The Liver The Hydrogenator

In Animals.

a

Thesis, by

George Meyld.

"Man is not born to solve the Mystery of Existence; but he must nevertheless attempt it, in order that he may learn how to keep within the limits of the knowable."

Göthe. as quoted by G.H. Lewis.

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The Object of this Thesis is.

To combat the prevalent doctrine of the Liver being mainly an Excreting Organ Vicarious with the Lungs, &
To propound the idea of its being essentially a Secreting Organ in Antagonism with the Lungs., that is,

As the Lungs are for the Oxygenation of the System:
So the Liver is for the Hydrogenation of the System.

The Manner in which the Subject is treated is.

1st A brief outline of the Anatomy of the Liver
2° Extracts from Physiologists in order to exhibit the doctrine as now held concerning the function of the Liver
3°. The Argument as propounded in these extracts met.
4th. The writer's own views concerning the function of the Liver . . . . . .

It is not nessary that we should minutely or critically enter upon the anatomy of the Liver, but it is expedient that we should at least give a general outline of that Anatomy.

The Normal adult human Liver is the largest gland in the body. His of a dull reddish brown color. Its weight is almost identical with that of the brain viz according to D. John Reid, in the adult female from 40 to 50 ounces & in the adult male from 48 to 58 ounces. His situated in the upper part of the Right hypochondriac region & extends across the Epigastric region into a part of the left hypochondrium. It is in immediate contact with the diaphragm above, & rides as it were on the Stomach, duodenum, & colon below. It measures about 10 or 12 inches from right to left, from 6 to 7 from its posterior to its anterior border, & about 3 inches at its thickest posterior margin from which it tapers wedge like to a fraction of an inch in front, which wedge like form is in evident accordance with is position to & movements on the circumjacent parts.

The form & position of the Liver in the adult is singularly unsymmetrical. Its mass is chiefly to the right, the upper surface is smooth & convex the under surface a notched fissured & irregular Concave, while of the two great divisions of the organ, formed by the longitudinal fissure & interlobular notch, into Right & left lobes, the right is about five times the weight of the left.

The Liver is suspended in the abdomen by cellular attachment

attachment at its posterior margin, to the Crura of the Diaphragm & large blood vessels &c but chiefly by folds of the peritonaeum adhering closely to the proper or cellular coat of the organ.

The Vessels of the liver are the Hepatic artery, Hepatic vein, & Vena Portae, the Hepatic Ducts & the Lymphatics.

The Hepatic artery is a branch of the Coeliac axis, it enters at the transverse fissure & there divides into a right & a left branch for the two great lobes of the liver. Its office is for the nourishment of the organ & the coats of its vessels.

The Hepatic veins emerging at the posterior border convey from the liver into the ascending Cava the residue of the blood sent to the organ by the hepatic artery & Vena Portae

The Vena Portae is formed by the Union of nearly all the veins of the Chylopoietic Viscera viz those of the Stomach, Intestines, Spleen pancreas, omentum, Mesentery, & gall bladder. Like the hepatic artery it enters the transverse fissure & there divides into a right & a left branch for the two lobes.

Concerning the hepatic artery it is remarkable in being smaller than the Splenic artery, although the liver is nine times as heavy an organ as the Spleen. And Concerning the Vena Portae this state further remarkable as forming the only example in the economy of a vein subdividing into Capillaries for the purpose of affording a Secretion.

The hepatic ducts arising in the lobules traverse the hepatic canals, emerge from the right & left lobes at the bottom of the transverse fissure

and

and uniting at an obtuse angle join the Cystic Duct.

The Sympathetics are large & numerous & are divided into a superficial & a deep set, the superficial form a net work upon the upper & under surfaces of the gland, the deep set accompany the vessels in the portal canals & emerge at the transverse fissure.

The nerves of the liver are from the Coeliac plexus & from the pneumogastric, they enter the liver supported by & distributed on the branches of the hepatic artery & Vena portae.

The intimate structure of the liver is a subject somewhat obscure & intricate, but the following is an outline of the leading facts.

The Liver is composed of innumerable polyhedral shaped Lobules each about the size of a pins head. These are bound together by an interlobular cellular tissue as also by vessels & ducts. Each lobule as composed of vessels ducts and hepatic cells is virtually a Liver.

The portal Veins entering at the transverse fissure subdivide & pass into the Portal canals. Traversing these canals they send off small branches, which entering between the lobules under the name of Interlobular veins, first surround as with a plexus, each lobule, & then by many branches penetrate the lobules & radiating towards their centres converge to form what are called the Intra lobular veins, viz the rudiments of the hepatic veins. These passing out of the lobules become inter-lobular hepatic veins, which by uniting into larger trunks under the name of Sublobular, ultimately terminate in

what

what are called hepatic venous trunks, which converging towards the posterior margin of the liver, enter by several branches into the vena cava ascendens.

The hepatic artery entering the portal canals along with the Portal veins, gives off minute branches, which passing between the lobules go to the Coats of the vessels & ducts & to the intercellular tissue & finally, as is supposed, pour themselves as venous Capillaries into the portal veins & thus as venous blood contribute probably to the secretion of the bile.

Concerning the Hepatic Nucleated Cells - which are about the 1000 inch in diameter, & which being the true Secreting Cells, may be considered the most important constituents of the gland - it is disputed whether they exist merely in the form of Clusters filling up the interspaces between the portal Capillaries of each lobule, or whether they arise as minute tubes having destitute walls or basement membrane. Be this as it may at least the portal capillaries are in intimate juxtaposition with these cells, which being filled with secreted bile empty themselves either by rupture or by exosion into channels or ducts, which ducts radiating towards the circumference of each lobule form a plexus on its exterior surface, & then passing into inter lobular ducts, & thence into larger branches, finally enter the portal canals; & emerging from the transverse fissure by a right & a left branch, unite at an obtuse angle & together with the Cystic duct form the Ductus Communis Choledochus.

The gall bladder is a pear shaped membranous sack lying in & attached to a depression on the under surface of the right lobe of the liver. It is about 4 inches long one inch broad & capable of containing from 8 to 10 fluid-drachms.

In the human foetus at the third or fourth week, the liver is said to constitute one half of the weight of the entire body, the proportion however gradually decreases as development advances, until the full period; when the relative weight of the foetal liver to the body is as 1. to 18. In the early foetus the right & left lobes are equal or nearly equal in size, & just before birth the difference is not great the relative weight of the left lobe to the right being, nearly as 1. to 1.6. The position also is nearly symmetrical with regard to the middle line. In the early foetus the gland occupies nearly the whole of the abdominal cavity & at the full period descends nearly to the crest of the ilium on the right side.

The Umbilical vein going to the foetus passes from the Placenta to the transverse fissure & there divides into two branches. The smaller of the two as the ductus venosus passes on to join the Vena Cava ascendens, the other & larger branch, ends in the Vena Portae, which in the foetus is comparatively small, & its blood is thus circulated through the liver before being admitted into the Vena Cava & general Circulation of the embryo. At birth the circulation is stopped thro' the Umbilical Vein

and

and ductus venosus. The liver becomes less distended with blood & ceasing to grow in an equal ratio with the rest of the child it is found about the sixth year to have fallen to the standart of the adult viz from 1/18 to 1/36th of the weight of the body.

The Bile is the fluid secreted from the portal capillaries by the nucleated hepatic cells of the liver. During digestion it is poured as a clear yellow fluid direct from the liver into the duodenum, but when chyme is not present in the duodenum it appears to be hoarded up in the gall bladder; where from absorption of its watery matter it becomes viscid. When viscid it has an oily aspect & its color appears to me to be a union of deep purple & green approaching to black, but when diluted with water, it becomes of the most beautiful & sparkling yellow. The taste of ox bile appears to me to be an intense sweet masked by a still more intense bitter.
Concerning the number & nature of the proximate principles of the bile there are many opinions.
Berzelius as quoted by Müller[1840] gives = Water 90.44

Biliary matter with fat	8.
Mucous of the gall bladder	0. 30
Otmazome Chloride of Sodium & Lactate of Soda	0. 74
Soda	0. 41
Phosphate of Soda Phosphate of Lime & a trace of a substance insol in alcohol	0. 11
	100. 00

Dr Prout in the main agrees with the analyses of Berzelius.

M. Thenard as quoted by Müller gives = Water 875. 6

Biliary Resin	30. 0
Picromel	75. 4
Yellow Coloring Matter	5. 0
Soda - - - - - -	5. 0
Phosphate of Soda	2. 5
Chloride of Sodium	4. 0
Sulphate of Soda	1. 0
Sulphate of Lime	1. 5
a trace of oxide of iron	
	1000. 0

Gmelin again seems to split the bile into some twenty six proximate principles, a process which does not appear to throw much light upon the subject.

Brande says "It is very likely that many of the supposed proximate principles of the bile are not educts from the bile but products formed by the tests employed in the process of analysis."

Carpenter in 1842 says "Cholesterine may be pretty certainly considered as the real proximate principle of the bile"

The same author in 1844 says "In healthy bile the proportion of Cholesterine appears to be very small & all are agreed that the chief part of the solid ingredients of the bile are allied to fat in composition viz C48. H42. O13. Ni." and this substance essentially corresponds with the Bilic acid Cholec acid, Bilin, Picromel &c. of the different chemists & seems to be a fatty acid united with soda so as to constitute a soap"

Thus says Müller is an idea recently revived by M. Demarcay

Gregory 1845 "It is evident that bile is composed of soda united to an organic compound having the characters of an acid thought a feeble one, & in some respects analogous to the fatty & resinous acids. This compound which is the whole organic or combustible part of the bile is called bilic & cholic acid, & bile is the cholate of soda. The probable formula of cholic acid is C44. H36. NO13. = C44 H35 NO12, HO This acid cholate of soda has lately by Platner been obtained crystallized, which is a strong argument in favor of the opinion that the bile is a uniform & definite compound of cholic acid & that all the numerous compounds obtained by Berzelius & others as the constituents of bile are products of the decomposition of cholic acid. This is a consideration of the utmost importance with reference to the production of bile in the human body to its function & in short to Chemical Physiology"

"Kirkes" & "Paget" 1848. "According to Gorup Besanez, human bile when first secreted is exactly neutral, & it is probable that the carbonate & bibasic phosphates of soda found in the ashes of bile are formed in the incineration." According to Liebig the biliary matter consisting of biline & the products of its spontaneous decomposition, yields on analysis C76. H66. O22. N2 & a certain quantity of sulphur. Comparing this with the ultimate composition of the organic parts of blood which may be stated as C48. H36. O14. N6.

with

with Sulphur & phosphorus it is evident that bile contains a large proportion of Carbon & Hydrogen & a deficiency of Nitrogen. The import of this will presently appear"

From the above quotations arranged chronologically it is shewn that ideas concerning the nature of the bile are continually being modified & I am informed that such is still the case even up to the present day. The bile is now known to consist of 2 nitrogenised acids, combined with Soda; Cholic acid = Cholalic acid + Taurine and Cholic Acid = Cholalic Acid + Glycocoll. See below their formulæ ×

Function of the Liver. We shall now proceed by quotations chronologically arranged to Exhibit the ideas now & of late entertained concerning the Function of the Liver.

Magendie by Milligan 1826. "Physiologists have been very eager to know whether the hepatic artery or portal vein forms bile. Several have said that the blood of the Vena Portae having more Carbon & Hydrogen than that of the hepatic artery is more proper for furnishing the elements of the bile. Bichat has successfully contested this opinion & has shewn that the quantity of arterial blood is more in relation with the quantity of bile formed than the quantity of the Venous blood. That the volume of the hepatic canal is not in proportion with the Vena Porta, that fat a fluid much hydrogenated is secreted by the arterial blood &c. We shall take no part

+ Cholic Acid = $C_{52} H_{43} N S_2 O_{14}$ Cholic Acid = $C_{52} H_{43} N O_{12}$

Cholalic Acid = $C_{48} H_{40} O_{10}$ W. Gregory

part in this discussion, both opinions are equally destitute of proof, besides nothing rebuts the idea that both sorts of blood may serve in the Secretion" (pp. 459-60)

"The bile contributes very usefully in digestion, but the manner is unknown. In our present ignorance relative to the causes of diseases, we attribute noxious properties to the bile which it is probably far from possessing", p. 460.

"Chyme begins to change its properties at the orifices of the ductus choledochus & pancreatic canal; from a semi fluid consistence, sharp odor & slightly acid taste, but when mixed with the bile & Pancreatic juice, its color becomes yellowish its taste bitter its sharp odor diminishes much. If it proceed from matters containing grease or oil irregular filaments are seen to form here & there upon its surface" p262

Müller by Baly 1840. "In the duodenum the Chyme is acid. The stimulus which it exerts on the coats of the intestine, which is propogated along the ductus choledochus & its branches generally, give rise to the effusion of bile & pancreatic juice" p599

"Acading to Tiedemann & Gmelin the acidity of the Chyme gradually diminishes in approaching the Caecum. Their researches afford no satisfactory information relative to the office of the bile in the process of Chymification. The resin of the bile appears to them to be excrementitious having no influence in the Change which the food undergoes & forming a principal ingredient in the fecal matter."

"The Matters in the bile which have a share in producing the necessary changes in the Chyme, are probably the Picromel the osmazome the matter similar to Gliadin & the cholic acid; since it appears from the researches of Tiedemann & Gmelin that they do not exist in the excrements. Besides being excrementitious & neutralizing the acid of the Chyme, the bile must contribute to complete the solution of the Chyme, which was Hallers opinion, or it must serve to effect the conversion of the Chyme into the Chyle, that is as Prout supposes the production of albumen from the food. Sir Benjamin Brodie states that in ligature of the bile duct Chyle was no longer formed from the Chyme & Tiedemann & Gmelin on repeating Brodies experiments found that the coloring matter of the bile was detected in the blood & urine, & the contents of the large intestine had an unusually exceedingly fœtid odor & (I (Müller) have observed that of two portions of Spleen the one macerated in the bile, an ox the other in water, the former was longer of putrefying than the latter) the contents of the thoracic duct were not milky but transparent, pp. 602-3 Leuret & Lassaigne with Tiedemann & Gmelin attribute to the bile the property of dissolving the fat of decomposing it & forming with it a kind of soap & thus effecting its digestion, but experiments of Tiedemann & Gmelin shew that bile is not capable of dissolving the smallest quantity of fatty matter & can therefore contribute to its division & absorption only in a mechanical manner by effecting its suspension in minute particles" p604.

"The bile seems to be a necessary stimulus for the peristaltic motions of the intestines for when its flow is arrested constipation is the result" p604
"The Chyle of birds is not milky but transparent" & "Tiedemann & Gmelin declare that the milkiness of the Chyle is owing to its containing p606
fatty matter suspended in a state of fine division" p608.
"In a drop of Chyle taken from the thoracic duct of the dog I (Müller) by the Microscope detected numerous globules of oil" p609.
"Schultz found the blood of the Vena portae of a darker tint than other venous blood & the dark tint was most evident in animals which were fasting, neither neutral salts nor the action of the air had the effect of reddening it, its coagulum was less firm than that of other blood it contained less fibrine & albumen but more fatty matter" p. 620.
"The most abundant component of the bile, Picromel, has evidently some connection with the assimilation of the Chyme for it is not found in the faeces, but the Cholesterine Resin & Coloring matter of which no traces are found in the chyle are evidently excrementitious. The Liver therefore frees the blood from an excess of matters containing Carbon & Hydrogen & from fatty matter, while the Kidneys remove from it the superabundance of those materials which contain a large proportion of Nitrogen. The Coloring matter of the bile which is excrementitious also contains Nitrogen." "The Lungs & the Liver are so far analogous in as much as both separate from the blood substances containing a large proportion of Carbon. Earlier Physiologists & more recently Autenrieth & particularly Tiedemann & Gmelin have directed

attention to a certain Vicarious action in the functions of the Lungs & Liver" pp 164-5.

"Tiedemann & Meline maintain that the Encreased secretion of bile in tropical Climates, is required to compensate for the diminished purification of the blood in the Lungs on account of the rarefication of the air by heat" p166

"Carpenters Physiology" 1842 "In insects it is curious to observe in animals of such complex structure, that a few long tubes closed at one end & opening at the other into the alimentary canal are all which they have to represent a liver, but the wonder is readily accounted for by keeping in view the extremely active respiration of these beings; which renders unnecessary any other complex apparatus for elaborating Carbon from the System. On the other hand among the Mollusca the liver attains a much greater development, is of a lobulated character & forms a considerable portion of the mass of the viscera & is evidently of great importance in the economy of the animal, & we are at once struck with the fact that the development of the liver bears an inverse proportion to the opportunity afforded by the respiratory organs for the aeration of the blood. This conclusion is confirmed in an interesting manner by the fact by the crustacea which have the general organization of insects; but which inhabit the water & breathe by gills instead of by a Complex System

System of air tubes, & possess a liver corresponding in form & degree of developement with Molluscs. In Fishes & Reptiles the Liver is of considerable size & seems to perform a very important part in the decarbonization of the blood. In birds on the other hand whose respiration is so much more active the Liver is smaller. In Mammalia also it is comparatively small. The Liver of man is much less developed than that of many other Mammalia" pp439.40

"Previous to birth the Liver is the only decarbonizing organ the lungs being at that time inert, but as soon as the lungs come into play they separate from the venous blood a large proportion of the Carbon with which it is charged, & less blood is transmitted to the Liver for this purpose" p.449

"The amount of bile secreted seems to have some proportion to the amount of food digested. In those animals which are most constantly ingesting food, we find no gall bladder for in them the bile flows into the intestine as fast as it is formed. but in those animals which take food only occasionally the bile when not required in the Intestine digestion flows back into the gall bladder. In those who have died of Starvation the gall bladder is almost invariably found turgid with bile: an interesting fact, proving how entirely the passage of the bile into the intestine is dependent on the presence of aliment in the latter" pp551.2

"No certain information has as yet been obtained whether any of the elements of the bile are absorbed in the form of chyle; or whether the bile acts simply as a precipitant & is altogether cast out of the system with the useless portion of the Chyme. There can be no question however that by far the largest part of the secretion, is destined to be entirely thrown off it would seem from the character of its proximate elements as if it were destined to remove from the blood its superfluous hydrocarbon. It would not seem improbable, that the liver acts towards the absorbed matters which enter the blood by the Mesenteric veins, the same part which the lungs perform for those which are introduced through the lymphatic system, viz the affording an opportunity for the excretion of superfluous or injurious substances cont.d in the absorbed fluid before it enter the general current of the circulation. Carbon & Hydrogen being the materials of which the chyle contains most (when compared with blood) for the extrication of these the lungs & liver afford ready means, hence we see why the Lacteal system should terminate in a venous trunk near the heart, so that the fluid discharged by it will proceed at once to the lungs, & why the liver should receive the blood from the walls of the intestines" p/552-3

"The Effect of mixing Bile Pancreatic juice & Chyme out of the Stomach as performed by Dr Beaumont is to separate the chyme into three distinct parts viz a reddish brown sediment at the bottom, a

Whey

a lohey coloured fluid in the centre, & a creamy pellicle at the top. The centre part is probably that which is absorbed as chyle, the sediment partly consisting of insoluble portions of food & partly of the biliary matter itself, is evidently excrementitious, the creamy & oily part is probably taken up by the Lacteals & appears as fatty matter in the fluid drawn from them" p 359.

"Carpenter's Manual" 1844 "The Chemical nature of the bile & the destination of the fluid, are still matters of doubt. That a large part of the bile is purely excrementitious & is poured into the intestinal tube for the purpose of being carried out of the body can scarcely be questioned, But there is a probability that a part of its function consists in rendering the fatty matters of the aliment more soluble, the nature of the secretion being such as to give it in some degree the action of a soap. From the bile duct entering so high up in the canal it seems clear that it has a purpose to serve in connection with digestion, & is not destined solely for the purpose of being cast out of the body, a conclusion confirmed by the expiraments of Schwann who shewed that if the bile be made to escape by a fistulous orifice through the walls of the abdomen instead of into the intestinal canal, those animals which survive the immediate effects of the operation; subsequently die from inanition, almost as soon as if they had been entirely deprived of food. But on the other hand that one great object is to free the blood from certain products of the decomposition

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of the tissues; appears certain from the disorders of the nervous system & even death which may follow on the suppression of the secretion; although if secreted & again reabsorbed, the evil effects do not appear to be so immediately injurious" pp. 277-8
"The liver is more rarely absent than any other gland being discernible in some form or other in all but the very lowest of the animal kingdom" p 413 Bile is a solvent of fatty matters, hence the emaciation in Schwann's experiments, in which the bile was drained off by a fistula in the abdominal walls, the fatty matter of their food not being introduced into their absorbent system, nor applied to the maintenance of their respiration. The fatty matter of the bile when reabsorbed with the newly ingested food is probably like it carried off by the respiratory process, but it cannot be the chief source of fuel in the process of combustion, as supposed by Liebig, as it is easily shewn that the biliary matter cannot supply more than one seventh or one eighth of the amount of carbon eliminated from the lungs in the form of carbonic acid. The elements of the bile may be altogether supplied by the disintegration of the tissues, & this must certainly be the case when the amount of food taken is no more than enough to supply the waste of the system. We may regard it then as one office of the liver to remove from the blood such products of that disintegration as

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are rich in Carbon & hydrogen; but also to remove from the blood any superfluity in the nonazotised compounds derived from the food, beyond the amount required in respiration or that can be deposited as fat; as is shewn in the state called bilious, resulting from excesses, the cure for which is chiefly an avoidance of those articles of diet containing a large amount of nonazotised matter & in abstinence from superfluous nutriment of any description. That the less Hydro. Carbon separated from the blood by respiration, the more is eliminated from it by the biliary Secretion, seems to be a general principle throughout the animal kingdom. The Liver & Respiratory organs being almost Every where an inverse ratio to each other in their degree of development.
pp 420 1.

"Liebig's Animal Chemistry" by Gregory 1842 "It is strictly speaking the carbon of the compounds formed in the metamorphoses of the living tissues, that serves for the production of animal heat, by the oxygen of the blood through the arteries meeting these & combining with their Carbon to form Carbonic acid, with their hydrogen to form water. Every portion of these substances which escapes this process of oxydation is sent back into the circulation in the form of bile which by degrees entirely disappears" p 60.
"In the carnivora the bile contains the Carbon of the metamorphosed tissues; this carbon disappears in the animal

animal body & the bile disappears in the vital process. Its Carbon & Hydrogen are given out through the Skin & Lungs, as Carbonic acid & water, & hence it is obvious that the elements of the bile serve for respiration & for the production of animal heat" p 61

A man secretes daily about 20 ℥ fluidbile or about 9600 grains viz about 960 grains dried bile, but only about 21 grains dry bile can be got from his feces viz about one forty sixth part of what is secreted by the Liver." calculated from pp 64-5

Budd p. 31. gives One thirty fourth part, as his calculation

"Prout on Stomach & Disease" 1843. "The blood which has been robbed of many of its materials as well as of a portion of its vitality in the Chylopoietic viscera, becomes ill adapted for the future operations of life, till it has undergone some depurating process in the hepatic system: accordingly we find it passes through the liver where the unnatural & deteriorated matters, complementary to those which had been separated in the stomach &c.; are in their turn eliminated in conjunction with other matters as bile. But this important organ, performs a positive as well as a negative function, such as neu=tralizing the acid products of digestion, but this though important is perhaps subordinate to other secondary functions performed at the same time, of which we know but little. There is reason however to believe that

that certain of the biliary matters are reabsorbed with the Chyle, & perform various offices: one of the most import: of which seems to be more especially connected with the elimination of albumen from saccharine aliments, while another appears to be connected with the coloring matter of the blood" pp 503-4

"Gregory's organic chemistry" 1845 "Health in the animal body consists in the due balance or equilebrium between the oxidising & destructive agency of the atmosphere & the process of nutrition by which the other is compensated" p 561 "It is very interesting to remark that the composition of the chief elements of the bile & urine bear a close & simple relation to that of the blood & tissues. The bile one product of the destruction of the tissues (at least this is its origin in the carnivora & probably in the herbivora) undergoes resorption in the intestines & is finally oxidised into carbonic acid & water thus contributing to keep up the animal heat. The final result is that the tissues which may be supposed with the addition of a little oxygen to be resolved into cholic acid (Bile) & urate of ammonia (Urine) are entirely converted or oxydised into carbonic acid water & ammonia" p 562.

"The fat of the animal body is at all events in great part derived from the Nonazotised Elements of the food, when these are in excess & oxygen is deficient. In these Circum-=stances the deficiency of oxygen is supplied at the expense

of Sugar, Starch, gum, which by losing oxygen give rise to fat for the proportion of Carbon + hydrogen in Sugar & in fat are exactly the same, that of oxygen alone being different; hence the abundant formation of fat from farinaceous food favored by rest, that is, deficient aer=
=ation, as is shewn in stall fed animals & in the fattening of geese on maize + deprivation of locomotion. The formation of wax as well as of fat from Sugar by the bee is another Example" pp 661. 2.

"Erasmus Wilson" in "Todds Ency:" 1845? "The Liver performs two most important functions in the animal economy. It separates from the venous blood of the chylopoietic viscera elements which are needful for digestion & it depur=
=ates the blood, as is evidenced in a comparative examen=
=ation of the two great depurating organs the Lungs & the Liver, where the latter in the various classes of animals will constantly be found in exact relation with the devel=
=opement of the respiratory Organs & with the necessity for the removal of a large quantity of Hydrogen & Carbon from the blood. Thus in herbivorous animals in Man & in the Monkey it is small, & has reached its largest developement among mammiferous animals, in Carnivora. In birds it is large from the necessity of a highly oxygenated blood. In animals with cold blood & low degree of respiration it is large" p 178

"The uses of the bile are threefold 1st It acts chemically upon the Chyme & produces the separation of the Chyle 2d It Com=
=bines with the residium & forms the fecal matter. 3d It stimulates the mucous surface of the canal & promotes its secretion & the Contractile action of the Muscular coat" p181.

"Budd on Diseases of the Liver" 1845 "It is clear enough that a large proportion of the proper principles of the bile are derived from the waste of the body; in the carnivora, foetus & in hibernating animals during sleep, these materials must be its only source. The Liver Lungs & Kidneys are the three principal outlets for the waste of the tissues, & the larger amount of these elements discharged from the lungs as Water & Carbonic gas, the less Caters paribus must remain unburned to form Constituents of the bile" p24. "When we come to details regarding the purposes of the bile our knowledge is found to be much wanting in precision. Perhaps one of the most important purposes is to purify the blood by separating from it noxious & effete matters. There has been much debate among physiologists whether the principles of the bile are formed in the Liver, or are not rather merely separated by this organ from the blood" p28. "It tends also to purify the blood by separating from it those impurities which it must absorbe from the Intestinal Canal p28

"There are many reasons for believing that the fatty matters we take as food undergo the needful modification (for their absorption) in mixing with bile p29.

"If the soda of the bile unite with the acid of the chyme its character as a soap will be destroyed, & hence it cannot alone & the same time act on fats as usually supposed, besides the amount of soda seems too small to neutralize the acidity of the chyme" p31.

"As 13 2/10 3 Carbon escape daily through the Skin & lungs as carbonic acid & as the bile daily secreted by man furnishes only 1 5/10 3 it follows that the bile cannot be a chief source of support to respiration" p32. It is a formidable objection to the Vicarious theory between the lungs & liver in separating Hydrogen & Carbon that in the serpent whose respiration is extremely feeble the excrement does not contain a particle of bile p32.

"If in hot climates the food be not regulated in accordance with the smaller need of the economy as to animal heat, an excess of bile is formed & bilious vomiting & diarrhoea follow, Hence also the repugnance to rich meats & the greater tendency which these & spirits unquestionably have to produce fever disease in hot seasons & in tropical climates, Hence also the biliousness of an indolent life & conversely the clear complexion of the Sportsman" p33

"Light diet, early rising, Cool Climate & acids are the Means of Cure" p35.

"Kuhes" "Paget" 1848 "In the foetus there is no respiration but the Liver is proportionally larger than after birth, & the Secretion of bile is active although there is no food in the intestinal canal. At both the intestinal canal is full of thick bile mixed with intestinal secretion viz the Meconium. In the foetus therefore the main purpose of the secretion of bile must be the purification of the blood by direct excretion. Probably all the bile secreted in foetal life is incorporated in the meconium & with it discharged & thus the liver may be said to discharge a function vicarious with the lungs. This makes it highly probable that the bile in extra uterine life is also at least for the most part destined to be discharged as excrement. But the analysis of faeces both of children & adults shews only a part of the bile that is secreted viz only its coloring & some of its fatty matters, but none of its essential principle the biline; but this has such a preponderance of Carbon & Hydrogen that it cannot be appropriated to the nutrition of the tissues, therefore it may be presumed that after absorption the Carbon & hydrogen uniting with oxygen are excreted as water & Carbonic acid gas; & thus Combination of C & H with Oxygen is very probably connected with the Development of heat. The Chief purpose of the secretion of bile may thus appear to be the purification of the blood by excretion, yet there is reason to believe that while in the intestine it serves the purpose of digestion. Respecting the nature

of

of this influence little is known. It is supposed that the bile in some way assists in changing Chyme into Chyle & in rendering it capable of being absorbed by the Lacteals. It has been held also that the bile has the power of transforming the Saccharine principles of the food into fat & the discovery of Nickel that when Sugar is mixed with bile out of the body part of it is converted into fatty matter seems to countenance this view, but the bile of Carnivora can have no such office. There is no certainty of more than the general fact that some influence is exercised by the bile on the contents of the Small intestine. Nothing is really known of the changes effected by the mixture of the bile with the food, neither is any thing certain respecting the change which the reabsorbed portions of the bile undergo, in either the intestines or in the Absorbent vessels" pp 442-3.4.5.6.

with

With the exception of Magendie, who wrote at a time before animal Chemistry had made much progress, it will be very evident from a perusal of the above quotations, that although the Physiologists quoted, admit that the bile serves an important purpose in the process of digestion, yet they all speak of this as an obscure & undefined subject, while on the other hand they all with the greatest freedom & confidence speak of the excretory function of the Liver; viz for the discharge of hydro-carbonaceous matters, the result of the waste of the tissues; as a subject almost beyond dispute; while Mr Carpenter & Messrs Kirkes & Paget speak of this office as the chief function of the Gland.

The Arguments produced in favor of this Excretory Theory are mainly three.

1st "If bile be not secreted there is Jaundice, which may be fatal; therefore the bile is mainly excrementitious"

2° "In hot Climates where from the rarity of the air Oxygen is deficient & therefore a deficient Oxydation & Excretion of Hydro-carbonaceous matters, from the Lungs, exists, there is biliousness; & an additional call made upon the Liver to excrete these superfluous hydrocarbonaceous matters:

hence

hence diarrhœa & bilious vomiting. Therefore the lungs & the liver are vicarious in function & that function is the excretion of Hydrocarbonaceous matters"

3. "This vicarious function is further illustrated, by the law of inverse ratio which subsists between the developement of the lungs & the liver in the animal series, & further by the immense developement of the fœtal liver: the lungs being in this case un= =developed & unemployed"

Now although we do not deny that the liver serves an excreting purpose, yet from arguments which we shall afterwards adduce, it appears to us, extremely unlikely that this should be its chief function, while on the other hand it appears to us that the arguments brought forward on the opposite side of this question, are without much difficulty, easily shewn to be unsound. and.

1st It is said that "If bile be not secreted there is jaundice which may be fatal, therefore the bile is mainly excrementitious"

In answer to this it may be replied, first, that there is

no

no proof that this fatality arises from the presence of those matters in the blood which should have been excreted as bile, because there is generally in these cases Urea also found in the blood, wch a sufficient cause for the effect produced by death. 2d granting that the poisoning does arise from the presence of matters which should have been excreted as bile: this by no means proves that all the matters going to form bile are poisonous, but merely a certain number of them. But 3d granting that all such retained matters are the source of this poisoning, this does not prove that secreted bile is an excrement, for as Dr Alison has shewn; if bile be once secreted & again reabsorbed the aforesaid fatal jaundice does not occur. Therefore the poison is not in the bile, & therefore he might add, bile is not a mere excrement.

2d. It is said that "In hot climates where from the rarity of the air oxygen is deficient & therefore a deficient oxy=
=dation & excretion by the lungs of hydro carbonaceous matters exists, there is biliousness, & an additional call made upon the Liver to excrete these hydro-
=Carbonaceous matters; & hence diarrhoea & bilious vomiting. Therefore the Lungs & the Liver are vicarious in function & that function is the excretion of hydro-Carbonaceous matters"

In answer to this we observe, that doubtless where from indolence induced by heat, there is a deficient muscular exertion maintained, & a consequent deficient Respiration & oxydation of the tissues & excretion of such by the Lungs, as hydrocarbonaceous matters: & a consequent biliousness; yet with sufficient exercise & temperance there is in hot climates, as in cold, an immunity from this biliousness. Again as to an excessive discharge of bile with diarrhoea & vomiting in hot climates, there is nothing to prove that this arises from a deficiency of oxygen in the air; & not rather from the presence of that natural Stimulus of the Liver, viz Heat, being in excess. For in temperate climates the indolent are continually liable to what is called biliousness, but not often to diseases of the Liver, unless as with Cooks there be exposure to great heat together with that intestinal, & consequently Hepatic irritation, produced by the over excitement of rich foods and spirituous liquors.

3. It is said that "This Vicarious function is further illustrated, by the law of inverse ratio which subsists between the developement of the Lungs & the Liver in the animal series; & further by the immense developement of the foetal Liver, the Lungs in this case being undeveloped & unemployed."

as

As Messrs Kirkes & Paget carry this argument further than any of the other physiologists, we have quoted; we shall now proceed to shew the extraordinary amount of error into which in this matter they have fallen. They say (Thesis p 25) "In the foetus probably all the bile formed is excreted into the intestinal canal, to be there found at birth with the Meconium; Therefore as is probable that in extra Uterine life also, the bile is mainly excrementitious"

Now we know that the adult human liver secretes from ℥xii to ℥xx (fluid ounces) of bile per day say ℥xv. That is the liver being from 40 to 50 ounces in weight secretes daily one third of its weight of fluid bile. The foetal liver at birth is about ℥viii in weight if we calculate its average weight from the fifth month, when it is about one third of its full weight, up to the full period, we obtain an average of fully ℥iii as the weight of the foetal liver extending over a period of six lunar months, now this at the admitted action of the adult gland should give ℥i per day of fluid bile & therefore at the birth of the infant, we should, according to Messrs K & P. find 168 fluid ounces of bile in the intestinal canal. But what do we find? only about two ounces of Meconium & mucus & bile mixed! viz about, say one fluid ounce of bile instead of the 168 fluid ounces we should expect!. To this it may be

be objected that we should only look for solid bile, the fluid part being reabsorbed. If this be granted, still we should find ʒxvii of solid bile instead of which we shall find probably not more than ¼ of an ounce, or about the 1/68 part of what we should demand if the theory propounded were true.

We have thus endeavoured to shew 1st. That fatal Jaundice accompanying the non-secretion of bile does not prove bile to be an Excrement

2d. That there is no proof that deficiency of oxygen in the air is the cause, in hot Climates, of a superfluity of bile in the duodenum.

3d. That the doctrine of a vicariousness, as subsisting between the Lungs & the Liver, as Excreting organs, rests only on an hypothesis, which is with regard to the foetus easily shewn to be manifestly untenable.

If we now proceed from the negative to the more positive side of the argument, we shall find the strongest reasons against this doctrine of the Liver being mainly an Excreting organ - and

1st. The immense size of the gland & its most beautiful & Complicated Structure, together with its nucleated secreting

hepatic

Hepatic cells, is apriori a strong argument against the doctrine of its main function being excretory.

2°. The Amount of supposed excrement daily produced viz about ℥ij of solid hydrocarbonaceous matter, is a most inadequate result to be furnished by so large & complicated a gland, seeing that the Lungs & Skin excrete about ℥xiv daily

3° There appears little necessity for this Elimination of hydro-carbonaceous matter, seeing that if, as is said, it be reabsorbed it could furnish only about 1/8th part of the daily required Animal heat, produced by the Combustion in the lungs of effete hydrocarbonaceous matters.

4th. Although most bountiful nature, ever scatters her gifts with the utmost luxuriousness of hand; yet in so doing she ever employs the utmost economy of means; producing from the smallest possible causes the largest possible results - If then all that is required be the excretion of the effete Hydro-Carbonaceous matters from the system, the result of the waste of the tissues, then there exists no necessity for the Liver at all, because the Lungs are the admitted Natural Emunctory of such products; And to say that these are first excreted by the Liver, second reabsorbed by the Lacteals, third,

again

again excreted by the lungs, is to attribute to nature a process of circumlocution & supererogation such as she is never guilty of.

5th As Dr Alison has shewn, if bile be secreted & then reabsorbed the effects on the system are not poisonous, as they probably are if the elements of the bile be not first separated from the blood by the liver. This proves 1st that the Lungs cannot separate these elements from the blood, for if so why jaundice & why poisoning. 2° that therefore these elements are not mere hydro-carbonaceous matters, the waste of the tissues. 3° That the bile is therefore a new & important chemical product created by the Liver.

6th From the fact that in the lower animals, as in the Echinodermata, Myriopoda & Conchifera, the bile is poured into the stomach, while in the higher animals, as from the fish upwards to man, it is, not poured into the Colon, or the rectum; but into the duodenum, & from the fact that there is no gall bladder in those animals most constantly ingesting food, & from the fact that the presence of Chyme &c in the duodenum is a necessary stimulus to the flow of bile into that Cavity; & from the converse fact that when this

Stim.

stimulus does not exist, the bile is hoarded up in the gall bladder, to be poured out only when chyme reaches the Duodenum — We find it impossible to resist the conclusion, & in truth the facts seem imperatively to demand of us to believe, that the main purpose of the liver is for the function of digestion & that the bile is not an excrement.

7th In connection with the above, the further fact of no true Chyle being found in the thoracic duct if the bile be by a fistulous opening in the walls of the abdomen drained out of the body, but death resulting as from a consequence of Starvation — We attain to a something like a perfect demonstration, that the bile is not an excrement; but that its presence is essential to the digestive process & to the Life of the animal.

8th The Skin & the Lungs are most cordially vicarious in function, & relieve each other with the utmost good-will & without any derangement to the System as a result of the one being plus & the other minus in its action. But no sooner is the liver called upon for a little extra vicarious work (as is supposed) than it & the System generally manifest great disturbance & dissatisfaction & truly with

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a bad grace does it perform the duties of the Vicarage!
But indeed this is a sufficient proof that its normal
function is not one, vicarious with that of the Lungs.

9. But lastly, this doctrine of the Vicariousness supposed to exist between the Lungs & the Liver as a chief function, seems to be in part founded on a curious oversight. For what is the chief function of the Lungs? Evidently not to excrete Hydrocarbonaceous matters but to absorbe Oxygen. If then a Vicariousness subsist, the chief function of the Liver should also be to absorbe oxygen - but this it never does. Therefore this doctrine of the Vicariousness between the Lungs & the Liver is not founded on, but is contrary to fact.

What then is the function of the Liver?
This question has been already in part answered by shewing, that the presence of the bile in the Duodenum with the Chyme, is essential to the nourishment & to the Life of the extra uterine Animal.
Seeing that Physiologists have observed & recognized these facts, it is certainly somewhat remarkable that instead of bringing their minds to bear upon them, they should have chosen rather to go about to establish the doctrine of an Excretory Vicariousness.

What then is the immediate result of the bile being mixed with the Chyme for it is here that we must look for the function of the Liver?

According to Dr Beaumont If bile, (& Pancreatic juice) be mixed with Chyme out of the body It separates into a Sediment at the bottom a Whey like fluid in the Centre & a Creamy Pellicle at the top. Tiedemann & Gmelin as quoted by Müller say, that the Milkiness of the Chyle is owing to minute particles of fat being held in minute division which division they believe to have been accomplished by the bile. And Müller says that he himself observed numerous globules of Oil in a drop of Chyle taken from the thoracic duct & placed under the Microscope he adds these Oil globules evidently caused the Milkiness of the Chyle.

According to "Sharpey" Chyle consists of 1. Chyle Corpuscles 2. Molecules $\frac{1}{3600}$ $\frac{1}{1200}$, called by Mr Gulliver the molecular base of the Chyle, are opaque bodies instantly soluble on Ether & therefore presumed to be fatty matter, Chyle becoming nearly transparent on their solution. 3 oil globules. 4 Minute Spherules probably albuminous.

According to Dr Rees the Chyle of an Ass consists of

Water	90.237
Albuminous matter	3.576
Fibrinous matter	0.370
Extractive Sol: in Water & alcohol	0 332
Do Soluble in Water only	1.233
× Fatty Matter	3.601
Alkaline Chloride - Carbonate &c	0.761
	100.000

Bile. besides the effects produced as spoken of in the last page, affords a coloring matter which goes to the faeces, it affords also a principle which acts on the peristaltic action of the intestines: as also antiseptic principles; also discharged with the faeces. It would appear also to act as a saponifier of fats. We have already produced the strongest proofs against its being a mere excrement & we have also seen that only about 1/30 to 1/50 of its amount is excreted by the intestines, but even that strikingly small amount, serving the purposes in its passage of a purgative & an antiseptic, and as to its principles being consumed in the lungs we have also seen that this opinion rests on an hypothesis which the facts which we have produced with regard to the foetus would seem to subvert.

The grand Function then of the Bill appears to us to be as exhibited on the last page. To create from the Chyme The Fatty molecules & Oil globules of the Chyle.

We learn from Dr Gregory (Thesis p 21-2) That fat (especially in such animals as do not eat fat) is probably formed from the non azotised elements of their food. Sugar, Gum, Starch, which if deprived of certain equivalents of Oxygen are reduced to an identity with fat in composition,

Viz

That is Starch = C24. H20. O20 − O18 = Fat C24. H20. O2.
Now with the greatest deference for the learning of the Chemists & with the deepest sense of my own ignorance in the minutiæ of Chemistry, it seems to me that this theory is somewhat, though not entirely applicable, to the formation of fatty matter & oil globules by the mixing of the bile with the chyme.
My own idea is that the fatty matter & oil globules formed in the Chyme by the presence of the Bile; is the result, not of Oxygen being taken away, but of the proportion of Oxygen being relatively demenished, by the addition of the Hydrogen & Carbon of the bile.

We have no formula for Chyme but accepting of the formula for blood as probably not differing much from what we may anticipate that for Chyme to be
Then we have Blood = C48. H36. O14. N6
If to this we add the formula of Bile = C76. H66. O22. N2
If this be divided by a common divisor we obtain a very near result to } 51 | C124. H102. O36. N8
C 24. H20. O7. N1.5 = Fat.

Of Course it is not pretended that the manner of this Calculation is strictly Scientific, or the result extremely Satisfactory. But still it appears to us to be sufficiently so, to merit some attention, nor is it difficult to

Suppose, nor perhaps do we ask too much in supposing, that the Extra 05 & Nl.5 may be of those constituents of the bile which are passed out of the body with the faeces. But whatever be the process by which the bile creates fat from the chyme this we know for certain that fatty Molecules & oil globules do result on the Bile being added to the chyme.

Now if we accept of the suggestions of Ascherson & of Dr Bennett as illustrated by Dr Williams with reference to Cod liver oil in the 1st No of the "London Journal of Medicine", it appears scarcely possible to overestimate the Value of the aforesaid fatty Molecules & oil globules of the Chyle.

Dr Williams, after quoting several illustrations of the almost miraculous benefits derived from the exhibition of Cod liver oil, & mentioning one instance in which a patient by the consumption of 8lbs of the oil gained 40lb in weight, adds that "The effect of the oil seems to be to increase the healthy function of the liver & thus add to the general health vigor of the system". He says also "There is much reason to believe that Cod liver oil proves serviceable in supplying the fat Molecules which appear to be essential to healthy nutrition as forming the nuclei of the primary cells or rudiments of tissues"

Ire

Now with reference to this idea of Aschenson & others; & knowing as we do that no other oils yet known act so beneficially in Phthisis as oils got from the Livers of fishes; it certainly appears extremely probable: that the Liver not only has the power of creating oil by its secretion the bile, but that it has also a power of creating an oil, which would seem to preside over the formation of the nutritive & formative Process.

Thus then we have arrived at what may be called the Proximate function of the Liver - But if from the proximate, we ventured to arrive at the ultimate power of the gland, we would suggest that that Power, was,

Hydrogen.

In the Sciences the grandest discovery ever made by Man, is that of Newton, viz the Antagonism of two. the Centrifugal & the Centripetal forces, attraction & Repulsion, the To & the From, Concentration & Irradiation.

These two powers are of unusual application, alike in the Mental as in the physical world.

We have Day & Night, Light & darkness, Hot & Cold

Summer

Summer & Winter. The two sexes. The good & the Bad Imagination & Reasoning. The "Preserver" God the "destroyer" Satan

In Chemistry this Antagonism again exists in Oxygen & Hydrogen

Oxygen eats into & corrodes all Substances, even the Metals, it hardens in so doing, & by its oxydising powers, are the tissues of the human frame consumed.

Hydrogen on the other hand, in that form in which we know it best, is a softner & solvent of matter. by Water are plants nourished & built up. while it is by Fat as we have seen that the life & growth of man is maintained, that is by Hydrogen, carried on its base Carbon.

In the decomposition of Water by the Battery, Oxygen appears at the positive, Hydrogen, at the negative pole.

The Immortal Faraday, has shewn Oxygen to be magnetic. We are not aware that he has tested Hydrogen, yet When its day comes, we doubt not but that it will shew to be diamagnetic.

Perhaps, as hinted by that most original of thinkers, & hard working of men, John Dove, Oxygen and Hydrogen shall one day be

Shewn

Shewn to be but the Posture of the Negative manifestations of
the Powers. See "Builder" 22d Feb 51.

Oxygen is the presiding Spirit in the air, Hydrogen is the
presiding Spirit of the Waters.

By the Lungs the human frame is Oxygenated.
By the Liver the human frame is Hydrogenated.

As air is the true Stimulus to the Lungs,
So Water is known to be the best of Cholagogues:
And as nitrous oxide is an inflammatory Stimulus to the Lungs,
So Alcohol is, in excess, a deadly enemy to the Liver.

As by the Lungs Oxygen enters for the destruction of the tissues,
So by the Liver, Hydrogen is sent to build up & replenish the same.

Between the Lungs & the Liver then, we reject the doctrine
of Vicariousness, & we substitute that of an Antagonism.

Between the Lungs & the Liver there exists no analogy, that they
both receive, & both act upon venous blood.

But the Lungs replenish that blood which has lost its energy,
chiefly by its action on those parts presided over by the
Cerebro-

Cerebro-Spinal nerves of the muscles, bones, & brain itself.

While the Liver replenishes that blood which has lost its energy, by its action on those parts presided over by the Vegetative system of Nerves, viz the Glands & Chylopoietic Viscera. natures laboratory.

The Lungs restore that oxygen so necessary to the Stimulating Muscles,
(Gastric juice analagous to Hydrochloric acid)
The Liver restores that Hydrogen, so paramount in the formative power.

The Lungs restore that oxygen by a process greatly mechanical (endosmose)
The Liver restores that Hydrogen by a process purely Chemical

The Source of this oxygen is in the air, taken in by the mouth.
The Source of the Hydrogen is in the water drunk by the mouth & exposed to the Capillaries of the Mesenteric Veins, absorbed & carried to the Liver.

The Pulmonary artery is analagous somewhat to the portal veins for they both go for the amendment of their Contents:
And the Pulmonary Veins are analagous to the bile ducts for they both restore to the system the things which were lost.

Oxygen as being a hardener is analagous to cold.
Hydrogen from its rarity, lightness & Radiant qualities is analagous to heat.

It is in cold climates where Oxygen is plus that Phthysis prevails &
It is in hot climates where Heat is plus that Hepatitis prevails

Diseases of the Liver prevail more in Men than in Women &
Diseases of the Lungs prevail more in Women than in Men.

Disease of the Liver in Man, is accompanied by a dry Skin,
a dull eye, a sour Temper, & a tendency to the profane.

Disease of the Lungs in Woman is accompanied by a perspiring
Skin, an angelic eye, a loving Spirit, & a tendency for
Heir towards the beatific, the Spiritual & the worship of God.

The Bird & of birds the Eagle is the type of the highest Oxygenated
Animal. Its motions are excessively rapid, its bones are excess=
=ively hard & its flesh is excessively lean

The Molluscs & of Molluscs the Snail is the type of the highest
Hydrogenised (Aqueised) Animal. Its motions are
excessively slow its tissues are excessively soft & its Condition
is almost entirely fat.

The Eagle dies from a slight wound (Comparatively)
The Snail can regrow her amputated head!

Between the fish & the foetus there are strong analogies.
The Fish breathes by gills bathed in water;
The foetus by placental tufts (gills) bathed in the placental blood.
They are both suspended in fluid.
In both the Liver is immense.
The fish can survive great injuries, &
The foetus will make an attempt to repair an amputated hand - for in it the Liver is predominant, that is to say the Plastic, formative, & Generative power of Hydrogen.
The Liver of the fish abounds in the plastic fat Molecules &
The foetus is if healthy extremely fat.
The Fish can live ten years without solid, intestinal food &
The foetus lives for ten months in like manner).

It is in the earliest foetus, when the Liver is at its largest, that the formative power has reached the Climacteric.

Man is the highest type of the Oxygenated - His Lungs are large his abdomen small - his respiration full, his pride is in his strength, his Muscles are hard, his outline angular - he acts, is prompt, & Reasoning.

Woman is the highest type of the Hydrogenated - Her lungs are moderate her abdomen full, her respiration soft,

She

She is not proud, nor hard, but gentle, & rounded in form
She persuades rather than acts; and her strength, is not
in reasoning, but in instinctiveness.

Angels, as the Ideal of the poets' pen, & Sculptors' hand,
are of neither Sex, but a melting into one of both.
In them the pride of Man is supplanted by pure dignity;
& the instinct of woman by the Spirit of prophecy.
They have no developed organs of generation nor intestinal
canal, but as in the early fœtus, the Liver fills that Cavity; &
They can live for ever & yet never eat.

In the voice of the People, must often have been uttered
the voice of God. & in the Superstitions of the vulgar,
must often have been exhibited a blind utterance
of the deepest Truths. For in the oldest of days
God conversed daily with men, & therefore in the traditions
of the Ancients, may have come down to us the
deepest of wisdom.

The Ancients said that in the Liver resided the passions,
Especially of Love & hate, & in this they were right.
for as we have seen, its
healthy action is towards beauty & Life while in
its derangement is the profane & bitterness.

They also looked upon the Liver, to find the prediction of events. In this they were wrong, for out of the body the Liver is but a mass of dead flesh - but the Customs Shewed the perversion of a wise tradition.

The Mythus of Prometheus, is probably the Story of our Eve. Eve attempted to steal out of Paradise "a knowledge of good & Evil" by the Prophetic Spirit.
Prometheus was "the Prophetic man" & did steal from out of Heaven the Sacred fire.
Eve was despiritualized (dehidrogenated) She came under the dominion of Satan by (oxygen) the "destroyer" & was made Subject to death, but Saved by Christ.
Prometheus, was dooms also to be despiritualized, that is, for Ever to have his Hydrogenating organ his Liver Consumed - & mark, it was consumed by an Eagle the highest type of the Oxygenated - it was consumed also during the day that is when respiration or oxygen is most active & it grew each night that is, when in Sleep the respiration is Stall, & the Liver therefore plus - And thus it was that he was saved by Hercules.

Hydrogen is the lightest & most Spiritual of substances. Hasn't then beyond the above Mythus any revelation to offer?

H.W.

It is in darkness, excluded from Light & air, that the Germ, potentially the tree, or the Animal; mysteriously, is called into being.

In the deepest Spiritual Contemplation the Lungs are almost still. &
It is from out of the centre of the deepest stillness & sleep that the illumination of the Spiritual beams forth in the Clairvoyant.

Plato somewhere says, the Snail is the Emblem of Prophetic Life. and Oken probably thinking on this, has these curious words. 3592-3 "In the Snail the Cardinal organ is the Liver. gazing upon a Snail one believes that he finds the prophesying goddess sitting upon the tripod."

The Bible continually speaks of the "Waters of Life" (Hydrogen)
The Bible also says "The fat is the Lord's" (Lev III. 16) (Fat = Hydrogen)
The Miracles of Christ were chiefly Miracles of nutrition, of the restoration of withered limbs & lost sight.
We have seen that the Liver is the source of the nutritive & formative power.
Do we push this argument too far in saying that that Power is by Hydrogen.?

Nature exists by the equal balance of two powers - That of attraction & that of Repulsion.
If the Law of attraction alone prevailed, then there could be no life or growth but a dead hard mass.
If the Law of Repulsion alone prevailed, there could be no form, no structure, perhaps no matter, matter being but the result of a force, a power, a fiat, for God Created all things out of Nothing

Therefore the antagonistic powers of Oxygen & Hydrogen, are essential to the life & nutrition of man &c. Dr Gregory says truly. "Health in the animal body consists in the due balance or equilebrium between the oxydising or destructive agency of the atmosphere, & the process of Nutrition by which the other is Compensated."

a consideration
But we fear lest from alone of analogues & Contrasts & of the wonderful in Gods Earth, we may sometimes have gone Somewhat beyond the rigid boundaries of Science. If so, we hope that at least we have never written Contrary to its true Spirit, Because we have ever desired, to be guided by that Loving & Upright Earnestness, without which it would not seem in accordance with Man's higher nature to believe; that any one Shall ever receive that most blessed Gift; of Extending the boundaries of Knowlege & ameliorating the Condition of his race.

Ingenious, and in many points accurate. In others too hasty.
William Gregory