tended with blood *within a few minutes* after the cessation of the heart's action, that, when they are opened, the blood flows in a full stream as in ordinary blood letting.

Two more facts have been brought forward by Dr. Carpenter. There are cases of spontaneous gangrene of the lower extremities, in which all the blood-vessels are found pervious throughout; but whether these cases really admit of the explanation given to them, I am as yet unprepared to say. Gangrene may occur from narrowness of the aortic orifice of the heart, from a contaminated state of the blood, as in ergotism; and, before we ascribe gangrene to the cessation of the nutrient actions of the capillary system, we must naturally exclude all other causes. If this has been done in the cases alluded to (which I regret has not been stated expressly), they certainly are striking illustrations of the capillary power, and the consequences of its cessation.

The other fact is the curious retardation or suspension of the circulation in so-called dead fingers. Dr. Carpenter relates a case, recorded by Dr. Graves,* in which the whole of one leg was thus affected with remarkable periodicity for about twelve hours out of twenty-four; whilst in the interval the circulation was unusually active, the action of the heart being quite natural throughout, and the circulation in the rest of the body not in the least affected.

Here the facts derived from pathology end. I leave the subject without entering into the microscopic appearances shown by capillaries in their wonderfully varied constructions and adaptations to the objects of the different organs; I leave it without an attempt even at a definition of the power of the capillaries. One positive experiment has established the certainty of its existence to my mind, and I hope on a future occasion to make it plain also to the mind of others who may favour me with their attention, on which indeed I am afraid of having trespassed already more than perhaps may be justified by the magnitude of the subject under consideration.

34, Keppel Street, Russell Square, January 1855.

EFFECTS OF SUBMARINE DESCENT.

By THOMAS LITTLETON, M.B., F.R.C.S.

IN the progress of constructing an iron bridge across the river Tamar at this place, by Mr. Brunel, my attention has been called to certain injuries, sustained by some of the workmen engaged therein during the endeavour, which has now proved successful, to procure a foundation for the central pier. The absence of any sufficient mention of the kind of accidents which attend upon those conducting submarine occupations, in the notices to which I have been able to gain access, induces me to attempt to supply some of these omissions; and I trust that the explanation of the effects produced, though far from satisfactory, may be suggestive to those better able to deal with the question, and may by such cooperation ultimately conduce to the welfare of those to whom society owes a debt which it has so long neglected, and which remains for the Committee on Industrial Pathology of the Society of Arts to discharge. And to do this fully, what better channel of communication and for assistance can be obtained than that of this JOURNAL?

There are accounts given of several of the inconveniences which attend on the descent in a diving bell, at p. 492, No. 349, and p. 177, No. 368, of the *Philosophical Transactions*, by Dr. Edm. Halley; at p. 377, No. 444, by Mr. Martin Triewald; and in Dr. Olinthus Gregory's translation of Abbé Haüy's *Natural Philosophy*, vol. i, p. 224. Such are the following: a painful sensation of pressure on the membrana tympani, which soon subsides, the ready communication by the Eustachian tube establishing an equilibrium of pressure on that part; spitting of blood; bleeding at the

nose and ears; blood-shotten state of the eyes; and the oppressive sensation attendant on a confined atmosphere, by which, if the means of constant renewal are not applied, life would be speedily destroyed.

But no allusion is made to one source of danger, that has demanded most attention here; and which, from the suddenness of the attack, and apprehensions of fatal results attending it, more especially deserves notice.

Some reason for this omission is supplied by the difference which the apparatus used here presents from a diving bell, and the less liability to danger which exists in the latter, from the *gradual* manner in which it is lowered and raised, and the consequently slow increase and diminution of pressure to which its inmates are subjected. Were this, which is so rightly insisted on by Dr. Halley, not observed, the same consequences would follow the rapid drawing up of the bell to the surface of the water as attend the working in this cylinder, and from the same cause, the *sudden removal of pressure*.

Considering the effects produced on some few by this change, from a pressure of three and a half atmospheres (the depth at high spring tides being eighty-five feet) to the normal pressure of fifteen pounds, it is a matter of surprise that more do not suffer them. There have not occurred, so far as I am aware, more than half a dozen severe cases, in a work which has occupied daily twenty-five men over a period of many months.

In the severe forms of the attack, the man is taken, within a few minutes after coming out of the cylinder, somewhat as in an apoplectic seizure, with a loss of power, preceded by pains, in the lower limbs (paraplegia), as I have seen in two cases, or of one-half of the body (hemiplegia); another, the only one I have seen so affected, was wholly unconscious, remaining in that state many hours. In those who escape with less injury, their sufferings are in some instances very severe, from pains in the limbs and joints; and few, if any, have wholly escaped these effects at some time or other during the progress of the work.

These are evidently the results of pressure on the cerebro-spinal nervous system; but what are the different links in the chain of causes producing it? It may be, that the respiratory movements are not accompanied by the alternate falling and rising of the brain attending the acts of inspiration and expiration, which undoubtedly constitute important conditions of the brain's action; and the impediments occasioned in this respect alone prove obstructive of its functions. I name this as possibly the case, because it is obvious the first few inspiratory efforts, on coming out from the pressure named, cannot be attended by their ordinary effects, the due influx of venous blood and of atmospheric air into the chest; for the *condensed air* at that time present in the lungs, and continually brought by the blood of the body, until the whole of it has circulated through the lungs, would expand itself, and thus occupy the space, which under normal conditions the venous blood and atmospheric air would enter on the production of the vacuum by inspiration.

But more than this must have occurred to bring about such a continuance for weeks of the loss of voluntary power as exists in some of these cases. There might have been an extravasation of serum into the ventricles, etc., a rupture of small blood-vessels, or possibly, under such physical conditions, there may occur an *extrication of air*, occasioning pressure on the brain. Under a like series of conditions, Boyle, in his experiments on animals breathing a rarefied atmosphere, notices to have manifested itself in the case of a viper,—"a conspicuous bubble of air moving to and fro in the waterish humour of one of its eyes." (*Phil. Trans.*, abridged, vol. i, p. 499.)

The precautions needed to obviate these several inconveniences, and which, if adopted, will prevent the occurrence of any ill consequences, are these. That the pressure be laid on gradually by not more than five pounds (Dr. Halley directs twelve feet of water) at a time, stopping at each increment of pressure during the time which is required for

* Lectures on Clinical Medicine. Second edition. Vol. i, p. 73.

the whole mass of the blood to circulate through the lungs, from one to two minutes, so that it may be imbued with air of a corresponding density; and, in the removal, equal care must be taken that no sudden rupture of the equilibrium of pressure is occasioned. That strict attention, also, be paid to the supply of fresh air, according to the number of men working, the number of lights burning, and the length of time during which they remain within the apparatus.

Saltaash, Cornwall, Jan. 31, 1855.

REPORTS OF SOCIETIES.

EAST KENT AND CANTERBURY MEDICAL SOCIETY.

The following is an abstract of some of the most interesting cases and papers read before this Society during the sessions 1852 to 1855.

REPORT OF CASES OF MEASLES ATTENDED IN AN EPIDEMIC OF THAT DISEASE IN CANTERBURY DURING 1852.

BY G. RIGDEN, ESQ.

It seems desirable when an epidemic has occurred in a locality, that its rise, progress, and effects, should be accurately noted; so that, by the careful comparison of many such histories, a more perfect knowledge of the cause of the disease may be formed; and, consequently, a better mode of preventing, or at least of checking its progress may be discovered. With these views, the following digest is submitted.

During the year 1852, this city was visited by an epidemic of measles, 138 cases of which Mr. RIGDEN attended—68 on dispensary account, and 70 in private practice.

The first case occurred on January 3rd, 1852, in the person of a female child, residing in the neighbourhood of the Gas Works; the second case on January 22nd, in a male child, residing in Guildhall Street; the third and fourth cases on January 24th, in two children residing in St. Peter's Lane; the fifth case on January 31st, in a child residing in Wincheap Street, Thannington; the sixth case on February 12th, in Orchard Place, St. Dunstan's; the seventh and eighth cases on February 13th, in Spring Gardens, Wincheap; the ninth case in the week commencing February 21st; the tenth case in the week commencing February 28th.

2 cases occurred in the week commencing			
5	"	"	March 13th
16	"	"	March 20th
12	"	"	March 27th
19	"	"	April 3rd
10	"	"	April 10th
11	"	"	April 17th
6	"	"	April 24th
11	"	"	May 1st
10	"	"	May 8th
12	"	"	May 15th
0	"	"	May 22nd
3	"	"	May 29th
3	"	"	June 5th
1	"	"	June 12th
0	"	"	June 19th
2	"	"	June 26th
1	"	"	July 3rd
2	"	"	July 10th
1	"	"	July 17th
1	and the last, occurred on		August 26th

138 cases

It was well known, previous to the epidemic appearing in Canterbury, that there had been several cases of the disease in the neighbouring villages of Bridge, Littlebourne, and Wingham; but Mr. Rigden could not trace any connexion between these and the first cases he witnessed in Canterbury. He therefore thought it most probable that the poison of the disease was in the atmosphere, and was propagated independently of the near approach of the individuals affected. Indeed, so far as he had observed, the appearance and spread of this outbreak in the city was not only wholly irrespective of that in the neighbourhood, but had several independent centres of origin.

The respective ages of 113 of the above mentioned cases, which include all those admitted on the books of the dispensary, were as follows:—

CASES.

10 under 1 year of age
11 between 1 and 2 years
17 between 2 and 3 years
19 between 3 and 4 years
13 between 4 and 5 years
10 between 5 and 6 years
12 between 6 and 7 years
8 between 7 and 8 years

CASES.

3 between 8 and 9 years
3 between 9 and 10 years
2 between 10 and 11 years
1 between 11 and 12 years
1 between 12 and 13 years
1 between 13 and 14 years
2 between 16 and 17 years

The youngest case was in an infant two weeks old; but, generally, young infants did not contract the disease, although in immediate contact with subjects affected.

The districts visited by the diseases were—

<i>The Southern District.</i> Including Gas Street, 4 cases; Wincheap Street, 20 cases; Church Lane and Delasaux Square, Saint Mildred's, 2 cases	26
<i>Central District.</i> Including Guildhall Street, 1 case; High Street, All Saints', 2 cases; King Street, 2 cases; Abbot's Place, 3 cases; Mercery Lane, 2 cases; Butchery Lane, 3 cases; Burgate Street, 13 cases; Stour Street, St. Margaret's Parish, 2 cases	28
<i>Western District.</i> Including St. Peter's Lane, 10 cases; St. Peter's Street, 3 cases; Grove's Lane, 1 case; Black Griffin Lane, 6 cases; St. Peter's Place, 5 cases; North Lane, 3 cases; Westgate Street, 2 cases; Kirby's Lane, 1 case; St. Dunstan's, 13 cases	44
<i>Saint Paul's.</i> Including Ivy Lane, Chantry Lane, and Longport, 9 cases; Monastery Street, 1 case; St. Augustine's, 1 case; Broad Street, 2 cases	13
<i>Northgate.</i> Including Military Road, 5 cases; Cross Street, 1 case; Old Ruttington Lane, 3 cases; Northgate Street, 1 case; Artillery Street, 1 case; Broad Street, 1 case; St. Gregory's Square, 3 cases	15
<i>Saint Mary Bredin.</i> Including Rose Lane and Gravel Walk, 4 cases; Watling Street, 1 case; Dane John Farm, 1 case; Oaten Hill and Old Dover Road, 6 cases	12
Total	138

The foregoing cases all terminated in recovery.

The following Table gives the age, date, and locality, of fifteen fatal cases, which are recorded in the Registry of Deaths for the City during the year.

No.	Sex.	Age.	Date.	Residence.	Nature of district.
1	M.	2 years	March 21	London Road, Saint Dunstan's	Healthy
2	M.	9 mths.	April 5	St. George's Terrace	Healthy
3	M.	2 years	April 15	St. Paul's Street	
4	M.	3 mths.	April 17	Grove's Lane, St. Peter's	Unhealthy
5	F.	10 mths.	April 17	Knott's Lane, Saint Alphage's	Unhealthy
6	M.	4 years	April 23	St. Laurence, Saint Paul's	
7	M.	1½ year	April 23	Butchery Lane, St. Andrew's	Unhealthy
8	M.	10 mths.	April 26	Burgate Lane, St. Mary Magdalen's	Unhealthy
9	F.	16 mths.	May 4	Northgate Street	Unhealthy
10	M.	1 year	May 11	Union Row, Saint Paul's	Unhealthy
11	M.	2 years	May 13	Iron Bar Lane, St. Mary Magdalen's	Unhealthy
12	M.	5 years	June 6	North Lane, Westgate	Unhealthy
13	F.	3 mths.	June 7	Northgate Street	Unhealthy
14	M.	2 years	June 17	Broad Street, Northgate	
15	F.	15 mths.	June 25	Stour Street, Saint Mildred's	Unhealthy

From these tables, it appears that the greatest intensity of the disease was in the month of April, and its mortality was highest in those districts in which the sanitary condition of the inhabitants, as well as that of the locality, are least favourable to recovery.