NOTES

ON

THE INSTITUTIONS FOR THE RELIEF OF THE
SICK, WOUNDED, AND DISABLED, OF
THE ROYAL NAVY.*By WILLIAM R. E. SMART, M.D., C.B.,
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DURING our visit to Plymouth, we may take a double interest, as Englishmen and as medical men, in the grand objects of architectural and engineering skill for the construction, conservation, and protection of the naval arm of our national defences.

Amid so great an assemblage of notable works, we shall find, as medical men, that there are many devoted to our own calling worthy of inspection. The parent institution of this kind is the Naval Hospital at Plymouth, which reflects the highest credit on the Admiralty. It is but a small indication of that widely spread care for the wants of the sick and wounded of the navy, that has done very much to remove the bad sanitary conditions that prevailed to the end of the last century.

It is the object of this paper, Mr. President and gentlemen, to bring to your notice the more prominent facts in the growth of the naval medical system, and to show the successive steps by which its present condition has been reached.

Our dockyards being for the care of the materials of our navy, and our hospitals for the care of the men, it became necessary that these should be twin-institutions; but it was not until 1744 that an Order in Council provided for the construction of the hospitals at Haslar and Stonehouse, near the great dockyards, on the ground of economy in money and men. Sir Gilbert Blane writes thus: "The sick and wounded of the navy were first received into Haslar Hospital in the year 1754, and it was completed about two years afterwards. Plymouth Hospital began first to be occupied in 1760, but was not completed till 1764." Previously to these dates, the sick and wounded were landed at the seaports, boarded in lodging-houses, and treated by civilians. The naval medical charges were thrown as much as possible on the Chest of Chatham. The surgeons who attended the wounded, and the people who lodged and boarded them while under treatment, were, before the Commonwealth, paid out of the chest. Until the year 1763, there was no other source of out-pensions. Until 1796, the surgeons afloat were paid, out of its funds, twopence per man per month, to provide medicines and instruments; and until 1812, the chaplains received from it fourpence a man per month ("by the ancient custom of the service"), as the main part of their emoluments; the funds being derived from stoppages out of the pay of the seamen and officers.

The Chest was an early benefit society, or brotherhood, like other trade guilds and corporations. It was the parent of our naval medical department, pension office, spiritual aid, and system of education for navigating officers. It was, indeed, a venerable institution, founded on the principle of self-help, by those gallant and charitable spirits, who stayed to play out their game of bowls in the little amphitheatre under the Hoe, before they embarked, with light hearts, to combat the great Armada, whose sails then whitened the horizon.

In the year 1654-5, a period of war, the income of the Chest was £4512:10:11½, and its expenditure was £4531:18:10½, out of which were paid pensions to wounded men, relief to widows, the charges for the wounded of the navy, aid to the inmates of Sir John Hawkins's alms-houses at Rochester, a gift to a teacher of navigation to all comers at Chatham, and the salaries of the surgeons at Chatham, Woolwich, and Deptford.

In the year 1802, the income had reached £80,000, and the deposits in the Consols amounted to £281,500, undergoing yearly increase, while the demand on the Chest for pensions was decreasing. There were only 8094 pensioners, of whom it was said many were not necessitous, receiving aid according to this scale:

For the loss of both eyes	£12	0	0	a year.
" one eye	4	0	0	"
" one eye (if sunk)	6	0	0	"
" a leg, above the knee	8	0	0	"
" a leg, below the knee	6	13	4	"
" an arm, above the elbow	8	0	0	"
" an arm, below the elbow	6	13	4	"

For compound fractures, and contusions of leg and foot, arm or hand, so as very much to impair their use

For compound fractures, and contusions of leg and foot, arm or hand, so as very much to impair their use	4	0	0	"
For ulcerated legs	4	0	0	"
For a fractured skull	4	0	0	"
For a double rupture	6	0	0	"
For a single rupture	4	0	0	"

This scale of pensions seems to have undergone very slight improvement indeed through a century and a half; the pensions were very much the same in 1654 as in 1802, and all pensions from the Chest at Chatham ceased on the recipients becoming inmates or out-pensioners of Greenwich Hospital.

In the year 1814, the Chest Fund of £1,355,400, together with its estates, was amalgamated with the funds of Greenwich Hospital.

It had been useful in its day; but it seems to have retarded, of late, rather than to have advanced, the interests of the sick and wounded, hurt and maimed, by its vicarious performance, on a smaller scale than was just, of those duties which the State was slow to accept so long as they were adopted by this offspring from the service itself. So long as it existed, all these important matters were regulated by standards of ancient date, and practices that were introduced to meet the wants of the service in the days of the Stuarts remained unaltered at the beginning of this century; although the very reason for its existence had ceased in 1763, when the State undertook to grant out-pensions of Greenwich Hospital.

This good work of the men who fought the Spanish Armada stood alone as the helper of the maimed and disabled seamen of the navy over a century, until the battle of La Hogue filled the streets of London with maimed men, and aroused the compassion of Queen Mary. At her dying request, the palace of Greenwich was devoted to their use as a hospital; and funds for its maintenance were raised by patriotic gifts and bequests, by a tax on the wages of all seamen, by confiscations, by percentages on prize-money and freight-money, and by unclaimed prize-money.

In 1704, it was opened to receive 100 inmates; and in 1814, after the great naval wars, it accommodated 2710 men, but about the year 1850 a decline commenced in its numbers. In 1865, it was in part cleared of its inmates; and in 1869 it was closed as a naval hospital. During a hundred and sixty-five years, it was styled the haven for maimed and worn-out sailors; and I believe that it most fully merited that reputation. The reasons for the decline in number of its inmates was the decrease of pensioners, and the improved rates and conditions of the out-pension list; but, notwithstanding these causes, there will ever be a residue of worn-out friendless men, to whom such a retreat would be an inestimable boon.

The State has taken possession of Greenwich Hospital, and its income of nearly £150,000 a-year, with which it supports the Greenwich schools, improves the pensions for twenty-one years' service, after the men have reached fifty-five years of age; and in this way the fund of £2,814,000 belonging to the seamen has become a subsidy to the State.

As medical officer of the hospital, I examined into the nature of the diseases of its inmates; and I carried this back to the year 1850, being the period of its decline, representing only a minor proportion of the good it had done. I found that, in its last twenty years, Greenwich Hospital provided a last home for 4224 inmates, whose mean of age at the time of death amounted to 70 years:

With a percentage of deaths above 60 years.....	85.5
" " 70 "	64.5
" " 80 "	23.0
" " 90 "	1.32

These facts exhibit well that it was the special home for the aged sailor; and I think it may be inferred from them that life was prolonged by the care and comforts provided in the hospital. The man without home and family found a home there, and this was done at no cost to the State. Since the abolition of this friendless seaman's home, a commission has sat on Chelsea Hospital, the analogous institution for the army, but which is maintained by an annual Parliamentary grant, and not on its independent funds and properties. That commission has given reasons why Chelsea should be maintained at the public cost, in order to provide a home for about 600 aged soldiers; and the question arises, ought not Greenwich to have been spared for similar reasons? *à fortiori*, that for its maintenance no annual vote was required.

As a substitute for this last home of the aged sailor, permission has been granted for the admission of sick pensioners into the naval hospitals at the out-ports; but for this boon the pensioner must surrender his entire pensions, whether for long service, or wounds, or both, and if he have a wife and family dependent on him, they will share among them the sum of two shillings a week, paid while he is in hospital. It is only in extremity that the pensioner is driven into a naval hospital,

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where shelter is offered him in lieu of his ancient right to it at Greenwich Hospital. Some greater consideration might surely be extended to himself, and those dependent on him, when illness casts him down, as the contrast of his forlorn case is very great with that of a half-pay or retired officer, who, being ill, can gain admission to a naval hospital, at the relatively small charge of from tenpence to three shillings a day, according to his rank and the length of his stay in hospital. To the officer's family it is pecuniarily a benefit, but to the pensioner's it is a sacrifice, for the bread-winner to go where he has the best chance of restoration to health. Virtually, the late changes have brought back the condition of the worn-out and disabled seaman to what it was under the old Chatham Chest—i.e., under a system of out-door relief, without adequate residuary advantages as an alternative.

From this review of the history of institutions that are now things of the past, we may take a survey of our existing naval hospitals, of which so fine an example is now near at hand for our inspection.

It is learnt from Evelyn's correspondence, that, in 1666, the propriety of building an infirmary at Chatham was pressed by him, under the patronage of the king himself, the country being at war with the Dutch; but, from causes unknown, the question became dormant until 1741. In the meantime, there had been several wars, during which the practice of the Chatham Chest was continued, of landing the sick and wounded at the naval ports, and placing them under civilian charge. The evils of that system were great and manifest, and they were set forth in a memorial from the Admiralty to his Majesty in Council, dated 15th September, 1744, which makes reference to a previous memorial of 26th October, 1741, the country being then at war with France and Spain. It states: "The want of royal hospitals is the cause that the lodging, diet, and nursing of sick men is performed by contract, a method liable to such abuses as are often fatal to the health of the seamen, notwithstanding all the care taken to prevent it. But, when the folly of the poor men is considered, intoxicating themselves with strong liquors in the height of their distempers, the great numbers that are swept away by such intemperance, and the desertion of great numbers who recover, both compassion to them, and the interest of your Majesty's service, require the putting a speedy stop to an evil of such pernicious consequence, which can no ways be effectually done but by building hospitals," as had been urged before by Mr. Evelyn. This representation led to the building of the hospitals at Haslar and Plymouth: the former receiving patients in 1754, and the latter in 1760, before their completion.

In point of time, there is so little difference, that it is strange to find two plans so distinct carried out almost together. It proves that the Admiralty were open to new ideas; and, in fact, in matters of hospital construction and management, the Board has always shewn readiness to adopt the most modern ideas and improvements. Thus, it happens that our naval hospitals present early examples of three plans of construction; viz., palatial, block, and pavilion.

The palatial system is of square or elongated quadrangles, with open interior courts. The prototype of this is King Charles the Second's palace at Greenwich, forming the north-western building of the hospital, repeated in Queen Anne's quarter, both facing the river. This was the design of Inigo Jones, which Wren improved on greatly in the two larger buildings at their rear, named after King William and Queen Mary. Haslar was built after the plan of the parts intended by Inigo Jones for a palace, and not after that of those planned by Wren as a hospital. Haslar forms continuously three sides of a square, open behind; the receding parallel sides are alike, being elongated quadrangles, with closed courts, ill adapted for complete ventilation; and the main wards are situated in these wings. The front, which connects the wings, contains a central colonnaded vestibule, having offices on each hand, and behind them open courts of smaller dimensions than those in the sides; above the ground floor it is made up of wards. It was designed for 1800 patients, with 600 cubic feet for each; but, on modern principles, it ought never to receive more than half that number.

The block system of cubic self-contained buildings, connected by an external colonnade, is well represented at Stonehouse by a central square, surrounded by ten large blocks containing wards on three floors, with four interspersed ground-floor buildings for stores, offices, kitchen, bath-rooms, etc., and one grand block, containing chapel, dispensary, museum, junior officers' quarters, etc. Each block contains six wards, on three flats, the flights of stairs occupying an angle of the block ending on landings into which the doorways of the wards open, and on which the water-closets are placed. Each ward has its open fireplace for warmth and ventilation, and also a small stove for the nurses' use in preparing the medical comforts for the patients.

The military hospital, on the opposite side of the creek, is also of detached blocks in a single row, connected by a colonnade in front of the blocks; and the Naval Hospital, Chatham, is on a similar plan.

Sir Gilbert Blane, in his *Observations on the Diseases of Seamen*, 1799, page 176, relates that "M. Tenon, a French physician, who, by his King's order, had made a comparative review of most of the hospitals in Europe, with a view to the reformation of those in Paris, and visited this one in 1787, gives the preference to it over all others, in regard to the judicious construction and distribution of the buildings." This is a high testimony to its merits, which appears to have been deserved.

In the pavilion system, the wards are arranged in distinct blocks also, but communications are kept up between them on the several floors by corridors that form a connecting screen from base to roof, and thus thorough ventilation around the blocks is prevented. It is applicable only to hospitals in single rows or terraces; but when these are placed near each other, all the demerits of the palatial quadrangular system, as far as concerns ventilation, are reproduced.

Woolwich Marine Infirmary is constructed on this plan, with two main wings retreating, to form the angles and ends, and four smaller intermediate blocks, connected by screens containing the corridors. The military hospitals at Woolwich Common and at Netley are merely repetitions of the parts of that infirmary which is now occupied as military officers' quarters. They have an advantage in the wards having windows on both sides and at one end: the windows reach to the ceiling, and have a swing-sash at the top for ventilation; and each ward is, in fact, a distinct hospital, opening into a corridor running the entire length, and communicating with all the wards on the floor.

The last new hospital, St. Thomas's, London, combines all the advantages of both the block and the pavilion systems, and appears to leave no room for further improvement in nosocomial construction.

There is no recent statistical information concerning the naval hospitals; but, in the volume referred to, Sir G. Blane, who was a commissioner for the sick and wounded, with official records at hand, has given the gross statistics of Haslar and Stonehouse, from 1755 to 1797, including forty-four years, which he apportions nineteen years to war, and twenty-five to peace time, and compares the results, which may be presented thus:

Hospitals.	Entire of 44 years.		War periods, 19 years.		Peace periods, 24 years.	
	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.
Haslar	177,300	9429	121,936	7263	56,454	2161
Stonehouse	111,634	5424	74,780	3661	36,846	1763
Totals	289,024	14,853	196,724	10,925	93,300	3924

These numbers yield ratios of mortality per thousand admissions, as follows:

Ratios of Deaths to 1000 Admissions.

Hospitals.	Entire period.	War.	Peace.	Difference.
Haslar	53.15	59.60	38.28	21.32
Stonehouse ..	48.52	48.95	47.84	1.11

A very remarkable feature of this is the great difference of results between the war and peace periods. It is at Haslar 21.32, and at Stonehouse 1.11 per thousand; the former presenting an extreme variation, and the latter scarcely any variation from the mean of the entire period. We may conclude that there must have been some very special, if not eccentric causes at work to produce results so different as these. The difference at Haslar is as incredible in its excess as that of Stonehouse is in its deficiency; and, being unable to explain either, I imagine there must be somewhere an error in the numbers—for, if these be true, Haslar was as superior to Stonehouse in time of peace as Stonehouse was to it in war. It is to be regretted that we have no hospital statistics of this century to guide opinion on such essential points.

Although these ratios are inordinate to modern eyes, yet they stand very favourably in relation to their own time. Blane quotes from *Mémoires sur les Hôpitaux de Paris*, 1788, numbers and proportions that give the following ratios of deaths per thousand to admissions at the great European hospitals.

Edinburgh, Royal Infirmary.....	40	per 1000
Vienna, General Hospital.....	75.8 to 80	"
Rome, Santo Spirito	98	"
Rouen, Hôtel-Dieu	100	"
Paris, Hôtel-Dieu	222	"

To which, as physician to it, he adds:

London, St. Thomas's	74	"
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The lowest of these civil hospital returns, except that from Edinburgh, is 15 per thousand above the war ratio of Haslar, and 25 per thousand above that of Stonehouse.

In a Parliamentary paper, dated July 20, 1869, being the Report of

a Civil Commission appointed to inquire into the condition and organisation of the naval hospitals, we have the latest authorised official statement concerning them. From it we may quote as follows, in proof of the manner in which these establishments are conducted by naval medical officers.

"Speaking in general terms, we would say that the management of the large naval hospitals is in all respects admirably adapted to secure the comfort and well-being of the patients. They (the establishments) represent the perfection of intelligent hospital construction and administration, but are unattainable in our London hospitals. It would be, in our opinion, much to be regretted that any change should be made which would tend to cripple these noble institutions: nor would it be becoming for us, as officers of the metropolitan charities, to write any report upon the naval hospitals, without recording distinctly our opinion that their medical arrangements are, in all respects, admirable, and such as voluntary foundations would willingly copy, if their circumstances permitted."

This unbiassed judgment as to the present condition of the naval hospitals testifies as strongly to the wisdom displayed in their original construction, as it does to the continued watchfulness to avail of every new resource of medical science, by which these institutions are rendered worthy of such high encomiums. But, however complete our hospitals may be in themselves, these advantages may be always neutralised by overcrowding of the patients. Sir Gilbert Blane was pleased with the great diminution of mortality in his day, when 800 cubic feet of space was the maximum allowed to each patient. Advanced hygienic knowledge now allots 1000 cubic feet as the minimum in our military hospitals, and some civil hospitals increase this even to 1600 feet. In future wars the capabilities of hospitals will be rated by a modern standard; and it will be found that our existing naval hospital accommodation will not exceed that for 2000 men. At the beginning of this century, our naval force averaged 120,000, and for it the naval hospitals at Haslar, Stonehouse, Chatham, Yarmouth, Deal, and Paignton, were unequal to the duties. Sick and wounded seamen and marines were then received for treatment at the London hospitals and at Greenwich Hospital; and an Admiralty official, styled "Superintendent of Town Hospitals", was charged to visit these hospitals at least thrice a-week, to look to the supplies of clothing and necessaries, to visit out-patients for the same purpose, and to see that cured men were sent back to their ships.

With these facts before us, it may be doubted that, in the event of a European war, our hospital accommodation would suffice. Such a war will employ a large channel fleet or fleets. Yarmouth, the Doggerbank, the Nore, and the Downs, will be once more the roadsteads in use. Our naval hospital accommodation for these is reduced to Melville Hospital at Chatham for 300 men; and, should such a war occur, Greenwich Hospital, which is easily accessible by steamers, might be utilised consistently with its original purpose as the great hospital for the East Coast fleet: otherwise, the London hospitals might be again occupied, as in the days of Charles II, by the sick and wounded of the fleet.

The health of the navy has undergone steady improvement during this century; in fact, the commencement of it may be dated from several years earlier than that; for, when Blane wrote in 1799, he alludes to a recent reduction of the medical staff at the hospitals as the result of that improvement. He states, on the authority of Dr. Lind, "that, when the grand fleet arrived at Portsmouth in 1779, a tenth part of all the men were sent to hospital, and that the diseases were mostly fevers." On his own authority, he made comparison of the war periods with France, 1778-82 and 1793-98, each inclusive of five years, and he described how that at Haslar and Stonehouse there had been admitted 27,000 more patients during the former than during the latter period. He considered the causes to have been, chiefly, less impressment and its evil of infection of epidemics of fever, improvement in the discipline of ships, the liberal use of lemon-juice, increased encouragement to surgeons, and the enforcement of medical regulations.

Since that era, the prevention of diseases among seamen has not been neglected; medical influence has continued its exertions with immense advantage to the sea service. Peculiar hurts, wounds, and accidents, from which landmen are exempt, must remain for ever the special casualties of seamen; but even these may be deprived of much of their fatality. Scurvy and typhus have been banished from navy returns; but there still remain with undue prominence the reports of yellow fever, syphilis, rheumatism, and phthisis, which are, however, being reduced, under hygienic measures, more nearly to general ratios; and when that has been effected, the seaman's life, always hazardous, will be acceptable on account of its superior healthiness.

A Parliamentary abstract of the health of the navy, 1869-70, affords, in a statistical summary of the last fourteen years, as valuable a standard

for future comparisons as Sir Gilbert Blane's *Observations* have done. If this good work were so extended as to include the fourteen years' ratios of all the diseases in the nosological returns, classified for the several stations, the navy would possess beacons and guarantees for the guidance of its medical officers, wherever placed, superior to those of most public services.

The abstract exhibits the mean ratios to 1000 of force, for the whole navy, as follows.

Admissions to sick list.....	1409 per 1000 men.
Invalided from service.....	34.2 "
Died in service, total.....	14.0 "
" from disease ...	10.4 "
" by casualties ...	3.6 "

To this mortality of fourteen per thousand, I think there should be added at least an eighth of the invalids, as men suffering from diseases sure to terminate fatally within a near period, whose names do not appear in any later navy return; and, on the other hand, to arrive near the amount of death by disease, it is necessary to abate those by violence, amounting to one-fourth of total mortality, which will make the approximate death-rate by disease fifteen in the thousand of force among males between 15 and 45 years of age.

The Report of the Registrar-General for England for 1864, will admit of comparison with its standard of mortality at home, framed on the annual reports from 1850 to 1861. It subdivides the ages from 15 to 45, and affords the following interesting results per thousand of population.

Annual Male Mortality of England to 1000 living.

Ages.	Mean of death-rate.	Localities.		Mean by violence.	Principal Causes.
		Min.	Max.		
15 to 20	6.69	4	8	0.86	Exanthems, phthisis.
20 to 25	8.83	5	12	0.96	Phthisis, typhine.
25 to 35	9.57	5	20	1.00	Phthisis, fevers.
35 to 45	12.48	5	18	1.15	Phthisis, monorganic diseases.

As the nosological returns of the navy are graduated to ten yearly periods of age, a similar table to this would show an interesting comparison of the chances of death to Englishmen as civilians at home, and as naval seamen, it being borne in mind that the latter are selected men. In this table, the deaths by violence have to be deducted from the mean ratios; the minima are the means of healthy country districts, and the maxima are those of unhealthy towns. In London the mean male mortality between 35 and 45 is 16.29 per thousand, and 3.03 of that mortality, little less than a fifth of the whole, takes place in the great hospitals. This is, perhaps, not far from the average mortality of the whole navy of Britain. The great difference of localities at home is similar to that of the foreign stations, of which some are healthy and others unhealthy, and the causes of mortality vary greatly among them. At home, mortality is always related to the density of the population, which may also apply to classes of ships, but it cannot do so to stations.

From the latest Report on the Health of the Navy, we learn that the most sickly stations of our fleet are China, West Indies, and Brazil.

Mean Ratios to 1000 Force, for the Year ending June 30, 1870.

	Cases.	Invaliding.	Death.
General average	1,224	32.2	10.3
China	1,646	60.4	24.2
North American and West Indies ..	1,559	34.2	23.1
Brazil.....	1,075	32.8	18.7

The causes may be assumed from the high ratios of remittent fever, dysentery, and phthisis, on the China station; of yellow fever, phthisis, and heart-disease, in the West Indies and on the Brazil station.

The class of vessels which suffer most are the small gun-vessels, which, it may be presumed, are the worst ventilated, and lie longest in rivers and tidal waters, and are the least disciplined; and, still more than these, the receiving ships stationary at Port Royal, Jamaica, and in the harbour of Janeiro—the former of which is a convalescent and the latter a hospital hulk, both receiving invalids and others waiting passage. It is satisfactory to learn, that the substitution of iron for wood in our fleet has been productive of improvement in health: as the above report shows, for the ironclads, ratios of 1266.6 sickness, 32.1 invalidings, 8.2 deaths, against 1224 sickness, 32.2 invalidings, 10.3 deaths, the general averages of the service in the year 1869-70.

In the nosological returns from iron-clad ships, there is a slight increase of admissions, which may indicate increased care of slight cases, with perhaps an increase of injuries, where such unusually heavy weights are dealt with, yet there is a minute decrease of invalidings

for the serious maladies, and a remarkable decrease of the death-rate. As the mean ratios of sickness in them on the less healthy stations are the general averages of the stations, and as the mean ratios of death on those in China and the West Indies are also under the general averages, it may be confidently expected that, when all the sanitary conditions of these vessels are known and attended to, the change from wood to iron in the construction of ships will be found of signal benefit to the health of the navy. Superior means of cleansing and ventilating decks, holds, and the bilges, and the interspaces of the ribs and those under the engine-rooms, are already advanced improvements, from which high results may be reckoned on in ironclads; and as those means are perfected, so we may calculate on a reduced rate of sickness and a diminished mortality from yellow and remittent fevers, dysentery, and bronchopneumonia, to which may be assigned three-fourths of the present large amount of phthisis.

I have dwelt on professional matters that will be more acceptable at a naval port, where we breathe the sea-air and look at ships, than they would be elsewhere. I have endeavoured to show:

1. How the charitable views and exertions of those who defended the country at sea in the days of Queen Elizabeth have influenced the medical affairs of the navy; and how the principles established, and the system adopted by them, have been revived, after apparent disuse, as a national instead of a class means of dealing with the residuum of the crews of our fleets: the accumulated funds, by defalcations of pay, etc., by voluntary offerings, endowments, bequests, and Parliamentary grants, being now availed of by the State, to supplement its own pensions, in providing for its maimed, disabled, and worn-out seamen and marines, when aged.

2. That the absolute necessities of the country in war led to the construction of the naval hospitals; and that, although their institution was postponed eighty years after their necessity was recognised, yet, like the fable of Minerva springing armed from the brain of Jove, they were designed on principles that have stood the test of time, and are still considered perfect models of their kind, fulfilling to the utmost their intent and functions.

3. That from the era in the internal economy of the navy, when, as Blane remarked, "impressment began to be less rigidly enforced, and to be deprived of some of its horrors, lemon-juice to be liberally allowed to ships at sea, surgeons to receive encouragement, and medical regulations to be enforced," a very constant progress of improvement in the health of the navy has gone on, until its medical statistics, gathered from every portion of the coasts of the world, exhibit mortality rates not far behind those of the general population of the British Isles.

My task is ended; and, in thanking you, Mr. President and gentlemen, for the attention with which you have listened to these notes on a branch of public medicine, I trust that this visit to Plymouth will, if possible, increase your professional interest in what concerns the health and vigour of that glorious service the British navy.

THE CIRCULATION IN THE ACARDIAC FŒTUS.

By JOHN W. OGLE, M.D., F.R.C.P.,

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THE question as to what rôle the capillaries or small blood-vessels play in furthering the circulation of the blood, has been often raised, and has lately been brought before the profession in a correspondence between Dr. G. Johnson and his "Reviewer" in the *British and Foreign Medico-Chirurgical Review*.* The subject must be allowed, for every reason, to be an interesting one; and I cannot but regard it as being somewhat strange that its discussion, after having advanced to a certain point, should apparently have been allowed to foreclose without any allusion on either side to certain observations which have been made by several writers in past years, and which would seem to constitute a necessary link in any chain of discussion on so important a subject. I desire in this communication to refer the reader to one or two facts which must be recognised in anything like a complete survey of data forming a basis for such discussion.

In support of the proposition that the arteries alone suffice by their contraction to carry on the circulation, the reviewer of Dr. Johnson had quoted the case of an acardiac fœtus which Sir B. Brodie in 1809 described in the *Philosophical Transactions*, and which had been alluded to erroneously by Mr. Palmer, in his notes on the works of Hunter, as having lived some time after birth. It proved, however,

that Brodie had described the fœtus as having been born dead; and this important statement, which Mr. Palmer had overlooked, had not been referred to by the reviewer. Consequently the supposed instance of viability of such a monster turned out to be not a fact.

Still the fœtus without a heart had lived *until* birth, and had originally been supposed by Brodie to have furnished an example of the circulation having been carried on apart from the influence of a heart—i. e., of any *vis à tergo*. This supposition, however, was subsequently set aside by the statement of Dr. Young, that, whenever an acardiac fœtus exists, there is always a second fœtus, well developed and possessing a heart, as an attendant; and this dictum was strengthened by Sir Astley Cooper, who not only described in the *Guy's Hospital Reports*, vol. i, 1836, a case of an acardiac fœtus which was a twin, the other fœtus having a heart; but went further, and showed the means or channel of communication between the two fœtuses, proving by injection and dissection that the heart of the perfect fœtus drives the blood through the vessels of the acardiac one by means of direct anastomosis between the arteries and veins of the two fœtuses at the junction of the umbilical cord with the placenta. Appended to this communication by Sir Astley Cooper was a declaration by Brodie acquiescing in Young's statement, accepting Cooper's explanation, and correcting the mistake which he had himself previously made in supposing the circulation in the acardiac fœtus to be independent of the heart.

The above facts are those (if I read it aright) concerning this question of the independence of the circulation, which have been elicited by the discussion between Dr. Johnson and his reviewer. Taking an interest in the subject, and being led by the discussion to follow it out to some extent, I found that other facts also exist connected with it, which should not be lost sight of, and which, as I before said, have been brought forward by those engaged in the subject in past years. Of these, I propose to give a short summary, by way of adding something towards the interest and completion of the discussion.

In the first place, I would allude to a paper on Acephalous Fœtuses* in the first volume of the *Guy's Hospital Reports*, 1836, p. 218, by Dr. Hodgkin. This was, in fact, a letter to Sir A. Cooper, and contains the history and description of several monstrous productions, and also an abstract of what had hitherto been written on the subject by English and foreign writers, including Brodie's case before alluded to. In this paper, Hodgkin specially dwells on "the mode of circulation through the bodies." He refers to the fact, previously alluded to by Breschet, that in almost all cases of acephalous fœtuses the heart has been wanting; and he observes that, in a large majority of cases, the acephalous fœtus has been accompanied by one or more perfect children—stating that the "inquiry immediately presents itself, how far the circulation in the monster was connected with that of the perfect child, and depended upon it;" and to this idea, started by Young, he had alluded in his Thesis in 1823.† He refers to the fact that Dr. John Clarke (and quotes the case) was the only author who had previously demonstrated the vascular connexion of the two placentæ. (See *Phil. Trans.*, 1793, p. 154, "A Description of an Extraordinary Production of Human Generation.")‡ He then notices the views held by various authors as to the maintenance of the circulation in the fœtus in the absence of a heart, observing that Méry and Lecat referred it to the direct impulse of the mother's heart; that Ponjol and Winslow concluded there was no circulation—the first thinking he found no other vessels than veins both in the fœtus and umbilical cord, whilst the latter found only arteries. Monro and Tiedemann both consider that the circulation is maintained by the impulse given to the blood by the vessels themselves, although they do not agree as to the course taken by the blood, Tiedemann considering that the blood is conveyed from placenta to fœtus by the umbilical arteries; and in this view Breschet coincides, endeavouring to support it by analogy with the circulation in fishes and mollusca.

Dr. Hodgkin then gives in detail, which it would be too long to recapitulate, the views held by those who have described this kind of malformation, as to the distribution of vessels and the course of the fluids in the foetal mass. Appended to the above paper by Hodgkin is an account of the structures of the placenta and imperfect fœtus by Sir A. Cooper,§ which was referred to in the recent controversy in this JOURNAL, and to which I have alluded already. In this account, as before said, Cooper demonstrates the mode of support and circulation of the

* He points out that the term "acephalous" comprehends not only those instances where the head is wanting, but also those in which this and every still more considerable degree of deficiency may be met with.

† This Thesis I have had no opportunity of seeing.

‡ The mother was a patient in the General Lying-in Hospital in Store Street, London.

§ The placenta and fœtuses had been sent by Hodgkin to Cooper for examination.

* See Dr. Johnson's article on the Physiology and Pathology of the Circulation in the number of the JOURNAL for May 10th; and correspondence in the numbers for June 3rd and 10th.