

ous trees and shrubs. The town area is very large in relation to the number of houses and inhabitants." On the other hand, "like other places on the south coast, it is subject to frequent and uncertain spells of bad weather, in the form of wet, cold, or both combined, and to even more dangerous, because deceptive, visitations of high east winds in the early spring."

"The kinds of cases which have been benefited by a residence at Bournemouth are chiefly as follows:

(1) Cases of pulmonary tuberculosis which would do well at any good health resort. (2) Pulmonary tuberculosis in the incipient stage. (3) Quiescent pulmonary tuberculosis when the patient can spend a number of hours continuously in the open air. (4) Patients in the last stage of phthisis often enjoy an extension of life here. In general, cases that can take advantage of outdoor life do well, while those who are confined to the house do badly. (5) Chronic bronchitis without fever, and particularly recurrent bronchial catarrh with a moderate amount of expectoration, asthma, whether neurotic or catarrhal, the different parts of the town being tried if necessary. (6) Chronic Bright's disease, particularly of inflammatory origin. (7) The subjects of chronic malaria. (8) Sufferers from chronic gastric catarrh with emaciation. (9) The victims of nervous over-work, particularly with insomnia, provided they do not settle too close to the sea. (10) Delicate persons generally, including more especially elderly and aged people, and feeble and rickety children."

"The cases, on the other hand, which do not do well or even badly, are: (1) Persons confined to the house, applying chiefly to consumptives. (2) The subjects of pulmonary tuberculosis in its active stage, especially when attended with much fever and profuse expectoration. (3) Those suffering with dry irritable catarrh of the larynx and bronchi. (4) Sufferers from neuralgia."

The accommodations are good and abundant and of every variety. From a personal visit the writer was impressed with the beauty of the place, its clear, bright atmosphere, the abundant sunshine, its luxuriant vegetation, and the striking effect of the great number of pines everywhere. The sea view from the cliffs is most attractive, and there are many pleasing excursions inland over the thickly wooded heath. For an outdoor life one can hardly imagine a more attractive place of residence.

Edward O. Otis.

**BOWDEN LITHIA SPRINGS.**—Douglas County, Georgia.

POST-OFFICE.—Lithia Springs. Sweetwater Park Hotel.

ACCESS.—Via Georgia Pacific Division of the Piedmont Air-Line. These springs are located in Douglas County, 17 miles west of Atlanta, 300 miles distant from the Atlantic coast and at an altitude of 1,200 feet above the sea level. The surrounding country is of a somewhat rugged, broken character, interspersed with forests of pine, oak, maple, and cypress and watered by streams skirted by haw and holly. The temperature rarely reaches 90° F. in summer or extends below 40° above zero in winter, while the nights are proverbially pleasant. The surroundings of the place are exceptionally charming, the Shoals, the Ruined Mill, Chapel Hill, and the Dome Rock, showing the mighty action of some great sea in prehistoric times, the Mill in the Glen, the Old Distillery, and the Sweetwater Creek being also among the numerous features of interest. The hotel is a first-class modern structure, capable of accommodating five hundred guests, and all of the appointments are of a superior order. While people have resorted to these springs for about sixty years, only recently have they become very extensively known.

The use of the Bowden lithia waters is particularly recommended in kidney and bladder affections, calculi, gravel, cystitis, etc., and in gout and rheumatism. The external use of the water in bathing, for which there are excellent facilities, is said to be beneficial in skin affections, chronic ulcers, glandular enlargements, etc. The

waters are used commercially, and may be found in most of the principal cities of the East and South.

Following are analyses of the waters:

Solids.	ONE UNITED STATES GALLON CONTAINS:		
	(Upper Spring.) Pratt, 1887.	(Lower Spring.) Pratt, 1889.	Doremus, 1890.
	Grains.	Grains.	Grains.
Carbonic acid as bicarbonates.....	9.85	.....	9.91
Lithium bicarbonate.....	2.85	1.97	4.45
Potassium bromide.....	.....	5.29	.....
Potassium sulphate.....	.....	.....	1.73
Potassium bicarbonate.....	3.36	.....	.....
Magnesium bromide.....	1.69	15.23	1.47
Magnesium bicarbonate.....	10.32	.....	.....
Magnesium sulphate.....	4.41	.....	.....
Magnesium iodide (iodine).....	Traces.	.73	Traces.
Calcium bicarbonate.....	14.18	.....	17.25
Calcium sulphate.....	.....	30.21	12.15
Calcium phosphate.....	.64	.....	.....
Strontium sulphate.....	1.02	.28	1.22
Ferrous bicarbonate.....	.21	.....	.21
Sodium sulphate.....	16.25	124.49	8.03
Sodium chloride.....	133.71	.....	121.78
Sodium phosphate.....	.....	.89	.....
Aluminum sulphate.....	1.33	2.61	.53
Silicic acid (soluble).....	1.12	1.96	1.26
Boric acid.....	.....	.....	Traces.
Manganese.....	Traces.	.....	Traces.
Phosphoric acid.....	.....	.....	.....
Rubidium (spectroscopic analysis).....	Traces.	.....	.....
Fluorine.....	Traces.	.....	.....
Loss on ignition.....	.....	.....	5.75
Total.....	200.94	173.36	185.74

James K. Crook.

**BOW LEG.**—(Synonym: Genu Varum.) In the popular sense bow leg includes all the deformities which cause separation of the knees when the ankles are in contact with each other; but, strictly speaking, bow leg implies an outward bending of the tibia and fibula, and genu varum a deformity in which the greatest distortion is at the knee, the opposite of genu valgum. In most instances simple bow leg is associated with slight outward deviation of the knee, and genu varum with a certain degree of bending of the bones of the leg, so that the two terms are properly synonymous.

**ETIOLOGY.**—Bow leg is the most common of all distortions, constituting about ten per cent. of the cases treated in orthopedic clinics. It is essentially a deformity of childhood. It may be congenital, and it is not uncommon in vigorous infants who stand at an early age. But in most instances it is an effect of rickets, usually of a mild type, and it develops therefore soon after the child begins to walk, although the tendency to deformity may have been acquired before this time. It may be acquired in later life, as an effect of occupation, or injury or disease, but this type is comparatively uncommon.

**SYMPTOMS.**—The essential symptom of bow legs is the deformity. In the genu varum type, the femur is abducted and rotated outward while the tibia is rotated inward; and in simple bow leg also there may be a spiral inward twist of the tibia, so that in-toeing, "pigeon toe," may be one of the effects of the deformity.

In the more extreme cases, in which there is laxity of the ligaments at the knee joint, the patient may suffer from discomfort and weakness, but this is unusual except during the stage of active rickets.

**TREATMENT.**—There is a strong tendency toward spontaneous recovery, the "outgrowth" of deformity. But although the distortion may be entirely cured by the natural process, it is far more often simply modified and made less noticeable. This may be inferred from the fact that bow leg in the slighter degree is so common in later life. According to the writer's observations, about one adult male in five has noticeable deformity of this character, a proportion that is apparently not exceeded among children. Thus, although bow leg may cause no physical discomfort, it is, from the æsthetic standpoint, of sufficient importance to merit treatment in all cases.

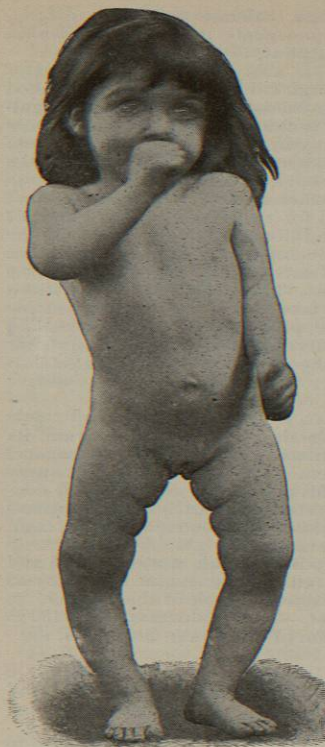


Fig. 660.—Bow Legs of the Genu Varum Type.

distortion is most marked at the knee, the bar should be prolonged to the upper third of the thigh, and a second band should be applied about the knee. A jointed brace is less effective than is the simple form that has been described.

The function of a brace is principally support. The correction of the deformity is hastened by daily systematic manual straightening, and cure is accomplished by the natural transformation of the internal structure of the deformed part which begins when the static conditions are changed. In older subjects, when the bones are more unyielding, operative treatment is indicated.

Osteoclasis or osteotomy may be employed. As a rule it is sufficient to straighten the tibia at the point of greatest deformity, but in exceptional cases both the tibia and femur may require treatment. By far the most satisfactory method is partial osteotomy, combined with forcible correction. A small sharp osteotome is inserted directly over the point of greatest deformity on the concave side of the tibia, and when the cortex on its inner surface has been divided the fracture is completed by manual force. The fibula may be bent or broken as it is more or less resistant. In all cases the distortion should be slightly overcorrected, and the limb fixed in this position until union is complete.

Other Varieties of Deformity.—Bow

leg may be easily overcome in infancy by systematic manual correction. It may be prevented in rachitic children by the avoidance of attitudes that induce the deformity, especially standing when the bones are weak. In the slight degree of deformity in walking children, the tendency toward distortion may be counteracted somewhat by making the sole of the shoe slightly thicker on the outer border. If the deformity is more marked, or if it is increasing, or if the bones are abnormally flexible, a brace should be applied. This consists essentially of a light bar of steel, reaching from the internal condyle of the femur to the sole of the shoe. This is suitably padded at the points of pressure and is provided with a laced band which is passed around the limb at the point of greatest deformity, thus supporting it and exercising slight corrective force. If the

leg may be unilateral, or it may be combined with knock-knee.

**Anterior Bow Leg.**—Anterior bow leg is a deformity in which the tibia is bowed with the convexity forward. This distortion is usually symptomatic of pronounced rachitis; it is often combined with knock-knee, or with general distortions of the limbs, "corkscrew" deformity. The antero-posterior diameter of the tibia is increased and its crest is prominent and projects sharply beneath the skin. As the weight is thrown upon the anterior part of the foot, the heel projects and the gait is awkward and shuffling. The distortion is not usually amenable to treatment by braces, and in the more extreme cases a cuneiform osteotomy may be



Fig. 661.—Bow Legs in Which the Principal Distortion is Below the Knees.

required to restore the normal contour. Royal Whitman.

**BOX.**—The leafy twigs of *Buxus sempervirens* L. (fam. *Buxaceæ*). The box is a slow-growing evergreen shrub, rather variable in habit, but usually compact, with a very short trunk, and numerous leafy branches. The leaves are opposite and crowded, 2 or 3 cm. long, elliptical or oval. They are dark green and shining above, pale beneath, thick and leathery. The bark of the younger twigs is green, that of the old trunks gray and tuberculated.

Box is a native of the southern part of Europe and the East. It is frequently cultivated for ornament there, and has been a favorite bordering plant for flower gardens in the United States, where it grows fairly, but very slowly. It seldom blossoms in New England. All parts of the plant are bitter; the leaves and twigs are the most available for medicinal use. By far the most important product of this valuable shrub is its wood, which for many purposes is unequalled.

The bitterness of box is due to the alkaloid *buxine*, discovered by Fauré in 1830. It is a white, amorphous powder

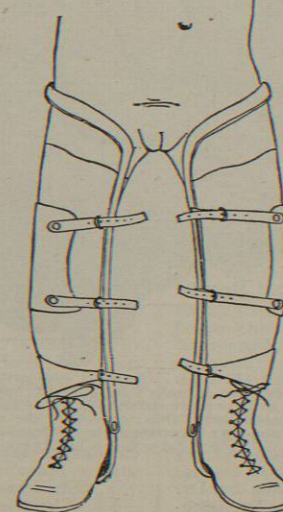


Fig. 662.—Braces for Bow Legs. (Bradford and Lovett.)

of a persistent bitter taste. It is very insoluble in water ( $\frac{1}{1000}$ ), but dissolves rather freely in alcohol, and more freely in chloroform. A second alkaloid, *parabuxin*, was found by Pavia to accompany the *buxine* in box; and it is still probable that some other principle may be found to explain the poisonous qualities it has been occasionally observed to have.

**USES.**—Box has had some reputation as a febrifuge and tonic; in large doses it is purgative and emetic. It is suspected of being sometimes used to replace hops in beer; but it is little employed in medicine to-day. The alkaloid *buxine* (beberine), either from box or *bibiru*, has been offered as a substitute for quinine in intermittents, but is much inferior; in the same large doses it deranges the stomach and digestion; in small doses it, however, is an excellent tonic. *Buxine* has been found in several plants of entirely different orders, and is probably, like *berberine*, a rather extensively distributed alkaloid. The *beberine* of *bibiru* (*Nectandra Rhodiæ* Schomb.), the *pelosine* of *pareira* (*Chondodendron tomentosum* R. et P.), as well as of the false *pareira*, have been shown by Flücker and others to be identical with this alkaloid, although it is not quite certain that the physiological effects of *buxine* from all these sources are the same. The *sulphate* and *hydrochlorate* of *buxine* are in the market. Dose, as a tonic, from 5 to 10 cgm. (0.05–0.10 = gr. i. ad ij.); as a febrifuge, eight or ten times as much (0.5–1 = gr. viij. ad xvi.).

W. P. Bolles.

**BRADFORD MINERAL SPRINGS.**—Merrimac County, N. H.

**POST-OFFICE.**—East Washington. Hotel.  
**ACCESS.**—From Boston via the Lowell Railroad to East Washington; thence one mile to hotel at springs. Stages await trains during the season from May 15th to October 15th.

This spring became known to the white settlers in 1770, and since early in the present century its waters have

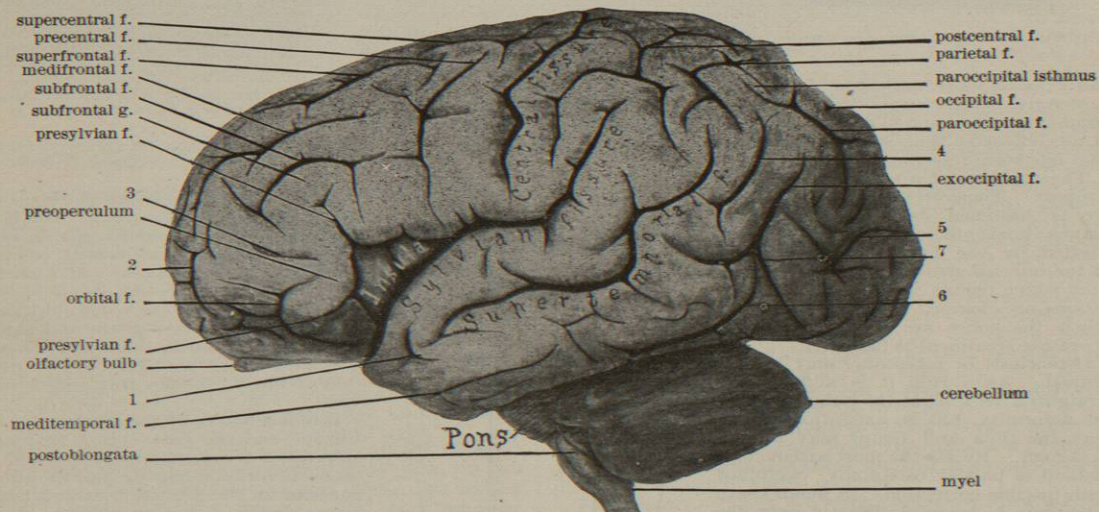


Fig. 663.—Left Side of the Brain of a Male Child at Birth: 478.  $\times 1$ . The brain was medisectioned when fresh, and the hemisphere spread and flattened considerably while hardening. The specimen is really the right half, but for reader comparison with other specimens and figures a diagram was made (by Mrs. Gage) reversed so as to represent the left half. This figure is based upon a photograph of the diagram. The cerebellum is correct in outline, but no details are shown. Other aspects of the same specimen are shown in Figs. 702, 756, 774, 775. Just ventrad of the narrow isthmus, between the overlapping branches of the subfrontal and precentral fissures, is a white x; 1, 2, 3, 4, 5, 6, undetermined fissures; 7, an isthmus between 6 and the exoccipital which is nearly concealed by the adjoining gyres. See § 4.

been used for medicinal purposes. An analysis by Dr. Jackson, of Boston, subsequently confirmed by Dr. Richards, of Poughkeepsie, New York, showed the presence of the following ingredients: Sodium chloride, potassium

chloride, sodium carbonate, calcium carbonate, magnesium carbonate, calcium phosphate, iron oxide, aluminum oxide, organic matter, sulphur, carbonic acid gas.

We are unable from this analysis to assign the water to its proper class, although it is probably a sulphureted chalybeate. The spring yields twenty-one hundred gallons hourly. The water is clear and sparkling, and emits an odor of sulphureted hydrogen gas. It has been successfully used by the residents of the neighborhood in the treatment of certain cutaneous diseases, especially eczema. It is said to be a very efficient diuretic and tonic, and seems to be well adapted for rheumatism and diseases of the alimentary tract, and for conditions in which the urine is scanty and high-colored. As a douche in nasal catarrh and in catarrhal states of the vagina and uterus it has been found useful. There are bathing facilities for guests who wish to take hot or cold sulphur baths. The surroundings of the place are very attractive, and ample amusements and diversion are afforded the visitor in the way of bowling, shooting, fishing, driving, etc.

James K. Crook.

**BRAIN. (ANATOMICAL.)—I. INTRODUCTION. § 1.** Scope of this Article.—The development of the brain, its growth, histology, functions, blood-vessels and surgery, and the methods of its removal, etc., are presented under appropriate titles. In this article the organ will be considered mainly from the standpoint of normal morphology, with occasional elucidations from embryology, comparative anatomy, and teratology.

I regret that so many points remain undetermined and so many problems unsolved. These relate especially to the meninges and the olfactory region of the brain.

§ 2. Order of Treatment.—I. Introduction, §§ 1–13.

II. General Constitution of the Brain, Segments, etc., §§ 14–69.

III. The Metencephal (postoblongata), §§ 70–90.

IV. The Erencephal (preoblongata, cerebellum, and pons), §§ 91–128.

V. The Mesencephal (gemina and crura), §§ 129–141.

VI. The Diencephal (thalami), §§ 142–157.

VII. The Prosencephal, its cavities, parietes, commissures, fissures, and gyres, §§ 158–356.

VIII. The Rhinencephal (olfactory bulbs, etc.), §§ 357–372.

IX. The Meninges (dura, arachnoid, pia), §§ 373–409.

X. Bibliography.  
§ 3. Method.—The text consists largely of commentaries upon the points illustrated by the figures. What seem to me the more important facts and fundamental ideas of encephalic morphology are embodied in concise propositions. Unless otherwise stated these propositions apply to the human brain, and may not always hold good for those of other vertebrates, or even other members of the mammalian class.\*

§ 4. Fig. 663 illustrates: A. The general aspect of a brain from the side; its continuity with the myel (spinal cord) through the oblongata; the existence of a smaller mass (the cerebellum) and a larger (the cerebrum); the overlapping of the former by the latter more extensive at birth, and in earlier than adult brains; the existence of other parts, the olfactory bulb, the pons, and the oliva (the elliptical elevation of the postoblongata upon which the line from that word ends); the fissures of the cerebrum; the subdivisions of the cerebellum (folia) are not indicated.

(The remaining points illustrated refer to the cerebral fissures, and may be considered more advantageously in connection with Part VII.)

B. The simple, almost schematic, relations of the fissures demarcating the several operculums (compare Fig. 784); the preoperculum only is named. The suboperculum is the region ventrad of the subsylvian fissure. The operculum is between the presylvian and Sylvian fissures; and the postoperculum is the overlapping margin of the temporal lobe, the region on which is the word *Sylvian* and ventrad of it.

C. The incomplete covering of the insula (see Fig. 788). D. The presence of a distinct medifrontal fissure, subdividing the medifrontal gyre.

E. The independence of the postcentral, parietal, and paroccipital fissures.

F. The presence of the exoccipital (the "ape fissure" of some writers).

G. The frequency of the zygial or H-shaped form of fissure—e.g., paroccipital, parietal, postcentral, subfrontal, orbital, and fissure 2; see § 307.

§ 5. The Facts.—Most of the statements are parts of common anatomical knowledge, and special references are seldom given in this connection; therefore the following extract from the preface to Huxley's "Anatomy of Vertebrated Animals" may be appropriately added:

"The reader, while he is justly entitled to hold me responsible for any errors he may detect, will do well to give me no credit for what may seem original, unless his knowledge is sufficient to render him a competent judge on that head."

§ 6. The Ideas.—Unfortunately, the facts of anatomy are susceptible of various interpretations according to the relative weight assigned to them. In particular there are divergent views respecting the segmental constitution of the entire brain and the normal pattern of the cerebral fissures.

§ 7. The Illustrations.—Of the one hundred and forty-five figures, one hundred represent preparations made by me for the museum of Cornell University; these preparations are designated by their catalogue numbers. The drawings have been executed, from the specimens and from photographs, by Prof. E. C. Cleaves (C.), Mrs. S. H. Gage (G. or S. P. G.), and Mrs. Wilder. The twenty-five borrowed figures are credited to their sources. The remaining illustrations are original diagrams or drawings, or direct reproductions of photographs.

§ 8. Terminology.—The general subject will be discussed in the article *Terminology, Anatomical*, in another volume; meantime those interested are referred to the article under that title in Vol. VIII., of the first edi-

\* The uses of certain animal brains as aids in the study of the human organ are set forth in the article, *Brain: Methods*, etc., and in my paper, 1896, g.

tion, pp. 515–537; to "Anatomical Technology" (Wilder and Gage, 1882); to the Reports, during the last ten years, of Committees of the American Association for the Advancement of Science, the American Neurological Association, the Association of American Anatomists, and the Anatomische Gesellschaft; to the article, "Anatomical Nomenclature," by F. H. Gerrish, in "Progressive Medicine," for 1899, pp. 327–346; to G. M. Gould's "Suggestions to Medical Writers," 1900, chap. iv.; and to my address, "Some Misapprehensions as to the Simplified Nomenclature," Assn. Amer. Anat., Proceedings, 1898, pp. 15–39, and *Science*, April 21st, 1899. The principal publications prior to 1896 are included in the bibliography of my "Neural Terms, International and National," *Jour. Comp. Neurology*, December, 1896, vol. vi. Here, therefore, it is necessary only to comment briefly upon the two groups of terms employed in this article.

§ 9. Terms of Position and Direction (Toponyms).—In place of the more or less ambiguous terms *upper*, *lower*, *anterior*, *posterior*, *inner*, *outer*, etc., will be employed terms referring to the regions of the vertebrate body in whatever attitude it may be—viz., *dorsal*, *ventral*, *cephalic*, *caudal*, *mesal*, *lateral*, *ental*, *ectal*, etc., constituting an intrinsic toponymy. The adverbial forms are *dorsad*, *mesad*, *ectad*, etc.

§ 10. Terms of Designation (Organonyms).—Each part is designated uniformly by one and the same name. Where two or more names are already in use, the simpler or shorter has been chosen. In some cases simple names have been formed by the omission of unessential words or by the combination of two, or by the coinage of words from the Latin or Greek. Where the English form (paronym) differs from the classical the former is often preferred. For examples, "pneumogastric" becomes *vagus*; "pons Varolii," *pons*; "corpus callosum," *callosum*; "commissura anterior," *precommissure*; "aqueductus Sylvii" and "iter a tertio ad quartum ventriculum" give place to *mesocelia* (the cavity of the mesencephal), Eng. *mesocle*.\*

§ 11. Fig. 664 illustrates: A. The general form and appearance of the cerebrum of an educated and moral distinguished man, rapid in thought and movement.

B. The general symmetry as to form and especially as to certain fissures, central, occipital, paroccipital, inflected, associated with some decidedly asymmetric conditions—e.g., the relations of the postcentrals to the paracentrals.

C. The bifurcation of the dorsal end of both central fissures and the bifurcation of the caudal branch on each side.

D. The coexistence of the more common relation of the paracentral to the postcentral on the right with the inclusion, on the left, of both branches of the postcentral within the curve of the paracentral; see § 285 and Fig. 769.

E. The great depth of both occipital fissures; this is their real depth, and is not due to a superficial extension.

F. The distinctness and simplicity of the paroccipital fissures, and the existence of the more usual combination—i.e., continuity with the parietal on the left and independence on the right; see Fig. 778.

G. Nevertheless, the difficulty of deciding how this case should be entered upon a Table. On the right the isthmus between the parietal and the paroccipital is perfectly distinct and visible in any direct view; yet it is below the level of the adjacent gyres and might perhaps be regarded as a vadium. On the left the vadium (at the point marked 13) is much more depressed, and hidden from easy view by the overlapping gyre just cephalad of it.

H. The unusual complexity of the fissures representing the parietal and the postcentral. On each side there are recognizable three irregular fissures caudad of the central; the most dorsal of each group is triradiate and

\* Orthographic discrepancies between this article and my recent papers (e.g., in the retention of certain diphthongs and of the ultima of *anatomical*, *morphological*, etc.) are due to the necessity of conforming to the plan of the entire work.