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A RE-EVALUATION OF THE SYSTEMATICS AND MORPHOLOGY OF CERTAIN ANOMODONT THERAPSIDA

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The cranial morphology of a number of specimens assigned to the genera *Oudenodon, Rhachiocephalus, Aulacephalodon* and *Pelanomodon* was investigated (Keyser, 1969). It was found that the internal morphology and the general structure of the skulls show great agreement. Many of the differences between the genera can be associated with the size of the skull. The main differences between the genera lie in the specialisation of the biting mechanism and in the relative size and shape of the nasal and prefrontal bosses. It is suggested that the genera *Oudenodon* and *Rhachiocephalus* bit off their food with the sides of the horn-covered jaws while the broad-nosed genera *Aulacephalodon* and *Pelanomodon* bit with the transverse anterior tips of the jaws. This difference in the morphology of the jaws is probably indicative of a fundamental dichotomy between the two groups of genera. A similar dichotomy has been suggested for Triassic dicynodonts by Cox (1965).

The skulls of *Oudenodon* and *Rhachiocephalus* have much in common and many of the differences between them can be attributed to differences in the relative sizes of the animals. *Rhachiocephalus* has a large boss surrounding the parietal foramen and a very small fenestra ovalis. The snouts of these two genera are pointed and the lower jaws do not have very pronounced shovel-like tips. These two features indicate that most of the biting took place at the sides of the jaws.

All the available type-specimens of this group of Anomodontia of which *Oudenodon kolbei* is the best known representative, were examined. *Oudenodon baini* Owen (1855) is the type species of the genus. The following South African species are placed in the genus *Oudenodon: Oudenodon baini* Owen, *O. prognathus* Owen, *O. greyi* Owen, *O. brevirostris* Owen, *O. strigiceps* Owen, *O. megalops* Owen, *O. truncatus* Broom, *O. gracilis* Broom, *O. bolorhinus* Broom, *O. kolbei* Broom, *Dicynodon lutriceps* Broom, *D. planus* Broom, *D. platyceps* Broom, *D. halli* Watson, *D. mustonis* Haughton, *D. breviceps* Haughton, *D. cyclops* Haughton, *D. grandis* Haughton, *D. corstorphinei* Broom and Haughton, *Chelyrhynchus lachrymalis* Haughton, *Dicynodon schwarzi* Broom, *D. curtus* Broom, *D. andrewsi* Broom, *D. milletti* Broom, *D. vanderbyli* Broom, *D. wilmanae* Broom, *D. latirostris* Broom, *Oudenodon margaritae* van Hoepen, *O. marlothi* Broili and Schröder, *Dicynodon wellwoodensis* Broom, *D. allani* Broom, *D. maccabei* Broom, *D. glaucops* Broom, *D. moutonae* Broom, *D. brachyrhynchus* Broom, and *D. robertsi* Broom.

The following species from the Upper Madumabisa Mudstone of Zambia are also placed in the genus *Oudenodon*, viz. *Dicynodon luangwaensis* Boonstra, *D. helenae* Boonstra, *D. euryceps* Boonstra and *D. parabreviceps* Boonstra.

Examination of a series of 20 specimens collected in a delimited area north of Graaff-Reinet from *Cistecephalus*-bearing strata showed that the characters used to distinguish the various species are subject to individual variation and deformation. It was found that all the types listed above are within the range of variation exhibited by this series.

Attention is drawn to the fact that all the species previously assigned to *Oudenodon* from the Karroo basin are very similar indeed and that most of the species mentioned above could be synonyms. The Zambian species are possibly all synonymous but differ from the South African species in having broader skulls.

Dicynodon huenei Broili and Schröder (*Oudenodon huenei*), a small species from the *Tapinocephalus* zone of Beaufort West, is tusked, unlike all the species listed above and accordingly will be placed in a new genus, of which a diagnosis will be given in due course.

The genera *Rhachiocephalus, Eocyclops, Neomegacyclops, Platycyclops, Pelorocyclops* and *Kitchingia* appear to be indistinguishable because of similarities in structure which are discussed. The genera were originally distinguished from one another on the structure and relationship of the preparietal, which was found to be highly variable in a group of specimens from a single locality. There is some doubt about this as the variation of the interpterygoid vacuity has not been studied sufficiently.

The skull of *Aulacephalodon* is fairly short and broad. The transverse anterior tip of the short snout is reinforced by anterior longitudinal palatal ridges and ridges on the external surface of the snout. This indicates that most of the biting action of the jaws was restricted to the tips of the jaws. The great widening of the zygomatic arches

posterior to the postorbital bars and the formation of bosses on the zygomatic arches can be attributed to this biting mechanism. It was found that the characters used to distinguish the various species of *Aulacephalodon* depend greatly on the size and consequently the age of the individual.

Because of this, the 16 named species of *Aulacephalodon* are found to be indistinguishable and the possibility that they are all synonyms deserves consideration.

The skull of *Pelanomodon* is very similar to that of *Aulacephalodon* but is tuskless. The similarity is probably the result of the similar biting mechanism. The very large nasal and prefrontal bosses, the presence of two lacrimal foramina in each orbit and the high placement of the orbits and nares in the skull indicate that the animal could have fed amongst vegetation in shallow water.

The taxonomy of the *Pelanomodon*-like anomodonts was investigated. It was found that *Pelanomodon rubidgei* and *P. kitchingi* are probably synonymous. *P. halli* was found to be very different from the above 2 species and very similar to *P. moschops* (Broom). *P. wesselsi* is placed in the genus *Rhachiocephalus*. *Propelanomodon devilliersi* Toerien (1955b) was found to be synonymous with *Dicynodon tylorhinus* Broom. This species should therefore be called *Propelanomodon tylorhinus* (Broom). The genus *Propelanomodon* is related to *Oudenodon* rather than to *Pelanomodon*.

The possibility is that all the genera treated in this paper are descended from a *Robertia broomiana*-like ancestor.

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A NOTE ON THE GENUS *PROPLACERIAS* CRUICKSHANK, 1970.

Since writing the review of the genus *Kannemeyeria* (Cruickshank 1970, pp. 47–55) a cast of the type of *Proplacerias vanhoepeni* (Camp) has been received for examination as part of the programme in the Bernard Price Institute for Palaeontological Research for making types of South African fossils available for study here (Camp 1956, p. 311).

Even a superficial glance at the cast shows that it is unmistakeably a member of the genus *Kannemeyeria*, and probably another specimen of the hitherto monotypic species *K. wilsoni* (Broom 1937). In the review of the genus *Kannemeyeria, K. wilsoni* was recognised as probably being distinct from *K. simocephalus* (Weit.) but the possibility exists that it is the female of *K. simocephalus* (Cruickshank 1970, p. 51).

The side of the skull which is visible in dorsal view in Camp's figures is dorso-ventrally crushed and the orbital border has been extensively re-modelled in plaster of paris. The snout has been pushed backwards and the palate is distorted. Labial fossae are present and the upper surface of the intertemporal bar has been weathered to expose the interparietal in an unnatural manner. The snout does not have a prominent longitudinal ridge, nor are the maxillary flanges as well developed as in *Kannemeyeria simocephalus*. The relevance of the horizontal jaw-tip in the type of *K. wilsoni*, as opposed to the normal, upturned tip in this specimen must be re-assessed.

Therefore as all the distinguishing characters of the genus *Proplacerias* are false, it must be placed into synonymy with the genus *Kannemeyeria* Seeley. Nonetheless, it is clear that the major conclusions reached on p. 51 and in figure 4 (Cruickshank 1970) are still valid and that the evolutionary lines leading to *Placerias* and *Kannemeyeria* are distinct.

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