

FIG. 3601.—Mesoderm of Chick of the Third Day, from close to the Ootocyst. A, Nucleus with the chromatin loops seen in optic section, being in karyokinesis.

regarded as an anhistic basement membrane secreted by the notochordal cells.

**SHAPE AND RELATIONS TO OTHER PARTS.**—As soon as the head bend (first cerebral flexure) appears (Fig. 3604) the notochord becomes correspondingly bent, and its anterior extremity lies close to Rathke's pocket (Fig. 3604, *hy.*)—the evagination of the oral epithelium, which is destined to form the pituitary body or *hypophysis cerebri*. The notochord never extends farther forward than this, hence the skull and head may be divided into two parts, the præ-pituitary and the post-pituitary regions. The latter region alone contains the notochord. Romiti finds that in the chick the end of the notochord is united, at the end of the fourth and during the fifth day of incubation, with an irregular solid cord of cells, which grows out from the epithelium of the hypophysis. Its significance is quite unknown. Romiti suggests that it may produce a strain resulting in the pulling out of the hypophyseal evagination. This notion seems to me untenable. The cranial portion of the notochord has not only the bend shown in Fig. 3604, but also follows the other curves of the head; it takes a sinuous course besides within the base of the cranium; finally, in the region corresponding to the middle third of the sphenoccipital cartilage, it makes a great dip ventralward. The sheath of the notochord in the cranial region is converted into the sphenoccipital cartilage; at the dip just mentioned, however, the notochord lies entirely below the cartilage, close against the wall of the pharynx (Froriep, Romiti). Writers before Froriep had represented the chorda as having disappeared at the bottom of the dip.

**DISAPPEARANCE.**—The disappearance of the notochord in man commences with the second month of fetal life. The first step is an alteration of the characteristic histological structure, accompanied by shrinking of the tissues, so that a clear space appears around it (see Fig. 3605). The inner chorda

cells. The cell walls are perforate, having fine pores, that correspond probably to intercellular bridges of protoplasm. The inner chorda sheath appears early and is to be

sheath is lost. The cell walls disappear, the tissue becomes granular, and breaks up into multinucleate, irregularly reticulate masses (Fig. 3606), which are gradually resorbed (Leboucq). In mammals the resorption progresses more rapidly in the cores of the vertebra than in the intervertebral spaces, and again more rapidly at the ends than in the centre of each vertebra; hence the chorda persists a little longer in the centre of the vertebra, and considerably longer in the intervertebral spaces; in these last the final remnants of the chorda may be detected in man even after birth. The cavity between the vertebral cartilages is a new structure, and is not the space left by the notochord, as has been sometimes asserted. It appears, however, that the resorption of the chorda may leave a small space, which becomes included in the intervertebral cavity. A peculiar feature is the frequent persistence of calcified cartilage immediately around the notochord in ossifying vertebræ.

**MORPHOLOGY.**—The notochord was for a long time supposed to be exclusively characteristic of vertebrates. It is now known to exist in amphioxus, which is not a true vertebrate, and in the tunicata. Morphologists have long believed that it must have some homologue among the organs of invertebrates. The development of the notochord in the lower vertebrates indicates very plainly what must have been the general character of such an homologous invertebrate organ. In certain fishes and amphibia the notochord has been ascertained to arise as a furrow along the median dorsal line of the entoderm; the furrow deepens and then closes over to form a canal separate from the entodermic canal

proper; but the notochordal canal retains for a time its anterior and posterior connections with the entoderm.

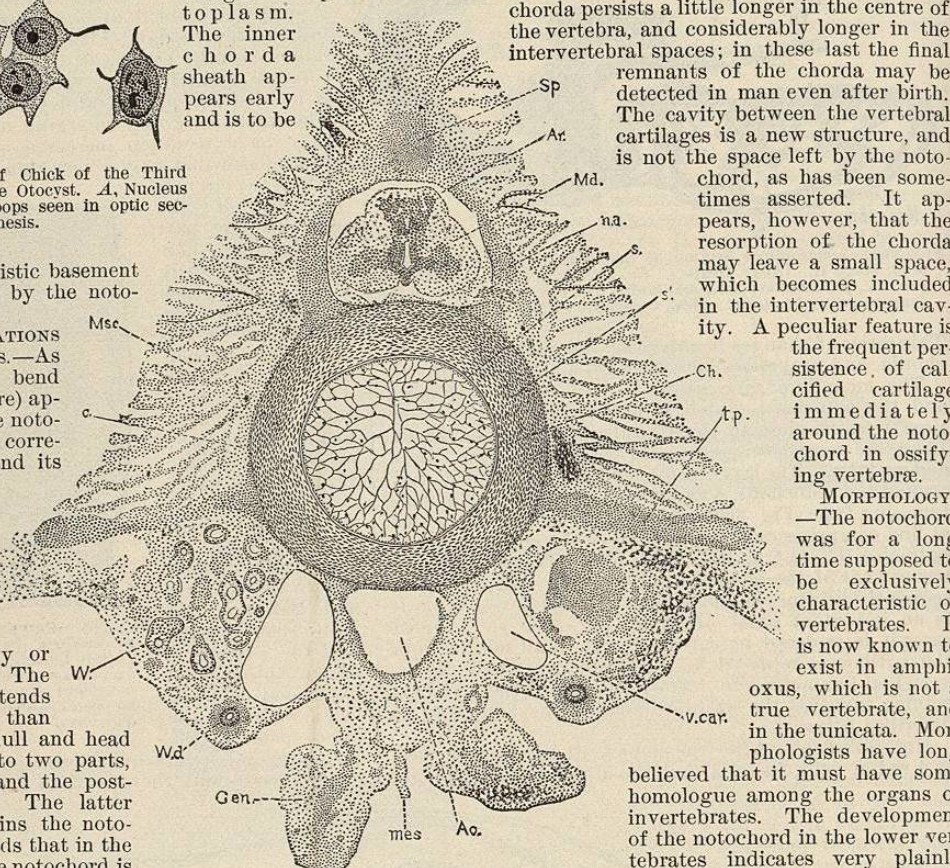


FIG. 3602.—Transverse Section of an Advanced Embryo of a Shark, *Scymnus licha*, through the Abdominal Region. (The dots represent nuclei.) Sp, Spinal process of the vertebra; Ar, arachnoid space; Md, spinal cord; na, neural arches of the vertebra; s, inner sheath of the notochord; s', outer sheath of the notochord; Ch, notochord; t.p., transverse process of the vertebra; v.car., cardinal vein; Ao., dorsal aorta; mes, mesentery; Gen., genital fold; W.d., Wolfian duct; W., Wolfian body with tubules; c, young cartilage; Msc, muscles developing.

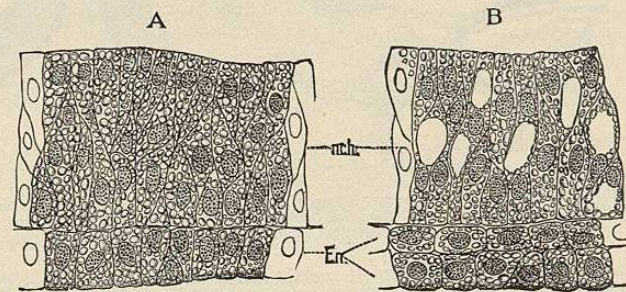


FIG. 3603.—Longitudinal Sections of the Notochord of Bombinator. (After Götze.) A, Before the appearance of the vacuoles; B, after the appearance of the vacuoles; nch., notochord; Em., entoderm. (The cells, as is usual in amphibian embryos, are charged with yolk granules.)

Ultimately the lumen is obliterated, the ends become detached, and so arises the solid isolated chorda. In the higher vertebrates the course of development is similar, although several of the primitive features in the formation of the chorda are obscured. Ehlers<sup>3</sup> has pointed out that in various invertebrates there is a similar canal, the "Nebendarm" of German writers, which is derived from the entoderm and connected anteriorly and posteriorly with the entodermic cavity. It is a very plausible suggestion, which homologizes the vertebrate notochord with the invertebrate "Nebendarm." Hubrecht has sought to homologize the notochord with the proboscis of

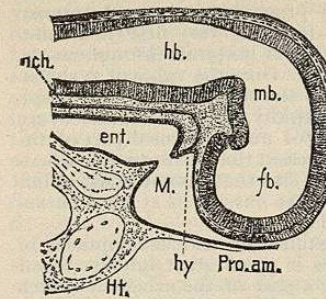


FIG. 3604.—Rabbit Embryo of 6 mm. Median Longitudinal Section of the Head. (After Mihalkovics.) The connection between the mouth, M, and pharynx, ent., is just established; nch., notochord; hb., hind-brain; mb., mid-brain; fb., fore-brain; Pro.am., pro-amnios; hy., hypophysis cerebri; Ht., heart.

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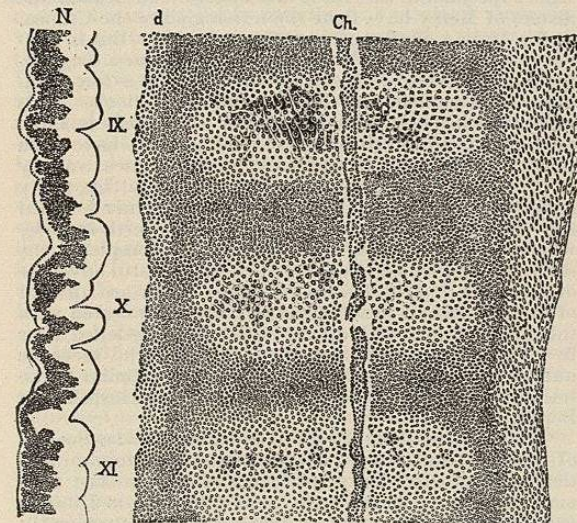


FIG. 3605.—Human Embryo of about Thirty-five Days: Longitudinal Section of the Ninth to the Eleventh Vertebrae, as numbered IX, to XI. N, Nervous system, wall of the spinal marrow; d, meningeal layer; Ch, notochord; Ao, aorta.

Nematodan worms. There is not a single fact which seems to me to justify, even remotely, this attempt at guesswork phylogeny.

**LITERATURE.**—Very numerous embryological articles

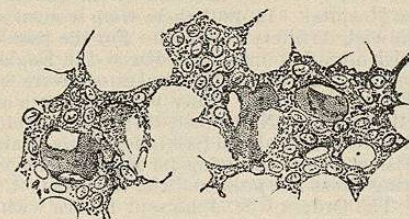


FIG. 3606.—Degenenerating Notochord Tissue, from the Central Portion of the Intervertebral Disc of a Cow's Embryo. (After Leboucq.)

contain references to the chorda; below is given a list of the principal authorities. The best discussion is given by Balfour, in his "Comparative Embryology";<sup>1</sup> the

best observations on its origin in mammals by Heape.<sup>9, 10</sup> For its histology see W. Müller; for its histogenesis see Götze;<sup>6</sup> for its anterior anatomical relations see Mihalkovics, Froriep,<sup>4</sup> Rabl-Rückhard, and Romiti; for its atrophy in mammals see Leboucq; for its evolution see Ehlers.<sup>3</sup> Charles Sedgwick Minot.

<sup>1</sup> Balfour: A Monograph on the Development of Elasmobranch Fishes, London, 1878. (Reprinted Works, i., pp. 203-520.)  
<sup>2</sup> Balfour: Comparative Embryology, vol. II.  
<sup>3</sup> Ehlers, E.: Nebendarm und Chorda dorsalis. Nachr. Ges. Wiss., Göttingen, 1885, pp. 330-404.  
<sup>4</sup> Froriep: Kopftheil der Chorda dorsalis bei menschlichen Embryonen, Festschrift für Henle, 1882, pp. 26-40, Taf. III.  
<sup>5</sup> Gegenbauer, Carl: Ueber das Skeletgewebe der Cyclostomen (Histologie der Chorda, S. 47-49). Jena Zeitschr. Nat. Wiss., v., 1869, pp. 43-53, Taf. I.  
<sup>6</sup> Götze, Alex.: Entwicklungsgeschichte der Unke (especially pp. 349-361), Leipzig, 1875.  
<sup>7</sup> Hase, C., und Schwarck, W.: Studien zur vergleichenden Anatomie der Wirbelsäule, etc. Hase's Anat. Studien, i., p. 21.  
<sup>8</sup> Hatschek, B.: Studien zur Entwicklungsgeschichte des Amphioxus. Arbeiten Zool. Inst. Wien, iv., Heft I., Taf. XIII.  
<sup>9</sup> Heape, Walter: The Development of the Mole (Talpa Europea); the Formation of the Germinal Layers and Early Development of the Medullary Groove and Notochord. Q. Jour. Micr. Sci., 1883, pp. 412-452, Pls. xxviii.-xxxi.  
<sup>10</sup> Heape, W.: The Development of the Mole. Q. Jour. Micr. Sci., xxvii., pp. 123-163.  
<sup>11</sup> Hensen: Zeitschrift f. Anat. u. Entwicklungsges., i., p. 366.  
<sup>12</sup> His, Wilhelm: Erste Anlage des Wirbelthierleibes, 4to, Leipzig, 1868.

**NOVA SCOTIA.**—Nova Scotia is one of the maritime provinces of Canada to the northeast of the State of Maine, lying in latitude 43° to 46° N. and longitude 60° to 66° W. It is a long, rather narrow peninsula, with a great extent of coast line, parallel to the mainland, extending in a direction from northeast to southwest. It is 350 miles in length, including Cape Breton, and varies in breadth from 50 to 100 miles. Its area is 20,550 square miles and it has a population of 450,396. The surface is undulating and is traversed by several ranges of hills. It has a cool, marine climate, and is a favorite summer resort for visitors.

The following table, condensed from the more elaborate ones in the article on Nova Scotia in the previous edition of the HANDBOOK, conveys an idea of the summer and autumn climate of this region, the seasons when one would visit Nova Scotia as a resort. As will be seen, the mean summer temperature is about 61° F., similar to that of the British Isles at this season, the highest temperature being about 80° F. and the lowest between 43° and 46° F.

The relative humidity is high and there is considerable rain. Fogs are also not infrequent. The number of fair days is, moreover, not large for the summer.

CLIMATE OF HALIFAX.—LATITUDE, 44° 39'; LONGITUDE 63° 36'. MOSTLY FOR THE YEAR 1883 ONLY.

	June.	July.	Aug.	Sept.	Oct.	Year.
Temperature (degrees Fahr.)—						
Mean average.....	57.26°	63.40°	63.77°	57.56°	47.99°	42.74°
Average range.....	18.67	17.19	19.78	18.63	15.95	
Mean of warmest.....	68.82	70.85	73.26	65.66	54.23	
Mean of coldest.....	50.15	53.66	54.48	47.03	38.28	
Highest or maximum.....	80.4	81.7	81.2	76.8	73.4	
Lowest or minimum.....	43.2	46.7	45.6	40.5	29.0	
Humidity—						
Mean relative.....	85%	86%	86%	83%	84%	84%
Precipitation—						
Average in inches.....	3.32	3.54	5.34	3.86	5.81	48.52
Wind—						
Prevailing direction.....	S. E. & W.	S. E.	S. W.	W.	W.	
Average hourly velocity in miles.....	4.51	4.88	4.88	5.78	6.97	6.75
Weather—						
Number of fair days.....	16	19	16	21	15	172
Number of days on which rain fell.....	17	16	12	14	15	145

Such a climate is manifestly unsuited for an invalid or delicate person, but affords a grateful change to those who have become debilitated by the summer heat of a large city, or for such as need a change of scene and air. One is always sure of finding it cool in Nova Scotia, and it is wise for those intending to visit this region to be provided with warm clothing.

"Certain sufferers from hay fever," says Huntington Richards, "enjoy perfect immunity from that disease at Halifax, and probably the same experience may be had at many other points in Nova Scotia." The natural attractions of Nova Scotia are many and varied, and its chief city and port, Halifax, "The Garrison City by the Sea," presents many objects of interest to the American traveller. It possesses a superb harbor in which, in the summer, is the headquarters of the British North Atlantic fleet, and on land a garrison is always quartered here. The public gardens are very attractive, and the drives in Point Pleasant Park afford delightful views of the water. The country round about Halifax offers many attractive excursions; and the roads are fairly good either for driving or for cycling.

In the interior is "Evangeline's Land," a lovely, pastoral region immortalized by Longfellow. The Annapolis basin and valley, the Bay of Fundy, and the numerous shore places likewise offer many attractions, both to the casual traveller and to those interested in the early history of America. Cape Breton, Prince Edward's Island, and Newfoundland are conveniently visited from Halifax.

Good facilities for hunting and fishing are to be had in various portions of this province. One has a choice of various routes to Nova Scotia: by boat from Boston direct to Yarmouth or Halifax; or by boat along the coast to St. John and then across the Bay of Fundy to Digby; by rail to St. John; or all the way by land by the Intercolonial Railway from Montreal or Quebec. The steamers to Yarmouth and Halifax afford excellent accommodations. *Edward O. Otis.*

**NUCLEINS** are a class of organic bodies of acid reaction, intermediate in composition between proteid and nucleic acid, and containing from three to ten per cent. of phosphorus. They occur in association with proteids in all animal and vegetable tissues, especially in the nuclei, and in milk. They are separated from the proteids by artificial digestion, the latter being changed to soluble peptones which are removed, while the nucleins undergo little if any alteration (Bunge). The nucleins are then brought into solution by potassium hydroxide. The commercial article is prepared from yeast or yolk of egg, and may be either nuclein or nucleinic acid. According to Chittenden, many of the marketed preparations are worthless.

Nucleins are insoluble in water, alcohol, ether, or dilute mineral acids, but are soluble in alkalis. On boiling with weak acid or alkali, and more slowly with plain water, they yield phosphoric acid in combination with organic bases. Some, at least, of them split in the body into xanthin, hypoxanthin, guanin, and adenin (Piccard). It is not known to what extent nucleins are absorbed, but probably very little is absorbed, as abundant nuclein was found in the faces of dogs experimented upon (Bókay).

The asserted value of nuclein in medicine depends on its ability to stimulate the antibacterial power of the animal body, and to cause an increase in the number of leucocytes. The solutions have been used in tuberculosis and septicæmia. (Hare.) Vaughan cured guinea-pigs inoculated with tuberculosis, and rendered others quite immune to pneumococcus infection. J. Mount Bleyer used it with good results in diphtheria. Sir R. D. Powell reports recovery in one out of five cases of malignant endocarditis. The dose is 2 to 3 gm. (gr. xxx.-xlv.) daily. (Shoemaker.) *W. A. Bastelo.*

**NURSES, TRAINING SCHOOLS FOR.**—That "the old order changeth and giveth place to the new" would seem to describe well the condition of nursing affairs dur-

ing the past decade and to foreshadow the future. It must be confessed that during the first fifteen years of their existence, dating from 1873, training schools for nurses made little if any progress from an educational standpoint; nevertheless, from the very first their influence upon the establishment of hospitals throughout the country has been enormous. Once the value of systematized methods of caring for the sick was realized, hospitals began to multiply rapidly, and in almost every instance a training school for nurses formed part of the organization, until at the present time there are few towns in the United States of any size that cannot boast of one or more hospitals in which the nursing is at least far superior to that of bygone days.

The history of the organization and development of training schools for nurses is of so great interest that I venture to introduce here a part of the excellent sketch which was written in 1889 by Prof. W. Gilman Thompson, of New York, for the first edition of this HANDBOOK.

"Organized nursing schools are of very recent date, and their establishment arose from the experience of army hospitals in European wars, especially the Crimean War. The nurses of religious sisterhoods, midwives, and monthly nurses were originally the women who followed nursing as an occupation. In France the nursing is mainly in the hands of Roman Catholic sisterhoods, and in the hospitals of Paris alone are over six hundred sisters who superintend the hired attendants. In Russia the Sisters of Mercy have done the nursing since the Crimea, and in Italy a similar arrangement obtains. But in January, 1888, the 'St. Paul's Home for Trained English-speaking Nurses' was started in Rome by a few graduates of American and English training schools. This institution has been very successful. Its object is, however, merely to afford a home to nurses who have been trained elsewhere. In Germany, among a great variety of Protestant and Roman Catholic nursing systems, many have become famous. Pastor Theodor Fliedner founded the 'Institute of Deaconesses' at Kaiserswerth in 1836, where, in after years, Miss Nightingale completed the early training which made her such a successful advocate of thorough instruction in nursing. There are upward of three thousand deaconesses at present connected with this institute and with others in Germany modelled after it. There are many Sisters of Charity who serve as nurses, and one of the best secular schools similar to the training schools is at the 'Kaiserin Augusta Hospital' in Berlin.

"The 'International Hospital and Field Service Society of Surgeons and Nurses' became famous on foreign battlefields, and after the experiences of the two last German wars the 'Albert Verein' was organized in Dresden and Leipsic. The nurses of this society are thoroughly trained by practical courses and lectures. Rewards and favors are granted for merit, and, if, after three years of active service, their health should become impaired, they are pensioned. They are sent out from the school to nurse private cases.

"In Vienna the nursing is done by sisters, and also by women who work without special organization. In England female nurses in hospitals are mentioned as early as 1760, and in 1791 they were indorsed by the governors of the London Hospital. In 1801 there were women nurses in the Woolwich Artillery Hospital. For the past thirty years special attention has been directed in England to nursing systems. At Guy's Hospital nurses were trained by Mrs. Elizabeth Fry for many years before a school was formally opened in November, 1879. The Protestant orders of St. John and of All Saints for many years performed satisfactorily the nursing for King's College Hospital, Charing Cross Hospital, and the University College Hospital. The Order of St. John sent nurses with Miss Nightingale to the Crimea. In June, 1860, a training school was founded at St. Thomas' Hospital, London, through the generosity of Miss Nightingale. This school, after being in successful operation for several years, was made the subject of special study by the New York State Charities Aid Association, and taken as a

model for the Bellevue Hospital School, as well as for most of the other American schools. In 1874 a school was opened at Westminster Hospital, London, and ten years later a special building was erected with accommodation for fifty nurses. It is desired to establish district nursing among the poor in connection with this school. In 1861 a training school was founded in Liverpool for district nursing, and a great reform in the quality of nursing was instituted at the Liverpool Workhouse. In 1866 there were two schools in Dublin, and there is now an excellent school at the Glasgow Royal Infirmary. In 1867 a school was founded at the Sydney Infirmary, New South Wales. There are also new schools in Russia, Sweden, and Holland.

"Toward the end of the eighteenth century Dr. Valentine Seaman gave a course of twenty-six lectures to the nurses of the New York Hospital upon important topics in relation to nursing and hygiene. These lectures were published in 1800, and they are the first recorded effort for the improved training of nurses in the United States. In Philadelphia in 1838 the Society of Friends formed a nurse society by which they raised the standard of nursing and relieved the Roman Catholic sisterhoods from doing the work alone. The Philadelphia Lying-in Charity has instructed nurses in special branches for forty-two years. St. Luke's Hospital in New York has been supplied since 1853 (until recently) with nurses of the Protestant Episcopal Order of the Holy Communion. Several Lutheran charitable societies have trained nurses in various parts of the country, and some two thousand of these women served during the War of the Rebellion. During this war women nurses were also sent to the field and hospitals under the auspices of the Sanitary Commission and of the American Society of the Red Cross. The latter society, aided by the enthusiasm of Miss Clara Barton, has done a great deal in recent years to nurse the sufferers from yellow fever and from floods in the South and elsewhere. At Syracuse, N. Y., a Protestant Episcopal sisterhood has nursed for the Hospital of the Good Shepherd for ten years, and the deaconesses are sent out to nurse in private families, in other institutions, and among the poor. Many excellent orders of like nature have long existed throughout the country for the purpose of training and supporting nurses.

"In 1873 three training schools for nurses were almost simultaneously established in New York, New Haven, and Boston, and from this year dates the impetus to the improved nursing system which has led, in fourteen years, to the establishment of over thirty-five schools in various cities of the United States, with an outlay of many thousand dollars. There have been thus far nearly two thousand nurses graduated."

During the period which has elapsed since Professor Thompson wrote this account, many new training schools for nurses have been established, and on the whole these organizations—both those of recent date and the older ones—have accomplished in a fairly satisfactory manner the purpose for which they were created. Nevertheless, while the progress which these schools have made affords much cause for gratitude, there still remain not a few things to deplore. In the first years of the organization of these schools but little thought and care were given to the theoretical part of the nurse's work; her education was almost entirely of a practical nature, and even in this she was allowed to pursue a somewhat haphazard method, so that what she did with her hands was largely mechanical and but little dominated by the mind. The system of nursing as first instituted in the leading hospitals required, as a rule, a two years' course of training, and provided during the first year only theoretical instruction in the form of classes and lectures with examinations, at the end of the time, in medical and surgical nursing; these examinations being conducted by two or three physicians. The didactic course was usually covered in a dozen or fifteen lectures, and as these were given gratuitously by busy practitioners it too frequently happened that the nurses were assembled only to be dispersed again without the lecture, as the doctor was not able to come.

Furthermore, since these lectures were almost invariably given at eight o'clock in the evening, a nurse on night duty was necessarily obliged to miss this part of her theoretical training for a whole month. Again, since in those days the pupils were often sent out to care for private cases during the first year, a nurse who averaged attendance at half the lectures given during her period of training was considered as doing well. Added to all this was the fact, which scarcely needs to be emphasized, that a woman who does not reach this portion of her theoretical studies until the end of a long day, after twelve or more busy hours in the wards, is in no mental condition to remember what she hears. An overpowering sense of fatigue usually renders her attitude one of painful but not always successful effort to keep awake. As regards the classes conducted by the superintendent or her assistants the student fared little better, as these were held in the afternoon and her attendance depended entirely upon whether the head nurse could spare her from the ward, or not. Here, again, night duty interfered, as the pupil nurse could not attend the class work without losing a part of her sleeping hours. Thus, when all these drawbacks are considered, it will readily be understood that to attend a consecutive course of class instruction was a rare occurrence with a first-year pupil.

The aids to study, in the way of books especially prepared for teaching the principles of nursing, were meagre in the extreme; the first manuals on nursing being exceedingly elementary in their subject matter. So far as the acquisition of knowledge in anatomy, physiology, and materia medica was concerned the pupil was left practically to her own resources, to obtain it as best she could, from Gray's "Anatomy" and Wood's "Materia Medica"; and as such books were in most cases unknown territory to the women before their entrance into hospitals, the knowledge acquired was seldom very deep or very much to the point. The subject of invalid dietary, if attempted at all, was covered in a few informal lectures delivered by any one who was willing to give them, and the nurse was only required to sit and observe the teacher's methods, being seldom called upon to prepare food with her own hands. Here again, as was true of her other classes, the pupil nurse was so frequently absent that little if any benefit was derived from this course. The only ethical training was that which was unconsciously experienced from the admirable discipline which existed, and from the unquestioning obedience which was always required from the junior nurse toward the medical staff, her superintendent, and the senior nurses. In making this statement I do not wish to be understood as minimizing the importance of these factors, since it was just this discipline which has stood so many nurses in good stead in after years and which has helped them to do their part in winning a favorable recognition of nursing work. In addition to the above, classes and lectures were held at any and all times during the year, and vacations were in order continuously, so that in a school for nurses there was little if any resemblance to the usual order that obtains in almost any kind of institution of learning.

This brief sketch of the educational condition in the early days of training schools for nurses has been given in order that the changes that have come about in recent years and the efforts that nurses have made, and are still making, to improve nursing education may be more readily understood and appreciated, and the obstacles that still hinder the highest order of work may be realized. As training schools increased in number the graduates from the older schools were selected to become the superintendents of the new ones, but unfortunately they were obliged to enter upon their new fields of work without any special preparation for their arduous and responsible duties, and with no experience beyond what they had acquired as pupil nurses. Hence it necessarily followed that much the same methods, or lack of methods, were introduced wherever a school opened, and any improvement over the old régime was due entirely to the superintendent's own originality, powers of imagination, and

aptitude to impart instruction. But among these same superintendents there was gradually developing a feeling of dissatisfaction with the courses of instruction, as outlined in the circulars of information, and they were beginning to appreciate that not enough care was given to these courses, and that justice was not being done to the women who entered training schools but who received nothing beyond a thorough course of training in nursing the sick. At the same time came the many changes in methods of medical work, the hospital physicians and surgeons requiring at the hands of their nurses greater thoroughness in the details of the work and a fineness of finish which had not heretofore been expected, and which demanded a higher order of intelligence to execute. I think that hardly any one at the present day would venture to deny that the science of bacteriology and preventive medicine requires both physicians and nurses to be people of intelligence. Of the nurse it is now expected that she shall have some knowledge of the principles of bacteriology in order to appreciate the value of surgical cleanliness in the prevention of disease, and to be able to do effective work. In order to surround her patient with intelligent care she must understand the principles of ventilation and hygiene; for the proper care of the body she requires a knowledge of physiology; to aid it to overcome or resist disease she must be taught more than a mere smattering about foods and the preparation of invalid dietary. Upon the nurse must devolve the execution of all such minutiae, and to do such work well it is necessary that she should be endowed with good common sense, practical ability, and intelligence, and then receive a proper education in her profession.

As soon as the trained nurse became a factor in everyday life abuses began to creep in, the salaries commanded began to attract the purely commercial woman with no aptitude for nursing, and the fact that a better class of students could be obtained by the offer of a degree, and that cheaper and at the same time better nursing could be secured in this way led the owners of sanatoriums and the trustees of small special hospitals to establish training schools in which the facilities for obtaining a proper professional education did not exist. As a consequence nurses who had devoted some of the best years of their lives to learning their profession were in danger of being classed with those who had obtained a certificate as a price for so many weeks' or months' nursing, but who possessed little real skill or knowledge. Hence arose two evils—the real graduate nurse lost standing and the public was in danger of being imposed upon.

In the face of these many and serious problems it is not to be wondered at that the leaders in the nursing world set to work to find remedies. At first, individual efforts took the form of trying to improve the educational side of nursing by grading the two years' course of instruction, making a junior and a senior year, with a separate course of classes, lectures, and examinations for each year. The junior year now included instruction in the first principles of nursing together with such medical and surgical subjects as were needed to be put into immediate practice. The senior year was devoted to more advanced teaching and the study of more difficult subjects. This theoretical course was confined to the eight scholastic months of each year, beginning in October and ending with examinations in June, while vacations were given only during the summer months. An effort was also made to divide the two years in such a way that each nurse might spend a nearly equal amount of time in the various branches of the medical and surgical services. In many schools the practice of sending the pupil out to private duty during her period of training was done away with, in order that she might follow an uninterrupted course of instruction. Thus by degrees the curriculum in many schools was greatly improved.

But to protect the public and the educated nurse against the badly trained woman, to overcome the commercial spirit, and to establish a uniform standard of education, individual superintendents, however earnest and influential, could at first do little; and until unity among nurses

as a body had been effected and the need for reform and improvement had been generally recognized by each individual nurse, nothing in the way of permanent progress could be attained. As this conviction gradually spread among women who regarded their work seriously, it became evident that for nurses, as for other workers, organization was necessary. For many years anything like unity of thought or work, or friendship among superintendents and graduates of training schools in America was practically unknown, and there was even no *esprit de corps* among graduates of the same school. But among the many congresses held in Chicago during the World's Fair there was one made up of trained nurses, working as a subsection of the hospital section of the Congress of the Associated Charities. This was the first time in the history of nursing in America that nurses had come together as members of the same profession. The most important result of this meeting was the organization of the American Society of Superintendents of Training Schools for Nurses, and to the efforts of this society is chiefly due the progress since made in the teaching of nursing. The avowed objects of this organization were to lay a solid foundation upon which a good practical educational standard might be established, and to further the best interests of the nursing profession by promoting fellowship among its members. Recognizing that any advance must come by the creation of an interest and enthusiasm in the work and in the awakening of an *esprit de corps* among graduates of the same school, the first step was the organization of school alumnae associations. If these were once well established, the leaders foresaw, a national association would naturally follow. With such rapidity were these alumnae associations formed that at the end of two years thirty-one were reported, and the proper time having now arrived, steps were at once taken to form the national association, which held its first meeting as the Associated Alumnae of the United States and Canada in April, 1898. Since that time its membership has steadily increased until it now includes fifty-six alumnae associations.

With the formation of this association, representing the nurses, and that of the Society of Superintendents, representing the teachers and leaders, nurses were prepared to do effective work. Nor was motive wanting, for almost simultaneously with the organization of the Associated Alumnae, the Spanish-American war began. Although too late in its organization to be of service as a body in the war, the association soon found an opportunity to work for a permanent reform in army nursing. The lessons taught by the lack of an efficient and properly organized nursing force were so severe that at the close of the war the nurses' societies took steps to remedy the evil; and largely to their work and influence was due the establishment of the army nursing service with a properly qualified graduate nurse in charge. The army nurses have passed their probationary stage and have so far overcome the strong prejudice against women in army hospitals that they may now be regarded as a permanency, and another new field of work is opened up to the graduate nurse.

The next important event was the establishment of a nursing journal, controlled and managed by nurses for the benefit of nurses. The need for such a publication had been long felt, and to establish it had been one of the objects of the Associated Alumnae. In October, 1900, two years after the organization of the association, the *American Journal of Nursing* was started under its auspices, through the exertions of individual members who assumed the financial responsibility. The undertaking is now an assured success.

Both societies have also been active in promoting a system of hourly nursing, by means of which good care of the sick at home is supplied at reasonable rates to people of moderate means and to those who cannot very well go to hospitals. The nurse who lives at home and pays her own carfare visits her patients once a day, or oftener if necessary, at a charge of about fifty cents an hour. By this plan she is enabled to care for several patients dur-

ing the day, undertake the most important duties herself in each case, regulate affairs in the sick-room, and then instruct some member of the family what to do during her absence. The method has been tried in several of the large cities, and physicians who have employed it have pronounced in its favor in many cases. There is much to be said for some such form of private nursing, which, when properly carried out, insures proper care for many whose circumstances do not entitle them to the services of the district nurse, relieves the family of the constant presence and maintenance of the nurse, and lessens the expense of the illness; at the same time it enables the nurse to lead a more systematic life, gives her more rest, and secures for her a greater degree of independence while pursuing her work.

New avenues of work and fresh opportunities are constantly opening up to the graduate nurse by which she may be enabled to do her full share in bettering social conditions. Notable among special efforts made by the nurses themselves is that of the Nurses' Settlement in New York, situated in the most densely populated east side portions of the city. It aims, in addition to nursing the sick poor, to be to the neighborhood all that the college settlements stand for. This settlement has steadily increased in size and usefulness, and now has branches in other parts of the city. Those who know whereof they speak are ready to bear witness that it has already done an incalculable amount of splendid work.

Outside of merely caring for the sick, the special training of the graduate nurse is being utilized in many ways. She is now regarded as a useful member on boards of hospital managers, on health commissions, and on inspection boards, and in at least one city a trained nurse is a member of the school board. The project is seriously being considered of having nurses appointed to visit the public schools daily under the supervision of a physician, to report to him suspicious cases, to indicate the homes in which any infectious diseases have developed, to point out unsanitary conditions existing in the schools, and at the same time to care for the numberless minor ailments and troubles to be found among large bodies of children.

As the Society of Superintendents stands first and foremost for the educational advancement of the nurse, much thought and attention has been devoted to the subject by its members, the one chief desire on the part of all being to supply the public with good, intelligent, practical nurses. To this end many changes have been made. The course of training in the majority of schools has been increased to three years, but unfortunately in only a few instances has it as yet been found possible to lessen the daily hours of practical work. Even to-day the pupil nurse spends from nine to ten hours daily at work in the wards. In a few schools, however, in which a serious endeavor is being made to place a true value upon education, a three years' course of training, eight hours of daily practical work, and the non-payment system have been established. According to this arrangement the pupil receives no monetary recompense, her education being considered an ample equivalent for her time and work, but text-books and uniform are allowed her in addition to her board, lodging, and laundry work. Good general and reference libraries are usually provided in the school. Nursing literature has been much improved and good text-books in the subjects taught have been specially prepared in most cases by superintendents themselves who have gained by long experience a far better appreciation of the needs and requirements of the pupils than physicians could possibly attain to. A graded course of instruction is arranged for in most schools, but no uniform curriculum has so far been adopted. Such a course embraces, as a rule, the fundamentals of anatomy, physiology, bacteriology, hygiene, and materia medica, and the principles of nursing in all branches of medicine and surgery. In the third year a course of lectures and demonstrations in massage, obstetrics, and nursing in infectious diseases and in diseases of the eye, ear, and skin are given. More and more attention is being paid to instruction in invalid dietary; and in a few schools a teacher is

engaged for this branch alone, and the pupils take a regular four to six weeks' course of study in food constituents and in the preparation and serving of invalid diet. During this time they are not expected to perform any ward duties. In the matter of nursing in cases of infectious disease, in which isolation is necessary, instruction can be obtained in only a limited number of hospitals. This matter belongs to post-graduate work.

Lastly, superintendents are beginning to realize the importance of giving more detailed and systematic teaching in the ethics of nursing, the constant observance of which is just as important to the graduate as that she should be an expert in practical work.

Although the instruction given in all these various branches must of necessity be very elementary in substance, it has been found that the pupil nurse finds it exceedingly difficult to prepare her class work, write up her lecture notes, do any collateral reading, and at the same time pursue her long hours of work in the wards. Lack of time and bodily fatigue make it practically impossible to assimilate the theoretical knowledge imparted in the courses of instruction. Added to this, the women of to-day have not as a rule a thorough systematic practical knowledge of the details of housekeeping, so essential for any one who expects to become a good nurse and a good manager in a ward. For these reasons an attempt has been made in one school in Scotland, one in London, and one in the United States to give the probationers, before entering the wards, a so-called preliminary course in household economics, in the theory of their work, and in the elements of nursing. By this arrangement the probationer is gradually fitted to begin her more arduous tasks in the ward, with an understanding of what is expected of her. Results are much better for the patients, and the head nurse is spared having so much crude material always on hand to teach; while the superintendent of nurses can feel sure that the preliminary ground has been thoroughly covered. The chief drawback to the general adoption of such a plan lies in the extra cost it entails, an outlay which few hospitals can afford. Under the auspices of the Society of Superintendents a course in hospital economics was established in 1899, in connection with the Teachers' College, Columbia University, New York, the object of which is to qualify specially selected graduates for the duties of superintendence in hospitals and training schools.

Among the more pressing matters calling for reform at the present time are the following: (1) The establishment of uniform entrance requirements for probationers and a uniform curriculum, as a result of which a graduate's degree obtained in any part of the country and from any hospital would practically mean the same thing. (2) Some arrangement by which the small general hospital may become a branch of the larger training school, so that every woman after she has been accepted as a pupil in a hospital of good standing—no matter whether it be large or small—shall be assured a thorough practical and theoretical education as a nurse. (3) Some plan in accordance with which only properly qualified graduates shall be employed at reasonable rates to do the nursing in special hospitals, and thus do away with one most objectionable form of training school. (4) The establishment in certain large centres, in different parts of the country, of post-graduate courses in general hospitals, which may be attended by graduate nurses, who will then be able to keep themselves up to date and become acquainted with the latest changes in medical and surgical methods. (5) The establishment of methods by which the public may be protected from inefficient and untrained nurses, while the women who have taken the time and trouble to perfect themselves in their profession may be accorded their proper status.

With the solution of the first four of these problems the Superintendents' Society is more especially occupying itself; the fifth has been left mainly in the hands of the Associated Alumnae, and on this point it may not be out of place to say a few words. Before a physician is allowed to practise his profession he is obliged to satisfy

the State board that he is properly qualified, after which his name is duly registered. May not some form of State examination and registration equally well find application in the case of graduate nurses? We are not suggesting a panacea—registration will not cure all defects in nurses, but it will at least afford some sort of a guaranty, and to a certain extent put it in the power of the public to learn for itself the legal status of any woman who offers herself as a nurse for their sick; at the same time it will serve as a hall mark, as it were, upon the woman who has spent time and labor to render herself a good nurse, and will distinguish her from the nondescript individual who so often poses as a trained nurse.

In this paper reference has mainly been made to changes which have occurred in the nursing world on this continent during the past decade. But even should we be inclined to flatter ourselves that America has led the van, it must not be supposed that other countries have been far behind in these matters. It should be a matter for sincere congratulation that there has been established an *entente cordiale* between the members of the nursing profession in all countries, whereby we have been brought into closer touch than ever before. One professional link has been forged between America and England in the form of the International Council of Nurses, which has as its object "the furtherance of the social and professional progress of all nurses and the maintenance of a high standard of nursing ethics and *esprit de corps*," and to which we trust nursing associations in all countries may become affiliated in the course of time.

It is a satisfaction to be able to record that in no civilized country has the development of the nursing profession been at a standstill, and everywhere our members have been working out their own problems according to their several needs. A more comprehensive account of the work being done by nurses throughout the world will be found in the Proceedings of the Third International Congress of Nurses held in Buffalo in September, 1902.\*

While the greater part of the progress in nursing has been mainly due to the efforts of nurses themselves, they have been fortunate in securing in their undertakings the active sympathy of the medical profession and of hospital authorities who have appreciated the fact that the better the nurse the more are their own efforts strengthened. It still remains for the well-to-do laity to realize how necessary and important to them is every step taken for the betterment of the nurse. After all, the sole object of all the work and progress is to render the greatest good to the greatest number when sick and in sore need of the best that human skill can afford, and were some portion of the financial aid so lavishly poured out upon university and other institutions of learning given to render the profession of nursing still more worthy of its name, such an outlay would assuredly be returned in good measure pressed down and running over.

Isabel Hampton Robb.

**NUTGALL.**—*Galla*, U. S.; Br., *Galls*; *Galla*; *Galla halapensis*; *G. Turcica*; *G. levantica*; *G. tinctoria*; *G. quercina*. Excrescences on *Quercus lusitanica* Lam. (*Q. infectoria* Olivier, fam. *Cupuliferæ*), caused by the punctures and deposited ova of *Cynips* (*Diptolepia*, Latreille) *Galla tinctoria*, Olivier (Class *Insecta*, Order *Hymenoptera*).

The species of oak here named is very variable and widely disseminated, growing over the greater part of Southern Europe, in the Levant, and in Western Asia. The variety which produces the galls is usually a mere shrub less than six feet high. The insect named is a small, wasp-like fly. The female punctures certain of the unexpanded buds, leaving a single egg in each, thus

\*This report may be obtained through the American Journal of Nursing, published at 624 Chestnut Street, Philadelphia, Pa.

causing it to develop into a gall, instead of a leafy branch. A spherical cavity is formed by the growth of the gall, its lining being of a different structure from that of the remainder of the gall. The larva, when fully developed, gnaws its way out, leaving a pinhole perforation. After this occurrence the gall presents quite a different appearance, being larger, lighter in color and weight, and less rich in active constituents, such galls being distinguished in commerce as White galls, and less highly esteemed than those collected at an earlier period.

**DESCRIPTION.**—Nearly spherical, about 2.5 cm. (1 in.) or less in diameter, with a short stipe, the surface smooth,

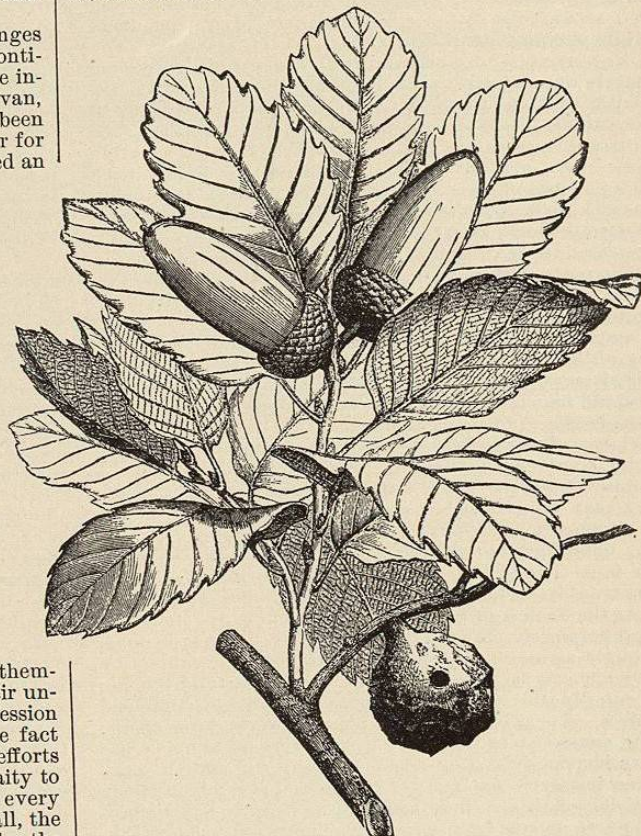


FIG. 3607.—The Nutgall Oak, Showing Leaves, Acorns, and One Nutgall. (Baillon.)

except for a number of short, thick tubercles toward the summit; externally deep greenish- or bluish-gray or blackish; heavy and hard, but readily broken with a hammer, exhibiting a more or less dense granular fracture, sometimes with a waxy lustre; internally, yellowish or pale brownish-gray, with a central nucleus or a cavity containing the more or less perfectly developed insect. The granular tissue of the nucleus is mostly filled with small starch granules and surrounded by a layer of thick-walled cells forming a shell, on the outside of which is the cellular tissue containing the tannin. This tissue has often a radiated appearance near the shell, and contains toward the surface small scattered bundles of vascular tissue. Nutgalls are nearly inodorous and have a very astringent taste. Light, spongy, and whitish-colored nutgalls should be rejected.

Nutgalls are distinguished in commerce according to their color, the *blue* or *black* galls of Syria (Aleppo) being preferred. *Smyrna* galls are usually of a grayish olive green, more spongy in texture and intermixed with *white* galls.

Many other varieties of galls, especially the Chinese variety, have a similar composition and uses, though sub-

stitution or adulteration of the medicinal article is hardly to be looked for. Chinese galls are large, occasionally three inches in length, oblong-ovoid and somewhat flattened, coarsely tuberculate, the tubercles very irregular in size and often prolonged into branches. This gall is of a yellowish-gray color, densely and softly tomentose or velvety, light in weight and hollow, the wall being thin and crustaceous.

Nutgalls contain upward of sixty per cent. of gallotannic acid, two or three per cent. of gallic acid, occurring as a natural derivative of the former, and small amounts of resin, sugar, and starch.

**ACTION AND USES.**—The properties of nutgall are those of tannic and gallic acids, in a degree corresponding with their percentages as stated above, and the reader is referred to those drugs for an account of its action and uses.

The official preparations of nutgall are the tincture, containing twenty per cent. of nutgall with ten per cent. of glycerin, and the ointment, which consists of twenty per cent. of the drug rubbed up with eighty per cent. of benzoinated lard.

Henry H. Rusby.

**NUTMEG.**—(*Myristica*, U. S.; Br. *Semen Myristica*; Ger. Muskatnuss; Fr. Muscade.) The dried ripe seed of *Myristica fragrans* Houttuyn (fam. *Myristicaceæ*), deprived of its testa.

Nutmeg is the product of a handsome, small, evergreen, dioecious tree, native of the Molucca Islands, now widely cultivated in tropical regions, such cultivated trees, mostly in the Malay Archipelago, supplying the commercial article. The fruit is fleshy, one-seeded, and when ripe much resembles the peach. The fleshy pericarp is tardily dehiscent and the seed is enclosed, though only partially covered, by a fleshy network, consisting of the aril. This is removed and dried to form *mace* (which see), leaving the seed as an oval body faintly grooved, where the aril has rested upon it. It is dried by a slow and tedious process, requiring about two months. When dry the nutmegs are beaten to break the testa, from which the kernel has now shrunken away, and the latter then constitutes the official nutmeg. It is nearly an inch in length and somewhat more than half as broad, oval to ovoid, very slightly flattened in one direction and not quite equilateral, of a rich brown color, slightly shining, more or less furrowed, with a circular scar at the broader end, from which a slight groove runs to a deeper depression near the smaller end. When cut transversely it exhibits a pale, brownish-yellow surface, of a fatty lustre, and marked by narrow curved brown lines entering from the surface and containing folds of the tegmen or inner coat. The odor is strong and agreeable, the taste similar and somewhat bitter. The ordinary nutmeg of commerce differs from this in being grayish-white from a partial covering of lime, which serves the purpose of protecting it against the attacks of insects, to which it is very liable. Such nutmegs are distinguished as "limed" or "Dutch," the others as "brown" or "Penang."

The important constituent of nutmeg is its volatile oil, stated in most books to amount to from two to eight per cent., but of which there is very much more. The other constituents are the following: about forty per cent. of fixed oil, of which about three-fourths is removable by expression, a small amount of an unstudied bitter principle, starch, protein, gum, and other ordinary constituents. The volatile oil (*Oleum Myristica*, U. S., Br., or *Oleum Nucista Æthereum*) varies considerably in character, according as a larger or smaller percentage has been distilled from the nutmeg. When freshly distilled it is colorless, but grows yellow or even reddish and thicker with age, at the same time changing its odor to a heavy and somewhat disagreeable character. It has a pleasant flavor, followed by a warming and biting or slightly acid effect. Its specific gravity ranges from 0.87 to 0.90 at 15° C. (59° F.). It is soluble in an equal volume of alcohol, the solution being neutral, and in the same amount of glacial acetic acid; it is freely soluble in carbon disulphide. It consists chiefly of *myristicinol*

( $C_{15}H_{14}O$ ?) and *myristicin* ( $C_{15}H_{14}O_2$ ), together with pinene, myristinic acid, and other unimportant substances. This oil possesses the properties of nutmeg in an intensified degree. The commercial article holds a small amount of the fixed oil in solution. The fixed oil (*Oleum Myristica Expressum*, *Oleum Nucista*, *Adeps* or *Butyrum Myristica* or *Nucista*, *Nutmeg Butter*) is expressed by the aid of heat. It usually occurs in the form of cakes, wrapped in palm leaves, is solid and firm at ordinary temperatures, melting at about 45° C. (113° F.), has a mottled, orange-brown and whitish color, a specific gravity of about 0.995, a pleasant buttery taste, but with a slight fragrance and taste of nutmeg, due to the presence of a little of the volatile oil in solution. It dissolves in four parts of boiling alcohol or in two of warm ether. It consists chiefly of *myristin*,  $C_{15}H_{14}(C_4H_7O_2)_2$ , with three or four per cent. of free myristic acid. This oil is very much subject to adulteration with, or substitution by, the fixed oils derived from other species of *myristica*, especially that from *M. fatua* Houttuyn. This fat has no special medicinal properties but merely those of other vegetable fats.

Whole nutmegs are at the present day scarcely ever sophisticated, though the long, wild, or male nutmegs above mentioned as being used to adulterate nutmeg butter, as well as some other species, are occasionally offered for them. Artificial nutmegs, pressed from a prepared paste and very inferior in odor and taste, have been frequently reported. Ground nutmeg is usually adulterated, often very heavily so, and the freshly grated article should be insisted upon.

**PROPERTIES AND USES.**—Almost the entire use of nutmeg is for flavoring purposes, although it possesses useful properties as an ordinary aromatic stimulant and carminative. Many cases of mild, and several of rather severe poisoning by overdoses (from two to five nutmegs) are reported, the symptoms being those of a narcotic or severe depressant, in some respects similar to those of overdoses of camphor. There is no preparation, properly speaking, of nutmeg, though it enters into the aromatic powder and the compound tincture of lavender. Of the volatile oil there is an official five-per-cent. spirit, the dose of which is 2-4 c.c. (fl. 3 ss.-i.); the dose of the oil as a carminative is  $\eta$  i.— $\eta$ ij., and a small amount of it enters into the aromatic spirit of ammonia.

Henry H. Rusby.

**NUTRITION.** See *Metabolism*.

**NUX VOMICA.**—U. S., Br., *Semen strychni*; P. G., *Semen nucis vomica*; *Poison Nut*; *Dog Buttons*; *Quaker Buttons*. The dried ripe seed of *Strychnos Nux vomica* L. (fam. *Loganiaceæ*).

Nux vomica seeds are produced in the East Indies by a small tree which bears a fruit similar in appearance to a small orange. There are from one to four seeds, usually with a few undeveloped ones, found embedded in the whitish, jelly-like pulp of the fruit. The smaller the number of seeds the larger they are likely to be, and the richer in active constituents. Although the principal constituent of the pulp of the fruit is the indifferent glucoside *loganin*, yet it also contains strychnine (about 1.5 per cent. in the dried pulp) and brucine (about one per cent.) and is highly poisonous. The leaves also contain a considerable percentage of brucine, and probably some strychnine, and are poisonous to cattle.

**DESCRIPTION.**—About 1.5-2.5 cm. ( $\frac{3}{8}$ -1 in.) broad, lenticular, but irregularly curved, with an elevated central spot upon one or both sides and upon one side a low ridge

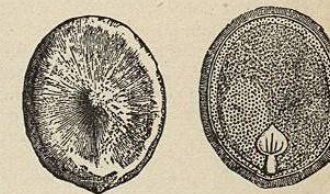


FIG. 3608.—Nux Vomica; outer surface and longitudinal section. (After Baillon.)