over the hair. It is advisable to put cotton-wool in the ears. The patients sit on stools or chairs. The lamp is not placed under the creasote until the patients are settled in the room, so that they get the vapour gradually mixed with the air. The average duration of a *séance* is half an hour; at first shorter, afterwards longer, possibly an hour or an hour and a half. The treatment is repeated as a rule every day but occasionally I have had it given twice a day. Bronchiectasis is the only condition which seems to derive benefit from it, but in that the benefit is usually very marked."

Coming now to the ordinary local inhalation, here again we see things undertaken much more thoroughly abroad. Each patient has his own private coupé, but the water, air, or steam is supplied to all from one source. Speaking generally, at the sulphur spas of Challes, Marlioz, Allevard, and Uriage pulverisation, or as we call it atomisation, of the water is the only method used. There are three varieties. The first is called "*brisement*," where the water is broken up by impinging on a metal surface. It is previously forced into a sphere under a pressure of 15 to 20 atmospheres; thence it comes with great force through a very fine agate or ruby nozzle with a lumen of one-fifth to one-tenth of a millimetre in diameter. The metal surfaces on which this fine jet forcibly impinges are of three kinds:—(a) A tambour. This is a small hollow cylinder about one and a half inches long and three-quarters of an inch in diameter. This cylinder is hinged on a metal stalk which in its turn is fixed into a solid earthenware foot some three inches in diameter. The jet enters one end of the tambour, is so directed that at the centre it impinges on the concave surface, is at once broken up, and issues in a cloud of the finest dust at the other end, the circumference of this end cutting off the outer portion so that a comparatively small, fairly cylindrical column of atomised water having a considerable velocity is the result. This tambour form is used for throat and bronchial inhalation (oral), as the whole of the column can enter the mouth without wetting the face. (b) A palette. This is a small disc of metal which replaces the tambour. It has a spray which radiates more widely than that from the tambour; it is used for skin eruptions, conjunctival or nasal troubles, and can be placed close to the diseased spot. (c) A tamis, or fine meshwork of platinum, through which the jet forces its way and is broken up in so doing. The resulting spray is a much coarser one than by either of the other methods and as far as I could see is not much used.

Another variety of inhalation is that where the fluid is drawn up and atomised by a jet of steam, a warm cloud of particles resulting; this is used a great deal at Challes and Uriage. Lastly, there is the variety so commonly made use of on a small scale in England where an *air* jet draws up and atomises the fluid. But with us the force of the air jet depends upon a small rubber bellows worked by the patient himself; at foreign spas this work is done for everyone by a common force which is always acting. For sulphur waters this method is not available, as the jet of air speedily decomposes them. Here again, in the matter of these local inhalers, we see how abroad they make things as easy as possible for the patient. It may seem a small matter whether you blow your own bellows or not; and if the inhalation is to be for five or ten minutes only perhaps it is not of great importance. Yet we must remember that our inhalers are invalids to whom every exertion, mental or physical, is something of an annoyance.³ But it is just these prescriptions of five and ten minutes which seem to me to be a mere playing with this form of medication, a species of quackery. What can you expect from a medicament which only acts for $\frac{1}{10}$ th of the day. The inhalation bathes an excreting, not an absorbing surface, so that we cannot suppose that its action can continue for long after the inhalation has stopped. Cells so essentially scavenger-like as are the ciliated cells of the bronchi can scarcely be expected to pass on the medicament to the deeper

tissues with any great energy. When I prescribe an inhalation I always try to get the patient to inhale for three hours daily, and if I fail to get a promise of one hour at least I drop it altogether for some other method of treatment. During inhalation respiration is deeper than with ordinary breathing. It should, therefore, always be done in pure air. I always endeavour that it shall be used out of doors. There are occasions when inhalation is used as a palliative only—e.g., as a sedative to cough before going to bed. Here, manifestly, if you achieve palliation it matters not how short a time the treatment has lasted. But when more far-reaching curative effects are desired then the longer periods are necessary.

I do not suppose any one of us questions the efficacy of treatment by inhalation when we have to do with nose, pharynx, larynx, or main bronchi, but many are sceptical as to its influence on diseased conditions of the alveoli or fine bronchioles. I think this scepticism is largely the result of our want of thoroughness in carrying out the treatment. When I have succeeded in getting it done for three hours daily for two or three weeks the improvement is usually so marked that there is no difficulty in persuading the patient to continue for two or three months. If the inhalation be a gaseous one—e.g., H_2S —I do not see how we can avoid the conclusion that diffusion will carry it right into the alveoli and that it will be there taken up into the blood along with the oxygen. But when the inhalation consists of an atomised liquid I admit the result is more doubtful. It will largely depend upon the fineness of the atomisation and upon the weight and volatility of the drugs used. In any case a large proportion must necessarily be deposited in the upper air passages. It would be unwise to use drugs which are not largely volatile at the temperature of the lungs; hence we find the volatile oils are favourite drugs for inhalation—e.g., the terpenes, eucalyptus, balsams of Peru and tolu, oil of cade, and betul. But we must remember that the tidal air is only one-thirteenth of the total air in the lungs; one half of this comes back again more or less unchanged; hence the inhalation when it reaches the alveoli can only be one twenty-fifth as strong as when it enters the mouth. When we consider the amount which has been deposited on the way we shall probably be right in saying that the percentage of active medicament which enters the alveoli cannot be more than one-fiftieth of that which enters the mouth. I am not saying this to discourage inhalation, for I believe it has a future; but there is no surer way of damning a therapeutic method than by expecting from it more than it can possibly give. On the other hand, when we call to mind the immense difference a comparatively minute change in the ordinary air makes in our health we cannot help believing that inhalation, properly employed, is a powerful therapeutic measure. But its power resides not in the percentage strength of the inhalation but in the vast quantity of it inhaled; that is, in the long duration of its employment.⁴

A STATISTICAL STUDY ON THE POLYMASTIA OF THE JAPANESE.

By DR. TEIZO IWAI,

PHYSICIAN-IN-CHIEF OF THE JAPAN RED CROSS HOSPITAL; ATTACHED TO THE SUITE OF H.I.H. PRINCE FUSHIMI REPRESENTING HIS MAJESTY THE EMPEROR OF JAPAN.

ALTHOUGH there is mention in the seventeenth and eighteenth centuries of a few scholars in Europe having made a study of polymastia it was not until the latter part of the nineteenth century that the subject began to be handled in a scientific manner, and only in the last 15 years can we say that it has made marked progress. Realising that the subject has a close relation not only to practical medical science but also to anthropology, comparative anatomy, and embryology, and that its study has been neglected hitherto by our own investigators, I venture to

³ I have tried, with the assistance of Messrs. Philip Harris and Co. of this city, to devise some plan for obtaining this constant pressure on a small portable scale suitable for one person. The city water pressure was evidently altogether insufficient for the purpose, and we found it practically very difficult to obtain sufficient pressure by placing weights on the open end of a cylinder which communicated with the fine nozzle. Either the cylinder was so small that its contents were speedily exhausted or else the requisite weight was so great as to be very cumbersome and impossible to be manipulated by the patient. A motor of some sort—a steam engine is used abroad—seems to be the only solution. Still, I trust it is not too Utopian to hope that such an apparatus may be placed in each large town where patients could resort, each taking his own nozzle and medicament, to be attached to the central power installation for a small fee per *séance*.

⁴ The amount of air inhaled daily by an average man is no less than 10,000 litres. If we take the absolute amount of water vapour in the air we find that a considerable change in this, which acts as a diluent to the gases of the air, can make a considerable difference to the intake of oxygen—e.g., at Madras a man inhales 80.7 kilogrammes of oxygen a month; at London or Brussels 87.3; and at St. Petersburg as much as 90.4 kilogrammes—i.e., one-eighth more oxygen at St. Petersburg than at Madras; or, *anglicè*, in a year he would inhale 270 pounds more oxygen at St. Petersburg than at Madras.

present the result of my own investigation up to the present time.

HISTORY OF THE STUDY OF POLYMASTIA IN JAPAN.

In November, 1893, I began the first statistical study of polymastia made in Japan, and published the result two years later in the *Mitteilungen der Medicinischen Gesellschaft zu Tokyo*.¹ Previously to that, so far as I know, only two reports had been made in Japan; one was entitled "My Observation on Supernumerary Mammary Glands," by Dr. T. Kuroiwa, Director of the Obama Hospital, Fukuiken,² and the other entitled "A Remarkable Case of Supernumerary Mammæ," by Dr. K. Satō of the Kōseikwan Hospital, Nagoya.³ Both articles, however, being mere reports on a single case, all the valuable statistical reports on the subject have only become available after the above-mentioned publication of mine in March, 1896, and are more or less based upon it. Therefore a mention of the relations between myself and those scholars will constitute by itself a history of the statistical study of polymastia in Japan.

The report of Dr. Kuroiwa just mentioned, together with a figure, is referred to in Dr. R. Wiedersheim's "Der Bau des Menschen" (3te Aufl., 1902), but it is to be regretted that he mentions only the name of Dr. K. Horiuchi, who sent him the article, instead of that of the original author, Dr. Kuroiwa. Dr. R. Bonnet also mentions in his work⁴ Dr. Horiuchi's name instead of that of the author himself, showing that he was misled by Dr. Wiedersheim's book. The first report I made on the subject fortunately attracted the attention of scientific men in Japan, so that there is hardly a person studying the subject who does not refer to it. The following are some of the extracts from various writers.

In July, 1896, Dr. K. Katayama, professor in the Tokyo Imperial University, in a report on four cases of female polymastia under the treatment of Dr. I. Honda of Kosaka, Akitaken,⁵ says that "the readers are advised to refer to the report made by Dr. T. Iwai." In December, 1897, Dr. K. Satō⁶ said in his second report: "After I made my first report Dr. Iwai's more minute report appeared, and I began to pay more attention to the subject, and came to the conclusion that polymastia is not rare among Japanese women." In May, 1899, Dr. S. Otani, professor in the Medical School of Nagasaki, assisted by Dr. I. Amemori and Dr. T. Hara, made a minute statistical report.⁷ At the outset he said: "Since Dr. Iwai has written an article on polymastia it is unnecessary to say anything further." And at the conclusion, following my method of comparison, he gives a statistical table under six headings which coincides with the result I stated in my first report and thus sufficiently proves the correctness of the same. In April, 1900, when I read papers at the annual meeting of the Tokyo Medical Association on the Supplementary Report about Polymastia,⁸ Dr. H. Uno spoke of the case of a woman at Yokohama, who, after having given birth to a child, was greatly annoyed by having milk dripping from the supernumerary glands she had in both axillæ. Dr. T. Irisawa, professor in the Tokyo Imperial University, made a statistical report on the cases which came under his observation and in general it accorded with my own. Dr. K. Kashida, who made a report, differing from Dr. Otani's and my own, says that in the greater number of his cases the glands were found directly under the normal breasts. In the spring of the same year Dr. E. Baelz told me about 48 cases that he had seen; and I found that his observation coincided in general with my own. In May, 1902, Dr. Otani, assisted by Dr. M. Satō, made a supplementary report on polymastia.⁹ In its introduction he says: "Among them, we might say that Dr. Iwai's report is most complete and valuable for those who may study this subject." This report of Dr. Otani is on the Relation of Tuberculosis to Polymastia, of which I have the honour to be the first discoverer, and I felt great satisfaction in finding

that Dr. Otani's opinion coincided in general with my own; this, however, I discuss more minutely in my essay entitled the "Relation of Polymastia to Tuberculosis," 1907. In October, 1904, Dr. K. Satō published a report entitled "An Extraordinary Case of Recurrence of a Supernumerary Gland after its Removal by Operation and the Results of Some Investigations concerning the Subject of Polymastia,"¹⁰ in which he referred to the relationship between polymastia and tuberculosis which I had formerly maintained. He also stated therein that out of 29 cases, subjects of polymastia, he found 19 actually affected by pulmonary tuberculosis or suspected to be tuberculous and began at last to believe that he could safely conclude that "those who are subjects of polymastia are more liable to be affected by tuberculosis."

POSITION OF POLYMASTIA AND STUDY OF ITS PIGMENTATION.

According to my observations the position of supernumerary glands is commonly in our country in the pectoral region, and most commonly they are found in the region II. indicated by Dr. Williams, which is above and external to the normal breasts along the front edge of the axillæ (see Fig. 1).

FIG. 1.

Usual position and shape of supernumerary glands as occurring among Japanese women.

Medical experts of the West generally locate these supernumerary glands below the ordinary mammæ, thus differing from the foregoing description. Out of 511 subjects of polymastia whom I examined I found these glands in 441 above the normal breasts, giving the ratio of 86·30 per cent. of the total number, while in only 48, or 9·39 per cent., of the total number I found them below the normal breasts, and in the remaining 22, or 4·30 per cent., both above and below. Dr. Otani's and Dr. Baelz's reports were to the same effect—that in the majority of subjects of polymastia the glands were found above the normal breasts.

Contrary to the above, Dr. T. Watanabe, captain-surgeon of the Imperial Japanese army, when making an examination of 5452 conscripts in the vicinity of Utsunomiya, compiled statistics of polymastia at my request and found 107 subjects of polymastia, of which 102, or 95·32 per cent., had these glands below the normal breasts, and four persons, or 3·74 per cent., above, and the remaining one, or 0·93 per cent., had them both above and below. Also, according to

¹ Vol. x., No. 5, March, 1896.

² Tokyo Medicinische Wochenschrift, No. 692, July, 1891.

³ The Kōseikwan Medical Magazine, vol. ii, Nos. 11 and 12, December, 1895.

⁴ "Die Mammaorgane im Lichte der Ontogenie und Phylogenie" in Markel and Bonnet's Ergebnisse der Anatomie und Entwicklungsgeschichte, 1892.

⁵ Mitteilungen der Medicinischen Gesellschaft zu Tokyo, vol. x., No. 14.

⁶ The Kōseikwan Medical Magazine, vol. iv., No. 6.

⁷ Mitteilungen der Medicinischen Gesellschaft zu Tokyo, vol. iii., No. 9.

⁸ Ibid., vol. xiv., No. 12.

⁹ Ibid., vol. xvi., No. 10.

¹⁰ Ibid., vol. xviii., No. 20.

Dr. Kashida's observation, though he does not give the exact figures, they were found in most cases below the normal breasts. But when I compare the results of these two observers, Dr. Watanabe and Dr. Kashida, with the results of my own observations on several cases I am rather inclined to wonder at the former. According to Dr. Leichtenstern's observation 91 per cent. of these glands are found on the pectoral region, and most of them (94 per cent.) are below the normal breasts; and when they are as rarely found above (3 per cent.) the position is invariably outside of the normal breasts towards the axillæ. Dr. Hennig described the location of these glands in the pectoral region as follows:—

Below the normal breasts	103
Above the normal breasts	3
Outer side of, and at the same height as, the normal breasts	3
Inner side of and lower than the normal breasts	37
Directly under the normal breasts	9
On the middle-line below the pair of normal breasts	5
Outer side of and lower than the normal breasts	1

Dr. Testut, taking 100 cases mentioned in the record made by Dr. Leichtenstern and Dr. Laloy, classified the position of these glands in the pectoral region as follows:—

Below the normal breasts	93
Same height as the normal breasts	2
Above the normal breasts	4
Both above and below the normal breasts	1

Dr. Bonnet says that in most cases the glands are found in the pectoral region below the normal breasts and chiefly on the inner side of them. Sometimes, but rarely, they are found above and outward of the normal breasts, or near the axillæ, or even in the axillæ themselves.

Apart from the question whether they are above or below the normal breasts, I have observed that the number of those on the left is greater than those on the right. Out of 936 of these glands I have seen 481, or 51·38 per cent., on the left, and 454, or 48·50 per cent., on the right, and only one, or 0·10 per cent., on the median line. Upon this point both Japanese and European authorities seem to agree, as will be seen from the following statements. Dr. Wiedersheim says that whenever supernumerary glands are more numerous on one side they are generally on the left side. Dr. Leichtenstern writes that out of 50 cases 34 had them on the left and 16 on the right. Dr. Ammon mentions 85 cases on the left and 32 on the right that have come under his observation. Dr. Watanabe, alone differing from all the above mentioned, states that out of 134 supernumerary glands which he had seen 64 were on the left and 70 on the right.

Supernumerary glands on the midway line are very rare. Dr. Gorré and Dr. Percy mention a case of a woman and Dr. Bartels of a man. I once saw a male tuberculous patient, 36 years of age, who had such a gland on the linea alba nine centimetres below the point of the xiphoid appendix of the sternum and 15 centimetres below and inward of both normal breasts. Although Western authorities mention cases in which these glands are found on the shoulder, back, thigh, labia majora, &c., I have not been able to find them anywhere but on the chest and abdomen. Dr. Leichtenstern classifies 105 cases of polymastia with regard to the position as follows:—

Pectoral region	96
Axilla	5
Back...	2
Shoulder...	1
Outer side of thigh	1

Dr. Hennig gave the following table:—

Pectoral region	105
Axilla	9
Shoulder...	1
Back...	5
Inguinal region	3
Outer side of thigh	3
Labia majora...	1
Ovary	1

Dr. Baelz has told me of a European gentleman who had a well-developed accessory mamilla on the inner side of the left thigh and another on the pectoral region near the left axilla. Dr. K. Satō, in his second report, writes of having observed a woman, 23 years of age, who had given birth to three children and had distinct mammary glands in both axillæ and under the skin of the left upper arm, which during the pregnancy were swollen like normal breasts. As

the existence of the glands on the upper arm is exceedingly rare, and as far as I know has not been found in medical literature, I have here reproduced the photograph of the same with his permission.

FIG. 2.

Supernumerary glands under the skin of the left upper arm and the right axilla, taken from Dr. K. Satō's second report.

The following is a table compiled as the result of my examination of 936 cases of polymastia.

Total number of polymas- tiae 936.	{	Male	250	{	Above normal breasts	190	{	Left ...	92
					Right...		Right...	98	
		{	Below normal breasts	60	{	Left ...	37		
						Midway	1		
	{	Female	686	{	Above normal breasts	662	{	Left ...	338
					Right...		Right...	324	
		{	Below normal breasts	24	{	Left ...	14		
						Right...	10		

The following is a table compiled from Dr. Otani's reports made at two different times:—

Total number of super- numerary glands 610.	{	Male	197	{	Above normal breasts	152	{	Left ...	86
					Right...	66			
		{	Below normal breasts	45	{	Left ...	30		
			Right...	15					
	{	Female	413	{	Above normal breasts	388	{	Left ...	201
					Right...	187			
		{	Below normal breasts	25	{	Left ...	12		
			Right...	13					

Again, the results of Dr. Watanabe's observation upon the conscripts are as follows:—

Total number of super- numerary glands	134	{	Above normal breasts	7	{	Left ...	2
						Right...	5
		{	Below normal breasts	127	{	Left ...	62
						Right...	65

By putting the above three tables together we obtain the following result:—

Total number of super- numerary glands 1680.	{	Male	581	{	Above normal breasts	349	{	Left ...	180
					Right...	169			
		{	Below normal breasts	232	{	Left ...	129		
			Midway	1					
	{	Female	1099	{	Above normal breasts	1050	{	Left ...	539
					Right...	511			
		{	Below normal breasts	49	{	Left ...	26		
			Right...	23					

Thus, we find the number of supernumerary glands above the normal breasts is greater by far than those found below, the former being 90·03 per cent. while the latter is only 9·96 per cent. As to the position of right or left, there is no doubt that the greater number occurs on the left rather than on the right, showing the ratio of 52·76 per cent. to 47·23 per cent. respectively.

In regard to the pigmentation of areola, I believe that in the great number of cases of polymastia in males the pigmentation is more marked than in females; and again, regardless of the sex, those situated below the normal breasts show more pigmentation than do those above. Dr. Irisawa, confirming my observation, states that such glands found below the normal breasts show more pigmentation than do those above. In regard to the pigmentation in cases of polymastia I have carefully analysed 399 and obtained the following result:—

TABLE I.

Total number of supernumerary glands 399.	Male ... 132 ...	Pigmented ... 63 ... 47·72%
		Normal ... 49 ... 37·12%
		Unpigmented 20 ... 15·15%
	Female ... 267 ...	Pigmented ... 64 ... 23·97%
		Normal ... 167 ... 62·54%
		Unpigmented 36 ... 13·48%

TABLE II.

Total number of supernumerary glands 399.	Above normal breasts ... 345 ...	Pigmented ... 79 ... 22·89%
		Normal ... 216 ... 62·60%
		Unpigmented 50 ... 14·49%
	Below normal breasts ... 54 ...	Pigmented ... 48 ... 88·88%
		Unpigmented 6 ... 11·11%

Dr. Otani and others hold that there is very little connexion, if any, between pigmentation and pregnancy and say in proof thereof that there was a woman who gave birth five times yet had no pigmentation in the areola; and again, they say that among the males there are comparatively more with pigmentation than among the females. Nevertheless, there can be no doubt, according to my own observation, that during pregnancy the areola of supernumerary mammary glands becomes darker in colour.

RATIO OF POLYMASTIA IN JAPAN AND ITS RELATION TO SEX.

The ratio of cases of polymastia found in Japan varies not only according to the investigators but even the same authors do not, or cannot, always give the same rate. As shown in the accompanying table, Dr. Otani gives in his first report a higher rate of cases than does my own first report, and again his second report shows a rise of ratio over the first. My own reports, made at several different times, show a gradual rise in ratio every time. This is due, I trust, to the better method applied in the investigation and the skill attained through more extended practice. The total number of persons (female sick nurses, students, patients, and so on) examined by me at several different times was 11,789. Out of this number 443 were subjects of polymastia, or a ratio of 3·75 per cent. of the total number. Dividing the total number between the sexes I found out of 6803 males 139 (or 2·04 per cent.) were subjects of polymastia, and out of 4986 females I found 304 (or 6·09 per cent.) were subjects of polymastia. Adding to these 17 males and 65 females recorded in my note-book gathered from various sources we have in all 156 males and 369 females, or a ratio of 2·36 females for 1 male. The total number of subjects examined by three physicians at different times (twice by Dr. Otani, once by Dr. Watanabe, and others by myself) amounts to 32,922, out of which 917 (or 2·44 per cent.) were subjects of polymastia. When we divide this number between the sexes, out of 22,577 males there were 380 (or 1·68 per cent.), while out of 10,345 females there were 537 (or 5·19 per cent.), showing that the ratio of polymastia in females is three times larger than that in males.

I believe that we can safely take the above figures, obtained through various investigations by different persons, as the fixed standard ratio of cases of polymastia in Japan. Dr. Leichtenstern states that polymastia is found at the rate of 1 in 500 persons; and, further, he declares that the number is equally frequent among males and females, but out of 13 cases which he cited nine were males and four were females. Dr. Bonnet obtained 92 cases from various authorities and divided them as follows: 22 males and 70 females. Out of

262 cases gathered by Dr. Hansemann, 81 were males and 104 were females. Nothing is said of the remaining 77 cases in regard to sex. Dr. J. Mitchell Bruce, who was the first to take note of polymastia in males, found out of 3956 persons examined by him in three years 61 cases, or a ratio of 1·54 per cent. Dr. Bardeleben in his first report gives the rate of males as 9·1 per cent. and that of females 4·8 per cent.; but in his later report, made after he examined the conscripts, he raised the ratio of males to over 14 per cent. Dr. Ammon found 114 subjects of polymastia out of 2189 conscripts examined in Baden, Germany, which makes a ratio of 5·2 per cent. Out of the 114 subjects, 66 persons (3·01 per cent.) had distinct supernumerary mammary glands, while the remaining 48 persons (2·19 per cent.) had considerably less distinct ones. Dr. Watanabe found, as stated before, 107 subjects (1·96 per cent.) out of 5452 conscripts examined in the vicinity of Utsunomiya.

Recently I met with a wonderfully high ratio of polymastia when I examined 159 nurses. Out of that number I found 43 subjects (27·04 per cent.) of polymastia. Among them 16 persons (or 10·06 per cent.) had very distinct ones, while the remaining 27 (or 16·98 per cent.) had less distinct ones. Again, out of 100 candidates (males only) for entrance to the school of the Formosan Association, there were 17 subjects of polymastia, making a ratio of 17 per cent.

NUMBER OF GLANDS IN CASES OF POLYMASTIA.

As I have stated before, it is common in Japan to find only one supernumerary gland on both right and left sides. I have found, in my observations, only 32 cases having more than 3 out of 511 subjects of polymastia—namely, 1 woman having 6 in number; 2 women having 5; 5 women and 6 men having 4; and 9 women and 8 men having 3. As far as I know, the case cited by Dr. Neugebauer, in which the woman had 6 above the normal breasts and 2 below, is the most remarkable one hitherto known. Dr. Hennig, adding 11 cases which he had observed himself to 105 cases of Dr. Leichtenstern, classified as follows: 51 cases having 3 in number; 33 cases having 4; 2 cases having 5; and 2 cases having 6. Nothing is said of the number of glands found on the remaining 28 subjects. Dr. Puech classified 77 cases as follows: 46 cases having 3 in number; 29 cases having 4; and 2 cases having 5. Dr. Ammon classified 66 cases as follows: 62 cases having 1 in number; and 4 cases having 2. Dr. Watanabe classified 107 cases as follows: 1 case having 3 in number; 25 cases having 2; and 81 cases having 1. Judging from the above it seems that those who have the larger number of such supernumerary glands are females.

HEREDITARY TRANSMISSION OF POLYMASTIA AND ITS BLOOD-RELATION.

Several experts have written on the hereditary nature of polymastia. Dr. Leichtenstern states that in one-thirteenth of the total number of cases observed there was an indication of its being inherited. The case cited by Dr. Péterquin is a remarkable one, three sons and two daughters having inherited polymastia from their father. In 1892 Dr. Bonnet wrote that there were five cases of hereditary transmission known up to that time, of which three cases were transmitted from mothers to daughters. Dr. Neugebauer, citing Dr. Martin's cases in which the transmission continued for three generations, says that he observed many instances in which such anomalies were not inherited.

Out of 555 cases which came under my observation I found 31 cases (or 6 per cent.) of hereditary transmission and five cases (or 0·97 per cent.) where brothers and sisters had them alike.

- 1 case from mother to 2 sons, 2 daughters, and 1 granddaughter.
- 1 " " " 2 sons and 3 daughters.
- 2 " " " 1 daughter and 2 granddaughters.
- 1 " " " 2 daughters and 1 grandson.
- 1 " " " 1 son and 2 daughters.
- 3 " " " 1 daughter.*
- 2 " " " 2 daughters.
- 8 " " " 1 son.
- 10 " " " 1 daughter.
- 1 " " " 1 daughter and 1 granddaughter.
- 1 " " " father to 1 daughter.
- 1 " in which elder and younger brothers had them alike.
- 4 " in which elder and younger sisters had them alike.

* The mother's younger brother was also a subject of polymastia.

As may be observed from the above, hereditary transmission is generally from mothers and I have met with only one

case of transmission from the father like that described by Dr. Péterquin. The case observed by Dr. Otani in Nagasaki, in which polymastia was inherited through four generations, from the great-grandmother to the grandmother, to the mother, and to her six children (three boys and three girls) is the most remarkable one on record.

MAMMARY GLANDS OF POLYMASTIA AND THEIR SECRETORY PROCESS.

The development of polymastia is not always uniform. As Mr. J. Bland-Sutton has pointed out, there are three forms of its development: (1) the nipple, areola, and glands are so completely formed that they do not differ from the ordinary mammary; (2) as we see very often, the nipple alone is existing—polythely; and (3) as in the cases reported by Dr. Satō and myself, the glands were found under the skin. In cases where these glands are fully developed there is generally more or less secretion of milk at the time of parturition; but the amount of milk and the duration of the secretory period are not always the same. I observed 11 cases in which the secretion was found at the time of parturition; and the longest period of lactation in my observation was six months after parturition. Although Dr. Uno, as above stated, mentions a case in which a woman was considerably annoyed after parturition by having dripping of milk from supernumerary glands in both axillæ, all my experience has proved to me that the secretion is obtained only by pressing or squeezing, and in so doing I could first obtain an uncoloured thin liquid, followed by cream-coloured milk.

The microscopical examination of the milk drawn from the glands a few days or a few months after parturition very often proves the existence of a great number of milk globules and a few epithelial cells. Whether there are glands or not in the polymastia cannot be ascertained until the subject has given birth to children several times. Although at ordinary times there may not seem to be any glands, when the lactation period comes on there are many cases where perfect secretion is performed. In the case cited by Dr. K. Satō the supernumerary glands at the anterior edge of the

FIG. 3.

Supernumerary mammary glands in both axillæ secreting milk.

right axilla had a swelling of the size of a pigeon's egg which at the time of parturition, together with the ordinary mammary, became enlarged to the size of an orange. At her second parturition a swelling of the same size appeared at the same place on the left and also on the inner side of the upper arm. At this time the one on the right had swollen to

a lump larger than the fist. At the third parturition it became enlarged to such an extent as to prevent the movement of the right upper extremity, so that Dr. Satō was obliged to remove it by a surgical operation. (See Fig. 2.) Later, at the fourth parturition, a regeneration of the mammary gland had appeared again at the same place on the right and gradually swollen to a lump as large as the fist. At the fifth parturition he was again obliged to remove it.

During the year 1906 I myself, too, observed in a woman who had given birth to triplets a bunch of the size of an egg which had appeared under the skin of the left axilla and atrophied within 30 days after the parturition. In July, 1903, Dr. Kinoshita, Professor in the Tokyo Imperial University, had kindly invited me to examine a female patient at the hospital of the Tokyo Imperial University, where I had an opportunity of observing a very interesting case of polymastia. The said patient, who was 24 years of age, was then on the eighth day after her third confinement. At the examination I found in her a supernumerary mammary gland of the size of a pigeon's egg in each axilla and a smaller one on each anterior wall of both axillæ. (See Fig. 3.) After squeezing them I recognised the secretion of milk from each of them.

FIG. 4.

Section of a supernumerary mammary gland in a case of polymastia.

In the case observed by Dr. Neugebauer, that of a woman 23 years of age having supernumerary mammary glands eight in number, at the first parturition no change took place, but from the second day of the second parturition the process of secretion commenced in every one of them. Through the kindness of Dr. Satō I was enabled to examine the glands which he had removed, and by examination of the microscopic specimen of the same I have been able to ascertain the existence of acinous glands in it. During the month of April, 1903, I had, however, an occasion of taking a supernumerary gland out of a woman 27 years of age. The microscopical examination of this proved the existence of acinous glands. (See Fig. 4.)

CONCLUSION.

From the above statements I have arrived at the following conclusions:—

1. Among the Japanese, unlike the Western people, polymastia is generally found above the normal breasts, and most commonly on the anterior wall of the axilla, or the region II, indicated by Dr. Williams.

2. It is likely that in many cases of polymastia the areolæ of those under the normal breasts are pigmented, and that in males they are more likely to be pigmented than they are in females.

3. According to the result of investigations made by myself and others up to the present time the rate of polymastia is 1.68 per cent. among males and 5.19 per cent. among females. The fact that we find it more frequently in females than in males, and on the left side than on the right, exactly coincides with the results obtained in the West.

4. Six is the largest number of glands yet found on one person.

5. It is certain that polymastia is inherited and in most cases is transmitted from mothers.

6. In the perfect supernumerary mammary glands secretory process begins at the time of parturition and sometimes it continues for over six months.

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SPONTANEOUS ANEURYSM OF THE POPLITEAL ARTERY TREATED BY EXTIRPATION.

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MUCH that has been written upon aneurysms of the limbs, and especially those of the popliteal artery, requires to be revised, in the light of modern methods of dealing with this disease, whether of spontaneous or of traumatic origin. For example, in Vol. LXXXII. of the Transactions of the Royal Medical and Chirurgical Society a paper on extirpation of a large non-pulsating aneurysm of the carotid artery, by the late W. J. Walsham, will be found, together with a very useful table of cases of various aneurysms treated by extirpation. Carotid, femoral, subclavian, inguinal, and tibial aneurysms are tabulated as well as popliteal, but for the present purpose allusion will be made to the 17 popliteal aneurysms only, forming as they do an excellent group for demonstrating the value of treating aneurysms of this artery by extirpation. Of this group, 13 were spontaneous aneurysms and were dealt with by exposure of the sac, ligature of the artery on its proximal and distal sides, and removal of the sac. All these cases came from foreign sources; 11 recovered and two died. The case now placed alongside with this group was treated in the same way.

A man, aged 54 years, a labourer in gas works, came under observation on August 25th, 1905, suffering from a popliteal aneurysm on the right side. Three months previously he strained his right knee and afterwards had always felt pain in the knee and down the calf of the leg when at work. A fortnight before admission to hospital he noticed a swelling behind the knee of about the size of a pigeon's egg; this swelling grew rapidly in size before he came for treatment. Behind the right knee there was a large pulsating fusiform swelling, expansile in all directions; a thrill could be felt over it and with a stethoscope a murmur could be heard. Pulsation and swelling could be obliterated by pressure on the femoral artery.

On August 28th chloroform was given, a tourniquet was applied to the thigh, and the patient was turned on to his face. An incision six inches long was made over the popliteal space; the popliteal artery was dissected out above the aneurysm, ligatured in two places, and cut between the ligatures. The artery was cleared below the aneurysm and the same method adopted as above; the aneurysm was then dissected away. The only difficulty met with was due to adhesion of the popliteal vein to the sac of the aneurysm. More than five minutes were lost in the endeavour to separate the union, but this was found impossible and the vein was divided. From the sac an artery of some size passed forwards to the knee-joint. When the sac was just upon cleared it broke off from the distal ligature, showing the degenerated and brittle condition of the vessel. The sac was not opened until the operation was over, and was got away with comparative ease and without damaging its walls. Within the aneurysm there was little or no clot, or any found there was in decolourised flakes of fibrin adhering to the wall. The wall of the sac was as thin as brown paper and the size of the sac was equal to the fist of an infant three months old or to a russet apple. On August 30th the patient complained of cramp in the calf of the leg and a hot burning feeling across the instep and sole of the foot. Circulation in the toes was good. On Sept. 7th the burning feeling and numbness were gone; the stitches were removed. On Nov. 25th a sinus which had persisted was touched with pure carbolic acid. On Dec. 12th the wound had healed. The

patient was able to kneel slowly without pain and walk with only a very slight limp.

With regard to the later progress of the case I heard from the patient on April 11th, 1907, when he reported himself as able to walk three or four miles without trouble or without a stick and he was engaged as a gardener and to do light work about a house. He stated that he had not the strength in his leg for any heavy work.

The method of treatment adopted was that which was considered by Walsham to be the ideal way of extirpating an aneurysm, for the whole aneurysm was got rid of and the cure was radical. The only damage done to other structures was due to the adhesion of the popliteal vein to the sac: a possibility to which Walsham drew attention; but it does not seem that cutting the vein is likely to be attended with any evil consequences. Perhaps the reason why reluctance has been shown to performing excision of a popliteal aneurysm is that it was formerly taught that cutting the popliteal vein would assuredly be followed by gangrene of the limb, but here it was the anatomist who spoke and not the surgeon. So often has this important adhesion been found that the surgeon who extirpates a popliteal aneurysm will always be on the outlook for it. In other respects, a popliteal aneurysm will not be likely to have contracted any adhesions. Even in Walsham's case of non-pulsating carotid aneurysm he speaks of it as well encapsuled, though slightly adherent to the neighbouring parts.¹ In short, for a case of uncomplicated spontaneous aneurysm of the popliteal artery excision of the sac will prove a comparatively simple operation. The ages of the cases given in Walsham's table ranged from eight to 63 years, and it is interesting to note that the man aged 63 years did quite well. One death was due to suppuration of the knee and the other to gangrene.

The risks associated with extirpation of popliteal aneurysm are possibly the same as those connected with other methods of treatment. Gangrene of the limb has followed compression of the femoral artery as well as after ligature and will perhaps occur in cases of extirpation. Compression has been stated in the record of cases of popliteal aneurysm to have cured in hours, days, weeks, and months, up to six, from which it may be gathered that considerable uncertainty attends this plan of treatment. Far more certain results have followed ligature of the femoral artery, but failure to cure by this method is also on record. Not only in popliteal aneurysm has ligature failed to cure, but in Henry Morris's case² a return of pulsation occurred in a carotid aneurysm after ligature of the carotid, and the old operation of laying open the sac, turning out the clots, and tying the vessels was done, but the sac was not removed.

Given an aneurysm cured by compression or ligature of the femoral so that the sac ceases to pulsate and the clot, if present, contracts, who can say if the cure will be a permanent one, or if trouble will not arise in the future, as in Scott's case,³ exhibited on April 27th, 1894? A popliteal aneurysm had been treated by compression, flexion of the limb, and finally by ligature of the artery, and was apparently cured. Three years later the tumour began to increase in size and subsequently gangrene of the foot set in. The aneurysm was dissected out and a Chopart's amputation was performed. Primary removal of the aneurysm would appear to have been a better plan of treatment.

I can well understand a false aneurysm giving far greater trouble to extirpate; the tissues have been distended with clot and disguised, the mouth of the wounded artery is not found at once, but it is just in such cases that extirpation of the aneurysm has been attempted and successfully carried out. For example, in THE LANCET of May 20th, 1893, p. 1214, is a note on a case taken from the *Revue de Chirurgie* treated by M. Terrier and M. Hartmann, where a diffuse popliteal aneurysm caused by an exostosis growing from the inner supracondyloid ridge was dealt with by excision of the injured portion of the artery and the patient recovered with full use of his limb.

In Walsham's table under another heading are three cases of popliteal aneurysm in which the sac was opened, clots were turned out, the artery was tied, and the sac was removed; all these recovered. Of popliteal aneurysms with false sacs Walsham gives a case by Littlewood, where a false sac was laid open, clots were turned out, the true sac was discovered, the artery was tied above and

¹ Transactions of the Royal Medical and Chirurgical Society, vol. lxxxii., p. 225.

² Ibid., vol. lxiv.

³ Transactions of the Clinical Society, vol. xxvi., p. 281.