and that the differentiation of the rodlet- and ganglion-cells takes place very early.

With reference to the function of this organ in general I am firmly convinced that it does not belong to the category of the so-called olfactory organs of the antenna. I think that my investigations prove that the nerve-endings are situated in such a way that each movement of the distal portion of the antenna, whether in consequence of pressure or tension (Zerrung), must cause a stimulus to be imparted to them. As has been determined by numerous observations and experiments, many insects exhibit with their antennæ a reaction to sound.

It is true that in many instances these observations are not free from error; but in spite of this it appears to be very probable that, at any rate in the case of many insects, an auditory organ is connected with the antenna. In my opinion the organ which I have investigated may be the auditory organ in question. It was, moreover, years ago regarded as such in the case of the Nematocera.

The presence of an organ of this nature in the Orthoptera might perhaps tell against this view, since these insects besides these structures also possess others, the tympanic organs, which are usually regarded as an auditory apparatus. Nevertheless I will here merely recall the experiments of Graber*, who found that Orthoptera, even after the excision of the tympanic organs, were still sensitive to sound, and moreover exhibited the reaction with their antennæ, in certain cases also with the legs.

It appears to me that this organ, if susceptible to very small sound-movements, is also stimulated by coarser shocks, *e.g.* by contact of the antenna with a solid object; in short, that in this case there is no sharp distinction between auditory and tactile sensation.

Since it was impossible for me to foresee that the investigation would extend so far, I collected but little fresh material during the past summer, and was later on prevented from acquiring more in consequence of the advanced season of the year. I intend, however, to ascertain precisely the range of this organ, and to determine its function if possible by experiment. The results of these investigations I purpose to treat in greater detail in a subsequent paper.—*Zoologischer Anzeiger*, xvii. Jahrg., No. 439, February 5, 1894, pp. 35–38.

*Researches on the Structure, Organization, and Classification of the Fossil Reptilia.*—Part IX. Section 1. *On the Therosuchia.* By H. G. Seeley, F.R.S.

This paper discusses the classification of reputed Permian and Triassic Reptilia which have been referred to the Anomodontia as Theriodonts.

*Lycosaurus*, as the genus placed first on Sir R. Owen's list, is accepted as the type of the Theriodontia. The species *Lycosaurus*

* Graber, "Ueber die Tympanalsinnesorgane der Orthopteren," Denkschr. der k. Akad. zu Wien, nat.-wiss. Theil, 1876; and other papers.

*curvimola* is regarded as the type of the genus, being the only species in which its characters are fully shown. *Galesaurus planiceps*, which was the type of the Cynodontia, is probably distinct from *Nythosaurus larvatus*, and from Sir R. Owen's second type of *Galesaurus planiceps* of 1887, which is referred to as *Thrinaxodon liorhinus*. *Ælurosaurus felinus* agrees with *Galesaurus* in having a transverse development of bones of the palate, regarded as palatine and transverse, which abut toward the inner side of the lower jaw. The palate in this genus is found to be covered with groups of small teeth with conical crowns, which are unknown in *Lycosaurus*. The palate of *Lycosaurus curvimola* is found and described in the type specimen. It shows a transverse development of the palatine arch abutting against the lower jaw, behind which is a long compressed sphenoidal keel flanked by narrow pterygoid bones. The occipital condyles do not appear to be prominently developed in *Lycosaurus*. The genus is regarded as the type of a division of the Theriodontia, defined by having the molar teeth pointed and without cusps. A snout from Tamboer, named *Pristerognathus polyodon*, is referred to this group. It is characterized by six incisor teeth in each premaxillary bone and three incisor teeth in each ramus of the mandible, followed by canine teeth and small molars of Lycosaurian type.

Professor Cope's definition of the Theriodontia as distinguished from the Anomodontia by characters of the post-orbital arch is regarded as unsupported by evidence. The author would limit the Theriodontia to animals which conform to Sir R. Owen's original definition based on the dentition (1876), and have temporal vacuities and a small quadrate bone. It would then include the Lycosauria, with type *Lycosaurus curvimola*; the Cynodontia, with *Cynognathus crateronotus* (sp. n.) and *Thrinaxodon liorhinus* as types; and a group of South-African Reptiles named Gomphodontia, based upon new genera *Gomphognathus* and *Trirachodon*, which have the molar teeth with flattened cuspidate crowns more or less worn with use. The palate is formed on the type of *Lycosaurus* in these Theriodontia.

*Gorgonops* is closely allied to Theriodonts in its dentition (though no molar teeth are known). The skull is closed behind as in *Kistecephalus*, and the temporal vacuities are roofed. It appears to show a palate formed on the same plan as in Theriodontia so far as its transverse development is concerned, but it has not any hard palate extending above the posterior nares as in Theriodontia. It is regarded as the type of a distinct group, named Gorgonopsia.

The Pareiasauria have the same transverse palatine arch, abutting against the lower jaw, but not developed downward to the same extent, as in Theriodontia. Its hard palate appears to be carried back behind the teeth, so that the posterior nares are further back than in the Theriodontia. It differs from the Theriodontia in the slight development of the coronoid process of the lower jaw, and in having the temporal vacuities roofed; and from the Gorgonopsia in having the skull open behind, and in having no canine teeth.

The Endothiodont type is believed to show the transverse descending palatal arch between the rami of the mandible. *Pristerodon* is regarded as possibly Endothiodont; and *Endothiodon uniseries* is

made the type of a genus *Esoterodon*. A small skull from Molteno Pass, *Cryptocynodon simus* (sp. n.), is regarded as an Endothiodont with imperfectly-developed canine teeth The Endothiodontia have no incisor teeth, have the hard palate imperfectly developed, and no coronoid process to the lower jaw.

Another South-African group is regarded as indicated by *Delphinognathus*, *Tapinocephalus*, and a new genus named *Dinocephalus*, which has the largest tusks known in any South-African genus, associated with small molars. In the typical genera the skull-bones are very thick and the temporal vacuities small. *Æluro-saurus* is probably to be placed in this group. It is referred to as Dinocephalia.

Thus there is a series of groups of South-African Reptilia which appear to agree in having a palate which has some resemblances to Mammals but approximates to *Sphenodon*, Lizards, and Crocodiles. All these sub-orders are combined as the Therosuchia. In this order or group may be included the Deuterosauria from the Permian rocks of Russia.

The Deuterosauria is distinguished from the Theriodontia by having palato-nares which open by oval vacuities on a concave surface instead of behind a hard palate. The transverse palatine arch is not developed downward. The sphenoidal region is at an angle with the palate, and in the same plane with the occiput.

Finally, the names given by Professor Cope to allied American types are examined. It appears that the Theromora as hitherto used is a synonym of the Anomodontia, though it might be conveniently limited to the American types, which appear to be distinct from those of Africa and Europe. But it is not possible to use either that name or the names Pelycosauria or Cotylosauria till the characters of the groups they indicate are adequately defined by good characters.

The relation of the Therosuchia to other Anomodontia is shown in the following grouping :—

ANOMODONTIA.

THEROSUCHIA.
- Pareiasauria.
  - Procolophonia.
- Gorgonopsia.
- Dinocephalia.
- Deuterosauria.
- Theriodontia.
  - Lycosauria.
  - Cynodontia.
  - Gomphodontia.
- Endothiodontia.
- [Theromora.]

THEROCHELONIA.
- Dicynodontia.
- Kistecephalia.

MESOSAURIA.

—*From the Proceedings of the Royal Society.* (Communicated by the Author.)



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