach contents by emetics or the stomach-pump.

**SYNERGISTS.**—The salts of lead, tin, zinc, mercury, silver, gold, favor the therapeutic action of the copper-salts. All of these agents agree in this : they promote waste, and affect the functions of the nervous system secondarily. All unfavorable hygienic conditions, which depress the functions of the body, increase the activity of the copper-salts.

**PHYSIOLOGICAL ACTIONS.**—The salts of copper have a styptic, metallic taste. When a poisonous dose of a copper-salt has been taken the following symptoms, referable to the digestive organs, appear : A strong metallic taste, burning and constriction of the throat, increased flow of saliva, burning pain at the epigastrium, with griping and colic-pain of the intestines, nausea and vomiting. The vomited matters have usually a bluish or greenish color, and the intestinal evacuations, which begin in a few minutes after the poison has been swallowed, are dark-greenish and frequently bloody. These are the symptoms produced by the irritant poisons, and have no special characters, except, it may be, the *color* of the evacuations. The salts of copper, being diffusible substances, quickly enter the blood, and the systemic symptoms which follow are referable to the nervous system and the organs of excretion. In the blood, as is the case with the other metallic poisons, copper probably exists in the form of an albuminate in close relation to the red blood-globules. The breathing becomes short, hurried, and labored ; the pulse small, quick, and weak ; the skin cold and perspiring, and restlessness, headache, trembling, cramps, vertigo, and stupor, are followed by convulsions (clonic or tetanic), paralysis, and insensibility.

Inhalation of cupreous fumes, as in certain occupations in the arts, the slow introduction of small quantities, as occurs sometimes from cooking acid fruits in copper vessels, or the prolonged medicinal administration of moderate doses of a copper-salt, will produce the symptoms of chronic or slow poisoning. When inhaled, the symptoms first observed are those of bronchial irritation and bronchial catarrh (Hirt). Internally administered, a gastro-intestinal catarrh is produced, epigastric pain is experienced, nausea, vomiting, colic, tenesmus, and dysenteric discharges, and complete anorexia occur. The loss of appetite, and the interference with digestion, as well as the injury done to the red blood-globules, impair the strength and increase the waste of the tissues. A purplish line along the margin of the gum has been observed, salivation and ulceration of the gums not unfrequently occur, and occasionally jaundice is present as one of the symptoms. As re-