Gall Stones:
More especially their Character, Causes, Consequences, and Treatment.
Being a Thesis submitted to the Faculty of Medicine of the University of Edinburgh

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Preface

The subject of gall stones is one to which my attention has frequently been drawn during the past four or five years. Early in 1887, a near relation of my own had a most severe attack; in the following Summer, at Rome, I attended a case which proved fatal; fifteen months later I met with a case in which rupture of the gall bladder was followed by a localized peritonitis and by the formation of an abscess which spread into the bowel; in January 1890 I was summoned to attend a case, then three cases of gall stones upon a single afternoon; while many other cases have come under my notice which were not specially worthy of remark.

That the subject is of wide and varied interest is evident from the fact that it encroaches upon the realms of Anatomy, Physiology, Pathology, and Therapeutics. That it is of great importance will be denied by no one who has undergone the agony of an attack. Within comparatively recent years, moreover, the gall bladder and the bile
dends, have come within the province of surgery. This, therefore, seems a
suitable time at which to review the whole subject, and, in the following
pages, I shall give an account of the present state of our knowledge, pointing
out where views seem to be erroneous, and offering such suggestions as
may appear to me.

The history of the literature of gall stones is so fully given by Thudichum that
I shall make no reference to it, except in
relation to the surgery of the gall bladder.
I shall study gall stones, first, as they
may be seen in the Museum of first hand
room. Having discussed their Physical
Properties, I shall refer very briefly to
their Chemistry, and then pass on to a
consideration of their Astrology. From
the Astrology I shall pass on to consider
the Consequences of Gall Stones. The
Signs and Symptoms will next be
noticed, and I shall endeavor to
describe the signs, symptoms, and
consequences of gall stones so fully that
it will be quite unnecessary to devote
any great amount of time to the sub-
ject of Diagnosis and Prognosis.

The paper will conclude with an
account of the Treatment of Gall Stones — more especially of the Surgical Treatment.

My thanks are due to the Council of the Royal College of Physicians of Edinburgh for permission to consult books in their library. I am also indebted to the Librarians of the University Reading Rooms, the University Library and the Advocates Library for the assistance which they have rendered me in gaining access to the literature of the subject.
Physical Characters of Gall Stones.

Number: — As certain of the physical characters, e.g. the size and shape, depend to some extent upon the number of gall stones present, it is well to consider this point first. The average lies between five and ten. In many cases there is only one stone, while in others the number is very great. In the Hunterian Museum at Glasgow, labelled "U. 50" is a beautiful preparation thus described: — "One thousand and seventy-four Gallstones of different sizes, forming thirteen rows of about ten inches long each, spread on white paper. The smallest form three circular planes at the bottom; they are (pinned to the paper and were taken from a patient who died of a flooding and had no jaundice". The largest number recorded is in Otto's case, the 7,802 were found. Large numbers have doubtless occurred, but, the observers being less industrious, they have either been left uncounted or

unrecorded. Of other recorded cases,
there may be mentioned those of Bates,
Wells, Berichs, Frankl. Morgan, and
Hoffman, in which there occurred,
over 1600, 1800, 1930, 2011, 3000
and 3646 respectively.

Size: In size, gall-stones present
are a great variety as a number.
A glance through any Museum Col-
lection is sufficient evidence of this.
From minute particles like the grains
of fine sand up to masses as large
or even larger than a goose's egg,
all gradations are met with. In
practical description purposes, they
are best classified as "small", "medi-
um sized" and "large" — the small
ranging in size from a grain of sand
to a small pea, the medium sized from

(a) "Lancet" 1874 II p. 502
(b) "Medical Times and Gazette" 1878 II 671
(c) "Clinical Practice on Diseases of the Liver"
by W. Friedr. Theodor. Berichs; translated by
Munchen. New Sydenham Society. Lond. 1861
(d) "Lancet" 1878 II 82
(e) von Schneppel. loc. cit.
(f)
a pea to a hazel nut, and the large from a hazel nut upwards. (Zizyphus.)

Of these, the small are by far the most common. Very large stones are distinctly rare. Of 27 specimens, e.g. in the Museum of the Royal College of Surgeons of Edinburgh, the largest (no. 1917 in catalogue) measures 2 inches in length by about 1 inch across, while the neck in size, (1925 in catalogue) is 1 3/4 inches long by 1 1/4 inches broad. The largest stone in William Hunter Collection in the University of Glasgow is one preserved in situ, labelled 'U. 492' and described in the catalogue as

"A gall stone about the size of a common hen's egg, filling up almost the whole cavity of the gall bladder."

Records of large gall stones are doubt

less somewhat larger in the literature

of the subject, but their very rarity is

the cause of their being so faithfully

recorded. Thus, e.g., in the American

Practitioner, Feb. 1877, it described a

biliary calculus passed per rectum by

a woman of 65. Its long diameter was

1 5/8 in., its short diameter 1 in., while its

weight was 190 grains. Mr. R. E.

Backer in 1878 exhibited a gall stone
like a green walnut. It was found in the
clums of a cley; its weight was 5 drachms
and its circumference was 4 1/2 and 4 inches.

(1) British Medical Journal 1878 I 261.

(2) Prior describes a gall stone cast to

(3) To 1875. He recorded a case in which the stone

(4) Bryant recorded a case in which the stone

(5) Measured 1 1/2 in. and its circumference

(6) Measuring 3 1/2 in. and its weight 213.83.

(7) W. H. Farrow is stated by Munchen to

(8) the Pathological Society

(9) two gall stones, each 2 1/2 by 1 1/2 inches in

(10) Richter records a

case in which, post mortem, a gall stone

(11) was removed from the ductus communis

(12) Choleschius, weighing 3 ounces and 5 drachms.

(13) Thayer says, "The largest gall stone

(14) I have ever seen is one in the Pathological

(15) Museum of the Civil Hospital at Ploetz.

(16) Ut is nearly as large as a goose's egg.

(17) Trenches alludes to "a gall stone weighing

(18) Brit. Med. Journal 1880 I 71

(19) " " " 1881 II 85-9

(20) Sir G. R. Richter. Göttingen. 1793

(21) " " " " " George Harley F.R.S.

(22) T. S. Churchill. London. 1883

four ounces. "Preserved in the collection at Göttingen." The largest gall stone yet recorded is that described by J. F. Meckel in the Transactions of the Berlin Academy. It measured 6 inches by 2½ inches. Such cases might be multiplied indefinitely. More important is the relationship that exists between size and number. The gall bladder being of a more or less constant size, the presumption is that when there are large gall stones they are few in number. This is exactly what one finds. Very large gall stones are almost invariably single. In mathematical terms, the size of the calculi is in inverse ratio to their number.

Shape: The shape depends largely upon the size and number of gallstones present. Thus, if there be but one, and if that one be large, it will almost to a certainty be egg-shaped or oval. While if it be large enough, it will be an exact cast of the cavity of the gallbladder. On the other hand, if there be many, they are likely to be more angular and to present facets. But, while the single gall stone is usually round or oval and without facets, the rule is not
so absolute that one would be justified in predicting, after the extinction of such a stone, that we would remain behind. Sometimes "tracheal concretions" are met with, but these coral-like concretions are commoner in cattle than in man. "Tubular concretions with a canal like that of a straw, filling the ramifications of the bile ducts to their finest branches" (one found by Brügge.) Again, + Ferrech, found nine "flattened leaf-shaped stones with a black surface and metallic lustre" in a gall bladder which contained no others. But these are curiosities.

The note which I made after examining the Royal College of Surgeons, Ed. Museum specimens was as follows: "Shape: large ones - oval, medium sized ones, rounded yet faceted, smaller ones - faceted to the extent of being polygonal." Then I paid upon under neathance to be a very generally applicable description.

Surface: - Not always the surface

* Dictionnaire encyclopédique des sciences méd. T X p. 386.
is beautifully smooth, rounded, and lustrous. At other times, while still rounded, it is studded over with excrescences or papillae by excretion.

In the Edinburgh University Museum Collection, e.g. While most of the specimens are faceted and have a smooth surface, in many cases the surface is nodulated and皮革 alike. In yet other cases, it is rough and calcareous, while in one key contains a specimen of white and distinctly specular gall stones. These stones, with sprinkles, however, are so rare that neither the R.C.S. E. Museum nor the Hunterian Museum in Glasgow contains any specimens.

**Colours** - While it would be manifestly an exaggeration to say that all the colours of the rainbow may be found exemplified in a large collection of gall stones, the fact remains that gall stones do present a very great variety of colours. A brownish or greenish yellow is perhaps the commonest colour, but from a snowy white to an ink black, many intermediate shades are met with.

Of the 27 specimens preserved in the Museum of the Royal College of Surgeons
Edinburgh, one (No. "1927" in Catalogue published in 1836) is absolutely black; two, (Nos. "1913" and "1932") are nearly black; two (Nos. "1918" and "1920") are distinctly reddish; seven (Nos. "1916", "1922", "1933", "1934", "1935", "1937" and another) are almost pure white; while the remaining fifteen are of a more or less greenish yellow or neutral grey.

Edinburgh University, Stratumical Museum, from among forty two with specimens there are seven pure white, and the other thirty present various degrees yellow. Side by side in the Hunterian Museum, Glasgow, are two preparations (Nos. "Th. 50" and "Th. 50 a") the former of which contains upwards of 1000 pure white calcite, while the latter contains nearly 1000 which are absolutely black.

When fresh, the white (cholesterin) stones have a pearl-like lustre and transparency, but on drying they become more opaque. On section, a chill yellow or fracture, some interesting variations in colour are seen. *Harley* e.g. describes a gall stone in his possession.

*Harley: Op. Cit. p. 528*
dried gall stones and found that they floated in water should have concluded that the specific gravity of gall stones was less than that of water, is natural enough; but that practical men of this century, engaged in actual clinical work, should recommend as a method for the detection of gall stones, the dilution of the stools with water in order that the gall stones may float upon the surface, seems hard to believe.

Not many days ago, a practitioner described to me a case in which he had abandoned his diagnosis of gall stones on no reason other than that, after the acute symptoms had subsided, the stools had been well diluted with water in four subsequent days, and no stones had floated to the surface.

Cox (p. 94) says: "They" (i.e. gall stones) "are in the most part specifically lighter than water and therefore come to the top when they are put into it; but there are some few which will immediately sink to the bottom."

Cox also says of the "single almost pure cholesterol gall stone that it "floats..."
Among comparative recent writers, the floating theory is no doubt mainly attributable to Sir Thomas Watson. He it was, in this country at any rate, who recommended this method of detecting gall stones. True, I acknowledged that he had only once succeeded. The wonder is, that he did once succeed!

Frenchi knew that pork gall stones were heavier than water; so did Munchion. Brintton, in his text book, puts the whole matter in a nutshell when he states that they are as a rule heavier than water, and sink in it, excepting when they have undergone denaturation.

Hunter took 30 dried gall stones promiscuously from his collection and put them into a vase of distilled water: about one half floated and the other half sank. Again, he took 7 freshly formed stones (i.e. stones formed within 48 hours) and put them into the same vesse, with the result that 6 sank and only one—a small one about the size of pea—while, and with a smooth, easy

*Joseph Coats, M.D. "Manual of Pathology" II Ed.
++Brinton: "Theory and Practice of Medicine" 7th Ed.
Vellum shale, like every other fossilized plant that floats in water, has its cells (p. 532) generally found on section to have a hollow centre, from their unsolidified substance while drying shrunk from the centre towards the hard external shell as occurs, e.g., in the corals. Harley considers that the specific gravity of the human liver ranges from 1.000 to 1.025. Hein states the average specific gravity of gallstones—when freshly at 1.027. Upward to Scheffzel, most gallstones exceed 1.027. There containing bile, being still more those with lime salts, are, the lows, much heavier—e.g., 1.580 in even 1966. On turning to Loudon and Stirling, we find that the specific gravity of human bile from the gall bladder ranges from 1.026 to 1.032, while that of bile from a fatty, varies from 1.020 to 1.011. Taking the average fresh gallstone as having a specific gravity of 1.027, it then becomes evident that, although probably rarely, gall stones may, and sometimes do float in the bile.

Structure: - The classification developed by Pancoast & Duprez, elaborated by Fereich and adopted by von Schmeggel is undoubtedly the best that exists. According to it all gall-stones come under one or other of the following categories:

1. Simple Homogeneous Stones.
2. Compound Nucleated Stones.

The simple homogeneous calculi are rare, and according to their fracture they are divided (by Fereich) into:

(a) Those having an earthy fracture, and consisting of earthy matter in a mixture of cholesterol and a compound of cholesteryl and lime.
(b) Those having a spongy, papyraceous fracture and consisting of bile, resin or cholesterol and water; and
(c) Those having a crystalline fracture, and the corpora in pure cholesterol.

Much commoner are the compound nucleated stones. In them as a rule, three distinct parts can, with fracture, be readily observed, viz. a nucleus, a shell, or middle zone, and a crust.

Nucleus: — The nucleus is usually block or brown. Generally it is "composed of the cholepygus and time component bound together by the nucleus, that is intermingled with it" (Schweppel). It may consist of fragments of intestinal tile. Sometimes it consists of tile fragment alone, e.g. in the specimen which Mr. Ord showed to the Pathological Society. (v. British Medical Journal, 1880 I. p. 71)

But, while tile fragment, alone or in combination, is the usual nucleus, thin and sometimes very remarkable substances sometimes take its place. Pousson e.g. found as a nucleus a little black lump, which, on microscopic examination proved to be red blood corpuscles. In another case I found a fragment of a drusen. Thudichum found, and figured (v. Plate in Precisique de ses leçons) nuclei consisting of casts of the tile passages.

Netzstein found a stone in the ductus choledochus of a woman, 68 years old, the nucleus of which was formed by a round worm.

* Pousson: "De la Bile et Morbihan" 1843.
‡ v. Fischen loc. cit.
Maxche found as a nucleus, a fragment of a needle, 1 centimetre in length.

While a piece of bone has been found by Lacartaud and J. Beigel, while describing the stones in the Göttingen collection which weighed four ounces, and which was developed in an absence of the time resulting from a percuting ulcer of the stomach, Freichs goes on to say (p. 503) "Fuchs and myself found a stone from forming the nucleus of this concretion."

As a rule there is but one nucleus, and that one is usually in the center. But in this case other nuclei there are exceptions, and oftentimes are the nuclei occasionally eccentric. But two, three, four and even five nuclei have been found within one gall stone. Furthermore Dufresne e.g. found four nuclei in a pyramidal shaped concretion, while in a round gall stone, Stellent found no less than five.

The "Middle Zone" (Schneck) "Body" (Kunichmann) or "Shell" (Freichs) is a very variable quantity. Often it compasses the greater part of the

* Lancette française 1835: 17th Sept.
+ Gaz. de Sante 1827: 25 April.
calculus; sometimes it is altogether absent. It usually presents at one and the same time an appearance of radiation and of concentric lamination, thus resembling to all intents and purposes the cross-section of the trunk of a tree. Just as the tree trunk from year to year increases its diameter by the addition of ring upon ring of new wood, so the gall stone, as it enlarges, increases in size by the deposition from day to day and week to week of layer upon layer of new matter. But while this analogy contains a segment of truth, the lamination and the radiation may be accounted for otherwise. An * Old* a the result of experiments, showed that Cholesterin deposited in Plaster or Gelatin is at first spherical, but gradually assumes a needle or quasi-crystalline form. Further, he showed that mixtures of Cholesterin and Bile Pigment yield in solution by its Acetic Acid form homogeneous spheres; that on cooling they form smaller crystalline spheres with separation of brilliant masses of pigment; that latter still keep resolved themselves into masses of needle-like crystals; and that finally,
after the lapse of a few days, these crystals arrange themselves in a mixed lamina and radiating form round the centre of each sphere. This laboratory experiment shows that, given the cholesterin and bile pigment, under favourable circumstances, a mixed lamina and radiating structure will result. In actual pathology, according to Ord, the cholesterin and bile pigment are deposited together: the bile pigment being a colloid of high molecule at first prevents the conjunct deposit from assuming a crystalline form, and the whole mass takes on a spheroidal or fuchol divided form. But, the colloidal pigment has a tendency to become crystalline. A gradual separation takes place, and ultimately these may be seen under the microscope radiating masses of perfectly colourless cholesterin with packed pigment between.

Gall stones, the radiate is most marked in them. The lamination, most of them show well, a few show neither. In colour, the middle zone is usually yellowish or brownish, and its consistence is as a rule less than that of the outermost layer or crust.
Crust: The crust is nearly always present, and it is, as a rule, easily distinguished. While the crusts of different gall stones may vary very greatly in thickness, the thickness of different parts of the crust of any one gall stone is usually more or less constant. No doubt exceptions are occasionally met with, but they are rare.

Structurally the crust is nearly always laminated, and it consists either of:

1. Pure Cholesterol; in which case it is white and with a greasy luster; or
2. Bile pigment + lime compound; in which case it is characterized by its hardness, its thinness, its smoothness, and its greenish black colour; or lastly, (3) of Carbohydrate + lime, in which case it may be either white or brown, and may be smooth, warty, or even effused.

At this point, one may take the opportunity of alluding to the frequency with which masses of compressed bile are mistaken for gall stones. With the exception of W. George Harley, no writer with whom I am familiar, pays particular attention to this distinction; but Harley, in his works on gall stones, gives such good
I have noted I shall not put on the part of others. At page 325 e.g. I write: "The two kinds of solid substances which I designate as impregnated tile and urinary calcini, bear a resemblance to each other whatever, either as Chemical composition, physical properties, or geological origin; except in so far as they are the products of the human seer."

Again, at page 326 I express: "The gall stone may be in King a green egg or small as to invisible to the naked eye. Notwithstanding which it invariably possesses a definite composition if not also a definite structure. Whereas concretions of impregnated tile are never large, and, no matter what their size, shape, or position in the urinary passages are heterogeneously structureless aggregates of ordinary urinary materials." Again, While the outermost surface of gall etre may be rough, mamilated, or even spiculated like a hedgehog, or so smooth and polished as the surface of tile itself, it were present the rough, irregular, jagged, indescribable formation of surface invariably presented by mere impregnated tile. Every gall stone in a describable form. Please to impregnated tile frequently battle...
Chemistry: To the Chemistry of Gall stones I shall only make a passing reference. It has been very fully investigated by Mendeleev, Hersey, and a host of chemists, and I need only draw attention to the two points which may interest themselves later on. 

Mendeleev, as the result of analysis found that Gall stones were composed of the following ingredients: 03.

- Cholesterol
- Cholesterol (Cholesterol - from Biliary Pois, their derivative salts, fully ailed and their salts.

From 12 air-dried gall stones taken promiscuously from the collection, and of an average weight of 31 gm. each, I have performed 3 analyses. The following results:

- Water 4.2%
- Solids 95.8%

Solids:

- Cholesterol: 98.25%
- Pigment Mucus: .50%
- Inorganic Salts: 1.25%

It may be true regarding these various constituents:

Cholesterol which is found so abundantly in gall stones is found also in normal...
Bile, in blood, and in urine, under the microscope its appearance is very characteristic, occurring, as it does, in transparent rhombic plates, with, as a rule, a small piece cut out of the corner. Its formula is \( \text{C}_{26} \text{H}_{44} \text{O}(\text{H}_2\text{O}) \); it is thus a monatomic alcohol. It is insoluble in water; soluble in 75% alcohol, in ether, and in chloroform. In the bile it is kept in solution by the bile salts, i.e., by the alkaline salts of the bilirubin acids. Cholestery is readily obtained from a white gall stone by pounding it, extracting with 75% alcohol, and then allowing the alcohol to evaporate. The ordinary tests are: (1) Sulphonic acid (5 vol. to 1 vol. H_2O) = red color; and (2) Ac. Sulphonic and Indigo = blue color.

**Bile Pigment:** The yellowish brown color of fresh human bile is due to the presence of bilirubin. This pigment is perhaps united with an Alkaloid. It crystallizes in transparent red rhombic prisms and its formula is \( \text{C}_{32} \text{H}_{36} \text{N}_6 \text{O}_6 \). In water, it is soluble in chloroform and is readily separated from Biliverdin, which is insol. Chloroform. It is readily obtained by pounding up a reddish yellow stone, dissolving the fine grains with HCl, extracting the pigment with chloroform, and
When bile is
kept long in the gall bladder, a dark brown, the Biliverdin turns green; the C_{32}H_{36}N_{4}O_{6} becomes C_{32}H_{36}N_{4}O_{8}.

The red becomes green; the Biliverdin becomes Biliverdin. This Biliverdin is est. Alcohol; only partially est. Ether,
and is est. Chloroform.

There two are the principal bile pigments. That there are others, and what these other are, may be seen by testing for the ordinary test for bile pigment.

The addition of Nitric Acid containing some Nitric Acid gives a blue color; green, blue, violet, red, yellow — due to
the excess, formation of Biliverdin Biliverdin, Biliverdin, Biliverdin, Biliverdin III.

The fact that one
or other, or several of these pigments, may be present in gallstones, simply accounts for the variety of color that
is met with.

Biliary-Steids: Le version bile, Glycocholic and Taurocholic Steids are united with
Soda, and to a less extent with Potash, to
form Glycochelate and Taurochelate of
Soda - a Nashes. Most gallstones
contain small quantities of these acids in
combination with an alkali.
Fatty Stools. The present in gall stones are usually in combination with lime. Kerdtm says that some stones contain more of "magnesia of lime". One specimen examined by him contained

68% Magnesia of lime
28% Cholesterol
3% "Cholephosphin and lime Compound"

Of the inorganic substances found in gall stones, lime is by far the most important. Iron, Manganese, Copper, Mercury, Zine, and many other substances have been found: but they are rarer. Lime - sometimes the Phosphate or Sulphate - more commonly the Carbonate, is frequently present. The lime, as a rule, forms a matrix about and they are supposed to be derived in large measure from the minerals of the gall bladder.

Having now discussed the physical character, and having very briefly alluded to the Chemistry of Gall stones, the question naturally suggests itself: How do Gall stones originate?

So long as the bile remains normal in composition, and so long as its secretion and flow is uninterrupted, it is self-evident that gall stones are a physical impossibility. But, as soon
As the bile, from what cause ever, is prevented from passing the "even flow" of its way, and as even as the balance or power between its various ingredients becomes interfered with, so even does the formation of a gallstone become a possibility. In that, Stagnation, Concentration and De- 
concentration are the necessary preliminaries to gall-stone formation. But why 
are they not even occur? At glance at the Courtney of the Liver and Gall Bladder will explain us that even in health, the Gall Bladder affords 
a temporary resting place for the bile. Many causes may operate to stopping 
the flow of bile in the Gall Bladder. In virtue of the fact that during stopping 
the gall bladder is not stimulated to con- 
tract, a long interval between meals causes 
the accumulation and stagnation of bile. 
Thus, even though meals are eaten with the 
 utmost regularity and with sufficient fre- 
quency throughout the day, there remains the 
fact that during the night there is inevitably 
a long interval. A very interesting research.

* "On the Composition, Flow, and Physiological Action 
of the Bile in Man." By W. Hed Peter. M. John M. Belfone. 
Laboratory Reports - R.C.P.S. Edin. 1841.
conducted in the Royal Infirmary and in the Laboratory of the College of Physicians, Edinburgh, by W. Neil Ritchie and McBain, shows that the flow of bile is irregulur, being greatest about midday and least in the early morning: further, that although the flow is least, the amount of solids produced is greatest (not relatively but actually) during the night. This increase, they find, is due to an augmented production of organic constituents; the soluble inorganic salts remaining fairly constant. In itself, this secretion and concentration, stagnation of bile, concentration bile during the night is an important factor in forming gall-stone formation. Even physiologically, therefore, there are many opportunities for bile to stagnate.

Pathologically, the extreme flexion and downward displacement of the gall bladder which occurs in ladies who resort to night sitting, insist, while not hindering the entrance of bile, yet form an obstacle to its exit. The diminution of elasticity and of contractile power which it is only natural to suppose occurs in old age, must also tend towards allowing the bile to stagnate. Obstruction of the duct - complete or partial - from cancer, carcinoma, or any cause whatsoever, will likewise form stagnation.
Ectasia results in Cacembhah, and Ectasy and Cacembhah, here as elsewhere, require very little inducement to bring about Decomposition. The process is analogous to that which occurs in the Urinary Bladder, and every Surgeon is familiar with the readiness with which urine undergoes decomposition in the case of a sick man. Thus, on account of an enlarged prostate, a person suffering from chronic iritis, is unable completely to empty his bladder. True, the gall-bladder does not run the same risk of being explored with a dirty catheter, but even then its catheter has been used, the urine is such a case readily becomes altered in composition. And so it is with the bile.

The Attrition in the Chemical Constitution of the Bile may be of several kinds: e.g. The natural cholrath, remaining normal in amount, the Cholesterol or Bile Pigment may be in excess. Again, the latter substances being present in normal quantity, there may be a diminution and consequent insufficiency of the Eclampsia. In either case the result is the same. Yet again, the Acidity of the bile may become excessive, so, e.g., in long illness, or when, from whatever cause the bile tends to stagnate in the gall bladder, and
still yet again, an excess of time may occur, and, having occurred, may cause a separation of the pigment. That the presence of time is sometimes an important factor was known to Verheugen, who in 1832 said that "every excess of time in the bile enters into an insoluble combination with the coloring matter of the same, the time partly taking the place of the color and thus diminishing the solubility power of the color of the color."

According to Reichen (in natural type) the bile is supplied in great part by the mucous membrane of the gall bladder. Yet, the mucous membrane does in certain cases produce large quantities of bile which will be acknowledged by anyone who has seen the gall bladder embalmed "c. e. 2446" in the Museum of the Royal College of Surgeons in Edinburgh.

Granting then that stagnation and altered composition of bile are the essentials of gall stone formation, do we know anything further regarding their etiology? Heredity: Shirley says (p. 574) that gall stones are very frequently hereditary, but with the exception of relating how it
1879. He had under treatment at one and the same time in gallstones, a lad of 18, his mother, aged 42, and her mother — c.e. three generations. It brings forward very little evidence in support of his conception. Cases have been known in which son, father and grandfather have all suffered from passage of the Calculus; but one is hardly warranted in considering that there is anything hereditary about a Broken Collar Bone! All these, it is true, may have inherited a stooping disposition, and, possibly, a certain brittleness of bone: in like manner a woman suffering from gallstones may have inherited a sluggish disposition and a desire to pull in the reins. Except, then, in very such a vast amount of cases, one can not attribute gallstones to heredity. In one case in which heredity can be traced there are cases innumerable in which no hereditary history can be found. Heredity" gallstones, in short, are pathological curiosities.

Diathesis: — That urinary and waxy calculi are sometimes present in one and the same body at one and the same time, has long been known. At page 79, e.g., of Cott's work, we read: — "That the

"Tibiary, urinary, and gouty stones have some connection with each other apparently by experience. That the gout and stones in the urinary passages are often found in the same patient is well known. Nor is it a new thing to observe the gout joined with tibiary stones. And that tibiary and urinary stones happen frequently together, is a thing mentioned by many authors, and known to every practitioner who is well acquainted with it."

"There are instances to show a constant number of both being found in the same bodies by dissection. Huntsman tells us, that in the body of Frederic III., Elector of Saxony, there were a large stone in the gall bladder, a large one in the urine bladder, and one in the kidney. Georgius Franch de Hantsen found twenty-three pretty large stones in the urine bladder, and twenty-two of various sizes in the gall bladder. Sandifor likewise gives an example of stones found in the bladder and also in the kidney of an old man who had been long troubled with the gout."

Chr. H. Wilckens also quotes Hantsen's

Georgius Franch de Hantsen: Satyr. Med. p. 382

Quoted by Vandechum

Chr. H. Wilckens: "De calentis biblicis" 1777
case. This occurrence of gall stones with urinary calculi is remarked on by Morgagni, Trout, Budd, and Trouseau; and Munchausen says regarding it:—"The frequent occurrence of the lithic and dyspeptic with gall stones is a clinical fact which I have had many opportunities of verifying." But then arises the question—Is this association of urinary and biliary calculi really a frequent occurrence? The answer is—No. It is an association which, though it does occur, is so striking to the mind of the pathologist that it is almost certain to be recorded, and yet, except in the reported cases, that we find this case of Munchausen's being duty is frequent treatment. Further, even though these different varieties of calculi did more frequently occur in one and the same body, their association would not necessarily imply a common cause. The mere fact that the physicians at Karlsruhe

Trout: -
Budd: "Disorders of the Liver," 1857
Munchausen: "Functional Arrangements of the Liver," 1874 (6th ed.)
and Vickyn attribute gallstones to gout in a
so curious remarkable a way as gout sup-
picious in their minds to account for all the
ills that flesh is heir to. If due to
a general diathesis, it seems strange that
women, who seldom suffer from gout should
to frequently suffer from gallstones. Until
much more evidence is forthcoming, the true
light in which to regard the matter at
present is, that the occasional occurrence
of kelley and urinary calculi is merely
a coincidence, and that the facts are not
sufficient to warrant the calcium wreckless
theory.

Some writers attribute
some worms a power of inducing
gall stone formation. Merchens, e.g.,
has shown that in the case of
knots and worms that the extraction of
gallstones from the gall bladder, as well
as their formation, may be traced to
worms eg.,

D. Budd has also
shown that mental anxiety is able
to exert influence in the production of
gall stones. This influence, in
so far as it exists, is of interest from
the fact that Cholecystin is a constituent of

* v. British Medical Journal, 1874 I. 367
† Budd: "Diuretics for the Liver" 3rd Ed. p. 369, quoted by

Merchens.
Age: — Age is undoubtedly an important factor. While it is true that gall stones have been met with at all ages, it is more the less true that they usually occur in advanced life. On tabulating the first forty cases (from various sources) of which I have notes, I find that the ages range from 24 to 94 and that the average age is 51.7 years. The table given by Doan and Fischel in 1868 (and again quoted by von Schmoller) is as follows:

<table>
<thead>
<tr>
<th></th>
<th>Women</th>
<th>Men</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under 20</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>From 20 to 30</td>
<td>25</td>
<td>3</td>
<td>28</td>
</tr>
<tr>
<td>&quot; 30 to 40</td>
<td>40</td>
<td>13</td>
<td>53</td>
</tr>
<tr>
<td>&quot; 40 to 50</td>
<td>28</td>
<td>30</td>
<td>58</td>
</tr>
<tr>
<td>&quot; 50 to 60</td>
<td>32</td>
<td>19</td>
<td>51</td>
</tr>
<tr>
<td>&quot; 60 to 70</td>
<td>12</td>
<td>18</td>
<td>30</td>
</tr>
<tr>
<td>&quot; 70 to 80</td>
<td>4</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>142</td>
<td>88</td>
<td>230</td>
</tr>
</tbody>
</table>

These 230 cases were diagnosed by himself.

Herley, again, (1874) says that of 10,000 cases, 750 were over 40 years of age.

200 — between 30 and 40

40 — 20 — 30

10 — under 20.
...as illustrating the fact that gall stones are occasionally met with in youth, refers to the cases of two young women between the ages of 16 and 17 whom he had been treating in the St. Peter's Ward of the Hotel Dieu. "Two years ago," he states further, "I observed
"tubercular calculi" in a girl of 10 years of age. Although the occurrence of gall stones in the present is not an impossibility, I have met with no recorded case. Fregge tells us that "Carnivorous and Omnivorous rendered their presence in children

The above tables are, themselves, quite sufficient to demonstrate what we observe clinically, viz. that it is in the later years of life that gall stones are most frequently met with. During early life the whole organism is in full play. Good digestion, good appetite, plenty of sleep, an exercise is taken, and the conditions which favor gall stone formation are absent.

Sex: - Even the early writers were struck with the fact that gall stones occur with very much greater frequency in females than in males. The relative frequency is usually stated as 3 to 2. Thus, of

620 cases collected by Henne, 377 or 61\% were females; while of the 230 cases observed by Durand Fiedel, 142 or 62\% were females. Of the 270 bodies in which Fiedel found gallstones in post-mortem examination made in the Dresden City Hospital from 1853 to 1869 inclusive, only 98 were male while 172 were female. Henley considers that 3:2 is too small a ratio. He puts it at 2:1, and the first forty cases of which I have seen, are nearly all females; rather to Henley's figures than to those of the previous writers — for 32 out of 40 were females! From a limited number of cases, however, one must not draw any wide inference. Still, 2:1 I should consider to be a tolerably accurate statement of the relative frequency of gall stones in females and in males.

Nothing in the sexual function appears to explain this remarkable frequency; it is due, I believe, to the fact in the sedentary habits of women, complicated in certain cases with the evil effects — above alluded to — of right lying.

Locality: The attention of statistic lovers in general has long been turned upon urinary calculi that make way to the bladder, by denoting in lighter shading.
The frequency or rarity of the occurrence of urinary calculi in any particular region may be seen at a glance. The time will probably come when our information regarding gallstones will be equally exact. Meanwhile, we have only very general statements to go by – e.g. that they are very rare in Holland and Finland, rare in Italy, frequent in Hanover, Sardinia, Hungary, and England, and so frequent in Vienna that they are said to occur once in every 10 bodies.

**Climate and Season:** The influence of climate and season is likewise, still subject to the alleged rarity or gallstones in the United States. It is complicated by Saint-Vel's belief that gallstones are uncommon in the United States, particularly in temperate climates, and common in other regions, among others.

If then the climate has no pronounced influence, it will readily be allowed that the season of the year has still less. The fact being that any theories based upon either climate or season can be readily explained under other grounds.

**Social Position:** While heredity

Saint-Vel: "Traité des Maladies des regions inter-rénales" Paris 1868
Dietless, Climate and Season, may all be mere a less mythical in cause of gall stones, there is no denying that, if these
conditions occur with very much greater frequency in persons of good social status than among the less favoured classes.
It is said, it is said, only affects the will to do, and the highly educated: the skilled classes, in like manner, appear to have more
than their just share of gall-stones. Every practitioner knows that they are much commoner in
private than in hospital practice. The
reason is not far to seek: from people can not afford the adoption of sedentary habits a of a too liberal diet...

Sedentary Habits! That sedentary habits
should be a fruitful source of gall-stones is
hardly to be wondered at. Rest, which
is in so many cases the most valuable
therapeutic agent known to us, may be
overdone, and may become a source of con-
siderable danger. It is not the active,
energetic individual, who is ever on the
move and never at rest that becomes the
subject of gall stones. No, it is rather the
delicate lady, who loves to recline on the
sofa, the student who sits long over his
books, or the invalid man who considers it
too much trouble to make exercise. It suffers in that way. Sedentary habits, in a word, promote stagnation of bile, and stagnation is the first step towards gallstone formation.

**Diet:** The question of diet is one upon which many views are held. That protracted fasting is conducive to stagnation and concentration of bile has already been pointed out. But, perhaps, fasting is not a cure of diet. At any rate it is only a sin of omission. What is the error in diet? The position error - which leads towards the formation of gallstones? Bristow says that the influence of diet is unknown.

Other writers have various articles about the habit of drinking porter - - - may also frequently lead to the formation of gallstones. Marchion (Op. cit. p. 76) says that calculi calcii are "particularly common in those who have lived too well and who are the subjects of lithiasis."

W. George Harley is due the credit of having very fully discussed the healing of diet upon gall-stone formation. In his opinion, Diet is the important factor in the etiology. At page 577 c. g. The says - If we are planning the frequency of gall-stones in old
age—"While in early life, when the vital processes are in greatest activity, the hydrocarbons of the food—the elements out of which gallstones are formed—are rapidly and completely consumed; in later life, when the vital processes are less active, only a portion of them is used up by the frame, and the excess, which is neither eliminated from nor consumed by the body, is generally deposited and stored up in and around its organs and tissues as fat. While in the preschool period, a portion of the fat forming principles of the food is transformed by the liver into the crystalline fat called cholesterol and is deposited in an insidious condition from the bile in the shape of gallstones." Harley then goes on to relate how in so many cases he had found that the subjects of gallstones had quite an inordinate liking for bacon! He goes on further to attribute the large gallstones met with in Russia to the use of the bleedingous food fat and such, together with a lack of timely medical treatment. In discussing the alleged frequency of gallstones in cold climates and during cold seasons, he says p. 579: "It is within the cold, not the depth of the Northern latitudes which directly interfere with the bile-pancreatic function, but the kind
of... which the damp cold necessitates.

In the other lands, we have S. F. Rosenburg reading a paper to the Berlin Medical Society in which he attributes the comparative rarity of gallstones in Italy to the constant use of olive oil among the people.

Foreign Bodies: — That the presence of foreign bodies within the bile-duct occasionally causes gallstones is evident from an examination of the biles in a sufficiently large number of specimens.

Anatomical Changes: — More important is the effect of various anatomical changes.

Obstruction to the flow of bile caused by narrowing of the lumen of the duct by cataract, by stricture — simple or malignant, by tumour of the duct, by tumour pressing on the duct, or by any cause whatsoever, must obviously cause stagnation. And like men, stagnation is caused by anything which interferes with the excretory powers of the gall-bladder — e.g., Cataract, inflammation, degeneration or tumour of the gall-bladder; or by interference or tumour in its neighbourhood.

Once started, it is quite easy to understand how a persistence of the conditions which led to the origin of gallstones should also lead to their
growth. But these conditions may alter: the gall-stones may not only stop growing, but they may actually undergo a DESTRUCTION process. Where there are many gall-stones within a gall-bladder one would expect that they would rub against one another (like pebbles on the sea beach) and so reduce one another in size; but that this is rarely the case may be seen from a careful inspection of a sufficiently large number of gall-stones. The facts are not as one might imagine, due to ATTENTION: were they so, then each face would show concentric rings, whereas in a faceted gall-stone the layers are parallel with the surfaces of the facet. Wysos' theory regarding the tempestual action of certain mineral waters thus water falls to the ground, - the theory viz. that these water causes increased peristalsis of the gall-bladder, that irritation necessarily resulted, and that the gall-stones just became reduced in size (by attrition) and finally were expelled.

But, while attrition is rare on sea beaches of Erziger on many specimen this erosion does not attack entire layers but proceeds

* v. Schneppel Qn. cit.
in a manner peculiarly its own. Schneppel compares it to the Clefts of teeth, and he carries the analogy so far as to attribute, — and I believe, rightly to attribute — the growth of gall stones to Bacteria. "Bacteria in cals (Op. cit. p. 705) live principally in the mucus and other organic materials which are enclosed within the cavities, and by covering these within a certain area, they render the Cholesterol-layers porous and prepare them for mechanical crumbling." In this connection it may be mentioned that Patey and Belfour (Op. cit.) dispute the doctrine that Bile is a Scurfyt.

Granting the assertion, it is natural enough that Splitting and Crumbling of Gall Stones should sometimes take place. Pearce Gould relates a case in which a man, aged 35, had symptoms of gall stones: an abscess formed in the abdominal wall: it was opened, and there escaped pus and gall stones that is Tube. "The Calculi, 140 in number, weighed 21 lbs. Then dry, most of them were treated in their removal: they are all small" he says, "and their chief interest. I believe, lies in the evidence they afford of..."
Spontaneous fracture like that to which Dr. C. has drawn attention in urinary calculi. The large ones all show a smooth, grey, glossy surface. The inner surface varying, and dotted with a darker brown colour as if a spherical or ovoid calculus had undergone a radiating fracture into several more or less pyramidal pieces. The case is reported by Jameson — a case of obstructive jaundice from gall stone in which spontaneous fracture and recovery took place. I found large two pieces of what had been a large gallstone of efficient calculus — I fancy the stone must have been crumpled and forced spontaneously from the fovea of the intestinal concretion.

These destructive processes are important from a therapeutic standpoint.

Where do Gall stones originate? Gall stones may take their origin and may grow in any part of the biliary passages — whereas in fact, there is bile. The gall bladder is no doubt the commonest structure in gall stones, but there is abundant evidence to prove that they may, and sometimes do, occur at all points from the minutest

particles of the bile ducts down to the point at which the ducts communicte chieftly with
open into the duodenum.
It appears then, that the best method to
adapt is to divide some cases ducts to gall
stones as they occur in various portions within
the biliary system, and, following the course
of the bile itself, to discuss 1st Gall stones in
the intrahepatic duct and their radicles;
2nd Gall stones in the Hepatic Duct; 3rd Gall
stones in the Gall Bladder; 4th Gall stones in
the Cystic Duct; 5th Gall stones in the Common
Bile Duct.

Gall stones in the
situation, will be treated thereonafter.
First then, Gall stones in the Hepatic Duct
and their Radicles, Under normal cir-
dition there is no the same opportunity
for stagnation and obstruction of bile in the intra-
hepatic or other bile ducts as in the gall bladder.
Whenever, where the Hepatic duct or the
Common Duct is obstructed, and the intra-
hepatic ducts are prevented from freely dis-
charging their bile, it only do we find in-
espanded bile duct occasionally in meet with
true biliary cirrhosis within these intrahepatic
ducts.

Richter, of Göttingen, in his memoirs
published on the subject (1793) described a case
in which the whole liver was full of white
emulsion, which floated in water, and which
varied in size from that of a pea to that of a cherry. Choléster "met with a case where the liver contained so many calculi that it could not be cut with a scalpel." Dr. St. John says the length of years that "biliary calculi and calculi, consisting of colouring matter, are formed mainly in the biliary passages." As a rule the calculi are small: sometimes they are actual casts of the duct, and in these cases they often exhibit coiled-like appearance. They are nearly always dark in colour, and the bile pigment holds much more largely in their composition than the Cholésterin.

When certain of the ducts become completely blockaded, the bile is apt to accumulate above the points of obstruction, and in that way small cysts are formed in the liver substance. More frequently there is seen a uniform thickening of certain of the ducts. Occasionally the presence of gall-stones excites irritation, which irritation may either bring about a proliferating of connective tissue and a consequent thickening of the walls of the ducts, or may go on to inflammation and a destructive process resulting in cirrhosis.

So acute is this destructive process at times that abscesses form; this, in fact, being one of the most important causes of hepatic abscess in this country. Of many cases recorded in the British Medical Journal 1878 I. 91, is an example of this. Yet again, the inflammation may extend to the branches of the Portal Vein and a portal embolism may result. Lastly, a gall stone, while still in the duct, when beingjected, may work out, may become firmly impacted.

Gall stones in the Hepatic Duct:--So rare are gall stones in this situation that it is sufficient merely to note that they are not unknown. If gall stone is hardly likely to originate in the hepatic duct, and a gall stone which has originated in the bile hepatic duct and which has travelled downwards, is hardly likely to be intercepted in the hepatic duct. It is known to be easier than that of the intrahepatic ducts; hence any body which can travel along the several intrahepatic ducts ought much more readily to travel along the wide hepatic duct. Still, from various pathological conditions, e.g., a stricture, a dilatation or a stricture, the gall stones may not only originate but may become intercepted and impacted in the hepatic duct.
Gall Stones in the Gall Bladder: — The gall bladder is by far the most frequent site for gall stones. That this is so is not surprising. Anatomical and physiological considerations alike point to the gall bladder as the most likely place for the formation of biliary calculi. Thus, once the angina, the bile has an opportunity of stagnating, and there are then anywhere here a chance of undergoing that alteration in character which is a necessary preliminary to gall stone formation. But it is not only that the gall bladder affords a temporary resting place for the bile. The examination of the interior of the gall bladder reveals the fact that the mucous membrane has a honeycomb appearance. Ila Cima says it is "cheeked up, its inner surface into very numerous small ridges, which, uniting together into meshes, leave between them depressions of different sizes and of various physical forms." When one considers the facility with which these crypts must afford for stagnation of gall stones, and when one remembers that at the bottom of these crypts there are often and smaller depressions, which, in their turn, lead to still further recesses, the wonder is, not that gall stones should occur, but that so
The occurrence of calculi embedded in the mucous membrane of the gall bladder is no doubt due to their being occluded within one of these recesses.

The effect which gall stones in the gall bladder exert upon the gall bladder, will be considered later.

**Gall stones in the Cystic Duct**

The cystic duct is a very common seat for the deposition of gall stones, but a very uncommon one for their formation. In virtue of the fact that bile passes through the cystic duct on its way to the gall bladder, one might have considered gall stones in the cystic duct before discussing gall stones in the gall bladder. But, considering that the bile after being in the gall bladder again passes through the cystic duct and that such gall stones can be found in the cystic duct, it is almost invariably one not from the hepatic duct but from the gall bladder. The idea which I have adopted seems the more realistic one. That it is possible for a small gall stone to travel down the hepatic duct and through the cystic duct to the gall bladder, I admit; but I admit further, that such a gall stone might be determined by one of the folds of mucous membrane projecting into the cystic duct, and that, while there it might grow in size, or might...
set up a sufficient degree of irritability and inflammation to cause swelling of the meso-membrane and impaction of the stone. But such a course must be very rare, for a stone sufficiently small to pass down the duodenum and into the cystic duct, would, in 99 cases out of 100 pass right on into the gall-bladder, whence back out of the cystic duct when the gall-bladder began to contract and to force out its bile.

In the gall-bladder a stone may be of any size, and of whatever size, its only natural mode of escape is through the cystic duct. What then were likely to keep a gall-stone, or its very small gall-bladder, should become impacted in the cystic duct? Give a stone of a certain size and a resilient duct of a smaller size, it is a mechanical impossibility for the stone to pass through that duct. But the problem is not so much a mathematical one. There is nothing rigid about the human body. A fatal stone will pass through a region which a few years previously would hardly admit the examining finger of the acumen - and so it is with the gall-stone and the cystic duct. To large, large any hard and fast line is a start size...
Of gallstone may pass through the cystic duct, what egg will become impacted in it, and what egg will never become engaged, is an impossibility. The Naturalist, in tabulating his statements as to the various diameters which necessitate turning, perforation, Cæsarian section etc. is guided by the measurements of the fund and blindly rigidly by what he sees. The egg's part do not concern him. In the neck of the gall bladder and in the duct, in thin looking duct egg part; hence an absolute limit can be given as to the size of gallstone which may pass out through the cystic duct.

While speaking of the diameter and the dilatability of the duct it may be mentioned that although the normal human is only 3 mm. Dr. Baillie has seen the duct in patients and the ducts of the child. Babcock (spelt Babcock) says that the ducts are frequently dilatable to admit of the passage of calculi as large as a raw egg; Eyglyn has reported a case in which the common duct would allow the finger to be introduced into it from the duodenum; and

Mr. Lawson said (as nearly as I recollect) who had exhibited a number of cases—one as large as a pigeon's egg—which had passed per rectum. He then operating the had seen the duct so dilated that I could almost pass my finger into the duodenum.

But granting that a certain degree of dilatation may occur, there are certain facts which render the impression of the gall-bladder in the neck of the gall bladder with the cystic duct not improbable. To begin with, the anatomical construction is so formed as quite to eclipse the curvature of the natural passages in a pertinent woman. "The neck," says Quain, in his anatomy, "is hollowed like a letter S, and then, becoming much contracted, and changing its general direction altogether, it bends downwards and backwards, i.e., the cystic duct", which is in its turn "runs backwards, downwards and to the left." A gall stone in this case very easily comes to follow. But the circulatory route is not all that it has to contend against for at the place where the neck of the gall bladder curves on itself, there are strong folds of its mucous and muscular coats.
jecting into the intestine. It is not therefore a matter for surprise that a gall stone should become trapped in its passage through the Cystic Duct.

Gall stones in the Ductus Communis Cholecreta:

It is highly improbable that gall stones should originate in the Common Duct, but it is more the less true that every gall stone, wherever formed, is attempting to make its way to the duodenum by the natural passages which pass through the Common bile Duct, and that in making this attempt it runs a very considerable chance of becoming impacted. Naturally, the extreme termination of the Common Duct, (like that of the urethra) is its narrowest point. The duodenum, therefore, is the very common seat for the impacted gall stone. Schneppel (1724) said:

"I believe that a gallstone of about one centimetre in diameter is the largest that can even pass the duodenum."

The effects of calculi in the Ductus Hepaticus and in the Hepatic Duct have been alluded to. It would be easy to show their effects in other situations.

In the Hepatic Duct a gall stone, if impacted & causing obstruction produces the same effect as a gall stone impacted in
The common duct, with this exception, viz. that there is no enlargement of the gall bladder.

In the Gall bladder, gall stones may be so quiescent and harmless as to cause no symptoms and to leave no pathological trace of their presence. They may, however, acting as foreign bodies, induce irritation and proliferation of connective tissue, in inflammation and ulceration. The former is more likely to occur where there is a single large and very rough stone, while the latter is more probable in the case of a rough stone in motion. Of in addition to irritation caused by the presence of stones in the gall bladder, gall stones are frequently passed through the hepatic duct and ductus communis cholecodochus, and, while passing, come in contact with and more frequent catheterism of the gall bladder, a hypertrophy results. The hypertrophied urinary bladder is familiar to everyone. The hypertrophied gall bladder, though not so well known, is probably far more common. In each case the cause of the hypertrophy of the gall bladder is the same viz: increased functional activity.

R.C.S. E.

Museum: There are 22 specimens of gall bladder. Of the 8 dried preparations it is impossible to say which were hypertrophied and which were not, but the
remaining 14 spirit preparations — without an exception — show evidences of hypertrophy. Numbers 1909 and 1910 (in the catalogue) are the best examples in the Antrim Museum at Dublin. The best specimen is No. 1910 (labelled "Ch. 52. c." and described as a gall bladder with a gall stone in the biliary cystic duct, and with "increased stringy and fasciculated muscular fibres." No. 1903 in the R.C.S. Museum is a good example of a gall bladder thickened and contracted in a calcarious cement.

This brings us to the question of the effect of gall stones in the biliary cystic duct. It seems from what I saw that there may be a certain amount of thickening and fibrosis in the gall bladder, a gall stone may lead to proliferation and to calcification. But a gall stone impacted in the cystic duct of those situations may cause certain renal effects which it is important to bear in mind. These effects vary, necessarily, according as the impacted stone does or does not cause complete obstruction to the flow of bile. If a stone in the cystic duct causes partial obstruction only, the gall bladder and the cystic duct may go on fulfilling their functions. In certain kidneys the difficulty which
it has to overcome, a slight degree of engorgement of the gall bladder may result, and beyond that, nothing. But, if the obstruction to complete the effect be very pronounced. To begin with, not a single drop of bile can pass into the gall bladder. The bile flows from the liver to the duodenum just as though there were no gall bladder. The patient becomes an elephant as far as his biliary passages are concerned! That is to say, it is, practically, no gall bladder. Like the elephant, too, his hepatic and common bile ducts tend to enlarge and to take up the reservoir function of the absent (n. r. in. f. chilen) gall bladder.

Meanwhile, what is the gall bladder doing? Bile can no longer enter it, and the bile which it contained can not escape. Does it remain in status quo? Of course! The bile, by degrees, becomes absorbed; the muscular membrane of the gall bladder goes on secreting mucus; the gall bladder becomes gradually larger and larger; the condition is fact, falsely known as " Physiological cystic dilatation." According to Prof. de Borch Wied, by returning fluids secreted from the gall bladder opened by Cholecystotomy are contained. Here the

*British Medical Journal, 1887 II p. 19
and secretion was a thin watery fluid of a faint diastatic power and containing its bile elements. In a matter of evidence, all degrees are met with, from a thin watery fluid to a thick curdy fluid, the pepsin being, possibly, the commonest extreme. The size attained by the gall bladder may be very great. Even when there has been no impaction or only a very temporary impaction of gallstones a certain degree of dilatation of the gall bladder may result. Five or six of the fourteen Effret Preparations in the R.C.S. Museum are markedly dilated. But in at least of these (viz. 920 2265) the dilatation was caused only by irritation of the cystic duct and accumulation of the secretions proper to the mucous membrane of the gall bladder, but to obstruction of the common duct and dilatation of the gall bladder by bile. And this leads to a consideration of the effects of gallstones impacted in the Common Duct. Here, as before, the gall bladder is likely to become distended — but with different contents. When the obstruction was in the cystic duct alone, bile flowed freely into the duodenum and the gall bladder became full of mucus; now that the common duct has become restricted, the bile can no longer flow on, and
The gall-bladder becomes distended with bile. As a result of the complete obstruction, the cystic duct becomes dilated, the cystic duct becomes dilated, the gall-bladder becomes dilated, the hepatic and even the intrahepatic ducts become dilated: and all with bile.

From Marchand’s (letter 37) quoting from Schenck, mention a case of Treffelmann, in which the cholecele duct was as large as a stomach and completely filled with calculi of different sizes.

And W. Bunder quotes from Van Swieten’s Commentaries the case of a boy whose gall bladder contained 8 lbs. of a thick sort of bile, consisting of a number of concentric stricks, each strick becoming thinner as it approached the surface. So that a very great degree of distension is possible. Absorption of bile also takes place and marked jaundice results.

Before describing any symptoms, it would be well here to note that jaundice is which gall stones may be found. Gall stones may take their origin, as we have seen, from one or other of two causes.


From their respective sources, they may travel each along its own course until the Common Duct is reached. From the Common Duct onwards, until they are voided near to the large and small intestines, they may be considered as ducts of the Liver, Bile Duct, Pancreas, and Duct of the Gall Bladder and Common Pancreatic Duct.

But at any point a deviation may occur anywhere in its passage through the body, a gallstone may excite inflammation and ulceration. Suppose, in the course of the Liver Duct to occur, a gallstone cannot stay very far. Entering the substance of the liver, it may excite further irritation and lead to abscess formation, or it may, through implication of the portal vein, lead to hepatic crises in the multiple abscesses.

Suppose ulceration and perforation to occur elsewhere, then the consequences will depend to a great extent upon the presence or absence of adhesions. Sometimes rupture takes place before adhesions have formed and in such cases the result is disastrous. The rupture may be due either to ulceration caused
If the presence of gall-stones, or to excess, is due to accumulated secretions acting upon weakened walls. Munchium refers to three cases in which perforation and death followed rupture respectively of the gall-bladder, the hepatic duct and the common bile duct.

McTavish, Freeland (CME Med. Off. Antigua, W. Indies) has recorded another case in which death occurred from rupture of the hepatic duct.

Two more cases are reported by in the 'Lancet' 1880, p 568, 569.

So much for perforation without adhesions. But in the majority of cases adhesion forms a firm bond to the organ. What then, do the gall bladder and bile ducts normally adhere? Look for a moment at the anatomical relations of the gall bladder. Its upper surface is attached to the liver by a sheath of tissue; its fundus makes the oblique parietes "Opposite the tip of the 10th Costal Cartilage" (Quain) it rests. Below on the commencement of the transverse colon and further back it is in contact with the duodenum and sometimes with the pyloric extremity of the stomach. Again, we read "It is not very rare to find the gall bladder applied by its whole length to the right kidney." Further, the relations of the hepato

Munchium: "Clinical Lectures on Diseases of the Liver" p 506

Lancet 1882 I, 285

Cassell's "Description of the Anatomy of the Ear and Throat of Man," and edited by W. Harvie Nicolls, M.D. Lond. 1861
Perforation

Without Adhesions
- Shock
- Peritonitis
- Pyrexia

With Adhesions
- To Abdominal Wall
- To a Viscera

- Stomach
- Duodenum
- Colon
- Vagina
- Urinary Tractage

Fistulas into the Stomach are not common. Vomited gall stones have in some cases entered into the stomach; in other cases, they have been regurgitated from the duodenum, through the pylorus. Mr. Symonds Bunce* recorded a case of a lady, aged 58, who vomited two gall stones; next day passed several fresh stools; and next day died. Munchausen collected from various sources twelve cases.

of gall stones being vomited. In one of these it was ascertained that mortem, that the gall stone had escaped by ulceration into the duodenum, but in most of them it was probable that there had been a direct communication between the gall bladder and the stomach. As you can, at least, this condition was found to exist post mortem.

Fistulae into the duodenum are by no means rare; in fact they are more frequent than fistulae into any other viscera. From different sources, Philadelphia collected notes of 28 cases in which this occurred. Dr. Crichton Browne reported a case in which it was found that mortem, that "a ragged opening formed a communication between the ileoceleal valve and the first division of the duodenum."

Dr. Bryant had a similar case, and yet another occurred to Dr. Macleayan.

It is not不可思议 that many persons go through life utterly unconscious of the fact that they have a fistula of this kind, because the formation of such a fistula may occur so gradually.

++ 1878. II 859.
and invariably to excite no suspicion, and, once established, there are no symptoms to indicate its presence, unless perchance a gallstone, having passed into the duodenum, become impacted in the bowel and cause intestinal obstruction. This will be referred to later on.

 Fistulas into the colon are much less common. Mitchell e.g. (Phil. Trans. 876) was only able to find records of 7 cases, and in 6 of the 7 there was cancer of the gall bladder. Cases occasionally occur in which more than one fistula exists; in which, e.g. there may be a fistula into the stomach and a second into the colon in one and the same patient. Mitchell refers to a specimen in the Museum of St. Bartholomew's Hospital (Ser. E.C. no. 84) in which "there were two fistulae, one into the small intestine, the other into the colon; the colon received a case of the stone which communicated with the duodenum, the colon, and the external surface". Yet another case is recorded by Breton (Phil. Trans. Vol. IX p. 285) in which the gall bladder communicated with the duodenum, the colon, and the portal vein.

The occasional relationship of the gall bladder to the right kidney implies

In two cases — in each of which, apparently, the urinary calculi had passed from the gall bladder into the pelvis of the right kidney, and in each of which an operation had to be performed to remove one of the calculi from the bladder. Hering* says that "Fæke has recorded the history of a female who voided nine small and four large yellow stones with the urine, without having exhibited any symptoms of a remarkable nature except pains in the urinary bladder." and Guterbock† describes a case in which a woman, aged 50, expelled from her symptoms seven large urinary calculi. Lithotomy was performed and these were removed. The calculi weighed in all 400 grms., and consisting of chlorella with small quantities of cholesterin and small quantities of urine, phosphates of lime, and bile pigment. These calculi, according to Guterbock, were too large to have been voluntarily introduced.

Fistula into the Vagina is such an extraordinary occurrence that Hænin's case, quoted by Tanscman Buprezen and again by

Münchow (p. 574) is worthy of being alluded to. He attributes two forms of the gall bladder and the female uterus, and during labour, the gall bladder burst into the uterus.

Fistula into the Portal vein: With the exception of Bristow, no cases are recorded. Of the historic and 19th century cases in which Reckles, Coulub, is said to have found three gall stones in the portal vein by operating, he calls in question to Vindelikum, Münchow could not collect two cases. Fistula into the Portal vein is therefore by no means a common occurrence.

Fistulae into the pleura are still rarer, and it is only necessary to mention that they are possible.

Common would it seem fistula into any of the visera, the Fistulous openings in the abdominal walls. The fusions of the gall bladder being in immediate relation to the abdominal peritoneum, and the peritoneum being so more moveable and possibly to indirectly less so than any of the neighboring visera, adhesion very readily form between the fusions and the abdominal wall. Heberden tells of a patient who for years had a discharging
tenuous near the umbilicus. It lasted. The patient had an attack of severe pain and vomiting, "et post pancreas dies, erect, calculus pellis, tres pollices longius, tota dextra ambulator, quaeque pendebat quam ccxl." * Munchausen collected no fewer than 70 cases—nearly all of which occurred "in females of middle or advanced age." To this list many cases might be added. I have after e.g. from the 7—alI taken from the "Gazetk" of the year 1868 to 1880 inclusive. Illustrating the unexpected places at which the stones may appear, I may mention Dr. Wheelwright's case (v. Brit. Med. Journ. 1882, II. 426) in which the gall-stones were discharged through an abscess in the right groin, and a case published in the Gazette des Hôpitaux (5 Oct. 1846) in which two gall-stones were removed from above the clitoris, where they were neglected in the subcutaneous tissue." +

But how, ensure a gall-stone to have found its way in safety—perchance triturated by digestion—in the bowel, the danger is not yet over.

* * *

Obstruction of the Bowels by Gall-stones is a very rare event. In England, e.g., in the year 1868, collected only 28 cases—seven of which occurred soon after the setting in of symptoms in vomiting. 70 Munchausen, but I am able to add 18 cases.

In one (viz. S. Crichton Browne's case, which occurred in the W. Riding Asylum) the seat of Obstruction was the Jejunum. On post-mortem examination, it was found that a large galls stone, weighing 231 grms, had become impacted in the Jejunum, 6 feet from its commencement.

In 13 of these cases the gall stone became impacted in the Ileum.


† Lancet 1871 II. 638

Med. Times. 1878 I. p. 217 + 246

Brit Med. Journ. 1879 I. 368

1879 I. 852

Lancet. 1881 II. 176


1885 II. 917

1886 II. 1122

1888 I. 136 (4 cases)

1888 I. 187
In one the infection was in the descending colon, while in the three remaining cases the obstruction was at the cecum.

Although, therefore, the ileum, and more especially the neighborhood of its ileocecal valve is the most likely place in a gall stone to become impacted, infection may occur anywhere. In some cases, a stone which might have passed through the entire alimentary tract without difficulty becomes temporarily arrested, increases in size, and ultimately becomes so large that it presses on, it breaks up obstruction.

Should obstruction be the only danger, ulceration and perforation of the bowel may occur, and, reaching an adhesion from a hair's breadth, the gall stone, a stone may escape externally or into the peritoneal cavity. Few cases of perforation of the bowel were collected by Munchen.

Lastly, a gall stone may run its whole course—from the gall bladder to the intestines. Hepatic ducts or the cecum may be—and

as length emerge triumphant through the arms. This is "a consummation devoutly to be wished."

**Eyes and Symptoms**

Given a woman of good social position, of sedentary habits, and of 40 or more

Summers, given e.g. a susceptible subject,

How could gallstones enter their presence?

Certain phenomena might or might not occur. These might, e.g. 1) a

feeling of uneasiness and discomfort;

previously there is a considerable degree of

indigestion and so-called "blisterness";

while occasionally there is a strange and

unaccountable sense of impending calamity.

Just as you, however, the first manifestation

of gallstones occurs without any warning

symptoms. The dear mentioned lady has been

in New York twice; she has taken two usual

twenty lunch; and about a couple of hours

afterwards she is seized with pain. The

pain is promptly accompanied by vomiting,

and in certain cases — to be hereafter mentioned —

the pain and vomiting are followed by jaundice.

**Pain:** The pain is a rule, i.e. for

kind (a) peroxynem, and (b) dull and

constant. The peroxynem present vary

shade of intensity from the most severe.
to the most awful agony. Helley speaks of the pain as sometimes "driving the strong-willed man to shed tears like a child, yell like a madman, contort his body like a foal, or lie rolling, squealing, and shrieking upon the floor in the throes of despair." This is his case report. Two of my patients described the pain as more severe than the pains of labor; another was suffering so much that although actually watching a hypodermic needle being introduced into the skin over the region of the gall bladder, he felt no pain whatever for its introduction; while yet another—an elderly man—actually died of shock from the intensity of the pain.

"Intense pain," they speak of shrieking, tearing, and burning: but that of which they generally complain is an acute agonising feeling of constriction. The pain is often most acute at the site of the gall bladder (although not infrequently it is referred to the umbilicus). It extends in various directions—to the back, across to the right hypochondrium, upwards towards the chest or neck, and occasionally downwards to simulate renal colic.

Helley: Ox. cit. p. 589
Toussaint: Ox. cit.
Sometimes presume efforts relief, but in nearly every instance it has an opposite effect. So much is this the case sometimes that measures and palliatives are altogether impossible. The pain is frequently just as are the pains of labour: the gall bladder and its tributaries are supplied with striped muscular fibres just as is the uterus. In each case a strong contraction is followed by a period of quiescence during which the organ relaxes strength for another contraction. The intervals are filled up by a dull, aching, but quite bearable pain — a pain, in fact, which is compared with the previous pain, is no pain at all. When the gall stone has passed through the duct the purgation at once ceases. A sudden cessation may also take place if the stone drops back into the cavity of the gall bladder. Such an occurrence Harper says is an impossibility, and in support of his contention he points out that the valves in the cystic duct would not allow a gall stone to pass backwards. This however is a pure assumption. When a stone passes into the cystic duct the valves are at once rendered inoperative and, they become just a little able to
prevent the entrance of passing bacteria
in the veins from various veins to cause the development of jaundice.
The manner in which the pain comes
to an end is sometimes important for
a diagnostic point of view. If it suddenly
disappear in time that it has passed
easily out of the duct; if so the
hand it subsides very gradually, we
anticipate the occurrence of ulceration
and perforation.
Accompanying the pain there is apt to
be a slight tenderness towards the
sinus. Sometimes a cold sweat covers the body.
The temperature is usually normal but it
has been known to run up to 104° F.
The pulse, too, is as a rule very little altered.
Sometimes it is slowed; often it is
increased in rapidity, and very weak. Of
course, in any case where ulceration is
still more, embolization is taking place, signs
of high temperature, quick pulse and all the
occurrences symptomatic of embolization may
present themselves.

But the symptom - a rather big -
which appeals to the observer and
upon which great stress has consequently
been laid by writers on the subject, is...
Jame dice. In this point more miscepcion is probably proceeded than upon any other in connection with the whole subject of gall stone. We in the miscepcion altogether a thing of the past. Even to this day there are many practitioners who firmly believe that jaundice is one of the inevitable signs of gall stones. If there be no jaundice they declare to a diagnosis of gall stones. And yet a more careful consideration will show that the symptom of jaundice is quite an accidential one, and is present a about merely according as the gall stone happens to be impacted at one point or another, and according as it does a damage oxygen obstruction to the second part if bile. In a word, if a gall stone be impacted in the hepatic duct or in the common bile duct as obstruction to the flow of bile from the liver may occur, and jaundice may result; but if the stone be impacted elsewhere, still worse if it be lying free in the gall bladder, there can be no jaundice.

A change in the system of the liver, gall bladder and bile duct is quite sufficient to make them clean and get miscepcion prevalence. It is mentioned as an amusing fact, that a gall stone weighing

*Med. Trans. Vol II p. 134*
"Two chocks were found in the gall bladder of the late Lord Bute, though I had never explained of the jaundice, as I may disorder which I could attribute to the cancer."

Cox, writing of the signs of bilious conjunctivitis "while they remain in the gall bladder itself," said: "Thus, a stone falling upon the neck of the gall bladder may stop the passage of the bile for a time, and cause a jaundice, in like manner, a stone in the urine bladder, being lodged upon the entrance into the vesica, brings on the suppression of urine, and again, if the passage comes to be totally and permanently stopped, either by a large stone or by a number of small ones, taking up that part of the vessel near the neck, or by only one small stone, obstructively fixed and quite filling up the entrance into the duct, so that no bile can ever pass; the jaundice is to be expected to continue during life." And all the time he is attending to the neck of the gall bladder and the cystic duct.

The fact is, that a gall stone may even be impacted in the hepatic or common bile duct, without causing jaundice, in the event

Cox. op. cit. p. 157

Cox. 188
the stones may be of such an irregular shape as to lean between through which bile may still pass. Even when the obstruction is complete, jaundice does not become apparent for the longer of 60 or 70 hours. Jaundice then occupies quite a conspicuous place among the symptoms of gall stones. In many cases it is absent, and when present it does not necessarily indicate gall stones. In these cases many other conditions which cause jaundice.

But, given the other indications of gall stones, jaundice is of very great service in helping to localize the seat of the trouble.

Persistent Jaundice in, of course, a very real danger, in which W. Temple Ayle records a case in which a gentleman who was jaundiced from obstruction of the bile duct lived for 8 years, and while Paget, reports a case which lasted for 7 years with persistent jaundice, there are exceptions. As a rule, a patient with persistent jaundice, due to complete obstruction of the ducts does not live more than 18 months or 2 years.

Itching is sometimes a very distressing

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Symptom, e.g. in the case of the lady upon whom Miss Sius performed his first Cholecystotomy, and in the case shown
by W. Herrin from 30th April 1888 to the
Medical Society of London. For we quote
Graves as his authority in saying that Valetas
may develop, and also in saying that the
itching sometimes precedes the jaundice by
an interval of from 10 days to 2 months.

The following table is taken from Stanley
Templeton's "The Excision of gall stones by digital
manipulation." Lond. 1889.

<table>
<thead>
<tr>
<th>Stage</th>
<th>Symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Indigestion and persistent distension of stomach and intestines.</td>
</tr>
<tr>
<td></td>
<td>Sharp aching or acute epigastric pain.</td>
</tr>
<tr>
<td></td>
<td>Nausea or vomiting.</td>
</tr>
<tr>
<td></td>
<td>Chills or chillsing.</td>
</tr>
<tr>
<td></td>
<td>Tenderness on pressure over gall bladder or liver.</td>
</tr>
<tr>
<td></td>
<td>Swelling skin and eyes.</td>
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<tr>
<td></td>
<td>The clay colored stools.</td>
</tr>
<tr>
<td></td>
<td>Cotton or paste colored urine.</td>
</tr>
<tr>
<td></td>
<td>Itching of skin.</td>
</tr>
<tr>
<td></td>
<td>Distended gall bladder.</td>
</tr>
<tr>
<td></td>
<td>Enlarged liver.</td>
</tr>
</tbody>
</table>
The signs and symptoms in cases where the gall stones follow abnormal causes present so many varieties that it would take too long even to enumerate them.

We shall I spend much time over the subject of Draparos. I shall simply mention the following conditions as conditions which have been and might again be mistaken for gall stones:

- Hepatalgia
- Cardialgia
- Gastralgie

Inflammation of Gall Bladder or Duct Process

Hydatids in

Cancer

Stricture [castanted single duct]

Inflammation of Liver Process

Hydatids

Cancer

Inflammation of Peritoneum or Pleura

Rural Colic

Lead Colic

Intestinal Colic

Intestinal Strangulation

External

Ascanso
Hydronephrosis
Floating Kidney
Renal and Ovarian Gout
Malignant Disease of Stomach
Omentum
Pancreas
Kidney

and having pointed out that in every case of Gall stones the proper care should be a guarded one, I shall pass on to consider the question of Treatment.

A. Medical.

The two great objects to be kept in view in the treatment of cases of Gall stones are:
1. The relief of pain and the expelling of the passage of the Gall stone; and
2. The solution and the prevention of the recurrence of Gall stones.

I. Local Applications are of great service. If possible, a warm bath should be recommended: failing that, the application of

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according to which "The lion and corresponding portion of the tract are covered with an ice bag or with an "ice packet" (i.e. "chipped ice mixed with dry news seals and enclosed in linen like a packet") I have had no experience. In certain complications, e.g. breast ulcer, it would be a useful application, but I fail to see what advantages it can have over 1% oration in a ordinary case of pellagra.

Sometimes the application of a few leeches is attended by relief. General bleeding was at one time practiced, but even so long ago as in 1757 Lees had no experience of it and of service. "Bleeding the leg (as 242 O.P. 16) is sometimes useful, but far from always being so." Where there is rich fever and where the nature is string and robust it might still be occasionally used to with advantage, in a Corr. spec. it "will help to relax the fibres and by that means promote the dilatation of the ducts in the suprarenal of the calabri." In cases present day, however, bleeding is no longer fashionable, and even leeches are sometimes used to get without a doubt the most useful of all drugs in the treatment of pellagra in Japan. It is one sheet a year.
It should be given in full and frequently repeated doses. If given by the mouth it is apt to be rejected by vomiting; it is therefore best administered by hypodermic injection.

Belladonna is a most useful drug. The extract may be used and it may be given in doses of $\frac{1}{2}$ every 2 hours.

In hotter climates, the Belladonna may be combined with the Opium and administered enterally, in the form of the "Injunctio Morphinæ et Atropini Hypodermica." (Martin del Westcott.)

In cases of exceedingly severe pain where the above treatment—external and internal—fails to give relief, in the case of the pain is so acute that one is not justified in waiting for the Opium and then waiting to take effect, Chloroform or Ether should be administered. Then internal administration will be entirely justified.

I refer once more to the view that, in the case of a persistent uterine pain, the muscular contractions continue uninteruptedly.

To what we are indebted for the suggestion of the use of large draughts of hot water, containing a few drops of
Bicarbonate of soda to the point. The bicarbonate acts like an internal somatose, while the soda counteracts the acidity of the stomach. It is a very simple and a very useful remedy; so much so, indeed, that from from day to day, nearly every writer on the subject of the stomach becasue to refer to it. Although it just it may be vomited it should be persevered in, for not only does it relieve the irritability of the stomach and render vomiting easier, but it also prevents the secretion of liguid bile and so helps in washing out the stone.

Emetics are recommended by some writers on the ground that the severe muscular contractions which accompany the act of emesis may assist in the expulsion of the gallstone along the bile duct. But an emetic is no danger a remedy. The possibility of rupturing the gallbladder or bile duct is so great that one is hardly justified in doing anything which could contribute to such a result; and the severe contractions of vomiting would in just as liable to precipitate a calculus as abnormal as in a normal direction - i.e. toward an ileum or through the bile duct.

More frequently in zero to want to accesse to check the vomiting which already perists
and for this purpose, ice, tincture, dilute hydrochloric acid, and effervescing draughts may be used.

First in emetics may be taken some very strong Perpetuines. Yet a purge is frequently indicated. Harley recommends the following formula:

2. Rhei., q. iv.
3. Magnesia, q. x.

A dose of castor oil would be just as efficacious, and better and safer than either would be a full enema of

Each and every Enema I took upon as Horses have been recommended on the ground that they act like Tallestones, but I should prefer to inject each water per rectum and to give the Tallestones in a stripin by the mouth in hypodermically.

Perpetuines enemata are very much talked of by Dr. Heyden *, the Vice President of the Med. Soc. of Ed. Myp. of Ireland, stated that he had never known the administration of a turpentine enema and a Ball at 108° F. fail to relieve a paroxysm.

As an means to avoid the repulsion of evil spirits, Olive Oil has been very

* Brit. Med. Journal 1876, 365
steadily recommended during recent years. That it is not a new method of treatment may be seen by referring to Cre"e, who, in his book in 1787 recommended the use of "oil lubricating things in general." This was revived by Just. Tourette of New Orleans (Arch. Rona. de Med. 1887 11 p. 1181).

"Practitioner" in 1890, at page 128, there is a summary of a paper read by Dr. S. Rosenburg before the Berlin Medical Society (and published in Therapeutische Monatschrift 10. 12. 1889). Rosenburg collected reports of 24 cases. In 19, oil was given relief; in 2 it had no effect. Of the other 3 cases he stated that after the administration of oil "a number of crystals passed of green color, faceted shape and waxy consistence. These were, however, found to be made up of excreta and fat." "Along with these, however, the gallstones came away and the patient was much relieved. The quantity given was about 6 ounces." Many of the wonderful results reported in which countless gallstones were passed after the administration of oil, are really true cases in which greasy and faceted masses of excreta were mistaken for true gall stones. Still, there
can in no doubt that in certain cases, as in Roenemark's case, is followed by the expulsion of the gall stones.

Roenemark's theory of the action of olive oil. Roenemark suggests that the oil finds its way into the biliary passages and there softens the concreta so that their expulsion becomes easier; and in support of this view he may be mentioned that. Vincenzo has seen oil absorbed and excreted through the bile ducts.

Roenemark, on the other hand, attributes the efficiency of the oil to an increase and dilution of the biliary secretion. "This increase and secretion...exceeds that which follows the administration of bile or 100 g. of codliver oil."

Roenemark concludes that olive oil is large doses is the most effective bile producer:

"From this it can be seen (as was before mentioned) to be attributed the alleged rapidity of gall stone expulsion in Italy to the frequent use of olive oil in salads among the people. The vegetable marrowy the salads then and then same preventive effect, but if oil were to prevent gall stone formation surely gall stones would be almost unknown in Germany where almost everything is served up in oil or some form or other. Then, further, how can such a statement as this be..."
recorded with Hervey's theory that gall stones, so far from being prevented, are actually caused by the use of oil. Of the two views, that of Hervey seems decidedly the more probable, for however valuable a very large dose of oil may be in aiding the expulsion of gall stones, it is very questionable whether the habitual use of oil in ordinary quantities can have any influence in their prevention. The question is one which must still remain under dispute.

Hervey's method of aiding the expulsion of gall stones should be mentioned. He recommends that the不准 of the dis- tended gall bladder be gently and repeatedly indentured by the tips of the fingers, just to the might indent the "tender" of a rubber ear syringe. While under times of service, this method must be used with great caution in every case where there is any evidence of ulceration.

II. Solution and prevention of recurrence.

Bourne and Bigna, who recommended a combination of Ether (3 parts) and Perfection (2 parts), and it was Bouchut who

recommended the internal use of Chloroform. The solubility of Cholesterol alike in Ether and in Chloroform, in the laboratory, no doubt suggested their use. But neither Ether nor Chloroform, when swallowed, can possibly reach the gall bladder in a sufficiently concentrated state to leave any appreciable effect upon gall stones. Not Alcohol is also a solvent of Cholesterol, yet no one does not hear of its being today being recommended as a solvent of gall stones! The real benefit that resulted from the use of Durand's remedy (or benefit did result) was due to the influence of Ether (and Chloroform) in clearing the stones.

Hall of Philadelphia, in 1821, suggested Electricity as a solvent, but yet no one in these nothing. Fagge tells us that "The succinate of the ferrocide of iron has been recommended as a solvent, but no one seems to have thought of using Durand: "Observations sur l'efficacité du mélange d'ether enfumé et d'huile volatile de trevielle dans les éclipses répétées par des pierres précieuses" Éclairage 1790. Also "Mém. sur les pierres précieuses" 1790.

and the succinates of the phosphates is only one of many drugs which have been suggested only to be laid aside again.

Many writers in fact consider that when gall stones have once formed, no form on earth will bring about their solution. Pronasee (p. 260) even emphatically: "I reject the chemical theories of the solution of epithelial calculi". Such a statement is too absolute. No doubt one can add dissolve a gallstone in the gall bladder with the same ease as in a test tube; still, there can be no doubt that gall stones as sometimes undergo a certain degree of solution and disintegration. But, as neither Ether nor Chloroform can be expected to exercise a solvent power, is what must we look? Just as an abundance of the alkaline salts of the bile acids may prevent the formation of gallstones, so their presence in sufficient quantity may bring about their solution. I mean, therefore, the solubility of gallstones, i.e., use Alkalies and Diluents.

The value of Alkalies lies in the fact that they increase the secretion of bile and ensure an abundance of the alkaline salts of the bile.
Phosphatic soda are exceedingly useful, and phosphatic soda is very valuable. While the Eucalyptate of Soda is believed by Lewaschew to be the most efficacious of all the aqueous. It increased the flow and the humidity of the bile more than any other alkali.

Chlorate of Soda as a preventative was first reported by W. Chalmers in an article entitled "The use of Chlorate of Soda to prevent the formation of gallstones." *

Better, however, than any other drugs in a course of natural alkali mineral water is a course of treatment e.g. at Vichy, Carlsbad, Eau, Rossignan in Hanover, and in this connection it may be mentioned that in the result of experiments, Lewaschew and Klikowitsch † found that waters such as Vichy, which contain very dilute and contained Carbonate of Soda, had more influence than those such as Carlsbad which contained chiefly Sulphate of Soda. They ascertained further, that these waters when used in effect was greatest than given below.

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† v. American Journal of Medical Sciences. April, 1876.
Certain conditions and complications require, of course, special treatment. Where e.g. there is Ulceration and a tendency to Perforation or greatest care is required to ensure absolute rest. If peritonitis occur and it is suspected, ice should be applied externally, while internally, a strong astrinvent should be administered. N. i. hematin is often useful. While in case of collapse Peritoneum is invaluable. At page 669 of this book, Harley says: "In almost all cases, the plenum may be tried, and that in the early period of injecting, freely drawn warm blood into the peritoneal cavity. It is said not only to produce no disturbance but even to do benefit by absorption." Harley gives as authority for this suggestion. Where collapse has been caused in account of perforation and hemorrhage into the peritoneal cavity, the suggestion that more fresh blood should be injected into the peritoneal favours rather to the success in the Principles of treatment. Even though the bleeding was relieved there into the peritoneal cavity, it seems a very unlikely thing that the injection of blood into that cavity should be attended by any great benefit.
Personally, I should not feel disposed to try it except in a perfectly hopeless case. Even in a hopeless case, I should prefer to use a saline solution.

Transfusion of blood is a very different matter. In the winter of 1886-87, while resident in the Royal Infirmary of Edinburgh, I took part in the practice of transfusion and on less than seven occasions, and the results of these transfusions were so satisfactory that I should have no hesitation in recommending transfusion in any case of collapse as a precaution.

B. Surgeon.

I shall conclude this paper by a short account of the Surgery of Gall Stones. Thomas Fabricius in 1618 is said to have removed gall stones from the living subject. Whether this be so or not, there is no doubt that in 1743 M. Petit of Paris recommended operation in this condition. He firmly believed that the entrance of bile into the abdominal cavity meant certain death. Petit, while advising operation, considered the presence of adhesions a "true opera non." If convinced he wrote (Mém. Imp. Acad. Sci. Tom. 1, 1781 p. 265) "that the life of the patient is in peril, we should
It is true, she does commence, since she cannot cease, the adhesion, and opening the gall bladder without adhesion is always fatal, but it is the duty of the skilful surgeon to observe nature and to profit thereby to seize upon the favourable moment to act himself when he sees that nature needs his aid, and that she cannot complete what she has commenced without it." Later, he says, "The existence of the stone and adhesion being assumed, the operation is without danger." Peter himself only records a case in which a large gallstone was extracted from a patient whose spleen opened in the vicinity of the umbilicus.

Sharp observed that adhesions, in certain cases, strongly adhered to the stone, so that he had to use a strong adhesion. In 1750, Coe wrote: "There is yet one other method of bringing away these calculi, which, if it was generally practicable, would be of all the most effectual and certain, especially for large ones, and that is by..."
making an incision into the bladder and extracting them. As an authority, Cicester, Pietri, and, like Pietri, I consider adhesion a necessity.

Dr. Andree, in the same hand wrote, in 1790: "Lithotomy has been advised for the removal of urinary calculi. This, however, has arisen from the uncandid representation of a very uncommon case, but one which, I know, occurred. To wit, of an abscess forming between the calyces and the integuments of the abdomen."

Richter, in his memoir (1793) wrote in reference to Pietri's suggested surgical treatment, that in 1748 he not only introduced a "lithotriptor" for crushing gall stones, but he also advocated ureteritis in certain cases. He declared that adhesions should be removed before making an incision.

Sommering, in 1793, also considered adhesion a requisite. "Ergo non" he wrote: "mai i adhesiones vesicae pellica ad integumenta abdominalia, tanta ad ulcerationem est, vel apertura artificiosa."

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* Andree: "Considerations on Bilious Diseases". 1790

"Fortis praeceps praecepit aequae partem
tamen tali motu; sed certe audacior
ille praecepit qui primus ex venuce urinar
sectamin calculum educere tentavit."

Good, in 1825, rather advances against operation. "Formerly I say," he adds. "when the gall bladder was suspected to be completely filled, its walls thinned from long continued irritation, the concretions too large to be forced forward and the pain permanent and severe, attempts were made to remove them by section into the cyst. Block (Medic. Bemerkungen 1841) gives a singular case of this kind in which not fewer than 62 distinct calculi were taken away with success. But in general the operation has not answered, nor been followed by the promptness of other cases of concretions, as that Morgagni (De Sed. et Cam. Mot. Eff. XXXVII. 19152) and many other writers of eminence have strongly recommended the use of the knife, and it is rarely or never bad recourse to in our own day."

also 4th. - 1840.
Council have almost apologised for ex.
leading to surgical interference.

"When disturbed with bile in calculi, the operator, the gall bladder
becomes prominent to us, to remove the
abdominal varieties." This relation ex-
plains the possibility of the occurrence of
abdominal subjacent hypertrophy, and why cal-
culi may escape through such openings;
or it is also founded on the scheme for
extracting the calculi by an operation analogous
to that performed on stones in the urinary
bladder, and which I should not have
mentioned had it not been prepared by
J. D. Pirrie."

Recamier and Dupuytren (about 1817) held approval of operation. They advocated
the use of caustic to destroy about
adhesion.

So firmly, on the other hand, was
Copley's career against the admissibility
of operation, that, in 1858, he wrote:—

"Petit has contended for the propriety of
making an early opening into such tumors
at their more prominent parts, with the

Cranachan: v. Dr. Ciba, "Descriptive Text.
Copley: "A Dictionary of Practical Medicine" by J. C.
Copley MD. Vol II p. 376. Lond. 1858.
view of evacuating the calculus, in the accumulat'd bile, which the gall bladder cannot expel owing to occlusion of its duct. But the incertitude of adhesions having been formed between its peritoneal and the abdominal parietes, and processes even although they have actually taken place, must prevent every physician from directing the performance of this operation.*

The lithotomy recommended the performance of the operation in two stages (first c. Cutting ves. & still is done in two stages) — first - abdominal incision and clitching gall bladder to parietes to become adhesion; second - incision of gall bladder.

Trace can say "that in my proc.
ceed with perfect safety in these cases, he must, following the practice of Bégur,* en-
deavor to produce adhesion by cutting through the abdominal parietes, leg by leg, till the peritoneum is reached. Then this has been done, we wait 24 hours before completing the operation by cutting into the tumour itself." In this way he explained, the same result was ob-

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* V. Linpat 22nd Oct. 1859, p. 421
† Transact: Op. Cit. p. 245
tained on by the use of Récamière's method.

Now, then, goes on to describe the method by which he himself treated not only gall bladder but also ovarian cysts - viz., by "a multiplicity of acupunctures." Thirty or forty needles with large heads were inserted and made to penetrate the gall bladder. Then they were left in for three or four days. Then another set of needles was introduced between the old punctures, and again, then a few days later, a third set. Mrs. Ellis advised that a shield of slow wetter should be placed over the part, and that the needles should have heads of sealing wax. Otherwise, she said, they could not penetrate and become lost.

Kerick* likewise considered that operation was only justifiable in cases where adhesions had formed.

Then it will appear, that from the time of Rehot to within a very few years ago, although the cause and cure of surgical interference were being discussed, little or nothing was being done surgically. In gall stones some writers altogether condemned cur.
great interference, then, were vented, while these were recommended it did so on the understanding that it should not be performed in cases where adhesions had formed. If adhesions had not formed, then, before opening or in part of the operation, steps were to be taken to secure their formation.

Of late years the peritoneum has been held in less reverence. Abdominal surgery has made immense strides, and the peritoneum is now opened into with the utmost freedom. No one was think of first trying to bring about adhesions; in fact, their existence is often looked upon as a troublesome complication. The suggestion of surgical interference thrown out by Peter and developed by subsequent writers is now facing abundant proof. Operations in gall stones are now of everyday occurrence.

J. Craig Smith M.D. F.R.S. (in his “Abdominal Surgery” Lond. 1887) and the majority of writers on the subject credit D. T. S. Balfour of India with having performed the first successful case of Cholecystotomy. In the Transactions of the Indian State Medical Society for 1868 at page 68 is published: "A Case of Lithotomy of the Gall Bladder..."
A woman, aged 30, a patient of Dr. B. M., had a tumor situated just inside the right iliac bone. Dr. B. M. diagnosed it as doubtful, but "probably ovarian," and on 16th June 1867 he operated. He made an incision between the umbilicus and the pubes. He enlarged it to 1 inch above the umbilicus on the right side; he cut into the "probably ovarian" cyst, and from it he removed 40 to 50 gall stones, (!) after which the patient made a good recovery.

There is no getting over the fact that Dr. B. M. did operate upon a gall bladder and did successfully remove gall stones, but, considering that he was operating under the impression that he had an ovarian tumor to deal with, that this opening into an enlarged gall bladder was a pure accident, and that, had it not been for his mistaken diagnosis, he might never have operated at all, I think that very little credit is due to Dr. B. M.

One might with just as much reason claim the credit of having introduced the operation of cholecystotomy in behalf of the first surgeon, who, after opening the tumor to let the contents flow, found that it was a chronic cholecystitis, well, proved that it was...
abscess discharged not only pus, but gall stones.

The credit of having introduced the operation of Cholecystotomy is really due to Marion Sims. Robots bled into the gall bladder; Marion Sims operated upon it with full knowledge of what he was doing, and of what he meant to do.

So important and interesting is this case of Marion Sims, that I shall refer to it at some length. An American lady, married, and living in Paris, had enjoyed perfect health until August 1877 when she first noticed an occasional pain in the right lumbar region. From time to time this pain returned, and it often occurred when she stood or the floor; in November she became of a deep mahogany colour. She suffered from “languor and debility.” But she had no pain. Until 5th Dec. 1877 she could see no doctor. On Jan. 8th there occurred a discharge of clear blood from the rectum; this was frequently repeated. Between itching and turning, and occasional lancinating pains, continued to render her condition very terrible. On 16th March, Marion Sims diagnosed “cyst connected with the liver.” Whether it was understood a disease of the gall bladder, I am not prepared
On Mar 17th the ascites was aspirated, and drss
32 oz. of dark brown fluid, which on
analysis was found to contain neither
bile nor digested foodstuffs. Immediate
improvement followed the aspiration; but
in two days the girl got worse again. She
came completely offlax; and operation
was decided upon.* An incision
three inches long, parallel with the lines
deep, was made over the most prominent
part of the tumour, about 3 inches to the
right of the umbilicus. It was begun
an inch above the umbilicus, and ex-
tended two inches below it. The peritoneal
membrane was soon reached and was
opened till all bleeding from divided
vessels was controlled. A horse was such
a haemorrhagic tendency, this required six
cutting sutures on each side of the incision.

When the peritoneum was opened several
men of purulent serum (perhaps six ounces)
were discharged. I am somewhat in doubt
whether the purulent colour of the serum was
due to the rupture of recent adhesions between
the cyst and the peri toneal peritoneum
or to remain from the peritoneum. But I
think it was from the latter cause; for

I did not press too much, discovering the adhesion of any existed. A decided pop of the largest size was thrust into the fornix, and the other of a dark, thin fluid withdrawn which I supposed to be bile. As soon as the eye was emptied it was knocked up with a tenaculum, and pulled to the outer edge of the incision, where it was held steady with forceps and drawn out in about two inches. It was then held while the finger was pressed into the peritoneal cavity along its under and upper surfaces, when it was encompassed by its attachments to the liver, to the gall bladder. The gall bladder was then severed with scissors, to the extent of about two inches, and was thoroughly cleaned out with sponge. Probing passed to the bottom of the sac, which, on measurement, was found to be 8 inches deep. At first there were removed about 28 of a dark-brown fluid, much redder (containing more urine) than had already drained off; and then there were drawn out with probing, a Help dozen or more gallstones. One probing after another was then removed, and until around till 60 gallstones were removed. Having emptied the gall bladder it was only remained to secure its
"In order to the upper angle of the abdominal incision, to form a protruding outlet. As it was already drawn out through the incision to a considerable extent, I resolved to amputate the projecting portion, which was a mistake. Its walls were greatly thickened, and black when cut, so as to require the use of several artery forceps. The thickened wound of the amputated eye was then crowded into the upper angle of the abdominal incision and then secured with 8 fine carbouled silk sutures, taking good care to pass each suture through the thickness of the abdominal wall, including the peritoneum. No drainage tube was used.

The operation was performed on April 18th 1878. The patient progressed unexpectedly till April 23rd. On the 24th there was 6oz. of blood from the edges of the gall bladder and from the gums. Eight and sixths ounces injection of lymphatic was given - but with no amelioration. On the 26th the 2nd week went by; she gradually sank; and died at 4:25 p.m.

Although this first case of Myer's Sims was unsuccessful as far as the patient's ultimate recovery was concerned, its publication brought the matter pro-
minute to the eyes of the Surgical world, and from that day to this, the Operation of Abdominoctomy has been considered a justifiable one. Yet it receives but scant notice in the Text Books. 

Erickson (1884 ed) hardly mentions it; in fact, in discussion of the entire surgery of the pelvis bladder in rather less than half a page. His Dictionary of Practical Surgery devotes but little more than a page and a half to its consideration; while Treves in his "Manual of Surgery" out of 79 pages on "Injuries and Diseases of the Abdomen" (excluding hernia) devotes little more than a page to the discussion of this operation.

But while the books are slow to recognize the place which this operation has made for itself, the journals are not behind hand. I have succeeded in collecting notes of 126 cases which have been operated on, and a glance at the attendings, where the references are given, will show that not only that the operation is frequently done, but also that it is done by many different operators. Deducting from the above 126 cases 22 the result of which I have been unable to ascertain, there remain 104 of which I can give a full record.
of this number 96 recovered, and 5 died.
There were 19 operations, in which 91.0% recovered, and such a result is eminently satisfactory.

But Cholecystotomy is only one of several operations which have been done and which may be done in gallstones.
I have e.g. notes of two cases (v. Brit. Med. Jour. 1886 I. 402) in which 412 gallstones were removed from the liver substance. I have notes of two cases (v. Lancet 1891 I. 821) in which the operation consisted of opening into the common duct and thus extracting the stone.
I have notes of many cases of Cholecystotomy, and I have ones of several cases of Cholecystectomy.

What then are these various operations? How are they performed? When are they indicated, and what are their respective advantages and disadvantages?
Cutting gall stones from the liver substance is rarely called for and is rarely done. The three operations herefore which are really to be considered are: - Cholecystotomy, Cholecystectomy, and Cholecystobacterotomy.

Cholecystotomy (χολί = gall; κυστίς = bladder; τόμος = a cutting or incision) consists - opening the
Cholecystectomy, (χόλη; κυοτίς; and ΕΚΤΟΞΗ - a cutting off, a resection) consists in (opening and then) cutting away the gall bladder.

Cholecystectomy (χόλη; κυοτίς; ΕΥΤΕΡΦΟΡ - a bowl in, gut, and τοκή) consists in establishing a communication between the gall bladder and the intestine.

The preliminary steps in each case are the same. A vertical incision, two to three inches in length, is made over the most prominent part of the liver, should there be one, and, feeling here, over the site of the tendon of the gall bladder, or over the top of the cartilage of the 10th rib. Before opening the peritoneum, all reservoirs should be emptied. On opening into the peritoneum one or two fingers should be introduced to determine the exact state of matters. The chance of the presence of adhesions should be asked and the camera and site of the obstruction - if any - shall later be ascertainment. If the case is one in which there is obstruction of the cystic or common bile duct, with distention of the gall bladder and it is decided to do a cholecystectomy, sponge rinsing been introduced so as to absorb any fluid
that might by any chance escape, an aspirin should be used to empty the gallbladder. While the cannula still remains in situ, the gallbladder should be emptied by means of a forceps and drawn into the abdominal wound. A vertical incision should then be made into it well (i.e., the puncture made by the aspirin should be enlarged vertically) and stones which are lying free should be removed; the interni should be sponged out, and by means of forceps or forceps a tube, the impacted calculi should be withdrawn. Having removed the cause of obstruction, one or other of two courses remains open:—

1. To stitch up the incision in the gallbladder and return it within the abdominal cavity; or

2. To stitch the incision in the gallbladder to the incision in the abdominal wall, and thus to create a biliary fistula.

Of these methods, the former is, theoretically, the more perfect; but, considering the practical difficulties attendant upon it, and the impossibility of making certain during the operation that every cause of obstruction has been removed, it is a method which is alike dangerous.
and inadvisable. The latter method, though it does not, at first at any rate, restore the parts to their normal size, is still easier and more expeditious. The external fistula is an invincible safety value. Should there be an inexcusable distortion of the cystic or common ducts, the secretion can still find free vent through the fistula; should the cystic and common ducts be patent, then, in course of time — probably within a few weeks — the external opening will close. Should it not close, it may be closed by operation. Then one obtains safety by the second method. The same results that are aimed at are dangerously by the first method.

In emptying the gall bladder by the abdominal wall, the stitches shall pass through the edges of the divided peritoneum and the edge of the incision into the gall bladder, and the entering should be done in such a way that the parts may closely embrace a drainage tube.

Various difficulties may present themselves in the course of an operation. It may, e.g., happen that impacted in the duct in such a way that it cannot be withdrawn. Several courses are then open: it may be pushed onward into the duodenum.
demum by the operator pieces; it may be
attached with well apted forceps; it
may be "needled" and in Wigan up; a
mixture of equal parts of ether and chloroform
may be injected deep by chest or to its sur-
face (e. v. as done by McVittie - Waterfield)
or the duct may be incised and the gall-
est removed through the incision. Care
shall always be taken to use no violence.
If a gallstone be adherent to the mucous
membranes: it shall be very gently dis-
attached.

It has been
alleged on a subject to this operation
that all ends of dreadful results most
of necessity follow the establishment of
a bilious fistula. But these results have
not followed. On the contrary, an knowledge
of the bile and its products, as, thanks to
Cholecystotomy, undergo a very considerable
modification. In the British Medical
Journal p 1841 (Vol II p 381) Lancer Parr
after referring to the experiments of John
Sturton Bennet and Arthur Guernsey which
appeared to show that an absence of bile
from the intestinal circulation killed animals
by slow starvation, wrote: "My
"Clinical experience shows, and it is published to the effect, that patients gain weight and improve in health whilst every particle of bile formed by them is pouring out of a fistula in their gall bladder. Majo Ritter and others have confirmed this, therefore we laugh at Bennet and his scientific experiments."

Again, in the Report from the Laboratory of the Royal College of Physicians, Edinburgh (1841, Vol III p. 218) I read:— "All researches on the subject then clearly shew that the entrance of bile into the intestine is not essential for the maintenance of the individual in a perfectly healthy condition. The only digestive disturbance produced is the diminished absorption of fat; and as this has already been there is good reason to believe that this is simply due to the withdrawal of a stimulant to the absorbing cells of the intestinal wall. But even with bile excluded from the intestine a less than about 70% of the fat is still absorbed."

"But, in short, this has come to be regarded more as an excretion than an excretion. And not only so, that even its alleged anthelmintic properties have been called in question. I am Balfour. I agree.
We at times actually swarming with bacteria. The results obtained by Czerman and Winston (in Journal of Physiology, Vol. II, p. 213, 1889) by Huxley, Map Robin (in Proceedings of Royal Society, Vol. XIV, p. 449, 1840) by Peter Belfry, and by others, from observations upon patients operated upon by Cholecystotomy, have done much to uproot some of our most dearly cherished beliefs.

The operation of Cholecystotomy is performed in a manner very similar to that of Cholecystotomy, with the important difference that in Cholecystotomy the gall bladder is cut away. Although not so favourably received in this country, it is on the Continent preferred by many to Cholecystotomy. IZen collected 220 cases (in Appendix) 15 of which recovered. Its advantage over Cholecystotomy are very problematical. The chance of gall stones again forming is no doubt slightly less, but the patient is reduced to the condition of an elephant in respect that Zen (or she) has no gall bladder! But Cholecystotomy is open to the same risks as a cholecystotomy in which the gall bladder was been known.
up and returned into the abdominal cavity, the risk, i.e. of there still being an N. stricture which has not been removed. In written cases there left a safety valve; in both cases, therefore, the results may be discussed.

Cholecystectomography is the next physiological of all the operations, yet its difficulties are such that it has rarely been performed. "The triumph of operative surgery," says Halsted (11. 1110) "would of course be to establish an artificial fistula between the gall bladder and the duodenum." This operation was first performed by M. Rives and later performed by Winiscischen. It has also been done by Kappeler, by Mayo Robson (twice) by M. Terrien Prata, and by Gaston of Atlanta. Credit is due for having, by his experiments upon dogs, brought this operation permanently before the notice of the profession. He pointed out that this operation was appropriate when there is

V. Amer. J. of Sci. Oct. 1884
V. "Surden's Cholecystotomy" by T. Willard Gaston, M.D.
permanent occlusion of the common duct without resection of the cystic duct.

This method of operation - which seems very simple - in our words, the
process consists in connecting the walls (i.e., the walls of the gall bladder and of the
duodenum) by a single loop of intestine which shall attach their surfaces by
adhesion, inflammation and cut an opening between them cavities ensuing above
in the intestinal canal.

While such an operation is very simple and very thankful as an experiment
on a healthy dog, it is hardly suitable in a patient who is suffering acutely
from gallstones. Relief must be
given.

It is an

improvement upon any operation which

I can yet seen described, I would
suggest a Cholecystectomy down
with the aid of decalcified bone
plates. Senn and his followers
have
got such good results in other depart-
ments of abdominal surgery thru the
use of these plates that I see no reason
why Senn's method should not be applied
to the gall bladder.

Let an
incision be made into the gall bladder:
through it withdraw any calculi that
may be present; let a thin incision be made into the duodenum, and each incision introduce a double-cliped bar plate; tie them together after Semm's method; stitch up the abdominal incision, and the operation is complete. In about a week the bar plates will become absorbed sufficiently to permit clear along the track, and there will remain a free communication between the gall bladder and the duodenum. The bile will of course be free to pass into the duodenum; whether the partially digested food will pass into the gall bladder and cause inconvenience or danger is a point upon which further information is required. The possibility of such an occurrence would certainly not deter me from recommending the operation in a similar case.

Cholecystectomy — although it may be and be performed in any case of gall stones — is most eminable and is, in fact, the best possible operation when a gall stone is impacted in and cannot be removed from the common bile duct.

Cholecystectomy is, in my opinion, only admissible when the ducts are
all patent (except of course the cystic duct) and it is only indicated in cases where, from ultrasonic views, the walls of the gall bladder are so lacerated and friable as to render either of the other methods inexpedient.

In a gallstone firmly impacted in the cystic duct, a percutaneous catheter then other specified as indicating a Cholecystectomy. The best Practice in Cholecystectomy.
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