THE RUBBER TEAT AND DEFORMITIES OF THE JAWS.*

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THE subject to which I beg to invite your attention is the use of the rubber teat and "baby comforter," and their giving rise to certain deformities of the jaws, irregularities of the teeth, nasal obstruction, and other diseases in infancy and childhood.

The dieting and care in the rearing of European and other infants form an important part of the work of the general practitioner in Rangoon. The difficulties of hand-feeding are much greater in the tropics than in England. I believe, too, that with Europeans residing in these climates it is more frequent and more an absolute necessity to resort to the feeding bottle than at home; for here often European mothers, from compulsion rather than from choice, fail wholly or in part to suckle their offspring. In many, however anxious they may be to perform this all-important function, there is a failure of milk secretion after a few weeks or months, and artificial feeding, with all its dangers and difficulties, becomes compulsory. The importance of one factor in this process is the use of the ordinary indiarubber teat, and later, the introduction of what is regarded by so many people as the harmless dummy teat or "baby comforter." This last product of perverted ingenuity, and the effects of its use in the mouths of some of my little patients, has opened my eyes to serious evils which I now believe arise from the defective form, and the too prolonged use of the artificial substitute for the mother's breast. I have for years consistently protested against the careless and prolonged use of the feeding-bottle, and, in most cases, succeeded in curtailing its use, also in abolishing the "comforter" from the nurseries of my patients. But with some obstinate and indulgent parents all arguments have failed until the mischief which I wish to describe has been brought about.

On examining during sleep the mouths of some bottle-fed babies of say between the ages of 18 months and 2 or 3 years, one may see between the parted lips, that though the jaws are closed, there is a gap between the upper and lower incisor teeth which will sometimes admit the tip of one's little finger, also that the child is breathing through its mouth. These conditions will be found to be the more pronounced the longer the child has been fed with the bottle or used the "comforter."

When both have been used, as they so often are, until after all the temporary teeth have been cut, the deformity is very severe.

If we watch an infant in the act of taking its natural food we see that it opens its mouth to the fullest extent, and takes a mouthful of its mother's breast; not only the

nipple, but a large part of the areola disappears. A mother will tell you that she feels that the nipple goes far to the back of her baby's mouth. At the same time the tongue is protruded over the whole of the lower gums and often over the lip, and its edge may be seen in the angles of the lips. Thus, an infant 3 months old takes into its mouth a soft tough mass which, when its jaws close upon it, measures from 1 in. to 1½ in. wide, ½ in. in thickness, and 1 in. to 1½ in. long—a flattened truncated cone which, when subjected to the pressure of the tongue

and the jaws, comes into contact with the larger portion of the palate and the upper gums and the upper surface of the tongue. The nipple itself forms a small part of what an infant a month old takes into its mouth. The everted lips lie around the base of this soft cone, with slight, if any, contraction.

In the act of feeding at the breast the jaws hardly close. The lower jaw is raised to squeeze the pap against the upper gums and the palate, a wave of contraction passes along the intervening tongue from its tip to its base, in the latter part of which movement there is some retraction of the body of the organ, which in this closed cavity makes for suction, then its approximation to the palate pushes the milk into the pharynx to be swallowed. The milk which is contained in the distended

ampullae immediately above the nipple is squeezed out rather than drawn out by suction. The jaws then separate to admit more milk into the flaccid apex of the breast for the process to be repeated; the first part of this effort of expression is aided by the lower gums biting inside the upper. The cheeks are passive, the whole act is peristaltic, the alternating pressure and relaxation exerted by the jaws and tongue being analogous to that which the milker imparts with his fingers to the teat of the cow.

The muscular effort becomes stronger as the meal terminates and ducts empty of secretion. But in a healthy woman there is under normal conditions always more than enough for her child. Mothers have repeatedly told me that it is more a matter of the baby drinking than sucking, for the milk often flows from the other nipple at the beginning of the meal. From such breasts an infant will fill its stomach in from eight to fifteen minutes. I have often watched and timed the meal.

Compare this natural process with what one constantly sees when the ordinary feeding-bottle with the common rubber teat is used, and one is impressed with the extraordinary defectiveness of the substitute for the human breast. The common teat is usually 1 in. to 1½ in. long.

That portion which lies between the lips is cylindrical and less than ½ in. in diameter. The lips have to be screwed up to grip it, while the tongue folds in its length round a narrow body lying upon its dorsum—an elastic and resisting material which, when pressed against the upper gums and the palate, can only touch a comparatively small and central portion of those surfaces. The bulkiest and broadest part comes into contact with that portion of

Fig. a.—Skull of infant. In the infant the palate is near to the floors of the orbits and the base of the skull.

Fig. b.—Specimen in Guy's Hospital Museum, showing the unossified sutures of the premaxillae at the age of 5 years.

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the palate which in nature receives the apex of the cone. The flow of milk through its orifices, is usually far too slow; it must be drawn out by suction and cannot be increased much in volume by the recurring pressure of the jaws; at the same time air usually must be admitted through its orifices to the bottle to allow of milk being extracted. The cheeks, instead of remaining full and passive as in feeding from the breast, are visibly pushed in by atmospheric pressure. If you place your little finger in your mouth and suck it, you will feel the edges of your tongue fold round it and away from your teeth. Do the same with two fingers as a baby does at the breast, you will feel that your tongue is lying over the biting surfaces of your incisors and most of your lower teeth. Try to suck 2 oz. of water from an ordinary feeding-bottle; it will make your jaws ache for half an hour.

If we have in the past given this matter a thought, we have come to the conclusion that Nature has especially and mercifully endowed the infant with great powers of suction. This is an error, for the muscles concerned should not be called upon to do much more than those of a man drinking from the hollow of his hand.

The mechanical effects of the prolonged use of the common rubber teat for feeding are now often added to and exaggerated by the use of the dummy teat or "baby comforter." This thing is usually the same shape as the bottle teat; often it is smaller and more resistant. It is commonly placed in the baby's mouth immediately after it has been fed from either the breast or the bottle, and is sucked for hours, day or night, until a habit is contracted which is most difficult to break. On the slightest sign of restlessness, or without any reasonable pretext, the dummy is pushed into the infant's mouth; often it is picked up from the floor and given to the child, or hung round its neck so as to be handy. Sometimes it is dipped into sugar or smeared with jam to render it more acceptable. Apart from its mechanical effects upon the jaws and teeth, its use, to my mind, is obnoxious and uncleanly, for it introduces into the child's mouth dirt and micro-organisms, and causes an abnormal secretion of saliva detrimental to digestion.

The defective shape and resiliency of the artificial teat, the severe muscular efforts demanded of the tongue, and its altered shape in sucking it, the extra muscular pressure of the lips and cheeks, the enormously increased atmospheric pressure upon the cheeks and jaws, are all abnormal influences which must have injurious effects upon the delicate bony tissues of the infantile maxillae, and interfere with their proper growth and development. The ossifying junctions of the maxillae, the premaxillae, and the mandible are subjected to these unnatural influences during a long period when they are most liable to be injured. When these processes are prolonged, as they often are, until the temporary teeth have all been erupted, or even into the third or fourth year, it is not surprising that the alveolus containing the upper incisors, both temporary and permanent, should be pushed forward, for the bulk of the premaxillae is alveolus. At the same time the upper alveolar arch, instead of broadening, is compressed transversely by the atmospheric pressure upon the cheeks. This, with the pressure of the bulk of the teat against the palate, destroys the symmetry of its concavity by preventing the descent which accompanies

natural development. The palatal arch may thus remain abnormally high in the centre, and sometimes becomes V-shaped.

This is the most important factor in the causes of those deformities of the tender bones above the palate which accompany abnormalities of the nasal cavities, and obstructions of those passages. With a narrowing of the transverse diameter of the nasal fossa, there is a buckling of the septum, approximation of the deflected vomer to the displaced turbinated bones on one side, or of any or all of these delicate bones to each other, with obstruction to, or abolition of, nasal respiration; there is abnormal height of the palate between the first permanent molars, and often it is ballooned instead of V-shaped. Mouth-breathing is secured by the mouth being habitually kept open until the approximation of the molars prevents the front teeth from meeting. The upper incisors not having the guidance afforded by biting outside their lower antagonists, are subjected to the constant and unrestrained pressure of the elevated upper lip, which alone may have corrected early protrusion. They may even incline inwards, and the alveolar arch between the canines be flattened. However much a varying atmospheric pressure may aid in the production of this deformity, the primary cause is the pressure of the rubber teat upon the palate.

With many children who are breast-fed, and who have only used the "comforter" or the bottle for a short time, it is probable that the natural pressure of the lips and tongue may mitigate the deformity; but where both teat and "comforter" have been long used, the damage is, I believe, irreparable. With multitudes of young children in Europe, the size and shape of the palate varies with the extent to which such influences have been brought to bear upon the plastic and growing tissues.

When the deformity becomes pronounced the lips cannot be closed except by effort, and the upper lip becomes habituated to its elevated position. When the lower lip once falls inside the upper temporary incisors, their malposition, and that of their successors,

is confirmed and incurable. Where bottle-feeding has been carried on from birth, there is sometimes to be found narrowing of the arch of the lower jaw from contraction of the symphysis during the process of ankylosis and the first nine months of infantile life. Even where the normal ankylosis of the two halves of the lower jaw has not been interfered with, it is obvious from what is known of the plastic growth and development of the alveolar process that the external pressure of the teeth of a contracted upper jaw must influence the position of the lower teeth and the alveolus which supports them. So that while the basal portion of the lower jaw may be normal in its curvature, the alveolus which is built upon it may at its upper margin form a contracted arch in which the lower teeth slope inwards, while those of the upper jaw take an outward slant. Here there follows a narrowing of the space between the permanent canines and a huddling of the lower incisors, a common irregularity which cannot be ascribed to premature loss of the lower temporary incisors through caries, for they are the least liable to decay. The use of the bottle teat and dummy fortunately does not affect the development of the lower jaw and the position of its teeth, as it does that of the upper, because the tongue is

REFERENCES TO ILLUSTRATIONS.

The first three photographs are of models of jaws of little children who came into my surgery with dummy teats in their mouths.

Figs. 1 and 1A show the front and side views of the denture of a Chinese male child, aged 2½ years.

Figs. 2 and 2A of a Eurasian male child of 3½ years.

Figs. 3, 3A, and 3B, of a Eurasian female child aged 4½ years.

Fig. 3B looks down upon the biting surfaces of the teeth in this case, and shows what may be seen in the other two, that while the palate is narrowed the alveolar arch of the lower jaw is not much interfered with, the explanation being that they were breast-fed from birth till they were a year old. The comforters were used from the time the children were a month old until the models were taken. The parents of all three have good and regular teeth and wide well-arched palates.

Fig. 4 is the side view of a Jewish boy of 7 years. He was breast-fed for a year, had the bottle till he was 2, and used the comforter till he was nearly 5 years old. His parents have regular teeth; he was the only one in a family of four children who used the comforter, and the only one with this deformity.

Figs. 5 and 5A are from a boy of 10 years of age. Figs. 6 and 6A from his brother, aged 12. These are two English boys whom I have known from birth. They were bottle-fed after the first two or three months. The devoted parents, deaf to my entreaties and predictions, gave them the dummies at an early period, and their use was continued until after the temporary teeth had all been out. So confirmed did the habit become, that there was no peace in the home if the children were deprived of their "pacifiers." They left my observation for a time, paying a visit to England; on their return to Rangoon, these models were taken, for I found that my predictions that the permanent teeth would follow the lines of their protruding predecessors had been fulfilled. The parents, an elder son, and a younger daughter are free from any such deformity. Neither of the latter used the dummy.

Fig. 1.

Fig. 1A.

Fig. 3.

Fig. 2.

Fig. 2A.

Fig. 3A.

Fig. 5.

Fig. 5A.

Fig. 3B.

Fig. 4.

Fig. 6.

Fig. 6A.

Fig. 7.

Fig. 7A.

Fig. 7B.

Fig. 8.

Fig. 9.

Fig. 8A.

Fig. 9A.

Fig. 10

interposed between the object sucked and the alveolus, both before and after the eruption of the teeth.

Irregularities of the milk teeth are of little importance when an individual tooth or two is affected, having little to do with the position assumed by their successors; but where the whole alveolus containing the temporary teeth with the crypts of developing permanent teeth, is displaced, deformities and irregularities must follow. Undue prominence of the permanent upper incisors is often ascribed to heredity; I believe that this is, in the main, an error. The use of the rubber teat with the feeding bottle has become so much more prevalent during the last two generations in Europe that these troubles are induced in parents and children, being subject to the same artificial cause. For instance, we find that the teeth and jaws of Eurasians, whatever may have been the dental peculiarities of their European fathers, are wonderfully good, regular, and well-developed, as in the native races, the vast majority of them being breast-fed. Irregularities amongst these people are so rare, that they attract one's attention, and an artificial cause is usually to be ascertained. Feeding-bottles are sometimes used by the Burmese and other Easterns of our polyglot population. Where formerly a Burmese mother could not suckle her child, she got another woman to do so. Now the bottle is resorted to, especially amongst the poorer classes, for wet nurses are expensive. Most of such children in Rangoon die of intestinal troubles; the earlier the artificial feeding is begun, the sooner they die. A few are given the bottle after having had the breast for a few months, so that they have had a good start; but their troubles soon begin, for one often finds failure to properly cleanse the rubber teat and its appurtenances, pipes, washers, shields, etc.; not seldom are they foul or smelling putrid. I suppose that the poor and ignorant classes in England, amongst whom hand-feeding is far more common, are not more careful than mothers out here. Apart from all the difficulties of obtaining pure cow's milk and of adapting it to the digestive powers of the infant, the feeding-bottle, as commonly used by these people, introduces into the mouths and alimentary canals of these infants numerous micro-organisms, from which the breast-fed are free. Amongst those who are struggling bravely with the bottle for existence, and those who have come out of the fight more or less damaged, we have opportunities of watching the diseases of modern child life as seen in civilized countries of the West. Many troubles unknown to the breast-fed children of the poorest and most ignorant of the native races, catarrhal and parasitic stomatitis, and ulcerations about the gums and palate, are often met with, due to friction of the rubber teat, and micro-organisms introduced by its uncleanness. Unfortunately the use of the feeding-bottle is with Europeans and others continued long after it might well be abandoned, even into the second and third year; then from dirty teats and stale milk one may find caries of the upper incisor teeth, and even of the first lower molars before the canines have been erupted. One may often see tonsillitis started at a very early age amongst these children, and careful examination of the mouth and back of the throat reveals a state of disease which easily accounts for any amount of

subsequent trouble in the form of hypertrophy of the tonsils and of the pharyngeal mucous membrane. Several Eurasian boys and girls, upon whom during the last few years I have found it necessary to operate for hypertrophy of the tonsils and adenoids, were without exception bottle-fed.

In Dr. Goodhart's *Treatise on the Diseases of Children*, he draws a vivid picture of the sufferings arising from hypertrophy of the tonsils and adenoids. He says:

First, it leads to snoring when the child sleeps—not in itself a matter of much concern; secondly, to deafness from the pressure upon the orifices of the Eustachian tubes and the associated hypertrophic or inflammatory changes which take place in the surrounding mucous membrane. This is of importance because such children often appear dull and stupid simply because they are deaf. It interferes, too, with free vocalisation and gives a nasal twang to the voice. It causes frequent cough. Lastly, by partial occlusion of the air passage, the lungs fill badly and the chest becomes distorted, and it is said that from the want of full use, the nostrils contract, the upper jaw fails to develop, and in consequence the arch of the palate remains high, and the teeth become cramped from want of room. The chest becomes pigeon-breasted—that is to say, the ribs are flattened in laterally—and the sternum and costal cartilages become prominent, sometimes quite pointed.

Across many such pages in our books of reference and many columns by writers upon this matter in our journals, one would be justified in writing the words "Caused by the rubber teat." Seeing and knowing what we do of the extreme rarity of these diseases amongst the many different races, nationalities, and types around us, one reads with wonder of 2,000 cases of operation for adenoids in a Liverpool hospital, or the patriotic appeal of a writer in the *Lancet* as to the national importance of subjecting tens of thousands of children in England to operations for this disease. It is most difficult to believe that if these troubles were in the past anything like as prevalent amongst our own people as we see them now to be, they could have so entirely escaped the notice of the masters of our art. It seems more reasonable to

inquire as to the advent of some recent and widespread cause of what should be regarded as diseases of modern life. I believe that the cause lies here—artificial feeding—and that with defective appliances.

The conclusions which I have come to, and the suggestions which I wish to offer for the prevention of these evils are: When an infant is deprived of its mother's milk and has to be fed by hand, the substitute should be quite different in shape and consistency to the patterns now in vogue. It seems so difficult to make, even in india-rubber, a good imitation of Nature, that it would be much safer to be satisfied with providing a soft end to the spout of a vessel from which the infant is to be fed, and through which the milk can be gently and slowly poured into its mouth.

No harm can result from a baby drinking without sucking.

As a substitute for the common rubber teat, I recommend the use of a good-sized soft rubber finger-stall; a baby a week old can accommodate the end of one which will fit a man's thumb. Such a teat may be used on the spout of a vessel like a feeding cup, or an ordinary feedin g

REFERENCES TO ILLUSTRATIONS.

Figs. 7 and 7A and 7B (reduced) are from the models of the mouth of a Eurasian girl, aged 14, who was bottle-fed, and who persistently sucked a forefinger until she was 6 years old. Her palate is too high and partly V-shaped, as shown in Fig. 7B, both the palatal and alveolar arches being deformed. She suffered from adenoids, enlarged tonsils, and deflections of the septum, with anterior nasal obstruction and flattening of the nasal arch. She is one of five children, all bottle-fed from early infancy, and all similarly afflicted in various degrees.

Figs. 8 and 8A (reduced) are photographs of models from a Eurasian lad of 18 years, with whom I have been acquainted from early childhood. I know that neither of his parents had any irregularity of the teeth or palatal deformity. He was fed from birth for the first nine months from a feeding-bottle with a pipe, which he used to lie and suck. This was then changed for a boat-shaped bottle with nipple and shield. He continued to feed from the bottle till he was 3 years old; it was with great difficulty that he was broken of this habit and induced to take other food. His mother tells me that she noticed at a very early age, when he was between 2 and 3 years old, he snored, always seemed to have a cold in his head, and had to breathe through his mouth. As shown in Fig. 8A, his palate is too high and ballooned, and in consequence he has deflection of the nasal septum and obstruction to nasal respiration, which the removal of adenoids and enlarged tonsils have not done much to relieve.

Figs. 9 and 9A (reduced) are from the mouth of a young woman, aged 23 years. She is one of two survivors of a family of fourteen, whose mother fed them from birth with feeding bottles. She tells me that they all died in infancy from convulsions, from which she also nearly died. Such a case as that, and such facts, call for many sad reflections.

I could get other models showing further varieties of these deformities in young children and in adults, but I think that these examples will serve our purpose. These deformities are hideous, and they are worse; for they all, in varying degrees, interfere with the efficiency of the masticatory apparatus, and in many cases involve nasal obstruction with all its dangers to the physical and mental development of the victims. In these cases the models show that the bite is always upset, and where the permanent teeth are erupted the outer cusps of the lower molars, instead of biting inside are outside those of their antagonists in the upper jaw.

Fig. 10 shows some rubber teats such as are in general use. They are reduced to two-thirds of the original size. A, the smallest, is one which I found in the mouth of a baby, 2 days old, as a "comforter"; B is a "comforter"; it is the same size and shape as most feeding-bottle teats; C is another teat in common use; I find it too small and too resilient; D is a pattern commonly used in Germany; it is too long and too narrow.

bottle. If this teat is properly adjusted, and the cup properly held so as to regulate the flow, there is no need for a shield, and the teat will not go down the baby's throat. Some of my little patients have taken quite readily to this method. Finger-stalls may be obtained in different sizes, are soft, flaccid, easily cleansed, and cost little more than the ordinary teats.

But a baby three months old can quite easily be taught to drink from a cup. At this age, then, I would recommend that all teats and bottles be thrown aside, and that we should revert to the old-fashioned metal pap-bowl with the long open lip. Our grandmothers for many generations back (before American ingenuity brought us the rubber teat) fed the children from such vessels in pewter. We can have handy-shaped, easily-cleansed, and unbreakable cups of this description in aluminium or silver. Of course, the baby "comforter" or "pacifier" must be abolished and forbidden; its use is injurious, and if after warning resorted to, should be deemed an indictable offence.

Lastly, every mother who can suckle her own child should do so. Much might be done by the State and philanthropy to encourage this ancient custom amongst the ignorant and illiterate of all classes of our population; for ignorance is accountable for much that is cruel. Many women might suckle their children, but will not; for any such neglect of this duty should be deemed a crime. If those who in past ages gave the sacred laws which rule our lives had foreseen! If He, the Friend of the little children, had imagined that such glorious women as ours—English women—could withhold their breasts from their babies, what denunciations, what protests, would have been recorded against this unnatural and unwomanly sin!

One may envy Meyer of Copenhagen his reputation, and the benefits which his discovery and treatment of adenoids has brought to thousands of suffering children; but "higher merit," as our Burmese friends would say, awaits those who, in the names of humanity and patriotism, will persuade our women to remember and to fulfil the first duty of a mother.

Postscript. London, September, 1906.

Returning to England for a brief holiday after many years of residence in Burmah, I am intensely interested to find that the subject of this paper is intimately connected with questions which are now deeply engaging the attention of the profession and practical philanthropists. I feel that the publication of the facts which I have collected, and the views here imperfectly set forth, may do a little to assist in solving some of the problems of our cruel infantile mortality, and the prevention of a group of diseases which is maiming and disfiguring so many of our people.

To one accustomed for years to the beautiful feature of healthy and regular teeth of many Asiatic races, the unconcealed evidence of disease which disfigures the smiling faces of so many men, women, and children in this country, is a distressing and painful experience.

I find that the museums of the dental and other hospitals contain numerous models such as I have collected, and am assured by London dentists of the widest practice that these cases are as common as blackberries in England.

I have lately visited many different parts of the country. Wherever I go the extraordinary prevalence of the use of the dummy teat has astonished me. In the streets or travelling by rail, I meet this thing; the children playing on the sands have it in their mouths. In tens of thousands the mischief has been done, they are shamefully disfigured for life. It seems to me that the arrest of this evil is as deserving of the attention of our legislators as many of the subjects to which they devote so much time and energy.

What great responsibility rests upon us as a profession in regard to all these matters! but now is our opportunity; never before have our countrymen been so willing to listen to the advice of those to whom they must look for guidance in all that concerns their health and physical well-being. Let us endeavour to act up to our responsibilities, and with a united and decided voice denounce the many preventable causes of disease, which are doing so much to sap the vigour and to impoverish the blood of the splendid race so envied of all the world.

COMBINED ANTRUM PLUG AND ARTIFICIAL DENTURE.

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In the practice of a surgeon there may occasionally arise cases of antral empyema, which are for some reason unsuited to the radical treatment. In these cases all that can be done is to trephine, and when that has been done the surgeon is confronted with the question of permanent drainage and of how occlusion of the opening may be prevented. Many methods have been tried with varying success, namely:

1. Frequent syringing without the use of any plug. This invariably ends in occlusion before very long, and the trouble recommences, leaving both patient and surgeon dissatisfied.

2. The spiral wire tube, which soon becomes septic from particles of food, is also liable to rust, and so is easily destroyed.

3. The gold, or other metal, cannula, which is permanently inserted, and into which passes a split wire attached to the plate. This method, however, is of limited application, owing to variation in the bite, where appearance has to be considered in supplying missing teeth.

4. In cases where the bite is close, and the lower teeth almost touch the upper gum, I employ the method which I will now describe, and which has given the greatest measure of comfort and satisfaction to many patients.

I prepare a gold plate, fitting absolutely closely to the palate and alveolar ridge, taking special care that the plate is closely applied to the buccal surface of the alveolar ridge, thus preventing access of food to the plug and antral opening. On the upper surface of

this closely-fitting gold plate (see cut) is soldered a solid gold pin, $\frac{1}{4}$ in. thick, of sufficient length to pass freely up into the antrum. On the lower surface of the antral bridge is fitted the necessary tooth to supply the place of the missing first or second molar, and such other teeth may be added to the plate as are required in the ordinary manner. The patient is instructed to syringe with the ordinary antiseptic lotions as may be prescribed by the surgeon, every time the plate is removed and replaced, at least three or four times a day.

Persons treated by me in this way report that the solid fixed gold pin is vastly superior in ease and comfort in wear, and the drainage opening is more easily found, than by any of the older methods described.

UNDER the will of the late Mr. William Henry Brown, of Alveston, Gloucester, the Royal Infirmary and the General Hospital, Bristol, each receive a sum of £200, and the United Hospital, Bath, the Mineral Water Hospital, Bath, and the Hospital for Women and Children at Bristol each a sum of £100.