

Men who illegally absent themselves are liable, in addition to punishment for the offence, to make up for the time of their absence by a corresponding extension of their service. The officers are appointed and promoted by the crown, but first appointments are given to persons recommended by the lord lieutenant of the county who may be approved as fulfilling the prescribed conditions in respect of age, physical fitness, and educational qualifications. Since 1877 the officers have been permanently subject to military law. The general body of the non-commissioned officers and men are so subject only when called out for training or embodiment. At other periods they have simply the legal status of civilians, except as regards a liability to trial and punishment for offences in connexion with enlistment or for military offences committed while called out. Each militia regiment has a permanent staff, consisting of an adjutant and a small body of non-commissioned officers and drummers, to conduct the recruiting drills and ordinary business of the corps; and the members of this permanent staff are always subject to military law. They mostly consist of non-commissioned officers who belong to or have served in the regular portion of the territorial regiment. Many of the militia corps have their headquarters at the brigade depôt or local establishment of the territorial regiment, and all are under the general supervision of the (regular) colonel commanding the brigade depôt. The area of service does not extend beyond the United Kingdom; but those who voluntarily offer to serve in the Channel Islands, the Isle of Man, Malta, or Gibraltar may be employed therein. The uniform of the officers and men of the militia is precisely the same as that of the regular corps with which they are associated, or rather of which they form part, except that in addition to the regimental distinguishing mark they bear the letter "M" upon their appointments, to denote that they belong to the militia portion of the corps.

As above stated, the ranks of the militia are usually filled by voluntary enlistment; but by a statute which, though temporarily suspended, can be put in force provisions are made for filling up any deficiency in the allotted quota in any county, city, or riding by ballot of the male inhabitants if within certain limits of age. The enactment provides as follows:—

The secretary of state is to declare the number of militiamen required, whereupon the lord lieutenant is to cause meetings to be held of the lieutenancy for each subdivision. To these meetings the householders of each parish are to send in lists of all male persons between the ages of eighteen and thirty dwelling in their respective houses. Before the ballot, however, the parish may supply volunteers to fill up the quota, every volunteer so provided and approved counting as if he were a balloted person. If a deficiency still exists, the persons on the lists shall be balloted for, and double the number of those required to supply the deficiency shall be drawn out. Any person whose name is so drawn may claim exemption or object; and the deputy lieutenants settle the question of his liability to serve. From the corrected list those who are of the requisite physique (the height is 5 feet 2) are enrolled in the order in which their names are numbered until the quota is completed. If the list is not sufficient to fill the quota, another ballot in the same manner is to be taken. Any balloted man becoming liable to serve may, however, provide a substitute who has the requisite physical qualifications, and is not himself liable to serve.

Within the general body of the militia is contained another having an additional and important obligation in the matter of service. It is called the "militia reserve," and is formed of men who voluntarily undertake a liability to join the regular forces and serve in any place to which they may be ordered in case of the proclamation of a state of imminent national danger or great emergency. In this respect they are in fact upon the same footing as the army reserve, and on the occasion of the mobilization of 1878 more than 20,000 of these men became part of the regular army. The present strength of the militia reserve is a

little under 29,000 men, and judging by past experience it may be computed that about 25,000 could be at once added to the ranks of an army in the field in the event of national danger or emergency. It is to be observed, however, that every man thus added to the regulars would be taken away from the effective strength of the militia.

There is no statutory provision for the number of men to be maintained, that number being what from time to time may be voted by parliament. The latest information available respecting the actual condition of the militia of Great Britain relates to the year 1881, and that of Ireland to 1880, the militia of the latter country for obvious political reasons not having been called out for training in 1881 or 1882. Taking the militia of the United Kingdom in 1881, we find that the establishment provided for was 139,501, of whom 18,618 were artillery, 1317 engineers, and 119,566 infantry. Divided into ranks, this establishment was made up of 3534 sergeants and 1260 drummers of the permanent staff, and of the general body 3909 officers, 2520 sergeants, 5040 corporals, and 123,238 privates. The number actually enrolled was 127,868 of all ranks, leaving 11,632 wanting to complete. Of the number enrolled 84,864 belonged to English, 14,138 to Scotch, and 28,866 to Irish regiments, the numbers wanting to complete being for England 7420, for Scotland 162, and for Ireland 4051. As the Irish regiments were not called out, our information regarding the actual effective condition of the force as shown at the annual training does not include Ireland. With regard to the English regiments, 74,945 were present out of an enrolled strength of 84,864. Of the absentees 3144 were with and 6775 without leave. In the Scotch regiments, 12,401 appeared at the training, and of the absentees 616 were with leave and 1121 without. Of the total establishment (106,584) for Great Britain, 99,002 were enrolled, and of those enrolled 87,346 presented themselves and 3760 were absent with leave and 7896 actual defaulters. Of the English regiments five-sixths and of the Scotch regiments two-thirds were born in the county to which their regiments respectively belonged. Of 92,677 men (for Great Britain) whose occupations are disclosed, 17,665 were artisans, 22,221 mechanical labourers, 26,227 agricultural labourers, and 26,564 other trades. Speaking approximately, more than one-half of the men were between twenty and thirty years of age, about 4 per cent. between seventeen and eighteen, about 9 per cent. between eighteen and nineteen, and about 12 per cent. between nineteen and twenty, while some 20 per cent. were over thirty years of age. More than one-half those inspected in 1881 were between 5 feet 5 inches and 5 feet 7 inches in height, about 20 per cent. were under 5 feet 5 inches, while only 585 out of a total of 92,677 were 6 feet and upwards. At the date of inspection there were 296 men in military confinement and 465 in the custody of the civil power. On the last occasion (1880) on which the Irish militia were called out, upon an establishment of 32,813 and an enrolled strength of 30,515 the number present at the training was 26,399, leaving 706 absent with and 2264 without leave. Regiments numbering in the aggregate 1146 men were not trained.

As distinguished from the regular forces or standing army, the militia has been described as the constitutional military force of the country; and its history justifies the description, at least up to a recent period when it lost its distinctive character and became to a great extent merged in the regular army. It is the oldest force Britain possesses, and in fact represents the train bands of early English history. Its origin is to be found in the obligation of all freemen between certain ages to arm themselves for the preservation of the peace within their respective counties, and generally for the protection of the kingdom from invasion. This obligation, imposed in the first instance upon the individuals themselves, became shifted to the owners of land, who were compelled to keep up their provision of horses and armour for the national defence. The forces were

placed under the lieutenant of the county, empowered in this respect by a commission from the crown. This prerogative of the sovereign, which had been in some instances a matter of controversy, was declared by statute shortly after the Restoration. By the same statute the militia of each county was placed under the lieutenant, who was vested with the appointment of officers, but with a reservation to the crown in the way of commissioning and dismissal. The cost of the annual training—for fourteen days—fell upon the local authority. Offences against discipline were dealt with by the civil magistrates, but with a power to the officers of fining and of imprisoning in default. Upon this footing the militia of England remained for nearly a century, with the general approval of the community. It was recognized as an instrument for defence and for the preservation of internal order, while it was especially popular from the circumstance that from its constitution and organization the crown could not use it as a means of violating the constitution or abridging the liberty of the subject. It was controlled and regulated in the county; it was officered by the landowners and their relatives, its ranks were filled by men not depending for their subsistence or advancement upon the favour of the crown; its numbers and maintenance were beyond the royal control; its government was by statute. While the supreme command was distinctly vested in the crown, every practical security was thus taken against its use by the crown for any object not constitutional or legitimate. It was regarded as, and was, in fact, the army of the state as distinguished from the standing army, which was very much the army of the king personally. The latter consisted of hired soldiers, and was more than once recruited by a conscription, confined, however, to persons of the vagrant class not having a lawful employment, while the former was mainly composed of those having a fixed abode and status. The militia thus enjoyed for many years as compared with the regular forces a social as well as a constitutional superiority. About the middle of the last century the militia was reconstituted, with certain modifications, not involving a sacrifice of the principle of its local government, but strengthening somewhat the supervising influence of the crown. Thus the king directly appointed the permanent staff, and was given a veto upon the appointment and promotion of the officers, who were to have a property qualification. A quota was fixed for each county, to be raised by ballot of those between the ages of eighteen and forty-five, each parish having the option of supplying volunteers at its own cost, and each man balloted being permitted in lieu of serving to pay £10 to provide a substitute. When called out for service the pay was to be the same as that of the regulars, and while embodied or assembled for annual training the officers and men were placed under the Mutiny Act and Articles of War, with, however, a proviso that in time of training no punishment was to extend to "life or limb." The crown was given the power to call out the militia in case of apprehended invasion or of rebellion, and associate it with the regular army, but only upon the condition of previously informing parliament if then sitting, and if it were not sitting of calling parliament together for the purpose. A further and important security was established to prevent an unconstitutional use of the militia by the crown: the estimate for its training was framed each year, not by an executive minister of the sovereign, but by the House of Commons itself. Upon the initiative of a committee of the House, an Act was passed providing for the pay and clothing of the militia for the year. Upon this footing substantially the militia of England remained for many years, the Irish and Scotch militias being meantime brought under the same conditions by various enactments. The force was embodied on several occasions during the last and in the early years of the present century, and it contributed largely to the army engaged in the Peninsula. From 1803 to 1813 just 100,000 men, or two-fifths of those raised for the army, came from the militia. In this way, however, it lost its distinctive character as a defensive force. During the peace which followed the final fall of Napoleon the militia was suffered to fall into decay; and up to 1852 it had only a nominal existence in the shape of an effete permanent staff with no duties to perform. In 1853 the militia was revived just in time to enable it to fulfil most valuable functions. In the war with Russia it was embodied and did garrison duty not only in the United Kingdom but in the Mediterranean garrisons, thus enabling the authorities to send most of the available regular troops to the scene of hostilities. It further contributed many officers and some 30,000 men to the line. It still gives annually about 8000 recruits to the regulars. During the Indian mutiny it filled scarcely less useful functions when again called out. It has since then been regularly assembled for annual training; and when it is brigaded with the regular forces at Aldershot and other camps of instruction its military aptitude and proficiency have generally elicited the surprised admiration of professional soldiers. In 1871 an important constitutional change was made. It was part of the new army system inaugurated in that year that the control of the militia should be removed from the lord lieutenant of the county and vested wholly in the crown. It has now virtually ceased to exist as a distinct body, and is a part of the regular forces with a limitation as to the time and area and

other conditions of service. There is no longer a regiment of militia. The body that would formerly be thus described is now a collection of militiamen of a regiment largely composed of regulars. The votes for the maintenance of the militia are now part of the army estimates. The officers of the militia and the line are eligible for duty with either force, and may sit upon courts martial indiscriminately. This practical amalgamation of the old constitutional force with the standing army may appear theoretically open to the objection that it is thereby placed under the direct control of the sovereign. But the day has passed when such an objection could have any value. The fact of the whole army being placed in all respects under the direct control of a minister responsible not only to the crown but to parliament is enough to dissipate any constitutional apprehensions under this head.

The only colonial militia that forms an effective force is that of Canada, which is organized as an efficient local army. The Government of the Dominion includes a minister of militia and defence. The force is placed under the command of a general officer, assisted by an adjutant-general, belonging to the regular army and appointed by the queen. The training of the officers is a matter of special care, there being a military college at Kingston, several of the governing body and professors of which are officers of the Royal Artillery and Royal Engineers, as well as schools of gunnery and musketry. For military purposes the Dominion is mapped out in twelve districts. The militia is divided into the active and the reserve, and the male inhabitants between the ages of eighteen and sixty, with the usual exceptions, are liable to military service, the extent of which varies with the age of each man, the larger amount of duty falling upon the younger. The active militia comprises 12 regiments of cavalry, 17 field and 31 garrison batteries of artillery besides a mountain battery, 4 companies of engineers, 2 mounted rifle corps, 97 battalions of from 5 to 10 companies each and 16 independent companies of infantry. The uniform is for the most part like that of the regular army, and the organization and general efficiency of the whole body have been very favourably reported upon. Although the obligations of the Canadian militia are purely local, a large number on a late occasion offered themselves for general service; and, in the event of a war on a large scale, it is believed that the force would contribute a valuable addition to the fighting strength of the imperial army. (J. C. O'D.)

MILK is the fluid secreted by the mammary glands of the division of vertebrate animals called *Mammalia*. These glands are in a rudimentary form in the *Monotremes*. In *Ornithorhynchus* there is no nipple, but the mouth and tongue are closely applied over the area on which the ducts open, and the fluid is withdrawn by suction on the part of the young and compression of the gland by the mother. In *Echidna* the ducts of the gland open into a small pouch, foreshadowing the larger pouches of marsupials. In Marsupials the glands are more compact, and have a greater number of lobules. They are found behind the marsupial depressions or those of the pouch; they are not fewer than two on each side nor more than thirteen, six on each side and one midway. The ducts, long and slender during lactation, open on a nipple which is covered by a reflexion of the skin at the back of the pouch, thus forming a kind of hood or sheath. The nipple is protruded beyond the hood during lactation, and is much elongated. The number of these nipples bears a relation to the number of young at a birth; thus the kangaroo, with one at a birth, has four nipples (two, generally the anterior pair, being in use), whilst the Virginian opossum, which produces six or more at a birth, has thirteen nipples. Rodents show a corresponding provision for the nourishment of the young in the number of nipples. A seeming exception is the common guinea-pig, which frequently has eight, ten, or twelve young at intervals of two or three months, and yet the mother has only two teats to serve them, turn and turn about; the original stock of the domestic species breeds, however, only once annually, and has but one to two young, so the domestic variety is a curious anomaly due to the artificial circumstances of its life. In the porcupines there are two nipples, one midway between the fore and hind leg, and the other midway between this and the base of the fore leg. In the coypu, a creature often carrying its young on its back whilst it swims across rivers, the teats project from the flanks near the shoulders, and are of considerable length,

so that the young readily reach them. The *Insectivora* have, as a rule, more nipples than are found in any other order. Thus in the tenrec (*Centetes*) there are as many as twenty-two, and they are rarely fewer than fourteen, spread out in pairs from the pectoral to the inguinal regions. There are ten teats in the common hedgehog, six to eight in moles and shrews, two in sloths and armadillos. In *Cetacea* there are two long, narrow, flat glands lying between the dermal and abdominal muscles, with the subcutaneous blubber separating them from the skin. The peculiarity of the arrangement in these animals, where suckling is performed under water, is the large size of the central duct, which acts as a kind of reservoir, so that the young may obtain a considerable supply in a very short time. It would appear also that when suckling takes place the nose of the young is above the surface of the water. Among Ungulates, in the elephant the glands and teats are between the fore legs; in the rhinoceros they are inguinal; in the mare and ass the glands are two in number, and are found between the thighs, about 9 inches in front of the vulva; the tapir has two inguinal nipples, the peccary two ventral and two inguinal, the wild sow eight nipples, whilst in the domestic breeds there are at least ten, extending from the pectoral to the inguinal regions. Ruminants have the glands aggregated into a round mass in the inguinal region, pendulous in full function, divisible into two glands, each of which has a large reservoir. When in use the teats, one pair or two pairs being the number, in connexion with the reservoirs become so large as to receive the special name of "udder." All the deer tribe, camels, the giraffe, and all kinds of cows have four teats; most antelopes and the gazelles have two teats, whilst a few antelopes have four. As to *Carnivora*, the felines have usually six nipples; the wolf, jackal, fox, dog have usually eight; the seals and the walrus have four, the otters two, the weasels six, the bears six; and in the kinkajou (*Cercopithecus*) the number is reduced to two. Amongst *Quadrumania*, the aye-aye (*Chiromys*) has only one pair of nipples, about an inch and a half in front of the vulva; many lemurs have in addition to those a pectoral pair; in all the platyrrhine and catarrhine *Quadrumania* there is only one pair of glands, restricted to the pectoral region. Here the teats are between the fore legs, and the young clings to the mother's breast in human fashion, but there is no protrusion of the breast as in the human being. (For further details see Owen's *Anatomy of Vertebrates*, vol. iii. p. 769.)

In the human race the glands are two in number, forming, along with the skin and fat, two rounded eminences, one on each side, on the front of the thorax. They extend from the third to the sixth or seventh rib, and from the side of the sternum to the axilla. In the centre projects a small conical body, the *nipple*. Around the nipple is a coloured circle, or *areola*, which is darker during pregnancy, and even in women who have borne children than in the virgin state. The surface of the nipple is wrinkled, and with a magnifying glass is seen to be covered with papillae. It is perforated by numerous openings, the mouths of the milk ducts. The tissue of the nipple contains numerous minute blood-vessels, and it has at the base muscular fibres arranged in concentric circles and in radiating bands. It has much of the character of erectile tissue, as in the *corpora cavernosa* of the penis, becoming turgid, firm, and prominent from excitement. The base of the gland lies on the pectoral muscle, a thin layer of fascia intervening. The surface is covered with fat, which gives it the smooth rounded outline. It is amply supplied with blood by the long thoracic artery, some other minute branches of the axillary artery, the internal intercostal artery, and the subjacent intercostals. The nerves come from the anterior and middle intercostal cutaneous branches,

and the nipple is especially sensitive. The gland is composed of numerous lobes bound together by connective and adipose tissue, and each lobe is formed of smaller lobules. Each lobe has an excretory duct, and these ducts, from fifteen to twenty in number, converge towards the areola, beneath which they are dilated so as to form sinuses from  $\frac{1}{4}$ th to  $\frac{1}{2}$ th of an inch in calibre. From these sinuses arise the ducts which open on the surface of the nipple. The general structure will be understood by referring to the accompanying figures, along with the description.



FIG. 1.—Half-diagrammatic view of a section through a lobe of the mammary gland, after Klein (*Atlas of Histology*, plate xl. fig. 1), magnified 45 diameters. a, a duct dividing into two branches; b, b, b, connective tissue surrounding and going between the ultimate pouches of the gland; c, c, c, the pouches or *alveoli* of the gland, the dots representing the cells lining them.

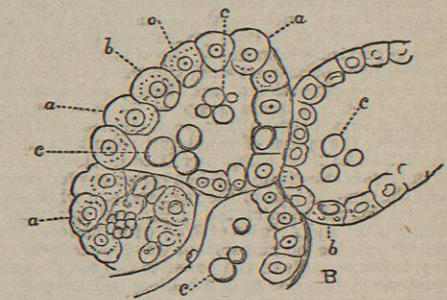


FIG. 2.—A portion of the same gland, magnified about 400 diameters, showing one complete and two incomplete alveoli. a, a, a, short, columnar, epithelial cells lining the alveolus, each having an oval or rounded nucleus; b, b, b, epithelium cells, containing, next the interior of the alveolus, a milk globule; c, c, c, milk globules which have been set free from epithelial cells.

When a duct is traced into the gland, it is found to subdivide into smaller ducts, and these into still smaller, until the smallest ductlet is reached, round the end of which are clustered several *alveoli* or pouches. Each alveolus has a wall, lined with epithelium cells. In the wall of the alveolus there are capillary blood-vessels which bring the blood near the cells. By this blood the cells are nourished. There is a minute cavity in the centre of each alveolus into which cells or their products can accumulate. There can be no doubt that the formation of the milk globule takes place in these cells. Whilst milk is not being formed the cells have a granular appearance, and the lumen or central cavity of the alveolus is small; but during secretion the cavity is enlarged and shows a few milk globules, whilst one or more milk globules can be seen in the interior of the cell. If the milk globule in the cell be very large, the nucleus of the cell is pressed outwards and the protoplasm of the cell is reduced to a thin covering, over the globule, at this stage presenting a striking resemblance to a fat cell containing an oil globule. Thus each milk globule is formed in the protoplasm of the epithelium cell, and even at an early stage each milk globule consists of a minute drop of fat or oil surrounded by a thin albuminous envelope. It has not been clearly ascertained whether epithelial cells, after having secreted milk globules, degenerate and fall off, or whether they have the power of ejecting the milk globules. The fluid constituents of milk (water holding

salts in solution) may be separated from the blood by a kind of filtration under blood pressure, as is the case in other secretory processes. The origin of the sugar of milk and of the casein is unknown. (For a description of the minute structure of the milk gland, see Klein's *Atlas of Histology*, p. 300, and references.)

At the beginning of lactation the milk is rich in large irregularly-formed corpuscles (fig. 3, a, a, a) called *colostrum* corpuscles. These are contractile bodies, slowly changing their form and squeezing out the oily particles. At first (FIG. 3.—A drop of milk magnified 300 diameters. a, a, a, *colostrum* corpuscles.) they are the only bodies present, but they are soon replaced by the ordinary milk globules. Such globules have bright refractive edges, the surface is smooth, they vary in size from  $\frac{1}{5000}$ th to  $\frac{1}{3000}$ th of an inch in diameter, and each consists of a drop of fatty matter surrounded by a layer of albumen ("Ascherson's membrane").

A secretion of milk takes place in newly-born children, from the fourth to the eighth day, and also in rare cases in men (Hermann's *Physiology*, p. 158). During gestation in the human being the mammary glands increase in size; immediately after the birth of the child active secretion commences; and usually it is on the stoppage of the secretion, ten months afterwards, that the process of menstruation, which has been arrested by impregnation, again is re-established.

The secretion of milk is undoubtedly affected by the nervous system, as is shown by fear or mental distress arresting or injuring the quality of the secretion, and by the "rush" or feeling of fullness in the breast experienced by the mother when the child's mouth touches the nipple, or even when she sees her offspring. The nervous mechanism, however, is unknown, as it has been observed that secretion may continue even after section of all the nerves known to pass to the gland. The nature of the diet has a marked influence on the quality of the secretion: Thus the amount of casein and of fat is greater during an animal than during a vegetable diet. Fatty foods do not seem to increase the amount of fat or butter; an ample supply of carbohydrates (starches and sugars) increases the amount of sugar. These facts indicate that most if not all of the constituents of milk are formed from changes in the protoplasm of the epithelial cells. In some women the milk is deficient in fat and casein, and consequently is less nutritious. Prolonged lactation diminishes the amount of fat and sugar without materially affecting the amount of albuminous matter; but the milk is less nutritious and is unfit for the child. The occurrence of menstruation during lactation also deteriorates the milk. (J. G. M.)

Milk as Food.

The milk of various domesticated animals is more or less used by man for food. The milk of the cow, which may be taken as typical of all others, and is indeed by far the most important and valuable of all, is, when newly drawn, an opaque white fluid, with a yellowish tinge, soft, bland, and sweetish to the taste, and possessed of a faintly animal odour. This odour, according to Schreiner, is due to the presence of sulphuretted hydrogen, and disappears after a short exposure. The specific gravity of milk ordinarily ranges from 1.029 to 1.033, very seldom reaching 1.035 or falling so low as 1.027. In chemical constitution it con-

sists of an emulsion of fatty globules (cream) in a watery alkaline solution of casein, and a variety of sugar, peculiar to milk, called lactose. The fat (which when separated we know as butter) and the lactose constitute the carbonaceous portion of the milk regarded as food. The casein, which forms the principal constituent of cheese, and a certain proportion of albumen which is present, form the nitrogenous, while the complex saline substances and water are the mineral constituents. These various substances are present in the proportions which render milk a perfect and typical food suitable to the wants of the young of the various animals for whom it is provided by nature. The milk of all animals, so far as is known, contains them, although they are present in somewhat different proportions. It is probable that the milk of ruminants possesses certain physical and physiological distinctions from that of non-ruminant animals, which will account for the virtues attributed to the milk of the ass and mare. The following table exhibits the chemical constitution of the kinds of milk most frequently used by man:—

	Cow.		Goat.	Ewe. <sup>1</sup>	Mare.	Ass.	Human.
	Water Blyth.	Casein.	Voelcker.	Voelcker.	Casein.	Chevallier and Henry.	Guiber.
Water.....	86.87	87.00	84.48	83.70	90.310	91.65	88.02
Fat.....	3.50	4.00	6.11	4.45	1.055	0.11	2.90
Casein and albumin.....	4.75	4.10	3.94	5.16	1.953	1.82	1.60
Sugar.....	4.00	4.28	4.68	5.73	6.285	6.08	7.03
Ash.....	0.70	0.62	0.79	0.96	0.369	0.34	0.31

In addition to these constituents milk contains small portions of the gases carbonic acid, sulphuretted hydrogen, nitrogen, and oxygen, and minute quantities of other principles, the constant presence and essential conditions of which have not been determined. These consist of galactin and lactochrome, substances peculiar to milk, discovered by Winter Blyth, with certain animal principles such as leucin, pepton, kreatin, tyrosin, &c. The salts in milk consist, according to the average of numerous analyses by Fleischmann, of the following constituents:—

Phosphoric acid.....	28.31	Potash.....	17.34
Chlorine.....	16.34	Magnesia.....	4.07
Lime.....	27.00	Ferric oxide.....	0.62
Soda.....	10.00		

Milk thus is not to be regarded as a definite chemical compound nor even as a mixture of bodies in fixed and invariable proportions. Not only does the milk of different races and breeds of cows vary within comparatively wide limits; the milk of the same animal is subject to extensive fluctuation. The principal causes of variation in the individual are age, period of lactation, nature and amount of food, state of health, and treatment, such as frequency of milking, &c. The following table indicates the range of normal variations:—

Water.....	90.00 to 83.65
Fat.....	2.80 ,, 4.50
Casein and albumin.....	3.30 ,, 5.55
Sugar.....	3.00 ,, 5.50
Ash.....	0.70 ,, 0.80

The average quantity of milk yielded by cows is also highly variable, both in individuals and breeds. As a rule the smaller breeds of cows yield a small amount of milk rich in cream (butter fat), while the yield of the larger breed is greater in quantity, but comparatively deficient in cream. A good milch cow should yield in a milk-giving period of from eight to nine months about

<sup>1</sup> Ewe's milk is exceedingly variable, especially in its percentage of fat. The above analysis is one of nine by Dr Voelcker, in which the fat was found to range from about 2 to 12½ per cent.