

F. F. F. F. Its Adhesions to the *Peritoneum*.

G. An Opening into the External Bag or *Abscess*, or Incision into it.

H. H. H. H. H. Elongations and Inequalities in it.

O. O. O. O. The Angles of the *Cystis* open'd, shewing in its back Parts an Elongation opening into it at *P*.

FIG. II.

A. A. A. The concave Side of the Liver.

B. The *Vena umbilicalis*.

C. The *Vesica biliaria* emptied, which when full cover'd almost all the Inside of the Right Lobe on its back Part.

D. D. D. D. D. D. Several Elongations or Expansions of the *Vesica* opening into the Gall-Bladder.

E. The cretaceous Bag in its Duplication full of Chalk, intermix'd with hard white irregular Stones.

VIII. *Some Observations on the Case of Mr. Le Grange*, by Alexander Stuart, *M. D.*
F. R. S. &c.

THE Symptoms during Life, recited by Mr. *Amyand* in the foregoing Paper, and the Appearances in the Body open'd, which I was Witness to, therein likewise fully narrated, I hope it may not be unacceptable to point out what appears to me to be the mechanical and necessary Connexion between these apparent Causes and their Effects, in this uncommon Case.

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I. As to the original or prime Cause of all the Symptoms, to wit, the Distention of the Gall-Bladder, now become a morbid *Cystis* of an enormous Extent.

If we consider the Size and Figure of the Liver, and Situation of the Gall-Bladder, with the Course or Direction of the Biliary Vessels, from various Places of the Liver, towards that narrow Space where the *Pori biliarii* open into the *Cystis*, it will appear, that in almost every Position of the Body, at least in an erect, supine and lateral Position, some of these biliary Ducts terminating in the Gall-Bladder, are perpendicular or nearly perpendicular to the Horizon and to the *Cystis*: Therefore, as far as Gravity takes Place in the Animal Oeconomy, the Bile descending by these Ducts, will press upon the Contents of the full *Cystis* and its Sides, as a Cylinder of that Fluid, of the Length of the Secretory Ducts or Pipes, and of the Diameter of the *Cystis*.

Besides this, the Extremity of every one of these small Ducts, conveys its Fluid into the full *Cystis*, as a Wedge acted upon by the repeated Strokes, Impulses, or Pressure of the circulating Blood of the *Vena Porta*, where it supplies the Gland at the Origine of each secretory Duct.

Therefore, by the known Laws of Hydrostaticks and Mechanicks, it is apparent, that the Force of this Secretion of the Bile into the Gall-Bladder is very great, and the Quantity copious; sufficient at least to distend the *Cystis* to an enormous Pitch, where the Discharge by the *Ductus cysticus* is not equal to the Secretion by the *Pori biliarii* and the *Ductus hepaticocysticus*.

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These Powers mention'd do sufficiently account for the Distention of the *Abdomen* in an *Ascites*, of the Womb in Gestation, of the Bladder in a morbid or voluntary Retention of Urine; also of morbid Impostems or Tumors, and of the Gall-Bladder in the Case before us.

But this Distention could never have happen'd, without a total or partial Obstruction of the excretory Duct, the *Ductus cysticus*.

Had this Obstruction been at once total, as when a Calculus is thrown suddenly out of the *Cystis* into the Duct, and stops it totally, he must have had the Jaundice immediately, or very soon after: For, notwithstanding the strong Powers above-mention'd, it would have been impossible for the Sides of the *Cystis* to have yielded to such a sudden Dilatation, no more than the Womb in the first Week of Gestation, can be dilated to the Pitch it is brought to in the Ninth Month, without a Rupture: So that the Dilatation here must have been very slow and gradual, and therefore the Obstruction must have been at first, and probably for many Years, only partial; and the Gall-Bladder thus slowly distended, gradually yielded and gave way only for the Reception of the Excess of the Secretion beyond the Excretion, and so prevented the Jaundice, or Regurgitation of the Bile into the Blood.

This partial Obstruction of the cystic Duct may probably have been occasion'd by one of those small soft incysted Tumors, lodged between the Membranes of the *Cystis fellea*, near the Origin of its excretory Duct, containing a soft white pultaceous Matter, with *Calculus's* or chalky Concretions in its Centre. If this was the Case, it is conceivable that while the Con-

rents of this small incysted Tumour was fluid or soft, it might not be capable to obstruct totally the Current of the Bile through the excretory Duct: But as the Matter of it grew thicker, and its Bulk increas'd, by pressing gradually more and more upon the Duct, the Obstruction must increase; and the Formation of *Calculus's*, by their Pressure, must at last make the Obstruction total. But as the cystic Duct was at opening of the Body intirely coalesced and obliterated, its Vicinity and Situation, with respect to these small incysted pultaceous and cretaceous Tumours, cannot be precisely determin'd; and therefore this is offer'd only as a probable Conjecture.

The Bulk, Contents, and Adherences of the Gall-Bladder to the Right side, were without doubt to him a very sensible, and to us avisible Cause of his first Symptom, the increasing Weight he had felt in the Region of the Liver, for 14 Years before his Death.

The Current of moving Humours in the Animal Body, is always determin'd most strongly to the Place of least Resistance: Therefore by the partial Obstruction of the cystic Duct, a greater Quantity of Bile than usual will be forc'd upon the biliary Ducts, leading directly from the Liver into the great hepatic Duct, to discharge itself by the *Choledochus communis* into the *Duodenum*, sufficient for the moderate Uses of the Animal Oeconomy; though not so perfectly sufficient, but that the peristaltic Motion in our Case felt the want of the cystic Bile, or at least the Defect of it, so far as to become weak and imperfect, too weak to propel the Excrements, or keep the elastic Air within due Bounds; and therefore the Patient must be subject to flatulent Distentions,
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and some Degree of Costiveness, only to be reliev'd by supplying the want of a sufficient natural Stimulus of the Gall, by the artificial Stimulus of Purgatives and Clysters, to assist from time to time the Expulsion both of the Excrements and also of the Flatus's, for the Ease of the Patient, as was practis'd in this Case.

As to the Jaundice which began to shew itself four Months before his Death, and continued increasing till the external purulent Tumour in his Side was open'd, when it began to decline, and quite disappear'd soon after the Gall-Bladder burst.

It is easy to conceive, that so long as the Gall, descending from the *Pori biliarii*, could make its Way into the *Cystis fellea*, and dilate it, there could be no Regurgitation of the Bile into the Blood, and therefore no Jaundice: But so soon as the purulent Impoſtem began to form itself in the Neighbourhood and Contact of the distended Gall-Bladder, it inroach'd or press'd upon the *Cystis fellea*, by the Force of a Multitude of Vessels, pouring Pus into the Cavity of the Impoſtem, urged on by the Circulation of the Blood, which is more forcible in these Vessels than in those of the Liver: And therefore this purulent Tumour increasing, will very forcibly inroach on the *Cystis fellea* in Contact with it, and not only hinder its farther Distention, but even force the Gall it contains to regurgitate, or return again by the *Pori biliarii* upwards, and from thence by the Capillaries of the *Vena cava* into the Blood, and so produce the Jaundice; without raising an Inflammation or Obstruction in the Liver itself, whose Vessels and Passages remain open, though the Bile take a retrograde Course in its biliary secretory Ducts.

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But so soon as this accessory Pressure is taken off from the *Cystis fellea*, by opening and emptying the purulent Tumour or Impoſtem in its Neighbourhood, adjoining and adhering to it, the Bile begins again to flow freely into the *Cystis fellea*, and to dilate it as before; therefore the Regurgitation of the Bile into the Blood ceaſeth, and the Jaundice begins to decline.

Then ſo ſoon as the Rupture or Burſting of the Gall-Bladder happened, and it began to be emptied, all Degrees of Reſiſtance being now totally taken off from the *Pori biliarii*, they ſpew out their Contents ſo copiouſly, that the Hepatic Ducts are gradually fruſtrated by ſuch a ſtrong Revulſion; the Bile begins to flow all to the wounded and almoſt emptied *Cyſtis biliaria*, and either very little or none to be carried by the *Ductus hepaticus* to the *Choledochus communis*, whoſe Diameter and Paſſage into the *Duodenum* we found larger than uſual, but empty. In this State, which was the laſt Stage of his Diſtemper, the periltaltic Motion begins to fail, the Expulſion of the Excrements to be very tardy, or not at all to ſucceed without the Aſſiſtance of purging Medicines or Clyſters, which alſo had but a very ſlender Effect; the Patient ceaſeth to be nouriſhed, tho' he took a competent Quantity of Food, and dies in a Week after this Coſtivenefs began.

The Degree of Perfection of the Natural, Vital and Animal Functions in this Perſon, during 14 Years Indiſpoſition, was certainly owing to the Soundneſs of all the *Viſcera*, and an almoſt ſufficient Secretion and Excretion of Bile by the *Ductus hepaticus* into the *Choledochus communis*, whoſe Cavity and Paſſage into the *Duodenum* was large and open, which could not
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have been and have continued, without a continual and proportional Flux of Bile through it: For it is well known, that so soon as the Fluids cease to flow through their natural Ducts, their Sides soon collapse, coalesce, and at last totally shut up. Thus the *Urachus*, and *Canalis arteriosus Botalli* in the Fœtus, shut up totally soon after the Birth; and Mr. *Amyand* and I have lately seen one of the Ureters totally coalesced and shut up, for want of a Fluid from the Kidney, which had secreted no Urine for some time, having become a *Cystis*, fill'd with a thick white pultaceous Matter, nearly of a cretaceous Consistence.

Therefore as the *Ductus cysticus* was found obliterated, and the *Choledochus communis* large and open, it is plain that no Bile had for some time flow'd through the former, and that there was a constant Supply from the *Ductus hepaticus* to the latter, for the Uses of the animal Oeconomy; until the Wound or Rupture of the Gall-Bladder, gradually abating its Current by that Channel, at last stopp'd it quite, and put an End to his Life in a few Days after.

The most essential Points in this Case, bearing a Conformity with what I have formerly observ'd in this SOCIETY, concerning the Use of the Bile in the animal Oeconomy, may so far serve to confirm it.