western part of this region from Montenegro and Servia northwestward, their greater number being under Austrian rule. While these peoples immigrated during the middle ages, numerous remains of the ancient inhabitants of south-eastern Europe are still extant, although in course of time much influenced by the immigrants of the middle ages. The most important of these are the Greeks in Greece and the adjoining parts of Turkey; on the Archipelago, Crete, and on many points of Asia Minor. Their distribution all around the coasts of the Ægean Sea and on the south-west coast of the Black Sea shows that they are principally a seafaring and trading people. Colonies of Greeks are found in all great cities of the Orient. Their neighbors are the Albanese, who live in the rugged mountains of the western part of the Balkan Peninsula, east of Montenegro. They are presumably descendants of the ancient Illyrians, although much doubt prevails as to their descent. In southern Eubœa and around the Gulf of Ægina they live among Greeks.

During the reign of the Romans over eastern Europe many peoples became Romanized. Their descendants are the Roumenians in Roumenia, Bessarabia, Transylvania, eastern Hungary, and the north-eastern corner of Servia. It is of interest that a number of them, widely separated from the main body, should live in the Pindus, near Berat, and in a few villages of eastern Thessalia.

The invasion of the Turks added a new element to these peoples, but there are only few places which are inhabited by them exclusively. Their principal territory in Europe is the eastern part of the Balkan Peninsula, between the mouths of the Danube, Philippopolis, and Constantinople; but, besides this, numerous isolated districts throughout the peninsula are inhabited by them. The number of Turks, however, in the outlying districts, which are not any longer under Turkish rule, has greatly decreased since the recent wars. The principal district of the Turks is Asia Minor.

In the north-western part of south-eastern Europe we find another foreign people settled among the Indo-Europeans, — the Hungarians, who belong to the Finno-Tartarian race. They occupy the greater part of Hungary, where Germans, Servians, Roumenians, Russians, and Slovenians are settled among them, and the eastern part of Transylvania. Last of all we mention the Germans, who are the neighbors of the Hungarians and Servians in the north-west, but have, besides, numerous colonies in Hungary, Transylvania, and near the mouths of the Danube.

The development of these numerous peoples is one of the interesting problems of European history. It is hardly possible to classify the peoples who in ancient times lived in these regions. During the middle ages numerous peoples — the Gauls, Romans, Goths, Huns, Avars, Petchenegs, and Cumans — invaded the peninsula; but the principal part of the population consists of the ancient Slovenes of Pannonia, who settled in course of time in the province of Moesia. About the middle of the seventh century we hear about their wars with the Byzantine empire. The most important event in the early history of the southern Slavic peoples is the invasion of the Bulgarians. Their descent is doubtful, for their language has been lost. Gaster points out that not only the relics of Bulgarian language, which consist mostly of proper names, but also certain customs, are in favor of the theory that they belonged to the Turkish peoples who ruled in southern Russia, and that with them came certain Finnish tribes. They crossed the Danube in 679 A.D., and in course of time subjected all peoples of south-eastern Europe. Within a few centuries they became amalgamated with the Slavic people, whom they had conquered, and thus formed the Bulgarian people of the present time. We need only to mention that the Turkish invaders found all these peoples settled, and added a new element to the numerous races and peoples of that region.

From this brief review of the facts it will be seen that there exists no homogeneous people in south-eastern Europe, but that all of them are the descendants of an extensive mixture of different peoples. Even the Greeks, whose language has comparatively little changed since the times of antiquity, have been greatly influenced by Slavic peoples.

As none of the states of this region comprises a population speaking only one language, and as at the present time the history of Europe is entirely ruled by the desire of each nation to be independent, the natural outcome of this state of affairs is a continuous struggle between the various peoples. But a glance at the map shows that the actual distribution of the peoples makes the establishment of states comprising only one people impossible. A Greek empire would exclude all other peoples from the sea; a Bulgarian state would include numerous Greeks, Turks, and Albanese. It is of great interest that these difficulties have only arisen in our century, for before this time the idea of nationality was hardly known. It is only since the French revolution that the tendency of all peoples speaking one language to form one state has grown up. To this idea Italy and Germany owe their existence, and it threatens Austria and Turkey with destruction. It is remarkable to see how people bitterly opposed to one another, not on account of diverging interests, but on account of difference of language, in Europe, become merged in our continent into one great people; how the same process that has been going on in Europe so frequently during the middle ages, but only by means of wars, is going on peaceably in America. Our map shows that so long as the same ideas and interests remain the leading ones in the history of south-eastern Europe, there is a constant source of wars and minor troubles, even aside from the contending interests of Russia and Austria to gain a foothold on the Ægean Sea, and England's fear of Russia's commanding the entrance to the Black Sea.

VALUES IN CLASSIFICATION OF THE STAGES OF GROWTH AND DECLINE, AND PROPOSITIONS FOR A NEW NOMENCLATURE.

AT the meeting of the Boston Society of Natural History, Nov. 16, 1887, Prof. Alpheus Hyatt presented a paper, of which the following is an abstract. He proposed, in accord with views previously published in his 'Larval Theory of the Origin of Tissue,'[1] and an abstract of the same subsequently printed in the *American Journal of Science*, May 31, 1886, to divide the animal kingdom into three comprehensive divisions: (1) *Protozoa*, unicellular animals, which propagate by means of asexual (autotemnic) fission and by spores, and build up colonies, but always remain typically unicellular; (2) *Mesozoa*, multicellular colonies, but composed of only one layer of cells, so closely connected that they form a layer of primitive tissue. They have more or less spherical forms, and propagate by means of ova, spermatozoa, and by autotemnic fission, and have an aula or common cavity, but no specialized digestive cavity or archenteron; (3) *Metazoa*, complexes of multicellular colonies, in which growth by sexual union and resulting fission of the ovum form three primitive tissue layers, and build up a body in which an archenteron is always developed, they propagate always by means of ova and spermatozoa, autotemnic fission occurring only, if at all, during the earliest stages of the ovum.

The stages of holoblastic ova may be in a general way classified as follows, to accord with that given above for the animal kingdom: —

(1) The ovum or monoplast (Lankester); (2) the first stage of segmentation, which normally results in the production of two cells, the *Monoplacula*; (3) the second stage of segmentation, in which two layers arise, the *Diploplacula*. The first two stages alone seem to have parallel or representative adult forms among *Protozoa*. He proposed to classify these stages under the name of 'protembryo.'

(4) The blastula is in aspect and general characteristics the morphological equivalent of the adults of the genera *Volvox* and *Eudorina*, the types of the *Mesozoa* or *Blastrea*. The latter are animals in which growth remained permanently arrested at the single-layered, spherical stage in the evolution of tissue-building forms. He proposed to classify these stages under the name of 'mesembryo.'

(5) The gastrula can be compared, as has been done by Haeckel, with the lower *Porifera* (*Ascones*), but these have three layers like the lowest *Hydrozoa*, in which a three-layered gastrula-like stage has been permanently preserved. The proper name for these stages would therefore be 'metembryo,' in allusion to the fact that the ovum at this stage was probably essentially a metazoon, or a near approximation to this type.

[1] Proceedings of the Boston Society of Natural History, vol. xxiii. 1884, p. 45.

(6) The first and simpler planula stages, though often characteristic of the larger divisions of the animal kingdom, do not possess, as a rule, the essential, diagnostic characters of the larger divisions to which they belong, and he proposed to call them 'neoembryos.' Examples: the *Cinctoplanula*, the planula of the *Cœlenterata*, the *Pluteus*, the *Trochosphere*, the *Pilidium*, the earliest planula-like ciliated stages of *Amphioxus*.

(7) The latest of the more specialized planula-like stages are either directly transformed into, or else give rise to, other forms in which the characters of the larger divisions or types of the animal kingdom begin to appear, at least so far as essential characters are concerned. Examples: the *Ascula* and *Ampullinula*, the *Actinula*, the *Gulinula*, the *Veliger*, the internal worm-like form arising in *Pilidium*, the stage of the formation of the notochord in *Amphioxus*. He proposed, therefore, to interpret these relations by naming the embryo in these stages the 'typembryo.' This term can be applied to the *Nauplius* of *Crustacea*, and the *Echinula*[1] of *Echinodermata*, as well as to those above noted.

The application of such principles to the study of the younger stages of fossil *Cephalopoda* was productive of what seemed to be satisfactory results. The protoconch of Owen is, according to this nomenclature, a shell of a univalve *Veliger* among the cephalous *Mollusca*, and a typembryo, which, though eminently characteristic of that group, has no exact morphological equivalent among normal adult forms of recent or fossil shells.

The true larval, or, as they are here named, silphologic (Σίλφη, 'a grub') stages began with the formation of what Owen appropriately called the apex of the conch or true shell. Among nautiloids this was a short living chamber occupied by the body of the animal, but having no siphon or septum. It was completed by the deposition of the apical plate, which sealed up the aperture of the protoconch, thus closing the opening, and cutting off communication between the two interiors. This stage can therefore be named the 'asiphonula' or siphonless larva.

The second larval stage in *Nautiloidea* was composed of a living chamber, closed apically and completed by a single septum, which had a cæcal prolongation reaching across the first air-chamber and resting upon the inner side of the cicatrix. It is proposed to call this stage the 'cæcosiphonula,' since it is undoubtedly the primitive stage of that organ. The cæcosiphonula may indicate the former existence of an ancestral form having a central axis composed of similar closed funnels or cæcal pouches.

The third silphologic stage in nautiloids was completed by a septum (the second in the apical part of the shell) having an open funnel extending apically and joined to a loose-textured siphonal wall which reached down into and lined the cæcum, thus forming a secondary closed tube. In accordance with the structure, this has been named the 'macrosiphonula.'

The fourth larval stage of the nautiloids was completed by the building of the third septum. This septum had a long funnel and attached porous wall, but this wall formed a true siphonal tube opening apically into the next section, the macrosiphon. This was the beginning of the small siphon, and can be appropriately termed the 'microsiphonula.' The microsiphonula was the typical stage of nearly all the known genera of nautiloids, beginning with the *Orthoceratites* of the Cambrian, and found at the present time in *Nautilus*, and also of all ammonoids and belemnoids without exception.

It has also been found in tracing the descent of forms within sub-orders, families, and genera, that it is practicable to prove, that characteristics usually appear first in adult stages, and are then inherited at earlier and earlier stages in successive species of the same stock, whether they occur on the same horizon or in different horizons. The adolescent stages are therefore of as great importance for tracing the genealogy of small groups as are the silphologic characters in larger groups. Thus one can speak in definite terms of the relations of the nealogic (Νεαλης, 'youthfulness') stages, and their meaning, and importance in tracing the genealogy of families and genera, without danger of confusing them with the characters of any of the silphologic stages.

After the silphologic and nealogic stages have been disposed of, there still remains the adult period, which is equally important in genealogical investigations, since it enables the observer to study the origin of many characters which afterwards become silphologic and nealogic in descendant forms.

The use of a distinct term for the adult period becomes necessary not only on this account, and to separate its relations from those of preceding periods, but also because of the constant recurrence and importance of representative forms. The term 'ephebology' ('Εφηβος, 'the age of puberty') has accordingly been adopted for the designation of the relations of the adult stages, and under this term can be classified also the representation of similar forms in different groups or morphological equivalents. These are often so exact that it becomes very difficult to separate them. They have been and will continue to be the most difficult and misleading obstacles to the student of genealogy and classification.

In former essays the senile transformations and their correlations with the degraded forms of the same groups have been described and defined by the term 'geratology' (Γέρας, 'old age').

There were two stages of decline or old age among ammonoids. The first of these is the clinologic (Κλίνω, 'to incline downwards') stage. This immediately succeeded the ephebolic stage, and during its continuance the nealogic and ephebolic characteristics underwent retrogression. Ornaments, spines, and sutures degenerated and lost their angularity; the ribs or pilæ, and often the keel and channels, when these were present, became less prominent; and before this period closed, the whorl itself sometimes decreased; showing that degeneration in the growth-force of the animal had taken place. In man the baldness of the head, loss of teeth and resorption of the alveoli, loss of the calves and rotund stomach, and return of early mental peculiarities, are phenomena of similar import.

The last changes in the ontology of the animal took place in what can be called the 'nostologic' (Νόστος, 'a return') stage, and during this period these tendencies reached their highest expression. Among ammonoids the ornaments were all lost by resorption, the whorl became almost as round and smooth as it was in the silphologic stage, and in extreme cases it even separated from the next whorl, leaving a perceptible gap. This almost complete reversion to the aspect of the silphologic stage can of course only occur in animals which attain an extreme age.

[1] Address at the American Association by Alexander Agassiz, vol. xxix. 1880, p. 410 reprint, p. 22, shows that there is a stage of the embryo common to all orders of living *Echinodermata*. This stage, however, was not named in the address above quoted, which was intended as preliminary to an illustrated essay on the same subject; and Mr. Agassiz has supplied that omission in the following note, which I quote from a letter to me: "I intended some time, when revising my 'Address on Paleontological and Embryological Development,' to call the earliest common stage of echinoderm embryos, 'Echinula,' for convenience in making comparisons. — A. AGASSIZ."

MENTAL SCIENCE.

Aphasia.[1]

IN 1861 Broca suggested before the French Society of Anthropology that the only method of determining the functions of the brain was to co-ordinate marked symptoms during life with the lesions found in a post-mortem examination. Some months later he announced his belief that the third frontal convolution of the left hemisphere of the brain was the seat of spoken language, and described a case of a patient called 'Tan' because that was the only word he used, helping himself out with various gestures. He had no paralysis, and seemed to understand what was said to him. The posterior half of the second and third left frontal convolutions of the left hemisphere was the seat of the organic lesion. In the same year a quite similar case of a man with only such scraps of words as 'oui,' 'no,' etc., but with mental and motor powers intact, showed in the autopsy a definite lesion in the third frontal convolution of the left side of the brain. These remarkable cases drew attention to diseases of this kind; and in the end of 1863, eleven cases were on record in which the power of vocal speech was almost or entirely lost, the common anatomical element of each of which was a lesion in the posterior third of the third frontal convolution of the left hemisphere. Broca called this condition 'aphemia,' and gave as its symptoms the loss of the power to express ideas by vocal movements without any motor paralysis or mental impairment. He concluded that memory was not a single

[1] Abstract of an address delivered before the Anthropological Society at Paris by M. Mathias Duval, *Revue Scientifique*, Dec. 17, 1887.