ventive pickaxe, and appropriate the fruits of his labour.

Having considered the three forces which obstruct the progress of those changes in the law, which are indispensable to the full exercise of the national intellect in the field of medicine, I must draw my tedious communication to a close.

The two modes to be adopted in acting upon Parliament are, as I have stated already, to enlighten its judgment and to stimulate its volition. The reasonings into which I have entered, are intended to contribute their mite of assistance to the former purpose; I must now say a few words upon the best mode of fulfilling the second.

A most effective means of producing an impression upon Parliament, would be to conciliate the co-operation of the educated and intelligent among the laity. Let every medical man unfold his professional griefs to his well-informed patients, and quietly explain the injuries ultimately inflicted upon society, by the tyrannous restrictions of the monopolists on the one hand, and by the unchecked licentiousness of empirics on the other. A clear and dispassionate statement of the truth cannot fail to produce conviction upon the minds of persons who by familiar intercourse, and a sense of benefits conferred, are already predisposed to receive all communications in a friendly spirit.

Each practitioner having made up his list, should coalesce with his brethren in the district, and thus contribute to form a mixed association of educated and clever men who might be termed the "friends of health," or any other preferable appellation. The association might meet periodically; and such members, whether laical or medical, as possess the accomplishment of public speaking, might conduct the business transacted at each meeting. These associations, thus dispersed over the surface of the three kingdoms, and capable as they would be of speedy agglomeration, would constitute an organ of sufficient potency, in its collective form, to insure the attention of any government, and of sufficient pliancy and ubiquity in its distributive capacity to recommend, by its unsuspected good offices, our reasonable and righteous cause to the good-will and support of the population. I am, Sir, your obedient servant,

D. O. EDWARDS.

Cheyne-walk, Chelsea,
Aug. 16, 1842.

MEDICAL REFORM IN AMERICA.—A number of the physicians of Kentucky recently met at Frankfort in that state, to discuss the important subject of a reform in the mode of conferring medical degrees.—*Philadelphia Medical Examiner.*

REMARKS ON THE ANATOMY AND PHYSIOLOGY OF THE SPLEEN, THE PORTAL AND GENERAL CIRCULATION.

By FRANCIS EAGLE, Surgeon,
Kingsland-road.

Whatever the product of the spleen, that product must be conveyed either by the veins or by the absorbent lymphatics.

That it is not conveyed by the absorbent lymphatics seems a fair inference, since there is nothing peculiar in these vessels in the spleen as compared with the same vessels in other organs; and wherever there are peculiar effects, it is according with good sense to look for peculiar causes. Now do we find peculiar vascular organisation in the spleen? Certainly. We find that the spleen is an extremely vascular and nervous organ, supplied with an unusual quantity of blood, and yet without any excretory or secretory duct, as the pancreas, liver, kidneys, &c. Its structure, circulation and function are all peculiar. Professor Grant and others are of opinion, that it forms part of the lymphatic system; but on a comparison of the lymphatic system of the spleen with the arterial system of the same organ, we find no peculiarity in the former to warrant the opinion that there is any function performed by the lymphatics of the spleen, which is not also supplied by the lymphatics of other organs; in other words, there is no peculiar organisation to lead to the inference of a peculiar function: while connected with the red-blood circulation of the spleen, every physical sign is peculiar. The conclusion then seems rational, that whatever the product of the spleen, that product is conveyed by the veins (so called).

What is the Nature of the Product of the Spleen?

While examining the contents of the splenic veins of an ox, the *idea* occurred to me, whether the function of the spleen might not be to secrete the colouring matter of the blood. The product of the spleen is of a brighter red colour than venous blood; it is not at all, or very slightly, coagulable on exposure to atmospheric air, neither is it reddened by neutral salts.

Let any man take the spleen of an ox, open the large vein in its whole length, notice the peculiarities, then compare it with any vein in the body, and decide if it resembles a vein in any one particular. No, it is not a vein; I submit that the common sense of anatomists and physiologists is here bad sense, very bad sense: not only the senses, but the sense or reason are both at fault. A palpable example of the "*mira indiligentia hominum*" of Lord Bacon: for it is not a

vein, nor does it contain venous blood, but it is a sinus for the receipt of the product of the spleen. This is the first proposition. The second proposition is, that the product of the spleen is the colouring matter of the blood in its primitive condition: a product, *sui generis*, as the bile is proper to the liver, &c. It is not identical in nature with any other blood or product of the body, but seems almost a simple red pigment.

Thinking to put this opinion to the test, I excised the spleen of a healthy rabbit, three months old. On the following day the animal ate well, and offered no remarkable deviation from health, except that the capillary vessels of the ear, and most probably of the body generally, were remarkably pale, and nearly red-blood-less. In a week the animal seemed well, and the cutaneous circulation had become natural, except a bluish or venous tinge, where before the operation it was arterial or florid. Thus far the operation seemed indecisive.

One month after, I excised a portion of the ear of this rabbit, and a portion of the ear of a healthy rabbit: the blood as it flowed seemed more watery in the former. Forty minutes after, the blood of the healthy rabbit had coagulated firmly; the blood of the operated animal less firmly, and exhaled considerable serum. The rabbits were then kept separately on the same food, and their respective *egesta* compared; at first it appeared that the food of the operated animal had undergone less perfect digestion, but on further observation this difference was not constant. I now compared the pulse, which was 144 in both; but although the number was the same, the difference in strength was great, being strong in the healthy rabbit, weak and fluttering in the operated animal.

Six weeks and a day or two after excision of the spleen, I observed the rabbit refuse its food, and seemed ill: up to this period it had appeared well, lively and hearty. Anxious to notice what, if any, changes followed the absence of the spleen, I destroyed it by a blow at the back of the head.

General Appearances.—Body not so much wasted; as pale and deficient in red colouring matter, or red blood, the muscles being scarcely tinged. Heart, enlargement of the right auricle. Lungs, more pale and colourless than I ever witnessed in any animal, biped or quadruped, diseased or healthy. Liver, abnormally pale, *but not tuberculated*.* Gall-bladder, normal in size, but filled with a thin watery bile. Stomach filled with food undigested. Porta nearly empty. Pancreas enlarged. Intestines—cæcum enormously enlarged, measuring four inches in circumference. Vena cava, blood liquid.

No single fact could possibly be more strongly corroborative of the opinion, that

the spleen secretes the colouring matter of the blood. Hewson imagined that the spleen concurred with the thymus and lymphatic glands in forming the red globules of blood; and more recently, MM. Tiedemann and Gmelin have declared that to the product of the spleen the blood owes much of the property of coagulation. There is thus but little difference between these able physiologists; for admitting that the function of the spleen is to increase the coagulability of the blood, it effects this by affording in colouring matter the grand medium, *if not cause*, of the hepatic and pulmonary changes.

The day after the death of this rabbit, another was seized with perfectly identical symptoms; this I also killed, and the thought at once suggested itself, as there was identity of symptoms, so also there might be identity of morbid appearances, which if it were the fact, then I had erroneously attributed to excision of the spleen, effects which were the result of another disease. But after a careful comparison of the morbid appearances in both cases, the peculiar exsanguine condition of the operated animal, warranted the opinion that such exsanguine condition was a specific result of excision of the spleen, although I believe that the animal would have died not from excision of the spleen, but from "pot-bellied" disease. I should add, that in the second animal the gall-bladder was entirely empty and colourless, and in structure seemed to resemble a stomach. The same night another cachectic rabbit (a doe) died. Three days before this on going to feed them, I observed four queer-looking identical fleshy substances, of the size and shape of a small walnut, surrounded by a pool of blood; these were evidently monstrous conceptions. As observed above, this animal died three days after her accouchement, and offered a most interesting post-mortem, as follows:—

General Appearances.—Body thin, but not unhealthy. Heart, nothing remarkable, except, perhaps, being rigidly contracted. Lungs injected, and here and there venous spots. Liver injected (highly). Gall-bladder contracted in size, but containing healthy bile. Stomach contained some undigested food. Porta enormously distended, blood fluid, which being removed, dried like splenic blood. Vena cava, inferior, enormously distended also, and apparently constricted by the superior mesenteric artery, above the crossing of which was found in the cava a portion of coagulated lymph, measuring two inches and a half in length, and weighing twenty-one grains. Spleen and pancreas healthy. Bladder six times its natural size, and containing three ounces and a half of urine. Uterus partly contracted. Cæcum and colon both enlarged.

The enormously distended bladder was, doubtless, the cause of the non-contraction

* Tubercles have as yet been discovered in no animal without a spleen.

of the uterus, and is a *very common* cause of lingering labour in the human subject.

There is an interesting paper in *THE LANCET* for Feb. 7, 1835, by Dr. O'Shaughnessy, on the discovery of a new principle in the blood, first observed while attending patients with disease of the spleen, but subsequently found of universal occurrence in health and disease in the Indian and European, and in all conditions of ages and sex; as also in the cow, horse, sheep, dog, fox. As this principle, not only in colour but also in its chemical properties, intimately resembles the colouring matter of the blood (rubrine), Dr. S. proposes to call it sub-rubrine. It varies in amount from fifteen to twenty grains per one thousand; thus exceeding considerably the amount of fibrine.

Might not the nature of the above disease have been an inordinate secretion or overflow of the product of the spleen, as we find under other circumstances an inordinate secretion or overflow of the product of the liver, the bile?

"We are all aware," says Dr. Clanny, "that in animals with red blood the principal effect of the mutual reaction between atmospheric air and blood falls upon the colouring matter. The serum, without the presence of colouring matter, converts equally well a portion of oxygen gas into carbonic acid gas, but this quantity is very insignificant compared with that which disappears when serum is mixed with colouring matter, the brown colour of which passes to vermilion red."

It thus appears that the vital changes of the blood can take place in the human subject as in the lower orders of animals, comparatively independent of the red blood. The fact that animals have lived for weeks and months after excision of the spleen, thus seems perfectly reconcilable with the view that the product of the spleen is the colouring matter of the blood.

The Nature and Origin of the Portal Blood.

The portal vein is formed principally by the junction of the splenic and mesenteric veins, its blood is thus described by P. Schultz, *LANCET*, March 5, 1836:—

"The blood of the vena portæ is in general more dark than venous blood, though this difference is not always distinguishable. It is not reddened by solutions of neutral salts, nor by the contact of atmospheric air, nor by the action of oxygen gas.

"The portal blood does not coagulate, or if it does so at any time it forms cakes, of which the texture is less firm than that of the blood of other veins. When the portal blood forms these cakes it liquifies, either wholly or partially, in about twenty-four hours, and gives in a similar manner to the portal blood, which does not coagulate, a black sediment, over which we find a volume of serum.

"The natures of the portal and splenic
No. 992.

blood offer nearly identical properties, while the mesenteric blood differs from both, and all three differ from general venous blood. It therefore becomes interesting to inquire, first, the nature of the mesenteric venous blood during digestion; and, secondly, whether these veins do not convey into the portæ a portion of the chyle, in its passage from the surface of the intestine to the thoracic duct, that fluid undergoing considerable change in its course through the abdominal lymphatic system." But to what is this change attributable? Is it (as I have supposed) to absorption of a part of the contents of the lymphatics by the veins? or is it to foreign additions, principally arising from the sanguineous system?*

The communication of the lacteals with the veins in the mesenteric glands is so free, that in some quadrupeds, as the seal, the whole of the injection thrown into the branches of the lacteals has been seen to pass into the mesenteric glands, and thence into the mesenteric veins and vena porta, while no lacteals appeared to convey any part of it from the mesenteric glands into the thoracic duct.

Is the nutrient circulation in the seal, a type of the circulation in the vertebrata generally?

In apparent opposition to this view is the celebrated experiment of Hunter, who, in order to show that the lymphatics absorb, while the veins do not, opened the abdomen of a dog, emptied a portion of the intestine, and injected into it some warm milk, which he retained by two ligatures. He now emptied the veins belonging to the intestine, by pricking the parietes, and tying the corresponding arteries. The parts were returned into the abdomen, and after half an hour he found the veins quite empty, while the lymphatics were gorged with fluid. But Magendie and Flandrin have repeated this experiment without ever perceiving any trace of milk in the lymphatics.

Against the opinion advanced in this paper, Mr. Hunter's experiment is in no degree conclusive, for the change which the chyle undergoes in the conglobate glands is, doubtless, owing to the action of the arteries, which action being suspended in the glands by the tying of the arteries, no wonder that the lacteals were gorged while the veins were empty; as well might we tie the renal artery, and wonder there was no secretion of urine.

The fact of death occurring in thirty-six hours after tying the vena portæ, while excision of the spleen can be performed with comparative impunity, seems further to strengthen the above view of the nutrient circulation.

Experiment.—A rabbit was fed at eight o'clock and killed at eleven. On opening the cavity of the abdomen I was struck with

* *LANCET*, June 10, 1837.

the unusual fulness of the mesenteric veins ; and on further notice I was of opinion that the colour was also peculiar, a dark or deep *couleur de rose*. On comparing this blood with the blood of another animal which had not been fed for six hours, the difference in colour was still more striking.

The Use of the Portal Blood.

That the portal blood principally forms the biliary secretion, seems fairly deducible from the following experiments, although cases are on record where the portal vein terminated directly in the inferior cava ; such cases are, however, very few, and very unsatisfactory.

The recent experiments of M. Simon upon pigeons have shown that when the hepatic artery is tied the secretion of bile continues ; but that if the veins of the porta and of the hepatic canals be tied, no trace of bile is subsequently found in the liver. Several pigeons survived the latter operation thirty-six hours. (Mayo's Physiology.)

I have not thought it necessary to repeat these experiments, but take them as *facts*.

OFFICE OF THE LIVER.

From what has been observed on the nature and use of the portal blood, it would appear that the function of the liver is twofold, viz., that besides the function of secreting bile, the liver prepares for aeration in the lungs the portal blood, which, if it be found a fact, may assist us in explaining the nature of that congestion which is constantly present in phthisis pulmonalis ; and although pointedly discussed by Andral, Louis, Dr. A. T. Thomson, and Sir J. Clark, it is still undecided whether such pulmonary congestion be a cause or a consequence of tubercular disease : the former opinion, however, seems best supported.

In a review of "Clark on Phthisis," LANCET, Jan. 10, 1835, it is observed, with reference to the doctrine of Stahl, adopted by Dr. Clark, and pithily expressed in the pun "*vena porta, porta malorum*," that Dr. Clark should publish all the facts, which prove the existence of abdominal congestion of more than the due proportion of blood in the large or small vessels of the vena porta, and describe the manner of distinguishing whether this is the consequence or the cause of a general morbid modification of the fluids and organs of the body. If the blood in the vena portæ can be measured, it will not be difficult to ascertain whether variations in its quantity produce tubercles ; but if congestion be found only in the capillary vessels, or if altered secretions be taken as a proof of this reasoning from analogy, and from what we see in scrofulous ophthalmia and glandular swellings, ought we to conclude that these congestions produce what Dr. Clark has termed "*tuberculous cachexia*," or that

they are the first passage of this state into actual disease ?

On this head the following facts are interesting, as showing that liver tubercular consumption, healthy-coloured fæces, or excrement, and absence of healthy bile, may co-exist in the rabbit. I purchased six cachectic rabbits, and destroyed the first.

Observation 1.—Tubercles were found in the liver, some crude, some softened ; coincident with these was an absence of normal bile in the gall-bladder, that organ containing a small portion of fluid, of a straw-colour, and almost tasteless. The lungs were healthy : there was no cough.

Observation 2.—This rabbit offered precisely the same morbid appearances as the preceding, excepting that the gall-bladder was so diminished in size, as to be incapable of holding more than a drop of fluid, straw-coloured.

Observation 3.—On opening the cavity of the abdomen of the third a small hydatid escaped ; isolated tubercles were also observed on the convex side of the liver ; other hydatids were found in the cavity of the abdomen. The gall-bladder contained three drops of straw-coloured fluid.

Observation 4.—On opening the body of another that *died* of marasmus, commonly called "*pot-bellied*" disease, tubercles were found in the liver, which also appeared injected with a purple-greenish hue, as if of portal blood, or bile imperfectly formed. The gall-bladder contained a straw-coloured fluid : the cæcum was enormously enlarged.

I have examined more than twenty rabbits, the subjects of liver tubercular consumption, and in no one case was there a healthy secretion of bile : whether the disease arose from disordered portal blood, from absence of bile, or from imperfect preparation of the hepato-venous blood, which being so prepared, or rather unprepared, for its pulmonary aeration, I profess not to decide, but merely notice the important inference from these facts, that bilious-coloured fæces, or egesta, are not decisive proof of a healthy condition of the liver. Whether in splenic and pulmonary phthisis the same condition of bile obtains, is a subject for inquiry.

The foregoing is the "*pith*" of an experimental inquiry on the anatomy and physiology of the spleen, the portal and general circulation ; whence I am inclined to believe that the chyle is taken up by the lacteals, becomes globular and albuminous in the intestinal conglomerate glands, milky pale, red, or deep *couleur de rose*, in the mesenteric veins during digestion ; joining the splenic product becomes dark red in the porta, to prepare the bile in the liver, where it is also rendered susceptible of aeration, emptied by the hepatic veins into the cava, to be mixed with the lymph in the right auricle,

thus becoming fibrinous;* aerated in the lungs, to form finally arterial blood; ex-aerated and deprived of its superabundant lymph in the cutaneous capillaries, to become again venous, fitted to receive the hepato-portal red blood, chyle, and lymph in the right auricle; and thus hæmotosis is not one process alone, but a series of processes; it is not in the lacteals alone; or in the abdominal lymphatic glands alone; or in the mesenteric veins alone; or in the spleen alone; or in the porta alone; or in the liver alone (the brilliant idea of Galen); or even in the lungs, that this vital fluid is prepared; but the formation of blood embraces a series of processes from the stomach to the lacteals, from the lacteals to the lungs.

At an early opportunity I will show the remarkable effects of excision of the spleen on tubercular liver consumption in rabbits; and as the subject is interesting, perhaps some of the readers of *THE LANCET* may also try the experiment either in lung or liver tubercular consumption in other animals: for in the present state of our ignorance, men pursuing the same subject of inquiry arrive at conclusions as opposite as Mr. Jackson (*LANCET*, July 2) and myself on the "Anatomy and Physiology of the Spleen."

FATAL DISEASE.

ABSENCE OF ABNORMAL POST-MORTEM APPEARANCES.

To the Editor of THE LANCET.

SIR,—I shall be glad if you can find a corner for the insertion of this case, and am, Sir, your obedient servant,

JAMES HONEYWOOD, M.R.C.S.L.
Queen-street, Cheapside,
August 22, 1842.

J. B., aged 45, residing in the neighbourhood of Blackfriars, a stout, short, square-built, plethoric man, of an unusually-developed muscular frame, was seized with a pain in his side, which continuing to increase in acuteness, I was requested by his wife to visit him on the afternoon of the 25th of January last. I found him sitting upright in his bed, and his pain confined to the left mammary region; it was of an acute lancinating character. His countenance was anxious and pallid, with an inclination to lividity; his respiration exceedingly hurried and embarrassed; his pulse was beating 110 beats in the minute, but intermitting in force and frequency; his tongue loaded; his bowels torpid. Upon applying the stethoscope, I found all the ordinary characteristics of pericardial inflammation, viz., a rolling,

tumbling, tumultuous struggling action of the heart, with a very loud bellows-murmur; also a frottement, with increased dulness on percussion. I bled him to twenty ounces, and prescribed eight grains of calomel with ten grains of rhubarb. Saw him again in three hours, found the pain but triflingly relieved, but the bowels freely unloaded. Recommended a dozen leeches to be applied to the left cardiac region, and also prescribed the following medicines:—

Rx *Chloride of mercury*, gr. iij;

Opium powder, gr. $\frac{1}{4}$;

Ant. tartrate of potash, gr. $\frac{1}{8}$. M.

To be taken every three hours.

Saw him again on the following morning, and found him relieved considerably, but the heart still acting very vehemently. Recommended a continuance in the above medicines, and established vigorous counter-irritation by means of strong antimony ointment over the region of the heart. Saw him again in the evening; still advised further perseverance with the remedies, which treatment was adopted until the morning of the 28th, when there was a very marked abatement in all his symptoms, and he became slightly ptyalised; the heart acted more regularly and less violently; the respiration became more easy; pulse 90; skin moist and perspiring; countenance cheerful. Recommended him to take two grains of chloride of mercury with half a grain of powdered opium every night, which he continued for three weeks, keeping him still slightly under the influence of the mercury; also recommended him to take the following draught during the day:—

Rx *Tincture of digitalis*;

Antimony wine;

Tartrate of potash, aa, m. xv;

Cinnamon-water, ℥j. M.

Three times a-day.

The bruit in the course of a few weeks declined nearly *in toto*, and I saw nothing further of him until a month ago, when he was seized with enteritis, from which he sank through collapse. Upon a scrutinising examination *post-mortem*, not the slightest vestige of inflammation existed indicative of alteration in any structures of the heart or pericardium.

A CURIOUS CASE.

I WAS requested to see the following case with a medical friend, and wrote down the particulars for him at the time, partly from the information he furnished and partly from our joint observation.

I may now venture to publish them, without exposing the lady to the shame or punishment which she perhaps deserves.

Mrs. —, a good-looking woman, called on me at eight o'clock on Saturday morning, Feb. 8; she informed me that she had

* Fibrine is most probably the product of what is called the lymphatic absorbent system.