for which reason he discards active treatment by blood-letting.

Laennec advised moderate blood-letting, and then only in strong and robust patients. The great Louis of the Hôtel Dieu remarks, "It is an error to believe you can regulate pneumonia by blood-letting. In all cases, if the bleeding is practised in the period when the disease is on the increase, the local symptoms are thereby aggravated, although the general symptoms may improve." He believes, however, it will in the end shorten the duration of the disease. From his cases, he concluded that the disease lasted only eighteen days, when bleeding was resorted to before the fourth day of the disease, when after that period it lasted twenty-one days. This is the result obtained at La Charité and Pitié. The experience of these hospitals proves that by blood-letting early, you only anticipate the period of cure, in some of the cases which yield to it.

4. Patients affected with pneumonia bear depletion well. It seems, therefore, unphilosophical not to afford them that relief which this operation ensures. But the truth of this proposition is founded in part on the truth of the three former; and if these be disputed, there cannot be said to be relief from depletion. And, again, patients do not bear depletion well in the present day. The type of existing diseases is, and indeed has been for some years back, adynamic, and in none is this more true than for pneumonia, which is fatal exactly in proportion as it is adynamic. Patients do not bear depletion as formerly; thirty years ago powerful medicines and heroic blood-letting was the order of the day, and eminently successful. The practitioner who would now follow the practice of his forefathers in this respect would meet with universal reprobation. Hence one of the reasons that that archquackery, homoeopathy, has taken so well among many. Typhus and low fevers have been upon the increase, and generally those diseases arising from cachectic blood, a better instance than which I could scarcely give than the extraordinary frequency of furuncular and carbuncular disease.

The following are the number of deaths from typhus and pneumonia for the years 1839—1850, taking typhus as the measurement of debility in the population.

Year.	Typhus.	Pneumonia.
1839	1819	3687
1840	1262	3776
1841	1151	3608
1842	1174	3923
1843	2083	4224
1844	1696	4064
1845	1501	3896
1846	1796	3151
1847	3181	4290
1848	3569	3409
1849	2479	3503
1850	1923	3108

Thus blood-letting, in theory at least, does not seem advisable. The reason it sometimes does good is probably stated correctly by Dr. B. W. Richardson, namely, by diminishing for the time the flow of blood to the lungs, and thus arresting its hyperoxygenation.

To recapitulate, therefore, I think I have proved that—

1. Pneumonia is characterised at first by unusual fluidity of the blood, and may be produced by causes which tend to poison the blood, as proved by experiments on the lower animals, accidents in the human body, and chemical examination.

2. It is characterised by an increased amount of fibrin, from hyperoxygenation, both in the lungs and skin, and a deficiency of chlorides, in the blood.

From such facts I conclude the disease is essentially adynamic in kind.

3. In regard to diagnosis, there is reason to believe it is mistaken for simple pulmonary congestion, capillary bronchitis, and some kinds of pleuritis.

Lastly, the theory which advocates blood-letting in this disease is both physiologically and pathologically unphilosophical.

Montague Square, March 1855.

NOTE ON THE FORAMEN OVALE.

By J. L. W. THUDICHUM, M.D.

[Read before the Physiological Section of the Medical Society of London, March 12th, 1855.]

Two hearts which I have lately removed, one from a sheep, and the other from a human female, have presented certain peculiarities in reference to the communications between the right and left side of the heart. I therefore propose to give a brief description of the specimens, and then to make a few remarks on the closure of the foramen ovale.

1. *Heart of a sheep.* The organ is pale; and all parts show fatty degeneration. The *foramen ovale proper* is closed, but there existed an oblique canal of about half an inch in length, passing from the right to the left auricle, and bounded by folds of membrane projecting into each cavity.

2. *Heart of a woman, aged 38, who died of pneumonia.* It showed the same transverse canal as the heart of the sheep, ending in the left auricle under what might be called the remnants of the free valve of the foramen ovale. The latter is attached to the front border of the fossa ovalis by three bridges of membrane and also by several filaments. There is an opening of the size of a pin's head through the fossa ovalis itself.

REMARKS. These preparations have suggested to me two questions: 1. As to the mode of closure of the foramen ovale; 2. The time at which it is closed.

1. *Mode of Closure of the Foramen Ovale.* There are two distinct modes of occlusion of the foramen ovale in man and animals. The first is what has been termed

1. *Occlusion of the Foramen by Filaments.* They are said to exist in the calf and the foal. Flourens says, that in the calf they exist as early as the second month of embryonal life. In his little work, *Histoire de la Découverte de la Circulation*, at p. 67, he gives a description of the mode of occlusion by filaments, which has a direct bearing on the preparations on the table.

"The filaments are always developed along with a membrane which grows from the posterior border of the foramen. From the opposite or front border the filaments rise, to the number of twelve or fifteen at least. But they almost directly join each other, separating again to join anew, and then forming a network, the meshes of which increase in size in proportion to their distance from the margin. This net is, so to speak, suspended in the left auricle, and ends with three or four filaments, which are inserted in the left wall of the advancing septum of the auricles, on a spot about one-fifth of an inch distant from the front margin of the foramen, from which the filaments grew.

"As the animal is developed, the membrane and the network of filaments become thicker, in consequence of which the meshes become smaller and disappear. The inserted ends always remain on the same spot, and do not vary in number. After a certain time, there are only three or four arches left, formed by the free border of the membrane and the filaments, which now have become very much shortened and thickened. These arches disappear in their turn by the same process; and there is no longer any communication left between the two auricles. Before this communication is completely closed, there is a very oblique canal left, which extends from the right into the left auricle. Sometimes this canal persists in the adult."

Flourens states this for the cow and the sheep. He is borne out by the specimen on the table; and we have, moreover, a preparation which shows that the same may be the case in man.

2. *Occlusion by the Valvula Foraminis Ovalis alone without any filaments.* Here the foramen closes by the hypertrophy of the membrane and its insertion into the left wall of the septum auricularum. After this mode of closure there may be an oblique canal, which, according to Flourens, can persist in the adult. This persistence takes place in the dog, in the rabbit, and in man. Bischoff (*History of De-*

occlusion of Man, etc., p. 247) represents the occlusion in man to be effected by the approaching of the two borders of the foramen ovale in the form of semilunar membranes, with their convexity towards the foramen. The posterior membrane might be called a valve. Nothing is said of filaments in animals; they escaped the notice of this great observer. It is the same with the investigations of Sabathier (*Histoire de l'Académie Royale des Sciences*, 1774, p. 198); and C. F. Wolf (*Nov. Comment. Academ. Petropol.*, vol. xx., p. 357).

I have already remarked upon the similarity which the preparation taken from the woman has with what we would imagine to be the effects of a closure by filaments. And it may be an opinion that occlusion in this case took place by filaments in combination with the valve; or perhaps the two valves approaching each other did not meet, but passed, and grew one to the side of the other.

II. *Time when the foramen ovale is found to be perfectly closed.* The time at which the foramen ovale and ductus arteriosus are perfectly closed in various animals is thus stated—

	Foramen ovale. Days after birth.	Ductus arteriosus. Days after birth.
Guineapig	12	—
Rabbit	16	26
Dog	23	36
Calf (between one and two years)	—	—

With respect to the time at which the foramen ovale is closed in man, great difference of opinion prevails. Förster (*Path. Anatom.*, p. 310: 1850) says that it is closed perfectly in the course of the first year. Canstatt, in his *Pathology*, vol. iv, says that it is commonly obliterated a fortnight after birth. Valentin (*Handbook of Physiology*, vol. ii, p. 155) states that the foramen ovale is closed at from four to six months, while the ductus Botalli becomes impervious in from two to six weeks. Flourens denies that the foramen ovale is closed in less time than fifteen months. Harvey (*De Motu Cordis et Sanguinis*, translated by Dr. Willis, chap. vi, p. 38) remarks: "But we further observe, that the passages in question are not only pervious up to the period of birth in man, as well as in other animals, as anatomists in general have described them; but for several months subsequently, in some indeed for several years, not to say for the whole course of life; as, for example, in the goose, snipe, and various birds, and many of the smaller animals. And this circumstance it was, perhaps, that imposed upon Botallus, who thought he had discovered a new passage for the blood from the vena cava into the left ventricle of the heart; and I own that, when I met with the same arrangement in one of the larger members of the mouse family, in the adult state, I was myself at first led to something of a like conclusion."

The relation of the open foramen ovale to cyanosis demands a few remarks. The following are the statistics of Gintrac of the abnormal condition in fifty-three cases of cyanosis:—

Aorta from left and right ventricle	22
Open ductus arteriosus	14
Communication of ventricles	5
Transposition of aorta and pulmonary artery	4
Open foramen ovale	33
Total	78

In twenty-two cases, the pulmonary artery was too narrow; in four, obliterated.

The statistics are numerous, but not conclusive. Bizot, Louis, Albert, Meyer, Cerutti, Tomassini, Richerand, Narre, Farre, Wilson, and others, have given valuable statements; but the subject requires still further study. As it stands, I believe we must discard the notion that the persistence of the foramen ovale alone can produce cyanosis.

Keppel Street, April 1855.

PERISCOPIC REVIEW.

EPIDEMIOLOGY, HYGIENICS, AND STATISTICS.

CHARACTERS OF DISEASED ANIMAL FOOD.

On this subject, the Imperial and Central Society of Veterinary Medicine of France some time ago proposed the following questions:—

"1. Is it possible to ascertain by examination of butchers' meat (beef, veal, mutton, and pork) whether the animal was perfectly healthy when slaughtered?"

"2. Are there any peculiar characters enabling one to determine whether butchers' meat, the animal either being entire, quartered, or otherwise divided, has been obtained from a healthy animal, but whose flesh has undergone changes from atmospheric or other influences, or from an animal which has died from fatigue, accident, want of care, privation of food, etc.? Is such meat to be regarded as wholesome or unwholesome? In the latter case, what mischief is likely to be produced by its temporary or habitual use?"

"3. Is it possible, from the inspection of an animal, either entire or divided, to determine whether, before dying or being slaughtered, it had been the subject, for a greater or less period of time, of such diseases as peripneumonia, phthisis, rot, measles, dropsy, etc.? If so, show how the traces of these diseases may be recognised."

"4. Ought such meat to be consumed, or to be confiscated and destroyed?"

"5. Are there any positive signs by which it may be determined from what animal any portion of butchers' meat has been taken?"

In answer to these questions, one essay only, by M. Soumille, of Avignon, was sent in. The following is an abstract of his replies:—

1. It is possible to ascertain whether an animal is healthy only when it is whole or quartered, except in diseases which manifest themselves in the entire system, such as measles, rot, cachexia, tubercular consumption, and *charbon*.

2. During rainy and misty seasons, meat, changed by atmospheric influences, remains soft; it dries with difficulty; it has a palish colour, and readily returns the impression of the finger. Such meat decomposes very rapidly, and contracts a putrid odour, which increases with time. M. Soumille has seen it even become black in two days. The meat can be cooked, but it is always soft and tasteless. In stormy seasons, the south winds exercise a pernicious influence on meat, especially lamb and veal. Beef and mutton escape; but they yield a broth deficient in nutritive materials. In winter, during severe frosts, meat is sometimes frozen; it then becomes very rigid; when cut with the knife, drops of coloured fluid exude from each fibre; it resists cooking, and does not cease to yield water. It ought not, therefore, to be consumed as food, being tasteless and indigestible. In the violent heat of summer, meat soon becomes black and decomposed more or less rapidly; the rapidity of the decomposition depends on the previous condition of the animals and on their food. In Avignon and the neighbourhood, fresh beef sometimes exhales an odour of onions; this is ascribed to the presence in the pastures of a plant of that kind.

The circumstances enabling us to determine whether an animal has died a natural death, are, when it is entire, the presence of disease of the viscera, coagulation of the blood in the vessels, accumulation of blood in the vessels of the great intestinal cavities, and sanguineous injection of the vessels of the cellular tissue. Separate portions of the meat are red, yield blood when cut into, and are of various colours on the surface. Nearly the same characters are observed, differing in intensity, in the flesh of animals which have been slaughtered after over-driving or deficient food. M. Soumille insists especially on the injection of the muscular flesh; but he does not consider that any real distinction can be drawn between a piece of meat taken from an animal which has been slaughtered after fatigue and from one which has died of disease. The former may be eaten; the latter ought to be rejected, although, from experiments on dogs, cats, ducks, and fowls, M. Soumille does not think it likely to produce mischief.

3. Examination of the entire animal, so that the viscera may be inspected, is the only means of ascertaining whether it has died of *charbon*, peripneumonia, or consumption. In sheep attacked with rot, examined when whole, the cellular tissue is