medially. The vertical diameters of the sides differ, the inner being much greater, and both are concave. A strong foramen pierces the shaft just within the point of junction of the inner and medial free extremities.

Measurements.		M.
Transverse diameter of proximal end of tarsometatarsus		.100
Antero-posterior do. (partly inferential)		.070
Interval between penetrating foramina on anterior face shaft		.017
Median distal condyle	Long diameter	.050
	Vertical diameter	.048
	Transverse diameter	.040
Internal distal condyle	Long diameter	.037
	Vertical diameter	.040
	Transverse diameter	.031

The large size and wide separation of the penetrating foramina, and the thin internal edge with sutural articular facet, distinguish this form as distinct from any of the genera of Struthionidæ and Dinornithidæ. It is therefore named *Diatryma gigantea.*

On the Theory of Evolution.—Prof. COPE gave a history of the progress of the doctrine of evolution of animal and vegetable types. While Darwin has been its prominent advocate within the last few years, it was first presented to the scientific world, in a rational form, by Lamarck of Paris, at the commencement of the present century. Owing to the adverse influence of Cuvier, the doctrine remained dormant for half a century, and Darwin resuscitated it, making important additions at the same time. Thus Lamarck found the variations of species to be the primary evidence of evolution by descent. Darwin enunciated the law of "natural selection" as a result of the struggle for existence, in accordance with which "the fittest" only survive. This law, now generally accepted, is Darwin's principal contribution to the doctrine. It, however, has a secondary position in relation to the *origin* of variation, which Lamarck saw, but did not account for, and which Darwin has to assume in order to have materials from which a "natural selection" can be made.

The relations exhibited by fully grown animals and plants with transitional or embryonic stages of other animals and plants, had attracted the attention of anatomists at the time of Lamarck. Some naturalists deduced from this now universally observed phenomenon, that the lower types of animals were merely repressed conditions of the higher, or in other words, were embryonic stages become permanent. But the resemblances do not usually extend to the entire organism, and the parallels are so incomplete, that this view of the matter was clearly defective, and did not constitute an explanation. Some embryologists, as Lereboullet and Agassiz, asserted that no argument for a doctrine of descent could be drawn from such facts.

The speaker, not adopting either view, made a full investigation into the later embryonic stages, chiefly of the skeleton of the Batrachia, in 1865, and Prof. Hyatt, of Salem, Mass., at the same time made similar studies in the development of the Ammonites and Nautili. The results as bearing on the doctrine of evolution were published in 1869 (in "The Origin of Genera"). It was there pointed out, that the most nearly related forms of animals do present a relation of repression and advance, or of permanent embryonic and adult type, leaving no doubt that the one is descended from the other. This relation was termed *exact parallelism*. It was also shown, that, if the embryonic form were the parent, the advanced descendant was produced by an increased rate of growth, which phenomenon was called *acceleration;* but that if the embryonic type were the offspring, then its failure to attain to the condition of the parent is due to the supervention of a slower rate of growth; to this phenomenon the term *retardation* was applied. It was then shown that the *inexact parallelism* was the result of *unequal* acceleration or retardation; that is, acceleration affecting one organ or part more than another, thus disturbing the combination of characters, which is necessary for the state of *exact parallelism* between the perfect stage of one animal, and the transitional state of another. Moreover, acceleration implies constant addition to the parts of an animal, while retardation implies continual subtraction from its characters, or atrophy. He had also shown (Method of Creation, 1871), that the additions either appeared as *exact repetitions* of preëxistent parts, or as *modified repetitions*, the former resulting in simple, the latter in more complex organisms.

Professor Haeckel, of Jena, has added the keystone to the doctrine of evolution in his gastræa theory. Prior to this generalization, it had been impossible to determine the true relation existing between the four types of embryonic growth, or, to speak otherwise, than that they are inherently distinct from each other. But Haeckel has happily determined the existence of identical stages of growth (or segmentation) in all of the types of eggs, the last of which is the *gastrula;* and beyond which the identity ceases. Not that the four types of gastrula are without difference, but this difference may be accounted for, on plain principles. In 1874, Haeckel, in his Anthropogenie, recognizes the importance of the irregularity of time of appearance of the different characters of animals, during the period of growth, as affecting their permanent structure. While maintaining the view that the low forms represent the transitional stages of the higher, he proceeds to account for the want of exact correspondence exhibited by them at the present time, by reference to this principle. He believes that the relation of parent and descendant has been concealed and changed by subsequent modifications of the order of appearance of characters in growth. To the original, simple descent he applies the

term *palingenesis;* to the modified and later growth, *cœnogenesis.* The causes of the change from palingenesis to cœnogenesis, he regards as three, viz.: acceleration, retardation, and heterotopy.

It is clear that the two types of growth distinguished by Prof. Haeckel are those which had been pointed out by Prof. Cope in "The Origin of Genera," as producing the relations of "exact" and "inexact parallelism;" and that his explanation of the origin of the latter relation by acceleration or retardation is the same as that of the latter essay. The importance which he attaches to the subject was a source of gratification to the speaker, as it was a similar impression that led to the publication of "The Origin of Genera" in 1869.

It remains to observe that the phenomena of exact parallelism or palingenesis, are quite as necessarily accounted for on the principle of acceleration or retardation, as are those of inexact parallelism or cœnogenesis. Were all parts of the organism accelerated or retarded at a like rate, the relation of exact parallelism would never be disturbed; while the inexactitude of the parallelism will depend on the number of variations in the rate of growth of different organs of the individual, with additions introduced from time to time. Hence it may be laid down, that *synchronous acceleration* or *retardation* produces exact parallelism, and *heterochronous acceleration* or *retardation*, produces inexact parallelism.

In conclusion, it may be added that acceleration of the segmentation, the protoplasma or animal portion of the primordial egg, or retardation of segmentation of the deutoplasma or vegetative half of the egg, or both, or the same relation between the growth of the circumference and centre of the egg, has given rise to the four types which the segmentation now presents.

An analysis of the laws of evolution may be tabulated as follows:—

		Exact parallelism, the product of *Palingenesis*, which is *synchronous*....	*Inexact parallelism*, the product of *Cœnogenesis*, which is *heterochronous*....
acceleration, which proceeds by	Exact repetition	*	*
	Modified repetition	*	*
	Heterotopy	*	*
retardation, which proceeds by	Exact atrophy	*	*
	Inexact atrophy (or senility)[1]	*	*

[1] So called by Professor Hyatt.