seeking an avenue of entrance. Through the skin in eczematous spots or in areas of irritation, at the navel, through the eyes, nose, mouth, larynx, lungs, stomach, and rectum, the bacteria can gain admission. To prevent infection, then, the most careful cleansing is necessary, both of the incubator and of the baby itself. Undoubtedly many of the later deaths can be traced to this source.

Finally, in the carrying out of the above essentials in the proper management of the premature infant, the most patient and painstaking attention on the part of the nurse is necessary, and upon her conscientiousness depends the chance of its survival.

*Results.*—The statistics furnished here are taken from 2,314 births which occurred at the Sloane Maternity Hospital in the two years from October 22d, 1897, to October 22d, 1899, before which time there had been no incubator in use.

Four hundred and ten of these babies were premature, but of these 74 were still-births, which included macerated fœtus and the still-born babies of cases of placenta prævia, accidental hemorrhage, eclampsia, and the like. There remained, therefore, 336 which were suitable for treatment.

Among these cases was a set of triplets and there were 18 pairs of twins; 85 were treated as infants at term, and of these 4 died—a mortality of 4¾ per cent.; 145 were put in cotton, and of these 12 died—a mortality of 8 per cent. Some of this class should have been placed in the incubator, but for lack of room it was impossible to do this; 106 were incubator babies. These are divided into two classes: I. Those that died within four days of birth; II. Those that lived longer than four days.

I. Twenty-nine of the incubator babies died within four days. All of these but 3 were more or less asphyxiated at birth; 9 were breech cases, and of these 5 were difficult extractions; 3 were delivered after an accouchement forcé in placenta prævia. The rest were vertex presentations; but, of these, 2 were forceps deliveries; 6 were under seven months of uterine gestation; 22 had reached a period of between seven and eight months, and 1 a period of eight and a quarter months.

The causes of the premature labor were as follows: an endometritis in 14, syphilis in 2, albuminuria in 1, placenta prævia in 3, accidental hemorrhage in 1, persistent vomiting in 1, twin in 1, violence in 1, and in 4 the labor was induced. The largest baby weighed 5$\frac{3}{16}$ lbs.; the smallest, 2$\frac{7}{16}$ lbs. Only 5 infants lived over twenty-four hours; 24 were in such poor condition at birth that they survived only a few hours. In 16 of these cases autopsies were held, and in all of these there was marked atelectasis; in 7 hemorrhages of some degree, either into the brain or into the serous membranes; in 2 the foramen ovale was still patent.

II. Seventy-seven incubator infants survived the first four days; 51 were children of primiparæ, 27 of whom were out of wedlock; 3 infants were under seven months of gestation; 8 were over eight months, and the rest between seven and eight months along; 9 were breech presentations; 1 a transverse and the rest vertices; 2 were of triplets associated with albuminuria; 18 were in twin deliveries, associated with albuminuria or hydramnios. The causes of the premature labor were: endometritis in 27; syphilis in 4; phthisis in 2; albuminuria in 7; accidental hemorrhage in 1; placenta prævia in 1; in 2 the labor was induced for albuminuria and eclampsia; 1 was a Cæsarean section; another an ectopic gestation; the cause, in the remainder, was unknown. Seven were delivered by forceps, 2 by version, 1 by accouchement forcé, 1 by Cæsarean section, and the ectopic gestation by a laparotomy; 12 were slightly asphyxiated at birth, 9 moderately so, and 5 deeply asphyxiated; 2 after one and a half hours' work or resuscitation were put in the incubator, head downward, and their condition was so poor that they were expected soon to die, but they left the hospital gaining in weight; 5 weighed less than 3 lbs., 38 between 3 and 4 lbs., 33 between 4 and 5 lbs., 1 over 5 lbs.; the average weight was 3$\frac{13}{16}$ lbs. During their incubator life 28 had one or more attacks of atelectasis. All but 10 were more or less jaundiced. The initial loss of the infants was from 1 to 17½ oz.; the average was 7 oz. These figures are not quite correct, as the babies were weighed at different intervals, some on the fifth day, some on the seventh day, and others not till the fourteenth day.

The period of loss lasted for from five to twenty-two days, the average, eleven days; 10 lost steadily till death; 1 baby was in the incubator only three days, while another lived there eighty-two days. The average time was nineteen days. Some were removed early to make room for others who needed the place more urgently.

Only 3 of the 77 cases vomited. The stools were normal in 32.

One was discharged from the hospital as early as the eleventh day, and others also too soon, at their mothers' demand. One was eighty-nine days old, the average was twenty-four days.

In 16 diluted breast milk was supplemented, at times, with a mixture of cow's milk and water with Russian gelatin and lactose. In 10 a 1% proteid, 6% sugar, and 0.33% albuminoid modification of cow's milk was used. In all the rest diluted breast milk was relied upon. Twenty-seven never nursed at the breast; of these 12 died. A few nursed as early as the third or fourth day, two or three times a day; others not for three weeks, and one not till the sixty-eighth day. Of the 77, 13 died in the hospital, a mortality of nearly 17 per cent. The cause of death was atelectasis and bronchitis in 7, acute asphyxia from a curd in the larynx in 1, syphilitic pneumonia in 1, cerebral hemorrhage in 1, gastro-enteritis in 3, and a patent foramen ovale and ductus arteriosus in 1. The condition of 3 was poor at time of discharge, fair in 24, and very good in 37; 32 were above their birth weights and 57 were gaining in weight. To letters written about January 1st, 1900, no answer was obtained from 28. Thirteen were reported as having died; 1 of these lived fourteen months, 1 nine months, 1 four and a half months, 3 lived two months, 6 lived six weeks, 1 only a month. Five of these children died at the Nursery and Child's Hospital and 2 died at Bellevue Hospital. They were bottle-fed, and the probable cause of death was gastro-enteritis. Twenty-one were found to be *alive* and doing well. Some had nursed and the others were bottle-fed. The oldest baby was twenty-two months and almost all were good specimens of healthy children. One baby at seven months weighed 16 pounds. It weighed 4$\frac{1}{16}$ pounds at birth and nursed its mother after leaving the hospital. The ectopic and the Cæsarean babies were in fine condition.

STATISTICS.

| Incubators. | Tarnier. | Charles. | Sloane Hospital. | At the Sloane Hospital, not counting those coming in but a few hours. |
|---|---|---|---|---|
| Saved at 6 months. | 16 per cent. | 10 per cent. | ..... | ..... |
| " 6½ " | 36 " | 20 " | 22 per cent. | 66 per cent. |
| " 7 " | 49 " | 40 " | 41 " | 71 " |
| " 7½ " | 77 " | 75 " | 75 " | 89 " |
| " 8 " | 88 " | ..... | 70 " | 91 " |

From this table it appears that the statistics* at the Sloane Maternity Hospital are not so good as Tarnier's, unless those babies who were in very poor condition at birth and who died in a few hours, are omitted.

*James D. Voorhees.*

LITERATURE.

Infections du nouveau-né dans les couveuses, Berlin.
Précis d'obstétrique, p. 841.
Lancet, 1897, vol. i., p. 1490.

* Tables containing more extensive data relating to these seventy-seven cases will be found in the Archives of Pediatrics for May 1st, 1900.





De la couveuse pour enfants, Auvard.
Union méd., Paris, 1883, vol. xxxvi., pp. 1025–1029.
New York Med. Record, 1884.
Bull. gén. de thérap., Paris, 1884.
Jour. d'accouch., Liège, 1884.
Amer. Journ. Obstet., 1897, xxxvi., pp. 696–702.
Trans. Am. Assn. Obs. and Gyn., 1897, pp. 432–438.
Lyon, 1898, p. 56, No. 106.
Amer. Med. and Surg. Bulletin, 1896, ix., 311–313.
Diffrée: N. Montpelier méd., 1896, 375–377. Les couveuses d'enfants.
Adriance: Amer. Journ. of the Med. Sciences, April, 1901. Premature Infants.
Rotch: Text-Book of Pediatrics.
Holt: Diseases of Children.
Am. Text-Book of Obstetrics.

**PRESBYOPIA**—Pr—from πρέσβυς, old, and ὤψ, eye; Fr., *presbytie*, from πρεσβίτης, an old-sighted person—is "the condition in which, as the result of the increase of years, the range of accommodation is diminished, and the vision of near objects interfered with" (Donders[1]). The range of accommodation diminishes year by year, from about 15 dioptries, at the earliest age (ten years) at which accurate observations have been made, to about 1 dioptrie, at the age of sixty-five or seventy; at forty it amounts to something less than 5 dioptries, and at forty-five to about 3.5 dioptries.[2]

Of the 15 dioptries of accommodation which the child of ten years is able to bring into exercise, from two-thirds to three-fourths (10 to 11 dioptries) may be lost without greatly incommoding an emmetrope in ordinary near vision. In emmetropia the distance ($P_2$) of the binocular near-point ($p_2$) is the reciprocal of the number of dioptries representing the binocular range of accommodation; hence, with a binocular range of accommodation of 5 dioptries, $P_2 = \frac{1}{5}$ metre (20 cm.), at which distance the smallest print in ordinary use is easily deciphered by eyes of average visual acuteness; when the binocular range of accommodation is reduced to 4 dioptries, $P_2 = \frac{1}{4}$ metre (25 cm.), at which distance ordinary newspaper print may still be read easily; with the loss of another dioptrie of accommodation (leaving but 3 dioptries available), $P_2 = \frac{1}{3}$ metre (33.3 cm.), and the reading of fine print becomes difficult, except under the conditions of good illumination and perfect acuteness of vision. These several values of $P_2$ correspond, in emmetropia, to ages ranging from about thirty-eight to about forty-seven years, and comparatively few emmetropes attain the latter age without seeking aid from convex glasses in reading or other fine work; the adoption of convex glasses by an emmetrope under forty is generally determined either by the exceptionally exacting nature of the work in which he habitually employs his eyes, or by the fact that his acuteness of vision is somewhat below the normal. When at the age of from fifty to fifty-five years the range of accommodation has become reduced to 2 dioptries, $P_2 = \frac{1}{2}$ metre (50 cm.), and the book must then be held at arm's length, at which distance only the larger sizes of print can be read; but, even with this range of accommodation, a public speaker may be able to read fluently from a plainly written manuscript lying before him upon a reading-desk or table.

The diminution of the range of accommodation with advancing years is a strictly physiological change, and is directly related to the progressive hardening of the crystalline lens, in consequence of which it becomes less and less capable of undergoing the change in curvature required for the adjustment of the eye for near vision. As this hardening of the crystalline occurs in all eyes alike, irrespective of their refractive condition as determined by the relation of the curvature of the refractive surfaces to the length of the axis of the eyeball, it would seem to be scientifically correct to define presbyopia as the loss of accommodative power incident to advancing years. Immemorial usage has, however, associated the name with the particular condition in which, as a result of increasing age, near vision becomes indistinct while distant vision remains either absolutely or relatively unimpaired. As thus defined, presbyopia is an incident in the life-history of all emmetropes and hypermetropes, and also of myopes whenever the myopia is of low grade—3 dioptries or less. In myopia of higher grades, 4 dioptries or more, the distance of the far-point remains within ¼ metre (25 cm.) of the eyes; so that, even with total loss of accommodation, it may still be possible to read fine print without the aid of glasses.

The striking contrast between the vision of myopes, who see only near objects distinctly, and that of presbyopes, who see distant objects clearly, while near objects appear confused, was very early recognized,[3] and, in the absence of any definite theory of accommodation, presbyopia was, for more than two thousand years, regarded as the opposite condition to myopia. Hypermetropia, the true opposite of myopia, remained confounded with presbyopia until after the middle of the nineteenth century, when the demonstration of a change in the form of the crystalline lens in accommodation by Cramer,[4] and, independently, by Helmholtz,[5] and the masterly analysis of the phenomena of accommodation in its relation to the several anomalies of refraction, by Donders,[6] dispelled the cloud of obscurity in which the whole subject had been so long enveloped, and through which only occasional glimpses of the truth had been previously enjoyed by a few exceptionally acute investigators.[7]

Premonitory signs of presbyopia may often be detected in emmetropes as early as the thirty-sixth year; exceptionally fine print, such as No. 1 of Jaeger's scale, being no longer read with the same perfect fluency as in youth, especially if the illumination is defective. Within the next five years newspaper print loses a little in sharpness of definition, and the finest needlework becomes difficult and perhaps deteriorates somewhat in quality. If the acuteness of vision (V—see *Optometry*) is normal, and the print not too fine, relief from the increasing strain in accommodation is obtained by holding the book or work a little farther from the eyes; but if vision is subnormal, or if the print is bad or very fine, a stronger illumination may be demanded, without increasing the reading distance. By the age of forty-five the disability has generally increased to she point that only fairly large print can be read with ease by ordinary artificial light, and a more powerful lamp is procured or the book is held nearer to the light; about this time the need of help from glasses commonly suggests itself.

A hypermetrope habitually wearing neutralizing (convex) glasses, or a myope wearing neutralizing (concave) glasses, experiences the disabilities of presbyopic vision at about the same age, and in about the same degree, as the emmetrope; thus, between the ages of forty and forty-five, the hypermetrope discovers that his convex glasses are no longer quite sufficient in reading, and similarly, the myope discovers that his concave glasses have become something of a hindrance in near vision, although in both cases the neutralizing (convex or concave) glasses continue to serve perfectly for distant vision. A change to stronger convex glasses by the hypermetrope, or to weaker concave glasses (or, perhaps, the temporary removal of his glasses) by the myope, is the remedy which now suggests itself, and which is, sooner or later, adopted. With a change of glasses reading again becomes easy, but with a corresponding falling off in the distinctness of distant vision. For this reason, an elderly emmetrope either removes his glasses or looks over them when not engaged in near work, and a presbyopic ametrope ordinarily requires two pairs of glasses, the one pair (neutralizing) for distance, the other pair (stronger convex or weaker concave) for reading and other near work; the inconvenience attending the use of two pairs of glasses may be obviated, in many cases, by wearing so-called bifocal glasses, in which both corrections are mounted in a single setting before each eye (see *Spectacles*).

A hypermetrope, not wearing convex glasses, experiences the disabilities of presbyopia at an earlier age than the emmetrope, after having, perhaps, passed through a more or less protracted stage of suffering from asthenopia (see *Asthenopia*). In myopia, on the other hand, if of low grade, the reading power with the unaided eyes is retained to a more advanced age than in

emmetropia; in the higher grades of myopia it is retained indefinitely.

As a result of the very gradual increase in the resistance which must be overcome in order to effect such degree of accommodative adjustment as is still possible in presbyopia, the relation of the accommodation to the convergence undergoes a notable change; the binocular accommodation ($A_2$) associated with convergence for the habitual reading distance becoming at length nearly equal to the absolute accommodation (A). In other words, the binocular near-point ($p_2$) comes more and more nearly to coincide with the absolute near-point ($p$). Following closely upon the acceptance of convex glasses in near work, the distance ($P_2$) of the binocular near-point ($p_2$) undergoes a rapid increase, so that such reading power as may have been retained up to the time of the adoption of the glasses is speedily lost, and reading without glasses becomes impossible. Hence the common experience of presbyopes, that having once formed the habit of using convex glasses, their continued use becomes imperative; and this whether the glasses have been adopted somewhat prematurely, or only after the need of them has become urgent. The too early use of convex glasses is, therefore, to be deprecated, as entailing the disabilities of presbyopic vision several years, perhaps, before the normal age; on the other hand, as there is a positive limit to the range of accommodation at any given age, the use of convex glasses cannot, as a rule, be deferred by an emmetrope much beyond the forty-fifth year, unless he be content to forego the use of the eyes in reading ordinary print or in other fine work.

The total disuse of the accommodation for a considerable period, as in the case of protracted and exhausting illness, may lead to the premature development of presbyopic symptoms, which are apt to be interpreted as an indication for the immediate adoption of convex glasses. If glasses are used in such a case, they should be of the least power compatible with the use of the eyes under favorable conditions of illumination, and the patient should be encouraged in the hope that, as the accommodative power increases with use, the glasses may be laid aside. In cases of this kind it is often possible to bring the accommodation again into effective use by the instillation, once or twice daily for a few weeks, of a weak solution of pilocarpine, and thus to put off the use of glasses for perhaps several years.

In addition to the impairment of the accommodation, which is the essential characteristic of presbyopia, the refraction undergoes, in the course of time, a slight but positive diminution, so that ultimately an emmetrope becomes slightly hypermetropic (H *acquisita*—see *Hypermetropia*), a hypermetrope somewhat more hypermetropic, and a myope somewhat less myopic; a very low grade of myopia may thus give place to emmetropia, or may even pass through emmetropia to hypermetropia of low grade. A low grade of hypermetropia, which late in life necessarily becomes absolute (H *absoluta*), is, in fact, the ultimate normal condition of all emmetropes, so that in advanced age weak convex glasses come to be required for perfect vision at a distance; hypermetropes similarly require a moderate increase in the power of their convex glasses, and myopes require a corresponding diminution in the power of their concave glasses. This falling off in the refraction is ordinarily scarcely to be detected at the age of forty-five; at sixty it may amount to perhaps 0.5 dioptrie, at seventy or seventy-five to 1 dioptrie, and at eighty to 2 dioptries or more.

The *treatment* of presbyopia consists essentially in the palliation of the disability by the use of such convex glasses as are needed to supplement the failing accommodation. A person originally emmetropic may, at the age of seventy, require convex glasses of as much as 5 dioptries, in order to read fairly good print at a distance of from 25 to 30 cm.; and if the acuteness of vision is below the normal, it may be necessary to use glasses of 6 or 7, or even 8 dioptries, in order to admit of reading at some shorter distance. In the case of a person originally hypermetropic, the measure of the required glasses will be increased by a quantity equal to the grade of the hypermetropia; in myopia the measure of the glasses will be similarly diminished.

The convex glasses first given to a presbyopic emmetrope of from forty to forty-five years of age, should ordinarily not much exceed 1 dioptrie, and in some cases even weaker glasses may be more acceptable to the patient. These glasses should be used at first for only such work as is performed with difficulty without glasses, in order that the habit of using the accommodation may not be needlessly or prematurely abandoned, and they should not be exchanged for stronger glasses so long as they continue to afford the needed assistance. Subsequent changes should always be made with reference to the glasses already in use, adding perhaps 0.5 dioptrie at each change, and it is often advisable to retain the old glasses for a time for reading by daylight, reserving the stronger glasses for more exacting work. It follows that a presbyope should always preserve a record of the power of the glasses which he is using, in order that, in replacing a lost pair, he may not be reduced to the necessity of selecting new glasses at random, or after hasty and generally imperfect tests made by a shopman whose knowledge, very probably, may be limited to the trick of selling his wares.

A presbyope, using glasses perfectly suited to his condition, is able to use his eyes in near work freely and without fatigue; glasses of insufficient strength fall short of affording the full measure of relief, and glasses of excessive strength compel the holding of the book at too short a distance, thus imposing needless work upon the recti interni muscles and so possibly giving rise to muscular asthenopia (see *Asthenopia*).

The clinical investigation of any case of presbyopia involves, first of all, the careful testing of the eyes in respect of the acuity of vision and for the estimation of any hypermetropia, myopia, or astigmatism that may be present (see these titles). As has been already explained, the measure of any hypermetropia that may be detected must be added to, and the measure of any myopia subtracted from, the value of the glasses ordinarily required by an emmetrope of corresponding age, in order to arrive at an approximation to the glasses to be given for reading. These tests are best conducted at a range of at least 5 metres, and only after the satisfactory determination of the refraction should a trial of reading-glasses, chosen with reference to this determination, be made. The final tests are made in reading fine print. If astigmatism is present, it should, as a rule, be accurately corrected by having one surface of the glass ground to the appropriate cylindrical curvature (see *Astigmatism*).

A rapid falling off in near vision, necessitating frequent and considerable additions to the power of the reading-glasses used by a presbyope, should be regarded with especial solicitude as indicating the possible beginning of glaucoma. In view of the recognized danger of precipitating an acute glaucomatous outbreak, the routine employment of mydriatics in the investigation of the refraction of presbyopes is to be especially deprecated.

Repeated changes from weaker to stronger glasses, attended with a shortening of the reading distance after each change, point to a falling off in the acuteness of vision, oftenest from failure in the perceptive power of the retina, or of the conductivity of the optic nerve.

A marked diminution in the apparent grade of presbyopia is occasionally observed late in life as a result of the development of a myopic state of the refraction; this change, which is popularly known as "second sight," is a not infrequent symptom of incipient cataract.

*John Green.*

[1] Donders: On the Anomalies of Accommodation and Refraction of the Eye, p. 210. The New Sydenham Society, London, 1864.
[2] Donders: *Op. cit.*, p. 207.
[3] Aristotelian Treatise, προβλήματα, xxxi., 25; Oribasius; Aëtius; Paulus Ægineta; *et al.*
[4] Cramer: Tydschrift der Maatsch. voor Geneeskunde, 1851.
[5] Helmholtz: Monatsberichte der Akademie der Wissenschaften, Berlin, February, 1853.





[6] Donders: Archiv für Ophthalmologie, vi., 1860; On the Anomalies of Accommodation and Refraction, 1864.
[7] *Vide* Donders: *Op. cit.*, p. 325, note.
[8] *Ibid.*, p. 208.

**PRESERVATIVES.**—Food preservation has been employed from a very early period. Many methods are available: drying, salting, pickling, smoking, the use of heat and cold, and addition of sugar, saltpetre, and various aromatic and astringent substances. The exigencies of modern food supply have greatly extended both the number of preservatives and their applications. Low temperature is probably the least objectionable method of preventing decay, but its application is limited and costly. It is unsuitable for some articles. In food preservation reliance is now largely on chemical substances that have decided antiseptic or germicide effect.

All preservation, even that by cold alone, affects to some extent the digestibility and nutritive value of food, but these changes are less objectionable than those caused by decomposition. Sterilization by heat finds wide application and has the advantage of producing a condition which permits of some exposure to the air without decay occurring. The medical questions which arise in this connection are mostly those concerning the newer preservatives. These are salicylic acid, benzoic acid, sodium benzoate, boric acid, borax, formaldehyde, sulphites, fluorides, beta-naphthol, saccharin, and a few synthetic products of complex composition and limited use. Each substance is found to be adapted to special uses. Thus, boric acid and borax are used largely for meats, milk, and butter; sulphites and fluorides are used in fermented beverages; salicylic acid, saccharin, benzoic acid, and sodium benzoates are used in jams, jellies, mince-meat, and preserved fruits and fruit juices. Formaldehyde is largely used in milk, and is the most common preservative in market milk and cream in the summer season. For the preservation of many vegetable products, sterilization in hermetically sealed cans is employed and no preservative material is needed.

The physiological effects and methods of detecting the different preservatives have been subjects of extended study. The latter problem has been solved in most cases, but the former is still under active discussion. At present, the weight of information seems to be that salicylic acid, formaldehyde, the sulphites, and the fluorides are objectionable either from inherent toxic qualities or by reason of interferences with digestive functions. Numerous investigations into the effects of boric acid and borax have failed to show that in moderate amount it has any injurious action, and the tendency is to permit its use in meats and butter, in which it satisfactorily replaces common salt. Sodium benzoate seems to be safe for use in fermentable foods, such as jams and jellies. Betanaphthol is but little used, but it and saccharin are probably objectionable except in special cases and under supervision.

Most of the substances above enumerated are not actively germicidal nor capable of coagulating proteids, but are rather inhibitory of bacterial growth and enzymic action, and thus prevent decomposition.

A dangerous phase of the modern use of preservatives is that many of them are sold under misleading names and their nature and effects misrepresented by manufacturers. Formaldehyde, for example, is sold in forty-percent. solution as "formalin," which is not an objectionable title, but weaker solutions are sold to milk purveyors under such fanciful names as "freezene," "icene," and the sellers' agents assert that the material is harmless and permissible. It has been found that a mixture of boric acid and borax is usually more efficient than either alone. This mixture is often sold under the title "boron preservative." Another danger is that chemical substances may be used to make up for deficiency in quality or sterilization of foods.

The regulation by law of the use of preservatives has so far been unsatisfactory. Wholesale prohibition of any but the old-established forms, such as smoking or pickling or salting, has been attempted in some places, but has resulted in much litigation and quarrelling. The question must be approached in a scientific way, and the regulations must regard the exigencies of trade as well as the interest of the consumer. For a comprehensive study of the main questions the report of the British Commission (Blue-Book, Cd. 833) will be found valuable.

*Henry Leffmann.*

**PRIMROSE, EVENING.**—The leaves and tops of *Onagra biennis* (L.) Scop. (*Œnothera biennis* L.—fam. *Onagraceæ*). This plant is an exceedingly common weed in waste fields and along roadsides throughout the United States, especially in the northeastern and central parts. It is hairy, the stem stout, erect, and branching, and is readily recognized by the large yellow flowers, with four obcordate petals, eight long versatile anthers, four linear stigmas, forming a cross, and the quadrangular ovary at the base of a long filiform calyx tube. It contains much tannin, with considerable gum, thus making it astringent and at the same time emollient to the intestine. It has consequently a considerable employment in the household in the treatment of diarrhœa. The dose is 2–8 gm. (ʒ ss.–ij.), and the infusion is the best form of administration. A number of species of the related genera Œnothera, Epilobium, etc., have a similar composition and use.

*Henry H. Rusby.*

**PROAMNION.**—This convenient term was introduced by Ed. van Beneden to designate that part of the *area embryonalis* at the sides and in front of the head of the developing embryo which remains without mesoderm for a considerable period, so that the ectoderm and entoderm are brought, in the region of the proamnion, into immediate contact. As found in one stage of the rabbit, it has already been figured in this work (Fig. 267, Vol. I.). A later stage in the rabbit, as seen in longitudinal section, is figured by Kölliker in his "Grundriss d. Entwickelungsges.," 2te Aufl., p. 107. We find that it had been observed in the chick by Remak, His, and Kölliker. Strahl was the first to direct special attention to it. It has since been observed by various writers; van Beneden and Julin have described it in the rabbit, Heape in the mole, Selenka in the opossum, and recently its exact history has been admirably worked out in the chick by Ravn, and in many birds and reptiles by Schauinsland. The proamnion, then, has been observed in representatives of the classes Reptilia, Aves, and Mammalia; hence we may conclude that it is common to all Amniota. It will be remembered that the mesoderm grows out in all directions from the blastopore, or hinder end of the primitive streak. In a chick of twenty-seven hours, the front edge of the mesoderm is a somewhat irregular transverse line, which crosses the germinal area about at the front border of the head. This line is well shown in His' drawings, *loc. cit.*, Pl. xii., Fig. 14. As the mesoderm expands, it does not grow forward in the median line, but does grow forward at the sides of the *area pellucida* in front of the head of the embryo. A space is thus enclosed between the mesoderm on each side; this space later becomes the proamnion; it contains no mesoderm. Later on, the lateral portions of the mesoderm approach the median line again, some distance in front of the head, so that now the proamniotic area is completely surrounded by mesoderm. We see, as the next phase of development, the head amniotic fold arising in such a position that the proamnion is embraced between the arc of this fold and the head of the embryo; the proamnion, therefore, constitutes the floor of the pit formed by the upgrowth of the head amnion. In the chick the proamnion never acquires any considerable development, but gradually disappears by encroachments of the mesoderm upon all sides, as has been well described by Ravn, whose Fig. 3, *loc. cit.*, Pl. xxi., will serve to give a clear general notion of the relation of the proamnion to the head, and to the true amnion in the chick. The disappearance of the proamnion in the chick involves some curious appearances in sections of embryos, which Ravn has correctly and fully elucidated.

In the rabbit, according to van Beneden and Julin, whose observations have been confirmed to a certain extent by Kölliker and Heape, the rôle of the proamnion is more considerable. The history of the proamnion, as given by van Beneden, may be followed easily by the aid of the accompanying diagrams (Fig. 3882), copied from van Beneden. In A, the proamnion, *pro.A*, is very small, and the allantois, *Al*, is just growing out. In B, the embryo, which for greater clearness has been shaded with stippling, has grown very much, and the anterior half of its body is bent down at a sharp angle into the yolk sac. The embryo, however, remains separated from the cavity *Y*, of the yolk sac, by the proamnion, which forms as it were a hood, *pro.A*, over the anterior extremity of the embryo. The amnion proper is as yet developed only over the posterior end of the embryo. For the further history of the amnion see *Amnion*, Vol. I. of this HANDBOOK. The proamnion, as can be seen in C and D, retains its importance as a fœtal covering for a considerable period, during which the amnion *am*, and allantois *Al*, are rapidly pursuing their development. After the stage shown in Fig. 3882, D, by the expansion of the cavity marked *Coe'*, the amnion proper, *am*, encroaches more and more upon the proamnion, *pro.A*, until at last the embryo is entirely covered by the true amnion, and the proamnion is altogether lost. It is to be noted especially that the amnion develops principally over the posterior end of the embryo, and grows forward. To this fact reference will be made again directly.

We possess no observations, at present, as to the existence of a proamnion in man, and it is probable, owing to the precocious development of the human amnion and of the extra-embryonic mesoderm, that no proamnion occurs in the course of human development.

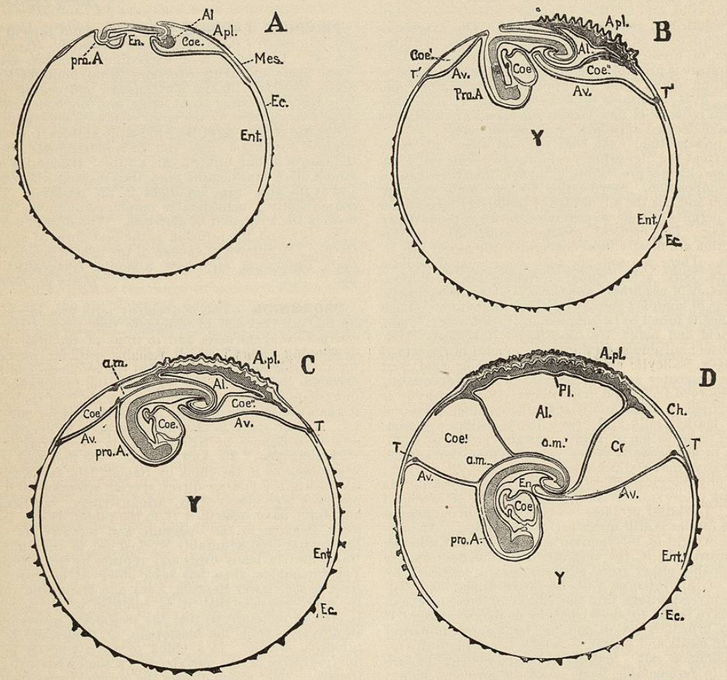


FIG. 3882.—Diagram of the Development of the Fœtal Adnexa in the Rabbit. (After van Beneden and Julin.) *A, B, C, D*, Successive stages; *pro.A*, proamnion; *Av*, area vasculosa; *Coe*, cœlom; *Coe'*, *Coe''*, extra-embryonic portion of the cœlom; *En*, entodermic cavity of the embryo; *Ent*, extra-embryonic entoderm; *Ec*, ectoderm; *Mes*, mesoderm; *Apl*, area placentalis; *Al*, allantois; *T*, terminal sinus of the area vasculosa; *Y*, yolk sac; *am*, amnion; *am'*, portion of the amnion united with the wall of the allantois; *Ch*, chorion.

*Charles Sedgwick Minot.*

LITERATURE.

Beneden, E. v.: Recherches sur la formation des annexes fœtales chez les mammifères (Lapin et Cheiroptères). Arch. biol., v., 369–434, 5 pls., 1884.
Heape, Walter: Quart. Journ. Micr. Sci., xxvii., 123-163.
His, Wilhelm: Untersuchungen über die erste Anlage des Wirbelthieres. Die erste Entwickelung des Hühnchens im Ei, 4to, pp. 237, Tafn. 13, Leipzig, 1868.
Kölliker, Albert: Grundriss der Entwickelungsgeschichte des Menschen und der höheren Tiere, zweite Auflage, 8vo, pp. viii., 454, Leipzig, 1884. For proamnion, see p. 107.
Strahl, H.: Ueber Entwickelungsvorgänge am Vorderende des Embryo von Lacerta agilis. Arch. f. anat. Physiol., Anat. Abth., pp. 41–88, Tafn., iii.–iv., 1884.
Selenka, E.: Studien über Entwickelungsgeschichte der Thiere. Heft iv. Das Opossum, 4to, 1886, 9 plates.
Ravn, Edward: Ueber die mesodermfreie Stelle in der Keimscheibe des Hühnerembryo. Arch. f. anat. Physiol., Anat. Abth., 1886, 412–421.





**PROFESSIONAL NEUROSES.** See *Hands and Fingers, Diseases and Deformities of.*

**PROPYLAMIN**—$CH_3.CH_2.CH_2.NH_2$—forms colorless crystals of ammoniacal odor, and for the treatment of chorea is administered in daily dosage of 2–4 gm. (ʒ ss.–i.) in spirit of peppermint. *W. A. Bastedo.*

**PROSECRETIN.** See *Secretin.*

**PROSTATE, THE.**—The prostate gland (Gr. προστάτης, from προ and ἱστάναι, to set, or ἵστημι, I stand) derives its name from its position at the entrance to the bladder.

ANATOMY.—The prostate is a body largely glandular in character, and in shape much like a Spanish chestnut. In the upright position of the body it lies just below the bladder and behind the symphysis pubis. The base of this heart-shaped gland is in contact with the bladder and vesiculæ seminales, while the apex rests upon the posterior layer of the deep perineal fascia; the anterior surface looks toward the pubis, and the posterior surface rests upon the anterior rectal wall.

The urethra, as it leaves the bladder (pars prostatica urethræ), traverses the prostate from near the middle of its base to its apex, and rather more than one-half of the gland lies behind the canal.

The prostate weighs from five to six drachms, and measures approximately one inch and a half in length, one and a half to two inches in breadth, and one inch in thickness (antero-posterior diameter). Slight longitudinal furrows along its anterior and posterior surfaces show an indistinct tendency toward a division into two lateral lobes, although the two halves are structurally continuous with each other. In this connection it is worthy of note that in some animals the prostate consists of two separate lobes.

That portion of the gland which lies between the ejaculatory ducts and the urethra (pars supramontana, Mercier) is usually known as the middle lobe (Home). Situated upon the floor of the urethra, just at the entrance to the bladder, it often forms a little prominence continuous with an elevation of the vesical floor (uvula vesicæ).

The portions of the gland behind and in front of the urethra, connecting the lateral lobes, are known as the posterior and anterior commissures.

The substance of the prostate is made up mainly of three tissues: (1) Glands; (2) unstriped muscular fibres; and (3) fibrous tissue.

The glands are of the acinous variety, and are most abundant in the lateral portions of the organ, their ducts coalescing and opening along the floor of the urethra. The muscular fibres are disposed in circular bands which are continuous at the junction of the bladder with the circular fibres of that viscus. Hyrtl also describes a system of these fibres radiating from the caput gallinaginis. The fibrous tissue forms a firm enveloping capsule which sends off-shoots through the substance of the gland.

Just below the point of entry of the urethra the two ejaculatory ducts enter the prostate, one on each side, and, running forward through its substance and converging, they enter the floor of the urethra.

*The prostatic urethra* (pars prostatica urethræ) is slightly narrower where it enters and leaves the gland than it is within it. The hollowed floor of this portion of the canal is called the sinus prostaticus, and is divided into two equal furrows by a longitudinal ridge (verumontanum), the end of which farthest from the bladder is composed of erectile tissue, and is capable of considerable dilatation into a little round prominence which, with the verumontanum running back from it, presents a fancied resemblance to the head of a snipe—hence its name *caput gallinaginis*.

On the top of this little eminence is the opening of a minute sac—the utricle or sinus pocularis—which is thought to be the analogue of the uterine cavity in the female. Close to the edge of this sinus, and sometimes within it, are the orifices of the ejaculatory ducts. Along the sides of the verumontanum open the prostatic glands proper, to the number of from twenty to thirty.

The prostate is enclosed in a tough fibrous capsule which is a part of the pelvic fascia. Besides its attachments to the bladder and deep perineal fascia, it is further held anteriorly by the pubo-prostatic ligaments, and posteriorly by the recto-vesical fascia. Its slight mobility is provided for by the levatores prostatæ—muscular bundles, really parts of the levator ani—which, arising from the posterior surface of the pubis, are inserted along the lateral borders of the gland.

Its blood supply is derived from the internal pudic, the vesical and hemorrhoidal arteries, and the veins which form a plexus around the gland empty through the hypogastric vein. The nerves are branches of the hypogastric plexus of the sympathetic.

PHYSIOLOGY.—The prostate is a sexual gland. After birth it remains in a quiescent state up to puberty, when it begins to increase in size and development. It attains its full growth at about the twenty-fifth year.

The secretion of the glands, which are especially active during sexual excitement, is a slightly turbid fluid of feebly alkaline reaction, with a specific gravity of 1.010.

It is especially rich in chloride of sodium (one per cent.), and, as solutions of this salt are known to excite the spermatozoa to movement, its presence in the prostatic fluid is thought by some to perpetuate their activity. Probably the most important function of this secretion is in producing coagulation of the secretion of the seminal vesicles.

The prostate, further, in its character as a muscular organ, acts as an involuntary sphincter of the bladder. As the urine accumulates a point is finally reached at which the tension of the detrusor urinæ muscle pulls open the rings of involuntary fibres around the neck of the bladder and allows the urine to enter the pars prostatica urethræ. Its presence there causes an urgent desire to urinate, and the escape of the water is then prevented only by the compressor urethræ muscle, which is the voluntary urinary sphincter. If this muscle does not relax and allow urination to be completed, the prostate closes down and forces the contained urine back into the bladder, where it stays until the further increased tension brings on another "besoin d'uriner."

MALFORMATIONS.—The prostate may be wholly wanting, in connection with a general lack of development of the urinary organs.

In exstrophy of the bladder there is no roof to the prostatic urethra, and the gland ducts may be seen opening through the mucous membrane over the site of the organ.

INJURIES AND WOUNDS.—The deep-seated position of the prostate makes it little liable to injury from without. In severe crushes of the pelvis with fracture about the pubis, it may be wounded. In perineal lithotomy it is always incised, and often somewhat contused by the extraction of the stone. If the crushing and laceration of the parts have not been serious, healing usually takes place kindly.

Injury of the prostate occasionally results from the passage of instruments through the urethra. This occurs most commonly in cases of hypertrophy, in which the irregular enlargement of parts of the gland has made the canal tortuous.

A specimen in the museum of the Harvard Medical School shows a very much enlarged middle lobe which so obstructed the entrance of the catheter that the instrument had been forced directly through it and had entered the bladder beyond.

The knowledge that such injuries are possible should lead to their avoidance. Much force is never needed in the passage of an instrument which is properly guided, but a thorough understanding of the nature of the possible obstacles, and considerable patience and care in overcoming them, are necessary to success in these cases.

INFLAMMATION OF THE PROSTATE—PROSTATITIS—may be either acute or chronic.

*Acute prostatitis* is commonly the result of the extension of an inflammation from adjacent parts.