type of unilocular sporangium. It is therefore impracticable to connect Cycas with Isoetes, on account of the sporangial structure, and either an independent development of heterospory must be assumed for the Cycadaceæ or they must be connected with the Coniferæ and traced back to Selaginella. That is, the evidence on the whole points to an independent deve opment in Cycadaceæ, and also probably in Gingkoaceæ, of multiciliate spermatozoids. This conclusion is borne out by the marked peculiarities of Cycad and Gingko spermatozoids as described by Ikeno, Hirase and Webber, although important resemblances between the development of the spermatozoid in Zamia, as described by Webber, and in Equisetum, as described by Belajeff, must be conceded.

The researches most needed at present are upon the genesis of the sperm-nucleus in Coniferæ and Gnetales to discover whether bodies which might be regarded as reduced blepharoplasts are present, and if so whether they indicate a multiciliate or biciliate spermatozoid in primitive Taxaceæ.

In general, it may be said that the polyphyletic theory of the origin of the gymnosperms is strengthened by the new researches, but it remains more difficult than before to include Isoetes-like forms among the probable ancestors of seed-plants. In addition, the very considerable differences between gymnospermous and angiospermous seeds arising from the wide variance in endosperm formation, together with the singular inversion (?) of the female plant in VanTieghem's Basigameæ and the suppression of the ovule in his Inovuleæ and of the nucellus in the Innucelleæ, together justify the view that the Spermatophyta is not a homogeneous group, but is purely ecological, comprising groups of widely different phylogeny, but, in general, similar adaptations arising under what I have previously termed symbiotic alternation of generations.

Conway MacMillan.

PALEONTOLOGICAL NOTES.

Among the recent papers of Mr. A. Smith Woodward, of the British Museum, are several matters of general interest in paleontology. Referring to Professor Marsh's discussion at Ipswich of the 'Jurassic Age of the Wealden Vertebrate Fauna,' Mr. Woodward has listed the Wealden fishes very carefully, and concludes as follows:*

"The result is, therefore, that all the known English Wealden fishes are survivors of typically Jurassic genera, except *Neorhombolepis* and *Cœlodus*, and these are their little-modified representatives. None but *Belonostomus* appear to range throughout the Cretaceous. In fact, the Wealden estuary seems to have been the last refuge of the Jurassic marine fish fauna in this part of the world, not invaded even by stragglers from the dominant race of higher fishes which characterized all the seas of the Cretaceous period. The Wealden river drained a land where a typically Jurassic flora flourished; the only two known Mammalian teeth from the Wealden resemble those of a Purbeckian genus, and now it is clear that the fishes agree both with these and the reptiles in their alliance with the life of the Jurassic era."

The second note relates to the occurrence of a gigantic Pterodactyl in the Cretaceous of Bahia, Brazil, and concludes with the following note:†

"Not being able to determine the genus of the Brazilian Cretaceous Pterodactyl, it is equally impossible to estimate the size of the skull or the animal itself from a single bone. There is too much variation from the proportions of the snout and the relative dimensions of the head among Pterodactyls to admit of any such induction. To judge by Marsh's figure of the skull of *Pteranodon*, however, the Brazilian form must have even exceeded in size the gigantic species of this North American genus, of which the head sometimes attains a length of four feet."

* 'On the Affinities of the English Wealden Fish-Fauna.' *Geol. Mag.*, Vol. III., No. 380, p. 69.

† 'On the Quadrate Bone of a Gigantic Pterodactyl,' etc. *Annals and Magazine of Natural History*, Ser. 6, Vol. XVII., 1896.

In a third paper appears the translation of Ameghino's recent summary of his researches upon the geology and paleontology of Argentina,* followed by a critical review of the same by the writer, who has recently examined the Argentine collections. He does not accept the evidence of the very great age assigned to the 'Pyrotherium' and overlying Beds and urges "that Señor Ameghino should show quite clearly why Pyrotherium cannot be a close ally of the large Australian Diprotodonts. It certainly differs from the Proboscidia in some of the most fundamental characters." In the Red Sandstones with Dinosaurian remains Dr. Santiago Roth has recently brought back a fine collection of small reptilia.† One of these is a typical and apparently fully-evolved snake, which the author had no time to study in detail. The others are small crocodilia, particularly interesting because they are typical Mesosuchia with the characteristic palate and amphicœlous vertebral centra. They seem to be most closely related to the small Purbeckian *Theriosuchus* and its allies, differing, among other features, in their more highly specialized dentition, and referable to a new genus, which the author names *Notosuchus*.

Another important note‡ relates to a new specimen of *Sterosternum tumidum* from the State of San Paulo, Brazil, interesting as showing for the first time the general proportions of the trunk and tail of this strange extinct reptile. Stereosternum was originally described by Professor Cope in 1886, and in the same year Dr. Baur made it a type of the new Reptilian order termed Proganosauria. It is now evident, according to Woodward, that the animal is related in some undetermined way to the ancestry of the Plesiosauria. The head is of an elongate triangular form, but much shorter than the neck. The tail possesses not less than sixty vertebræ, of which the foremost seven bear robust transverse processes. As a whole the tail is thus somewhat more than twice as long as the trunk, occupying slightly less than three-fifths of the length of the entire animal. Dr. Derby has also obtained a typical Labyrinthodont tooth from the Silicious Limestones at Conchas. "In fact," Mr. Woodward concludes, "evidence is gradually accumulating to render it still more certain that the Karoo Series of South Africa is well represented by homotaxial deposits in the south of Brazil and in parts of the Argentine Republic."

A new specimen of Ceraterpeton* from the Coal Measures of Castlecomer, Kilkenny, Ireland, is the second example from the typical locality of Huxley's original description thirty years ago. This specimen found by Mr. Robertson is of special importance in making known for the first time many characters of the scapular arch and limbs. It now appears that the amended definition based by Fritsch upon specimens from the lower Permian of Bohemia does not apply to the genus with which Huxley was dealing when he originally proposed the name. The generic name *Scincosaurus* originally applied by Fritsch to his Bohemian specimens ought thus to stand. The skull from the Coal Measures of Ohio described by Cope under the name *C. lennicorne* seems, however, to be correctly placed here; but of this animal the trunk still remains unknown.

H. F. O.

* 'Geology and Paleontology of Argentina.' *Geological Magazine*, Vol. IV., No. 391, p. 4, 1897.

† Ceraterpeton Galvani, Huxley. *Geological Magazine*, July, 1897.

‡ Stereosternum from Brazil. *Geological Magazine*, March and April, 1897.

*Ceraterpeton Galvani, Huxley. *Geological Magazine*, July, 1897.

CURRENT NOTES ON ANTHROPOLOGY.

DEFORMED SKULLS FROM GUATEMALA.

AT a recent meeting of the Berlin Anthropological Society Professor Virchow ex-