
On the anatomy of the breast, by Sir Astley
Paston Cooper, 1840

Rare Medical Books

1840

Of the structure of the constituent parts of the breasts

Sir Astley Paston Cooper , Bart.

Follow this and additional works at: <https://jdc.jefferson.edu/cooper>



Part of the [History of Science, Technology, and Medicine Commons](#)

[Let us know how access to this document benefits you](#)

Recommended Citation

Cooper, Sir Astley Paston , Bart., "Of the structure of the constituent parts of the breasts" (1840). *On the anatomy of the breast, by Sir Astley Paston Cooper, 1840*. Paper 7.

<https://jdc.jefferson.edu/cooper/7>

This Article is brought to you for free and open access by the Jefferson Digital Commons. The Jefferson Digital Commons is a service of Thomas Jefferson University's [Center for Teaching and Learning \(CTL\)](#). The Commons is a showcase for Jefferson books and journals, peer-reviewed scholarly publications, unique historical collections from the University archives, and teaching tools. The Jefferson Digital Commons allows researchers and interested readers anywhere in the world to learn about and keep up to date with Jefferson scholarship. This article has been accepted for inclusion in *On the anatomy of the breast, by Sir Astley Paston Cooper, 1840* by an authorized administrator of the Jefferson Digital Commons. For more information, please contact: JeffersonDigitalCommons@jefferson.edu.

OF THE STRUCTURE OF THE CONSTITUENT PARTS
OF THE BREASTS.

For the more clear and intelligible description of these parts, I shall begin from without and proceed inwards, rather than pursue the course of the milk from its secretion to the orifices of the milk tubes in the nipple, as it will enable me to pass from the simple to the more complicated structures, and I shall commence with the

Nipple, or Mamilla.

This part springs from the convex surface of the breast, and projects forwards and outwards, the point being also generally directed slightly upwards.

It is an organ of the utmost importance to the secretory functions of the breast, for without it the secretion of milk would proceed in vain, as it could not be conveyed into the mouth of the child. It is a cutaneous projection, but it contains within it the terminating extremities of the milk ducts, blood vessels, and nerves, united by a fibrous and cellular tissue.

The nipple is not placed at the centre of the breast, but is situated nearer the abdominal margin of the gland than

the clavicular edge. In a well-formed breast the measurements were as follow, in a girl eighteen years of age, who was unmarried.

From the clavicular margin to the nipple, $2\frac{3}{8}$ inches.

From the abdominal margin to the nipple, $1\frac{3}{4}$ inches.

From the sternal margin to the nipple, $1\frac{7}{8}$ inches.

From the outer margin of the breast to the nipple, $2\frac{1}{4}$ in.

From the axillary margin to the nipple, $2\frac{1}{2}$ inches.

The diameter of the breast horizontally was a little more than 4 inches, and vertically nearly the same.

The nipple is placed below a line drawn across the middle of the gland from the sternum to the axilla, and on the outer side of a vertical line from the middle of the clavicle to the abdomen. It is usually placed from one-half to three-quarters of an inch above the lower edge of the pectoralis major.

The form of the nipple is that of a cone, rather rounded at its extremity in the virgin, but it forms a flat surface in the lactating woman, the centre of which is cribriform, being perforated by the numerous terminations of the lactiferous tubes, which are placed in a cleft before lactation, but are spread out upon the surface pending that period. The circumference of the nipple at its base is attached to the areola.

The direction of the nipple is, as I have stated, forwards

and outwards, but it is very much changed by lactation, more especially if it be frequently repeated.

In the female infant the nipple is placed upon the edge of the fourth rib. At puberty it descends to between the fourth and fifth ribs; in the adult it reaches the fifth rib. After several lactations it descends to the seventh rib, and sometimes lower; and in this relaxed and pendulous state the child can draw the nipple in any direction which may suit its convenience.

In the child the nipple scarcely rises above the skin of the areola, but it usually grows to the age of puberty; in the adult female it is from half an inch to three-quarters in length; in lactation it is often an inch. After fifty it remains elongated, but relaxed; in old age it is sometimes in a great degree absorbed, and when thus wasted, appears as a mere wart.

The nipple is nearly smooth until puberty. At fifteen years it has a cleft near its centre, in which are the orifices of the lactiferous tubes, and it forms an uneven hemispherical projection.

At sixteen years it is slightly wrinkled; at seventeen it has small papillæ upon its surface. From twenty to forty years the papillæ are large; from forty to fifty the nipple becomes wrinkled; from fifty to sixty the nipple is elongated, and in old age it usually has a warty appearance.

In suckling women the nipple is not only elongated, but its cone is reversed; for its extremity or broadest part, and greatest diameter, was its apex in the virgin nipple, and this change of form renders the adhesion of the child's mouth much more firm and complete.

The colour of the nipple varies at different periods of life, and under different states of the uterus. In infancy it is of a pinkish-red; at puberty of a more florid red. In young women of a slightly brownish red, but in pregnancy it becomes of a very dark colour. In old age it becomes again more of the hue of the surrounding skin, although sometimes it remains very dark. The nipple is often defective, or buried in a cleft, and is sometimes entirely wanting; the first makes nursing difficult, and the second prevents it altogether.

The nipple, or mamilla, is composed of the following structures:—

First, of the common integuments.

Secondly, of the fascia covering and surrounding the lactiferous ducts.

Thirdly, of the milk tubes.

Fourthly, of the common organization of arteries, veins, absorbents and nerves.

Fifthly, of cellular tissue, in which those parts are found.

First, of the common integuments.

The Cuticle.

This texture covers the nipple and projects between its folds and into its depressions. It sends processes into the lactiferous tubes, which processes may be drawn out after continued maceration.

It forms folds and a net-work upon its inner surface, of very irregular and unequal meshes.

It adheres to the cutis by passing between its projections and by entering into its pores; and as its processes into the lactiferous tubes are the largest, it adheres more firmly at the apex of the nipple, than elsewhere on the breast.

In lactating women so soon as the cuticle is removed, the orifices of the lactiferous tubes become very apparent.

In women of light complexions, and more especially those with red hair, the cuticle is extremely thin, and is frequently subject to abrasion from the application of the child's lips in sucking, and the process of nursing is, from this cause, rendered exceedingly, and I might say, almost intolerably painful, and therefore astringent applications are required, or often a shield is obliged to be applied to defend the part and to favour the reproduction of the cuticle.

In similar temperaments, incrustations often form on the

nipples of girls, covering their clefts and points, and requiring attention to prevent ulceration, which the unguentum hydrargyri nitratis, or unguentum zinci, are most fitted to oppose. In age an incrustation of a much firmer kind fills the cleft and covers the point of the mamilla.

Of the Rete Mucosum of the Nipple.

Beneath the cuticle is situated the colouring matter of the skin.

It adheres firmly to the posterior surface of the cuticle, and is placed upon the anterior surface of the cutis.

It is not so abundant on the nipple as upon the areola, on which I shall chiefly describe it.

It not only covers the surface of the nipple, but enters, with the cuticle, into its lactiferous tubes. This may be better seen in other animals than in the human female, as the ducts are small; but in the larger quadrupeds, when the skin is dark, the cuticle and rete mucosum may be seen terminating within the lactiferous tubes, at a few lines from their extremities, forming a fringed edge.

The nipple, deprived of its rete mucosum and cuticle, appears white as the skin of other parts of the body.

Some follicles exist in the nipple, and admit the cuticle and rete mucosum.

Of the Cutis of the Nipple.

The cutis forms a considerable portion of the nipple, and it is divided into two surfaces, when the breast is in a state of lactation.

The first forms the disk or circumference of the nipple, and the second its broad, flat, truncated apex, in which the terminations of the milk tubes may be seen in numerous orifices.

The disk is composed of a great number of papillæ, which produce a vascular and sentient surface, and which form its erectile and highly sensitive tissue.

The direction of these papillæ is from the base towards the apex of the nipple, so that they are pushed back as the mamilla enters the mouth of the child, and thus greater excitement is produced.

They lap over the truncated extremity of the nipple, forming a foliage upon its apex.

They form, in their arrangement upon the nipple, broken portions of circles; but when the nipple is elongated and dried, they appear to be spiral.

They form flaps, which are at their edges divided into numerous projections, with serrated depressions between them.

They are directed forwards towards the apex of the nipple, and the papillæ of the child's lips passing from within outwards, meet them in sucking, are received between them, intermix with them, and produce considerable adhesion and sensation.

They are very numerous and large for the size of the part, and rather spongy at their extremities.

They are very vascular bodies, and I have given a figure of them injected. The minute arteries which pass from the base towards the apex of the nipple, send numerous branches to the papillæ cutis, which divide into little bushes of vessels in each papilla, and terminate in veins.

The veins, also, are very numerous, and they will be seen injected, and forming bushes similar to the extremities of the arteries*.

The application of the child's lips, the drawing of the nipple in the motions of the child's head, and the suction produced by its mouth, produce so much excitement as to occasion erection of the nipple.

* Let him who doubts in the direct communication between arteries and veins, look through a microscope at the tail of the tadpole, in which numerous communications between these vessels may be observed. Let him divide all these communications but one, and the vein directly pulsates like an artery. Or if coarse injection be thrown into the human radial and ulnar arteries, it returns freely by the veins. Of this injection I have two beautiful preparations.

This effect has been supposed to arise from the passage of the blood into an elastic, cellular structure, like the corpora cavernosa penis, but there is no such formation in the nipple. It is a state arising simply from the determination of blood into the little bushes or assemblage of capillary arteries in the nipple and papillæ. The blood is propelled forwards to the papillæ by the action of the heart and arteries, so that by this vis a tergo, the capillary arteries become extremely distended, and erection is produced; it more slowly escapes through the little branches of communication with the veins, and which are more distant from and less under the influence of the vis a tergo from the heart, which is the principal source of the circulation; thus a congestion of arterial blood is produced in the capillary arteries. But when the excitement subsides, the blood is no longer directed with the same impetuosity upon the papillæ, and the veins will then remove the congestion in the extreme branches of the arteries, as the vis a tergo has in a considerable degree subsided.

This erection of the nipple may be produced, not only by mechanical causes, as in suckling, but also by mental excitement, as by the influence of the passions.

Moral causes affect not only the nipple, but the mammary gland, and thus occasion a greater determination of blood to it, and a more considerable secretion from its

glandules, by the nervous communication between its different parts.

Thus then is formed the papillous surface or disk of the nipple, and as to its apex, and what is, when the breast is in a state of lactation, its truncated surface, it is a cleft generally before the breast secretes; but during lactation the papillæ are everted, and the broad surface of the apex is exposed, and then the orifices of the lactiferous tubes appear, which terminate in a kind of cribriform net-work, between the meshes of which the milk escapes. This net-work being very little elastic, yields but slightly to the pressure of the milk, so that the orifices of the ducts continue of very diminutive size, not only in woman, but in other animals: thus it is that the escape of the milk is prevented, excepting under excessive distension and in the process of suckling.

There is no transverse wrinkling of the lactiferous tube internally, as Haller states, to prevent the escape of the milk, but, as any one may at once see by cutting open the tubes near their terminations, they are wrinkled longitudinally, to allow of a greater dilatation of the tube behind the contracted orifice.

On the inner side of the cutis, which forms the nipple, it is lined by a fibrous tissue, which passing from the surface of the breast to the skin, covers and encircles the lactiferous

tubes. This structure forms the strong connecting medium between the nipple and the gland of the breast; it prevents great elongations and relaxation of the nipple, and it is the chief defence from those injuries and violences which might tear off the mamilla from the gland, separate the ducts, and destroy the function and utility of the organ. This circle of fascia around the ducts is derived from the general fibrous tissue of the breast and thorax.

As some degree of elongation and change of place is necessary to the performance of the functions of the nipple, it also contains a cellular tissue, which is elastic, and admits of change in the form and situation of this projection. In this tissue the arteries and veins are supported, as well as the absorbents and the nerves. It is in the nipple more of the reticular than of the adipose kind, because much fat placed in the substance of the nipple itself, would be attended with great inconvenience, and might, indeed, interfere with the function of the part, and defeat the object of Nature.

Within this reticular tissue are placed the lactiferous tubes as they proceed to their termination upon the truncated surface of the nipple, which tissue permits them to be elongated and drawn into capillary tubes at the time of sucking.

Thus, then, the nipple is formed of the common integuments with numerous papillæ upon its disk, of an apex with

cribriform openings for the termination of the lactiferous tubes, within the integuments, of a fibrous tissue, and more internally still, of a reticular tissue conveying the blood vessels, absorbents, and nerves; lastly, of the lactiferous tubes, as they proceed to their termination.

The arteries of the nipple are principally four:—

First, the thoracica longa sends branches to its outer or axillary side.

Secondly, an external mammary artery which is also often a branch of the former, is distributed particularly to the nipple and breast, and both the first and second are derived from the axillary artery.

There are also two principal anterior branches.

First, one from the *internal mammary* artery, which passes from the inner side of the thorax between the second and third ribs to the anterior surface of the chest, on the outer part of the sternum, and descends to the upper part of the nipple.

Secondly, there is another large anterior branch, from the internal mammary, which usually appears upon the fore part of the chest, and which is found generally between the cartilages of the fourth and fifth ribs, and passes to the sternal side of the nipple; however, varieties occur, and in my plate, two arteries pass between the third and fourth cartilages, and one between the fourth and fifth.

To the upper part of the breast an artery which penetrates the pectoralis major, derived from the thoracica suprema, passes to the upper part of the nipple, and small anterior branches perforate the intercostal muscles of the third and fifth spaces between the cartilages, to proceed to the inner, lower, and back part of the nipple.

The upper of the principal anterior branches is derived from the internal mammary artery, and the lower from the internal mammary intercostal arteries.

These arteries greatly vary in their course; however, their sources are generally from the axillary and from the internal mammary arteries.

They pass to the basis of the nipple, and there they have lateral branches of communication, and from these proceed parallel arteries, which are continued from the basis to the apex of the nipple, and send vessels to the papillæ at the apex; whilst others pass backwards to the lactiferous tubes, and entering the centre of the gland, communicate with the deeply seated arteries which enter at the back of the organ from the intercostals.

The veins of the nipple originate in bundles or bushes of capillary veins, from which larger branches arise that form a net-work at the roots of the papillæ cutis, and then they enter much larger veins, which pass to the base of the nipple.

The veins beginning thus at the nipple pass into large

branches of veins, which enter a venous circle at the areola, and from this circle veins proceed from the nipple to the axillary and cephalic vein of the arm, also into a vein which pierces the intercostal muscles between the cartilages of the second and third ribs, and which enters the internal mammary vein, and one which penetrates below the fourth rib the intercostal muscles, to terminate in the internal mammary intercostal veins.

Other veins are found less regular in their course than those which I have described, entering the axillary, the cervical, internal mammary, and both kinds of intercostal veins; *viz.*, those of the vena azygos and the internal mammary vein.

The absorbents of the nipple, which are very large and numerous, proceed from its basis along the surface of the gland to the axillary fascia, where they pass through its cribriform absorbent opening or openings to terminate in the axillary absorbent glands immediately behind the fascial aperture, and a little above it, and close to the edge of the pectoralis major. But the absorbents on the sternal side of the nipple take two courses into the anterior mediastinum, *viz.*, between the second and third cartilages of the ribs, and between the fourth and fifth.

The nerves of the nipple, or mamilla, are two sets:—first, the posterior, or axillary; secondly the anterior, or sternal, as they proceed to one or the other part of the breast.

First, the posterior, consisting principally of the fourth and fifth dorsal branches, which penetrate the intercostal muscles behind the breast, and proceed supported on branches of arteries to the base and apex of the nipple. The third dorsal also sends a branch upon the arteries which descend to the nipple.

Secondly, the anterior, consisting principally of the reflected branch of the fourth dorsal nerve, which penetrates the intercostal muscles between the cartilages of the fourth and fifth layer of intercostal muscles, close to the outer part of the sternum, and accompanies the artery to the skin and base of the nipple on its sternal side.

The third nerve gives a branch to the anterior artery, which artery descends to the nipple; and the fifth, which is generally very small, now and then observes the distribution of the fourth.

To these branches of nerves is the nipple indebted for its capability of excitement from mental and mechanical stimuli, and for its high sensibility.

In addition to the structures which I have described, there are, at the apex of the nipple, the numerous and minute orifices of the lactiferous tubes, which amount to more than twenty orifices when in great numbers, and from twelve to fifteen in others, but I cannot be sure that all the openings are lactiferous ducts, as some may be follicles only.