to contradict the statement recently made that such paralysis is always due to central or nuclear disease.¹ We have just seen that it may be also of neural or of peripheral origin, as when due to thrombosis and inflammation of the cavernous tissues, to syphilis, diphtheria, and chronic alcoholism, which may produce either inflammation or degeneration of the oculo-motor nerves themselves. A blow on the head must also be recognized as a possible peripheral cause. Further, the affection may be a purely functional one of hysterical nature and the prognosis be then favorable.

Again, it follows from the facts adduced that bilateral external ophthalmoplegia is frequently at first unilateral and not symmetrical, and it may be impossible to say with certainty whether a unilateral case will become bilateral or not.

Owing to the close proximity of those nuclei of the third pair which preside over the movements of the ciliary muscle and the iris, to those nuclei of the same nerve which regulate the movements of the external muscles of the eyeballs, it frequently happens that bilateral external ophthalmoplegia coexists with bilateral internal ophthalmoplegia; and the circumstance that these nuclei are distinct with functions proper to each accounts for the existence of ophthalmoplegia interna or externa independently each of the other. As a final remark, those interested in the subject of the diagnosis of the several varieties of palsy of the ocular muscles will find a valuable paper by Dr. Allen Starr in the last May number of the *Journal of Nervous and Mental Diseases*. He has there adduced some striking reasons for a new arrangement of the position of the nuclei of the third nerve on the floor of the fourth ventricle differing from both Hensen and Völcker's and from Kohler and Pick's.

SUPERNUMERARY MAMMÆ AND NIPPLES IN MAN, MONKEYS, COWS, ETC.,

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MUCH that is fanciful and speculative is mixed with the subject of atavism, and the widespread acceptance of the principles of evolution has had the effect of rendering us less critical in the examination of suspected cases. In this short paper I propose to consider briefly the main facts connected with supernumerary nipples and mammae, for the purpose of showing the care necessary for the proper discrimination of

¹ Dr. M. A. Starr; *Journal Nervous and Mental Dis.*, May, 1888, p. 316; and *Trans. Ophthal. Soc. United Kingdom*, vii.

atavistic phenomena from counterfeit manifestations; this is not always an easy task, but I trust the facts considered in this communication will indicate clearly the need of such distinction.

Up to the present time supernumerary mammae or nipples in various stages of development have been reported in the following situations of the human body: the anterior wall of the thorax and abdomen, axilla, arm, shoulder, over the parotid, labium major, and in ovarian dermoids. If we accept unreservedly, that supernumerary mammae are always atavistic, we force ourselves into the absurd position of imagining ancestors better supplied with milk-glands than even Diana of Ephesus; or if we protect our opinion by stating it in this way: when a mamma occurs in an abnormal situation in man, but corresponds to the normal situation of the mamma in some lower animal of our class, it is then atavistic, we save ourselves much trouble. In many cases the guess may be correct, but it is quite as likely to be erroneous, and as such loose

FIG. 1.

Three forms of milk glands. A. The ducts open on a hairless patch of skin. B. The ducts traverse the nipple. C. The ducts open at the base of the test, the sides of which are elongated to form a conduit for the secretion.

methods of determining the nature of abnormal organs will in the long run lead to much confusion, it is necessary to raise a timely caution, and as this matter may be well illustrated by supernumerary mammae we will now proceed to consider them.

At the outset we are faced by the question, What is a mamma?

A mamma is a collection of modified sebaceous glands secreting milk and having close relation to the function of reproduction. As a rule, such glands are furnished with a cutaneous papilla, the nipple or teat, which is either traversed by the ducts of the glands, as in Fig. 1, B, or forms a conduit for the milk as in C, thereby affording convenient means whereby the young are enabled readily to suck the secretion. Mammary glands without ducts normally occur only in the menohemata. Milk-glands are the distinguishing feature of the class of vertebrata known as mammalia, and are unknown beyond the limits of this class.

Mammary glands are, as a rule, regular and symmetrically arranged along the ventral aspect of the trunk in two rows. When numerous they extend along the thorax and abdomen into the inguinal region. The teats usually correspond to the maximum number of young at a birth, but to this rule there are many exceptions. The greatest number known is fourteen pair. When the number of functional glands is reduced to two, traces of the suppressed mammary occur as supernumerary or accessory nipples with or without rudimentary glands.

The reduction in number may take place in the thoracic region, leaving the inguinal set functional, as in the cow, mare, goat, and ruminants in general. The inguinal glands may abort, leaving the thoracic set to carry on the work as in man, dugong, manatee, elephants, monkeys, and sloth. Normal mammary are rarely seen in situations other than the ventral aspect of the trunk, but in the remarkable form *Haplolemur griseus*, Beddard¹ found them on the arm (Fig. 2). In many didelphia the teats are arranged concentrically, and when the number is uneven

FIG. 2.

Haplolemur griseus with its brachial mamma.

the odd nipple may be median in position, as in some opossums. The lemurs present instructive variations. *Lemur catta*, like most of that family and quadrumana generally, possesses a pectoral pair of glands;

¹ Proc. Zool Soc., 1881.

Galago has two pair of pectoral teats. The Aye-Aye (*Cheiromys*) possesses an inguinal pair, whilst that remarkable form *Tarsius spectrum* is said to be furnished with an inguinal and a pectoral pair of glands.

Though nipples are present in equal number in the male as in the female, they are rudimentary in character; in rare cases, however, the male gland has been known to furnish milk and in useful quantity. Such cases have been reported in men, male goats, and castrated sheep.

When the mamme or nipples are increased beyond the number normal for a given mammal, male or female, they are said to be supernumerary or accessory, and may occur in three forms:

1. Mamme with nipples.
2. Nipples without mamme.
3. Mamme without nipples.

Such mamme may be due to *atavism*, or arise by *dichotomy* of the normal gland germ, or may occur as a "sport" or spontaneous variation.

It is now our business to study examples of supernumerary mamme and disense to which class they belong.

Supernumerary nipples and mamme are more common in men than in women; indeed, they occur so frequently that Dr. Mitchell Bruce¹ in

FIG. 3.

Two supernumerary nipples in the male. (After LICHTENBERG.)

three years saw sixty-five examples. Among 207 men examined consecutively, 9.11 per cent. presented an extra nipple, and of 104 women, 4.8 per cent. The extreme frequency of supernumerary nipples in man is now generally admitted.

¹ Journal of Anatomy and Physiology, vol. xiii.

In most instances the accessory nipple is single, is far oftener seen on the left than on the right side, and is in the majority of cases situated on the thoracic wall. In a few instances it is seen on the abdomen, but is quite exceptional. Occasionally they may be symmetrical (Fig. 3). In such cases they strictly follow the line of the superior and deep epigastric arteries, a circumstance which will demand consideration. It has already been mentioned that a comprehensive survey of the disposition of the teats in mammals generally, indicates that primitively they were arranged in two rows extending along the ventral aspect of the trunk in both sexes. In situation they correspond to the course of the superior and deep epigastric arteries. This extraordinary anastomosis effecting a communication between the subclavian and iliac system of arteries is a vascular arrangement peculiar to mammals, and has a close, if not direct, relation with the mammary glands.¹ From this it would follow, from what we know of atavistic phenomena in general, that some of these suppressed mammaræ, or nipples, should occasionally reappear in those mammals which now normally possess only a fraction of the number which existed in their ancestors, or in closely allied forms. As far as I

FIG. 4.

Supernumerary nipples in a woman. (After LICHTENSTERN.)

can see, only those supernumerary mammaræ and nipples which follow the line of these arteries can be looked upon as reversionary; even in this situation they cannot always be regarded in this light, as I shall presently show.

¹ See *Lancet*, February, 1857.

We now know that accessory nipples and rudimentary mammae are extremely common in man, and it occurred to me that theoretically they should be found in monkeys if carefully sought. To this end I systematically examined all the monkeys coming under my notice, and in a very short space of time secured two well-marked specimens.

My first specimen was a female, a Macaque monkey, *Macacus sinicus*. On the left side, and an inch below the normal mamma, an accessory and well-developed nipple was seen, associated with glandular tissue (Fig. 5). My second specimen came to hand a few months later in a

FIG. 6.

The thorax of a female Macaque monkey with an accessory mamma and nipple.

Putas monkey, *Cercopithecus putas*. This was a male monkey, and the accessory gland corresponded in position to that in the Macaque (Fig. 6). The parts illustrating the malformation are preserved in the Museum of the Royal College of Surgeons.

Among domesticated mammals it is well known that cows present occasionally accessory teats. Normally they are furnished with four, the extra teats being situated behind the posterior pair. In some cases they transmit milk, and cows have been known to furnish milk from seven teats. A medical friend has furnished me with particulars of a

cow with four functional and two rudimentary teats. In consequence of an injury one of the normal teats became obstructed. This accident was compensated for, as one of the rudimentary necessary teats enlarged and was regularly milked.

FIG. 6.

A supernumerary nipple in a male Patas monkey, *Cercopithecus patas*.

Goats normally possess two teats, but it is very common to find four present.

In addition to the varieties just considered, mention must be made of a variety of supernumerary glands which, though occurring in the line of the superior epigastric arteries, are not atavistic. Occasionally in women, but much more frequently in cows, we see a bifid nipple, at other times we find two mammae coalesced, but with separate nipples (Fig. 7). Such a condition is due to dichotomy or abnormal division of the gland germ. Intermediate stages between two separate glands and a bifid nipple have been recorded. Such are not reversions.

We must now pass on to the consideration of aberrant mammae. The most favorite situation is the axilla, where they may be found with or without nipples. Our knowledge of this subject has been considerably

advanced by Champneys.¹ This observer has found that the skin of the axilla in parturient women often presents nippleless "lumps" which may attain the size of a hen's egg. These "lumps" do not possess ducts

FIG. 7.

A, a bifid nipple. B, a supernumerary mamma due to dichotomy.

or pores, and though they may be noticed during pregnancy, more commonly attract attention on the third day after delivery; they enlarge with the breasts, and, as a rule, decline on the fourteenth day after delivery. These axillary lumps are limited to the hair-covered region, and occasionally may be made to furnish a milk-like secretion on pressure, but not spontaneously. Champneys also mentions cases in which he found mammae furnished with nipples containing ducts or pores lodged in the apex of the axilla, from which, after delivery, milk and colostrum could be expressed.

Axillary mammae have been recorded by many observers, but Champneys' paper contains the most complete account of them, and is valuable from the numerous references it furnishes.

Axillary mammae, like the normal gland, are liable to become adenomatous, and an interesting description of a case of this kind is given by Mr. A. H. F. Cameron.²

An excellent example of supernumerary axillary mamma is represented in Fig. 8, taken from Lichtenstern's classical memoir.³

In addition to the axilla, mammae have been described in the skin of the acromion and on the thigh; in these situations mammae are extremely rare. The well-known account of a functional mamma on the thigh rests on the authority of a committee from the French Academy of Sciences. Among other curious situations may be mentioned the labium

¹ Development of Mammary Functions by the Skin of Lying-in Women. *Med. Chir. Trans.*, vol. lxi. p. 419.

² *Journal of Anatomy and Physiology*, vol. xiii. p. 149.

³ Ueber das Vorkommen und die Bedeutung supernumerärer (accessorischer) Brüste und Brustwarzen. *Virchow's Archiv*, lvi. 73, S. 222.

major. I met with the reference to this in Alfeld's well-known *Missbildung des Menschen*.

The case is described by Hartung¹ in an "inaugural dissertation." Barth² has given an account of a nipple which grew on the face of a maiden twenty years old. The nipple was connected with the skin over

FIG. 8.

An axillary and thoracic supernumerary mamma in a woman. (After LICHTENSTERN.)

the parotid, immediately anterior to the right ear, and was surrounded by an areola and pigmented skin. When handled it became sensibly harder, resembling in this respect the true nipple, and gave rise to similar sensations when touched. At the girl's request it was removed. Microscopically it conformed to the structure of a true nipple, and glandular tissue existed beneath it. Of these various situations there is only one in which the mamma can by any means be regarded as atavistic, and that is on the skin of the acromion; in this instance the justice of its claim may well be questioned. True it is that in *Haplemur* the mammae are brachial in position, but the lemurs are aberrant in so very many characters that extreme care must be exercised in drawing conclusions from them in regard to this matter.

The situations in which supernumerary mammae occur in the human subject are chiefly remarkable as possessing a goodly crop of hairs, large

¹ Ueber einen Fall von mamma accessoria. Erlangen, 1875.

² Virchow's Archiv, Bd. 112, S. 569.

sebaceous glands, or both. As we regard the milk-gland as modified sebaceous glands, so we may regard these aberrant mammae as "sports" due to excessive development of the sebaceous glands. Some remarkable evidence as to the justice of this assumption is forthcoming from an unexpected source. Those very remarkable tumors of the ovary, dermoids, contain in their lining membrane sebaceous glands far exceeding in size any we find on the skin. Such cysts also often contain in addition tags of skin resembling nipples, and dotted with pores which indicate the orifices of sebaceous glands. Recently I have been enabled to trace in such dermoids every stage from a nipple-like cutaneous tag to a well-developed mamma, presenting glandular tissue, ducts, and a nipple filled with a fluid microscopically identical with milk, and containing colostrum corpuscles.

A striking example is represented in Fig. 9, but for more complete details the student should consult this reference.¹ Such mammae are

FIG. 9.

A mamma in an ovarian dermoid. (Transactions Pathological Society, vol. xxxix.)

interesting in connection with the following opinion: Mr. A. H. F. Cameron mentions that Laycock suggested that a mamma might make its appearance in any part of the body, and there seems to be a power of producing this particular organ reminding one of the development of hair and teeth in ovarian cysts.²

Notwithstanding the scanty evidence which was at Darwin's disposal

¹ Transactions Pathological Society, vol. xxxix. . .

² Journal of Anatomy and Physiology, vol. xlii. 152.

when he wrote *The Descent of Man*, he regarded supernumerary mammae as reversionary phenomena, although he thought the opinion weakened by the occurrence of mammae on the thigh and back. Since Darwin considered this matter our knowledge has been increased on the subject a thousandfold. It seems to me perfectly clear that a careful analysis of the evidence shows that accessory mammae may arise in the three ways I have endeavored to indicate, viz., by (1) atavism, (2) as "sports," (3) very rarely by dichotomy; and such is the object of this paper.

A CASE OF PERICHONDritis OF THE CRICOID CARTILAGE, WITH PARALYSIS OF THE CRICO-ARYTENOIDEUS POSTICUS MUSCLES.

POST-MORTEM RESULTS APPENDED.

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THE patient, aged twenty-two years, a waiter in a restaurant, entered the New Haven Hospital on the 5th of May, 1888, presenting the history and the existing characteristics of a perfectly typical case of typhoid fever.

Of his previous history all that is at present accurately known is contained in the records of the Hospital for the previous year, 1887, which show that about the middle of June he was entered as a patient on the surgical side of the house, suffering from an abscess on the left side of the neck, which was situated near the insertion of the sterno-cleido-mastoid muscle of that side. In spite of careful treatment the healing process was slow, and as late as November of the same year there were still sinuses with small pockets of pus present. Dr. William H. Carmalt, senior surgeon to the Hospital, then did what was possible to do in the way of slitting up the sinuses and removing the old caseous matter which had gathered in some of the small pockets already referred to. As a result of this procedure, the patient got nearly well, and passed from sight. The parts, however, had healed subsequently and on his second appearance at the Hospital nothing but the cicatrices remained.

As before stated, the illness for which the patient was brought a second time into the hospital was an every-day case of typhoid fever, and the only symptom which I will mention as not being always present in such cases was marked hoarseness. As a slight bronchitis was present, this symptom did not receive much particular attention, and during the weeks that followed was lost sight of. On recovery of the patient so as to be able to talk, the hoarseness seems to have improved, as it was not prominent.

Toward the first of June, after a not very severe illness, convalescence seemed assured, and by the second day of that month was fully established, the records of the case showing the temperature as having been