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### Dissertation on iodine

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*Yale University.*

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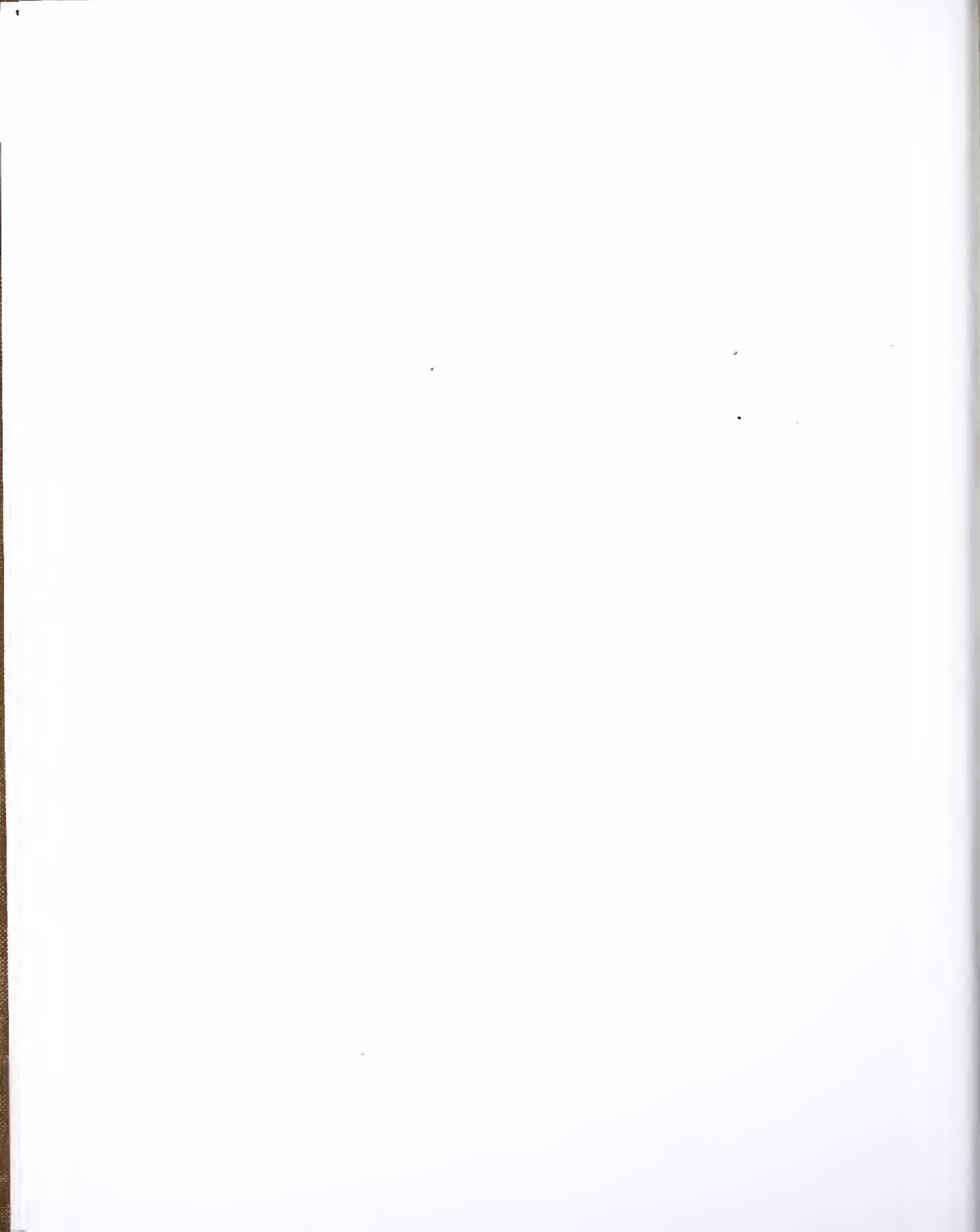


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Dissertations  
read by the  
Candidates for Degrees and Licenses,  
at the  
Annual Examination  
in the  
Medical Institution of Yale College,  
January 21-22,  
1846.

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Disputation on Iodine, By Samuel Augdeu Mills, of Glasgow;  
Candidate for the Degree of Doctor in Medicine.

Story

Iodine is an elementary, non-metallic body, possessing many of the properties of Chlorine. It is one of the most remarkable substances in nature. It was discovered in 1812 by Mr. Courtois a Soda manufacturer of Paris. It is called iodine from its violet colored vapor, which is from the greek *iodos* which signifies violet color. A few years after most or all of its chemical properties were described which are now known. Its therapeutic powers were also tried and these having been found valuable, it gradually came into general use, so that at the present time it is recognised as a standard remedy, of much power and used to great extent. Iodine exists in all of the marine vegetables, or sea weeds, in this vicinity excepting the *Bostrera marina*, or eel grass, and particularly in the *Fucus*, a common seaweed. In the animal kingdom, it is found in the oyster, various polypi, and in cod's liver oil. The mineral kingdom also contains it in small quantities, but in the silver ore of Mexico, it is found as high as 15 per cent. Sea water contains it in small quantities, also the

water of certain Springs. The first that it was discovered in the United States, was in the water of the Congress Spring at Saratoga by Dr. Wm. Fisher. Dr. A. H. Leel ascertained it to be in a state of iodide of Sodium, and probably exists in the same form or state, in the sea-weed. The Congress water contains three or four grains to the wine gallon.

Iodine is manufactured in England and France in large quantities, from sea weeds, also in the western isles and shores of Scotland and Ireland. The product is called kelp, it is a fused semitransparent mass, which contains about a 22.5<sup>th</sup> part of iodine, which on being lixiviated in water about one half is dissolved, when farther prepared for use.

Properties. Iodine is a soft friable opaque substance in the form of crystalline scales of a bluish black color, and metallic lusture, resembling plumbago. Sometimes the crystals are very large and brilliant. It has a hot acid taste, and a disagreeable odor resembling chlorine. Its specific gravity is 4,948; it is a volatile substance and evaporates at common temperatures, if it is in a moist state.



on the application of heat, it evaporates more rapidly - It fuses at 225 degrees, is volatilized at 347 degrees, the vapor having an exceedingly beautiful violet color. Its specific gravity is 8.716 being the heaviest aciform substance known. Its atomic weight is about 126 atomic volume 1. The vapor is irrespirable, suffocating instantly, and when inhaled with air, it excites coughing, and irritation of the Schneiderian membrane. It requires 7.000 times its weight of water to dissolve it. In Alcohol and ether it is much more soluble - The aqueous solution is tasteless, but has a feeble odor and brownish color. It is rendered much more soluble in water by the addition of a little chloride of sodium, muriate of ammonia, or iodide of potassium. In chemical habitudes, it resembles chlorine, but in affinity is much weaker.

Iodine unites with most of the metallic and non-metallic bodies, <sup>forming</sup> either salts acids or iodides, several of which are officinal. With oxygen it forms three acids viz the iodous, iodic, and hyperiodic, and with hydrogen one acid, the hydiadic, which unites -

with potassa, forming hydriodate of potassa, but the haloidal salt which bears that name is not a hydriodate of potassa but an iodide of potassium.

One of the most characteristic properties of iodine, is the production of a splendid blue color, with a solution of starch; so delicate is this test that is said to receive a blue tinge from  $\frac{1}{50,000}$  part of its weight of iodine. The solution must be cold, and the iodine in a free state, which may be done, if it is combined, by adding a small quantity of chloric water or a few drops of sulphuric acid. — Iodine is sometimes adulterated with mineral coal, charcoal, plumbago &c, but on analysis it has not been found, <sup>only</sup> in small quantities. These impurities may be detected by dissolving iodine in alcohol, as in this it is perfectly soluble and evaporizing the solution. If any thing remains either undissolved or unevaporated it is an adulteration. It contains also more or less water, sometimes as high as 15 or 20, per cent. This is of consequence as it interferes with the uniformity of its preparations. — When it is considerable, the iodine will adhere to the inside of the vessel which contains it. —



In the Edinburgh Pharmacopiea, we find a test to detect all impurities of this kind above two per cent. which is, a certain quantity of quick lime, with pure iodine dissolved in water, forms a clear solution. In consequence of the almost uniform presence of water, in iodine, the Edinburgh College recommends the drying of it, in a shallow basin of earthen ware, in a small confined space of air, with ten or twelve times its weight of fresh burnt lime, untill it cleaves off, almost entirely from the vessel.

The special actions of iodine on the system are varied by its degree of concentration, state of the constitution &c. hence it is deemed capable of acting as a corrosive poison, irritant, desiccant, tonic, diaphoretic, diuretic and emmenagogue. —

The two most remarkable effects which have been produced by iodine are the absorption of the mammae and wasting away of the testicle, these effects however I believe are not very common. The mammae sometimes recovers itself and sometimes does not. —

A. disordered condition of the cerebro-spinal system has in several instances been caused by iodine,

also a specific effect on the skin besides the diaphoresis which it occasions, which may be owing to its indiscriminate use.

Iodine acts by being absorbed when employed either internally or externally. This is proved by its being detected not only in the blood but in the secretions, as urine, milk, saliva &c. —

It exists in a state of iodide or hydriodic acid.

Its tonic effects are evinced by its strengthening the digestive organs, and increasing the appetite which are the most constant effects of its use. —

Uses As a remedial agent it has been principally used for its resolvent influence, in chronic, visceral and glandular enlargements, indurations, thickening of membranes of the periastrium in tumours

Its therapeutical applications are widely different from those of mercury, the latter being applicable in cronic states of the system, the former not.

Iodine being especially adapted for scrofulous, mercury for syphilitic maladies or states of the system

Iodine effects the secretions less than mercury, and also certain glands, which mercury does not.

When given in large doses, five or six grs, it produces a sense of constriction in the throat, sickness and pain at the stomach, at length vomiting.

When given in medicinal doses, if they are rather large, it sometimes produces unpleasant symptoms and even dangerous ones, — such as a sense of burning in the esophagus, restlessness, palpitation, excessive thirst, violent eructs, acute pain in the stomach, rapid and extreme emaciation and frequent pulse.

This state of the system is called iodism. —

These symptoms do not always follow the generous use of iodine, but the fact that it produces such a state of the system, show the necessity of caution in its exhibition, notwithstanding the assertion of some to the contrary, who have given it in large quantities and seen no ill effects arise there from, which case may have been from the food being of the amylaceous kind, in which case a considerable portion of the iodine would have been converted into an iodide of starch, which is a very mild preparation. Upon the appearance of any of the symptoms, above mentioned, as indicating



iodism, which shows us that the remedy is being carried to far, it should be discontinued or the dose diminished.

The Official preparations are numerous.

The following are some of the more important

lides Iodide of Ammonia, - this preparation made into an ointment with lard, is useful in some cutaneous effections.

of arsenic Iodide of Arsenic, - this has been used as an external application, to corroding tubercula skin diseases, and also given internally in cutaneous effections, and where there is a cancerous diathesis. Dose  $\frac{1}{8}$  gr. three times per day -

of Arsenic mercuric Iodide of Mercury, which is a solution of the iodide of arsenic and mercury -

of Iron Iodide of Iron, and a Solution and Syrup of the same - This possess the powers of a tonic and deobstruent.

Lead Iodide of Lead, this has been found to be of but little value. Prof. B., <sup>however</sup> has used it in Pthisis and thinks well of it. -

of -- \* Iodide, a the red iodide of mercury - is analogous to the Chloride of mercury, a corrosive sublimate.  
\* The Biniodide of the U. S. Dispensatory -

of — — \* Iodide a green iodide of mercury — is milder  
— than the red iodide of mercury, and may be given  
similar to Colomel. —

Potassium Iodide of Potassium, or a solution of this is  
the form in which iodine is generally given —

Sulphur Iodide of Sulphur, this is an excellent ap-  
plication, for cutaneous affections in which iodine is called for —

Zinc Iodide of Zinc is a deobstruent, tonic astring-  
— gent — in solution is useful in gonorrhoeal  
and the like discharges, as an injection. —

Double Iodide Iodide Hydrargyrate of Potassium, is a valuable  
remedy in hepatic and cutaneous disorders. —

Iodic Tincture and several other forms of  
iodine are used to some extent. —

Goitre Iodine was first used as a medicine in the  
goitre in 1820 by Dr. Condet of Geneva, and of  
all the remedies yet proposed, for this disease, this  
has been the most successful, by some it is con-  
sidered almost a sovereign remedy, but it is not a  
specific as all cases are not cured by it. —

When the thyroid gland is affected, it is not always  
of the <sup>same</sup> nature, sometimes a hypertrophy merely exists,

\* The protoiodide of the Dr. Dispensatory —



and from the gland enlarging suddenly, and as suddenly diminishing, it has been thought to be owing to an effusion of serum in its tissue, or an accumulation of blood in its vessels. —

Another state is where it is enlarged by certain fluids, or solid substances, which may be contained in its vessels or infiltrated through its substance.

It is also, sometimes in a scirrhous concretion, or perhaps more frequently, of a gelatinous, fibrous or cartilaginous structure. —

Here it would not be expected, that iodine would cure, with a like success, these diversified states of this gland. — those having solid deposits, the most difficult. In order that iodine should cure goitre it should not be of too long standing, or tender to the touch, swelling confined to the gland, and not of a scirrus or carcinomatous nature, — nor containing any stony or analogous concretions, or the general health not too much impaired. — If the swelling was tense and other marks of inflammation present, antiphlogistic treatment should precede the administration of iodine. —

It may be employed, both internally and externally. The best method of employing it externally is the endermic. As to its internal use, some think small doses largely diluted is the most useful one while others think, that as much should be given as the system can bear, — Small doses long continued, would I think be the most preferable method.

It may be given in tincture, or which is better in the form of an iodide, either alone or combined with the protiodide of mercury, forming the, Iodo Hydrocyanate of Potassium, which is a double iodide, one acting as an acid, the other as a base. The dose of this preparation is a  $\frac{1}{10}$  or  $\frac{1}{12}$  of a gr. three or four times per day. The iodine itself, may be given in a solution of iodide of potassium. —

Profusa. This is a disease in which iodine has been used more extensively, probably than any other one remedy, and with unparalleled success — so that at the present time it is almost the only radical remedy depended upon. It changes action, converts the unhealthy, into healthy action, causes the parts and whole system, to assume a healthy

condition, and this by virtue of its alterative power.  
Its effect on the glandular system is decided, and on  
the abdominal viscera, & glands, as well as on the  
lymphatic system. —

It was used first in this disease, by the same gen-  
tlemen who used it for the cure of bronchite. —

The theatre of its action, has been the Hospital  
St. Louis — under the direction of Dr. Gugeol.

He has treated numerous cases successfully with it.  
Other Physicians also have been alike successful in  
its use, though perhaps not to that extent, which  
Dr. Gugeol has been. The circumstances under  
which his patients were placed, connected with  
other treatment, probably, were auxillaries. —

Scrofula effestions in which iodine has been used  
are glandular swellings, especially about the neck,  
Scrofulus ophthalmia, and Oena has been treated  
successfully with iodine. —

Scrofula and ulcers of a scrofulus kind, and diseases of the  
Bones, as white swellings and hip disease, which  
are generally developed in stumous constitutions.  
Iodine may be given internally, and used, topically. —



The best form is the iodide of potassium. —

Dr. Lugol preferred this preparation, and iodine mixed in a solution of distilled water. — this to be largely diluted. — In its external use, <sup>the</sup> tincture may be applied, either as a mild, or a more powerful irritant, by a camel's hair pencil, directly to the abscess or ulcer. — this has produced decided beneficial effects, drying up the discharge and producing cicatrization. —

Diuretic Bath is highly recommended by some Physicians

— — — — — Dr. Lugol used for this purpose, iodine, dissolved in water by means of iodide of potassium, a few grs. to the gallon, — strength pro re nata. —

The system may need some previous treatment to prepare it for the better reception of iodine. —

In head affections, iodine is a valuable remedy particularly where there is a tendency to hydrocephalus, in those children who are weak or of a scrofulous taint, — it should be persevered in for a considerable time. —

Anasarca, or dropsy of the cellular tissue, it has been used with success, — though it has no direct diuretic effects, yet it has been found

that dropsical swellings, have yielded to its use. — its effects at first, are not very apparrent, but by its continued use, its effects are produced. Chronic diseases of organs, especially those accompanied, with induration and enlargement, iodine has been eminently successful —

What its action or influence is, in these cases, is not so well understood, but it checks the further progress of the disease, and apparently restores if not positively, the organ to its normal condition. — It is usually given with the view of exciting action in the absorbents, — but its influence does not find limit here, it exercises a controlling and modifying effect on the circulation of the part, and is in the true sense of the word an alterative. —

By some it is thought to remove the morbid growth by starving them which it effects by contracting the capillaries of the part, but this action I think would not be sufficient, for the enlargements, which it removes are not mere hypertrophies, but a morbid structure,



of the part, is removed, which must have been caused by morbid action, now medicines which remove morbid conditions, can do so, only by restoring healthy actions, that is, having an alterative effect. It is by virtue of this property, that iodine is thus efficacious in restoring parts diseased to a healthy natural condition.

Liver. In chronic inflammation of the liver, after antiphlogistic means have been resorted to, if necessary, iodine is of much service, exciting the secretions and changing action. —

It may be used when mercury has failed, or in connection with mercury — as the Iodo Hydrargyrate of Potassium, or the diodide\*, pot-iodide of mercury — as may best serve the indications, the first and last of which are allied to chloride of mercury, a corrosive sublimate, the other to the Dichloride of mercury, or calomel, which remedies, will probably effect a cure, if the disease is curable. —

Spleen. — The enlarged spleen has derived much benefit from the use of iodine. —

Uterus. Iodine has been found the most successful

\* The part, & dose of the U. S. Dispensatory —

in chronic diseases of the uterus, accompanied with induration and enlargement.—

Case. A case is reported of a uterus of excessive hardness and so large as to nearly fill the pelvis, yet in six weeks the disease gave way and the catamenia was restored.— other cases are reported in which a like success has been obtained.—

Hard tumors of the cervix, and indurated puckering of the os uteri, have also been cured by iodine— it should be administered internally and also used locally.— for its local use an ointment may be made of iodide of potassium 3 parts iodine 1 part, Spermaceti ointment 6 parts— of this a piece of the size of a walnut may be introduced and rubbed in, or on to the affected part for a few minutes every night, either with the finger, or a piece of cane mounted with a sponge.—

Ovarian tumors, have been treated with iodine, and with beneficial results.—

Mammary tumors, of the chronic kind, iodine has alleviated the pain, and held the disease in check— also in indurated enlargements of the, parotid—

prostate, and lymphatic glands, it has been found  
servicable. —

Its Emmenagogue powers have been thought to be  
considerable, by some so great as to produce miscarriage.

Dr. Bell thinks that it has a controll over the ute-  
rus, obviating sterility. —

In, Gleet, Gonorrhoea and Leucorrhoea, it has been  
found useful, after the inflammatory symptoms  
have subsided. — Amenorrhoea and Dysmenorrhoea  
have been cured by its use. —

The iodide of iron is a most valuable remedy in  
chlorosis, and weak chlorotic patients. — This  
preparation has the properties of both its ingredients  
combined. — It is applicable in atonic states of the  
system, where indigestion, and debility are present.

Syphilis, some forms of this, as chronic affections of  
the testis, the Iodo Hydrargyrate of Potassium, is  
a very valuable remedy. —

In Syphilis, and cachexia, arising from the ab-  
use of mercury, as emaciation with ulcers of the  
skin, throat, inflammation of the perivestium,  
bones &c. Sargol's solution is one of the best remedies.



In checking and controlling the ulcerative process of ulcers, which threaten to destroy the part, or in those which are left severe, iodine is a most valuable remedy, causing them to yield to its influence and assume a healthy granulating appearance. Inhalation of the vapor of iodine has been used in phthisis and chronic Bronchitis.

From the irritating property of iodine, it would be applicable only when there is considerable expectoration in the advanced stage. — It acts locally changing and checking at the same time the secretions. —

The ioduretted iodide of potassium, with tincture of coniun is recommended for this purpose. —

Chronic diseases of the Nervous System such as palsy and chorea have been treated successfully with it. It has been used in chronic diseases of the skin as lepra, psoriasis &c, with considerable advantage. —

In Chronic Rheumatism, the iodide of potassium is a remedy much relied upon by some, and is an efficient remedy. —

Antidote. As an antidote for the poisonous effects of Brucia, Strichnia and veratria, it has been res-



commended, for the reason that the compounds formed by the union of these alkalis with iodine, are less active than the alkalis themselves—

The Tincture of iodine, diluted, three or four times is used as an injection for the cure of hydrocele.—also as a check to mercurial salivation. — — — — —

The tincture, either concentrated, or diluted, (according to the state of the part) is a valuable topical remedy, and has been used successfully, in several classes of diseases. In Lexus it is highly beneficial, the ulceration is checked and cicatrization induced.—

It is an excellent application in Eczema, also in several other cutaneous diseases as, lichen, prurigo, psoriasis, scabies &c.

In chilblains, and diseases of the joints, it has been used with advantage, in the form of iodide of Lead, and cambricment, or mixing iodine with lead\*, when you soon have an iodide of lead. This may be worn on the part.—

Erysipelas, Iodine tincture is a good remedy in erysipelas and in phlegmonous inflammation,—it should be applied a little beyond the seat of inflammation.

The application may be made with a camel hair pencil.—

Sloughing, of the cellular tissue, inflammation of the

\* The common lead plaster—

absorbents, gout, - carbuncle, whitlow, wounds,  
burns and scalds, have been treated with this  
invaluable remedy with great effect. —

In its topical application, it is allied to nitrate of  
silver, and used with similar intentions. —

P. S. Liquor Arsenici et Hydrargyri Iodidi, or Dou-  
-oars Solution, (which has been before mentioned) is one  
of the most valuable remedies that we possess in lepra  
impetigo, rupia, psoriasis, and cutaneous diseases in  
general, both papule and scaly, also when there  
is a consensous eczthesis, a disease resembling scurvy  
as very efficient effects have followed its use. —

In uterine diseases of various kinds, it has been very  
beneficial. — — — — —

It is thought to possess the therapeutical properties  
of the three articles combined. — — — — —

The dose is twenty gtt. three times per day, - in  
distilled water - this dose contains  $\frac{1}{24}$  gr. of arsenic  
or arsenious acid, -  $\frac{1}{12}$  gr. of deut-oxide of Mercury, and  
 $\frac{1}{4}$  gr of iodine. — — — — —



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