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**GEOLOGY AND PALAEOBIOLOGY OF THE
NORTHERN SPERRGEBIET, NAMIBIA**

by

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Bibliography of the Early Miocene Palaeontology of the Sperrgebiet, Namibia

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The palaeontological literature on the Early Miocene of the northern Sperrgebiet comprises over 50 papers. There was a short lived flurry of activity between 1920 and 1930, after which there was extremely little published until the last decade of the 20th century. The few papers that appeared in the 1950's, 1960's and 1970's usually referred to the Sperrgebiet fossils in passing, or while comparing them with material from East Africa. Half the total number of papers has appeared since 1990.

- Ahl, E. 1926. Anura, Aglossa, Xenopodidae In: E. Kaiser (ed.) *Die Diamantenwüste Südwest-Afrikas*, 2, 141-142, D. Reimer, Berlin.
- Anton, M. 2003. Reconstructing fossil mammals from Arrisdrift (17-17.5 Ma), Namibia. *Mem. Geol. Surv. Namibia*, **19**, 389-394.
- Azanza, B., Morales, J. and Pickford, M. 2003. On the nature of the multibranched cranial appendages of the climacoceratid *Orangemeryx hendeyi*. *Mem. Geol. Surv. Namibia*, **19**, 345-357.
- Bamford, M. 2003. Fossil woods from Auchas and their palaeoenvironment. *Mem. Geol. Surv. Namibia*, **19**, 23-34.
- Beetz, W. 1926. Die Tertiärablagerungen der Küsten-namib. In: E. Kaiser (ed.) *Die Diamantenwüste Südwest-Afrikas*, 2, 1-54, Berlin, Reimer.
- Braestrup, F.W. 1935. Remarks on climatic change and faunal evolution in Africa. *Zoogeographica*, **2**, 484-494.
- Butler, P. 1984. Macroscelidea, Insectivora and Chiroptera from the Miocene of East Africa. *Palaeovertebrata*, **14**, 117-200.
- Butler, P. 1995. Fossil Macroscelidea. *Mammal Review*, **25**, 3-14.
- Cooke, H.B.S. 1955. Some fossil mammals in the South African Museum collections. *Ann. S. Afr. Mus.*, **42**, 161-168.
- Cooke, H.B.S. 1968. The fossil mammal fauna of Africa. *Quarterly Revue of Biology*, **43**, 234-264.
- Cooke, H.B.S. 1972. The fossil mammal fauna of Africa. In: A. Keast (Ed.) *Evolution, Mammals and Southern Continents*, pp. 89-139. Albany, State University of New York.
- Corbett, I. 1989. *The Sedimentology of Diamondiferous Deflation Deposits within the Sperrgebiet, Namibia*. PhD Thesis, Univ. Cape Town, 430 pp.
- Corbett, I., Ward, J., Pickford, M. and McMillan, I. 1995. Applications of sequence stratigraphy to the high-energy, arid continental margin of southwestern Africa. *Centennial Geocongress (1995) Geol. Soc. S. Afr.* p. 871, Rand Afrikaans Univ. Johannesburg, S. Afr.
- Dawson, M. 1967. Lagomorph history and the stratigraphic record. In: *Essays in Palaeontology and Stratigraphy*, R.C. Moore Commem. Vol. Univ. Kansas Dept Geol. Publ., **2**, 287-316.
- de Broin, F. 2003. Miocene Chelonians from southern Namibia. *Mem. Geol. Surv. Namibia*, **19**, 67-102.
- Flynn, L., Jacobs, L. and Sen, S. 1983. La diversité de *Paraulacodus* (Thryonomyidae, Rodentia) et des groupes apparentés pendant le Miocène. *Ann. Paléont.*, **69**, 355-366.
- Greenman, L. 1966. *The Geology of Area 2615C Lüderitz, South West Africa*. MSc Thesis, University of Cape Town, 117 pp.
- Greenman, L. 1970. The Elizabeth Bay Formation, Lüderitz, and its bearing on the genesis of dolomite. *Trans. Geol. Soc. S. Afr.*, **73**, 115-121.
- Guérin, C. 2003. Miocene Rhinocerotidae of the Orange River Valley, Namibia, *Mem. Geol. Surv. Namibia*, **19**, 257-281.
- Guérin, C. 2003. Palaeoecological study of Arrisdrift Mammals. *Mem. Geol. Surv. Namibia*, **19**, 385-388.
- Hamilton, R. and Van Couvering, J.A. 1977. Lower Miocene mammals of South West Africa. *Namib. Bull. (Suppl. Transv. Mus. Bull.)*, **2**, 9-11.
- Heissig, K. 1971. *Brachypotherium* aus dem Miozän von Südwestafrikas. *Mitt. bayer. Staatsamml. Paläont. hist. geol.*, **11**, 125-128.
- Hopwood, A.T. 1928. New and little known mammals from the Miocene of Africa. *Am. Mus. Novitates*, **344**, 1-9.
- Hopwood, A.T. 1929. A review of the fossil mammals of central Africa. *Am. J. Sci.*, **5**, 101-118.
- Kalbskopf, S. 1977. The Klinghardt Breccia Pipes and Freshwater Limestone Depressions. *Unpublished Report, Consolidated Diamond Mines of South West Africa (Pty) Ltd. Sperrgebiet Geological Investigation*, pp. 1-35 (Namdeb archives ref. 78125).
- Lambrecht, K. 1933. *Handbuch der Palaeornithologie*. Borntraeger Verlag, Berlin, 1029 p.
- Lavocat, R. 1973. Les rongeurs du Miocène d'Afrique

- Orientale. *Mém. Trav. E.P.H.E. Inst. Montpellier.*, **1**, 1-284.
- Liddle, R.S. 1971. The Cretaceous deposits of the North West Sperrgebiet. *Unpublished Report, Consolidated Diamond Mines of South West Africa (Pty) Ltd. Sperrgebiet Geological Investigation*, pp. 1-22 (Namdeb archives ref. 78127).
- MacInnes, D.G. 1953. The Miocene and Pleistocene Lagomorpha of East Africa. *Foss. Mamm. Afr.*, **6**, 1-30.
- Mein, P. and Pickford, M. 2003. Fossil Bat (Microchiroptera, Mammalia) from Arrisdrift, Namibia. *Mem. Geol. Surv. Namibia*, **19**, 115-117.
- Mein, P. and Pickford, M. 2003. Insectivora from Arrisdrift, a basal Middle Miocene locality in Southern Namibia. *Mem. Geol. Surv. Namibia*, **19**, 143-146.
- Mein, P. and Pickford, M. 2003. Fossil Picas (Ochotonidae, Lagomorpha, Mammalia) from the Basal Middle Miocene of Arrisdrift, Namibia. *Mem. Geol. Surv. Namibia*, **19**, 171-176.
- Mein, P. and Pickford, M. 2003. Rodentia (other than Pedetidae) from the Orange River deposits, Namibia. *Mem. Geol. Surv. Namibia*, **19**, 147-160.
- Mein, P. and Senut, B. 2003. The Pedetidae from the Miocene site of Arrisdrift, Namibia. *Mem. Geol. Surv. Namibia*, **19**, 161-170.
- Meyer, G. 1978. Hyracoidea. In: V.J. Maglio and H.B.S. Cooke (Eds) *Evolution of African Mammals*, pp. 284-314. Cambridge, Harvard University Press.
- Meylan, P.A. and Auffenberg, W. 1986. New land tortoises (Testudines, Testudinidae) from the Miocene of Africa. *Zool. J. Linn. Soc.*, **86** (3), 279-307.
- Morales, J., Pickford, M., Fraile, S., Salesa, M.J. and Soria, D. 2003. Creodonts and Carnivora from Arrisdrift, early Middle Miocene of Southern Namibia. *Mem. Geol. Surv. Namibia*, **19**, 177-194.
- Morales, J., Pickford, M. and Soria, D. 1998. A new creodont *Metapterodon stromeri* nov. sp. (Hyaenodontidae, Mammalia) from the early Miocene of Langental (Sperrgebiet, Namibia). *C. R. Acad. Sci. Paris*, **327**, 633-638.
- Morales, J., Soria, D., Nieto, M., Pelaez-Campomanes, P. and Pickford, M. 2003. New data regarding *Orangeremeryx hendeyi* Morales et al., 2000, from the type locality, Arrisdrift, Namibia. *Mem. Geol. Surv. Namibia*, **19**, 305-344.
- Morales, J., Soria, D. and Pickford, M. 1995. Sur les origines de la famille des Bovidae (Artiodactyla, Mammalia). *C. R. Acad. Sci. Paris*, **321**, 1211-1217.
- Morales, J., Soria, D. and Pickford, M. 1999. New stem giraffoid ruminants from the Lower and Middle Miocene of Namibia. *Geodiversitas*, **21**, 229-254.
- Morales, J., Soria, D. and Pickford, M. 2003. Tragulidae from Arrisdrift (basal Middle Miocene of Namibia). *Mem. Geol. Surv. Namibia*, **19**, 359-370.
- Morales, J., Soria, D., Pickford, M. and Nieto, M. 2003. A new genus and species of Bovidae (Artiodactyla, Mammalia) from the early Middle Miocene of Arrisdrift, Namibia, and the origins of the family Bovidae. *Mem. Geol. Surv. Namibia*, **19**, 371-384.
- Mourer-Chauviré, C. 2003. Birds (Aves) from the middle Miocene of Arrisdrift (Namibia). Preliminary study with description of two new genera: *Amanguensis* (Accipitridae, Sagittariidae) and *Namibiavis* (Gruiformes, Idiornithidae). *Mem. Geol. Surv. Namibia*, **19**, 103-113.
- Mourer-Chauviré, C., Senut, B., Pickford, M. and Mein, P. 1996. Le plus ancien représentant du genre *Struthio* (Aves, Struthionidae), *Struthio coppensi* n. sp. du Miocène inférieur de Namibie. *C. R. Acad. Sci. Paris*, **322**, 325-332.
- Mourer-Chauviré, C., Senut, B., Pickford, M., Mein, P. and Dauphin, Y. 1996. Ostrich eggs, legs and phylogenies. *S. Afr. J. Sci.*, **92**, 492-495.
- Otero, O. 2003. Fossil fish from Arrisdrift (Middle Miocene, Namibia). *Mem. Geol. Surv. Namibia*, **19**, 35-42.
- Patterson, B. 1965. The fossil elephant shrews (Family Macroscelididae). *Bull. Mus. Comp. Zool. Harvard*, **133** (6), 295-336.
- Pickford, M. 1984. A revision of the Sanitheriidae (Suiformes, Mammalia). *Geobios*, **17**, 133-154.
- Pickford, M. 1986. A revision of the Miocene Suidae and Tayassuidae of Africa. *Tertiary Res. Spec. Pap.*, **7**, 1-83.
- Pickford, M. 1994. A new species of *Prohyrax* (Mammalia, Hyracoidea) from the Middle Miocene of Arrisdrift, Namibia. *Communs. Geol. Surv. Namibia*, **9**, 43-62.
- Pickford, M. 1995. Palaeontology. In: J. Pallet (ed.) *The Sperrgebiet: Namibia's Least Known Wilderness*, pp. 33-37. Windhoek, DRFN and NAMDEB.
- Pickford, M. 1997. Lower Miocene Suiforms from the northern Sperrgebiet, Namibia. *C. R. Acad. Sci. Paris*, **325**, 285-292.
- Pickford, M. 1998. Onland Tertiary marine strata in southwestern Africa: eustasy, local tectonics and epeirogenesis in a passive continental margin setting. *S. Afr. J. Sci.*, **94**, 5-8.
- Pickford, M. 2000. Neogene and Quaternary vertebrate biochronology of the Sperrgebiet and Otavi Mountainland, Namibia. *Communs. Geol. Surv. Namibia*, **12**, 359-366.
- Pickford, M. 2001. The biochronological importance of Kubanochoerinae (Mammalia, Suidae) together with a description of new material of *Megalochœrus khinzikebirus* and *Libycochoerus massai* from Kenya. *C. R. Acad. Sci. Paris*, **332**, 193-201.
- Pickford, M. 2003. A new species of Crocodile from Early and Middle Miocene deposits of the lower Orange River Valley, Namibia, and the origins of

- the Nile Crocodile (*Crocodylus niloticus*). *Mem. Geol. Surv. Namibia*, **19**, 43-50.
- Pickford, M. 2003. Minute species of *Orycteropus* from the early Middle Miocene at Arrisdrift, Namibia. *Mem. Geol. Surv. Namibia*, **19**, 195-198.
- Pickford, M. 2003. Middle Miocene Hyracoidea from the lower Orange River Valley, Namibia. *Mem. Geol. Surv. Namibia*, **19**, 199-206.
- Pickford, M. 2003. New Proboscidea from the Miocene strata of the lower Orange River Valley, Namibia. *Mem. Geol. Surv. Namibia*, **19**, 207-256.
- Pickford, M. 2003. Suidae from the Middle Miocene of Arrisdrift, Namibia. *Mem. Geol. Surv. Namibia*, **19**, 291-303.
- Pickford, M. 2003. Early and Middle Miocene Anthracotheriidae (Mammalia, Artiodactyla) from the Sperrgebiet, Namibia. *Mem. Geol. Surv. Namibia*, **19**, 283-290.
- Pickford, M. 2003. References pertaining to the Terrestrial Miocene Palaeontology of the Namib Desert and the Sperrgebiet, Namibia. *Mem. Geol. Surv. Namibia*, **19**, 395-398.
- Pickford, M. 2004. Miocene Sanitheriidae (Suiformes, Mammalia) from Namibia and Kenya : systematic and phylogenetic implications. *Ann. Paléont.*, **90**, 223-278.
- Pickford, M. and Fischer, M. 1987. *Parapliohiprax ngororaensis*, a new hyracoid from the Miocene of Kenya, with an outline of the classification of Neogene Hyracoidea. *N. Jb. Paläont. Abh. Stuttgart*, **175 (2)**, 207-234.
- Pickford, M., Moya Sola, S. and Mein, P. 1997. A revised phylogeny of Hyracoidea (Mammalia) based on new specimens of Pliohyracidae from Africa and Europe. *N. Jb. Geol. Paläont. Abh.*, **205**, 265-288.
- Pickford, M. and Senut, B. 2000. Geology and Palaeobiology of the Namib Desert, South-western Africa. *Mem. Geol. Surv. Namibia*, **18**, 1-155.
- Pickford, M. and Senut, B. 2002. *The Fossil Record of Namibia*. Geological Survey of Namibia, Windhoek, Namprint, 39 pp.
- Pickford, M. and Senut, B. 2003. Miocene Palaeobiology of the Orange River Valley, Namibia. *Mem. Geol. Surv. Namibia*, **19**, 1-22.
- Rage, J.-C. 2003. Squamate reptiles from the Early Miocene of Arrisdrift (Namibia). *Mem. Geol. Surv. Namibia*, **19**, 43-50.
- Savage, R. 1965. The Miocene Carnivora of East Africa. *Foss. Mamm. Afr.*, **19**, 239-316.
- Senut, B. 2003. The Macroselididae from the Miocene of the Orange River, Namibia, *Mem. Geol. Surv. Namibia*, **19**, 119-141.
- Senut, B. and Pickford, M. 1995. Fossil eggs and Cenozoic continental biostratigraphy of Namibia. *Palaeont. afr.*, **32**, 33-37.
- Senut, B., Pickford, M. and Dauphin, Y. 1995. Découverte d'oeufs de type "Aepyornithoïde" dans le Miocène inférieur de Namibie. *C. R. Acad. Sci. Paris*, **320**, 71-76.
- Stocken, C.G. 1978. A review of the later Mesozoic and Cenozoic deposits of the Sperrgebiet. *Unpubl. Rept The Consolidated Diamond Mines of South West Africa (Pty) Ltd Geol. Dept.*, 1-33 and 1-4.
- Stromer, E. 1914. Funde fossilen Wirbeltiere in den Deutschen Schutzgebieten in Afrika. *Naturwiss. Wochenschr. N.F.*, **13 (48)**, Jena.
- Stromer, E. 1921. Die ersten tertiären Wirbeltierreste Deutsch-Südwestafrikas (Abstr.) *Umschau*, **26 (46)**, 1-4.
- Stromer, E. 1922. Erste Mitteilung über Tertiäre Wirbeltierreste aus Deutsch-SüdwestAfrika. *Sitzber. bayer. Akad. Wiss. Math. Phys. Kl.*, (1921), 331-340.
- Stromer, E. 1923. Bemerkungen über die ersten Landwirbeltier-Reste aus dem Tertiär Deutsch-Südwestafrikas. *Paläont. Z.*, **5**, 226-228.
- Stromer, E. 1924. Ergebnisse der Bearbeitung mitteltertiären Wirbeltierreste aus Deutsch-Südwestafrika. *Ebenda Ber. bayer. Akad. Wiss.*, **1923**, 253-270, München.
- Stromer, E. 1926. Reste Land- und Süßwasser Bewohnender Wirbeltierereste aus dem Diamantfeldern Deutsch-SüdwestAfrikas. In: E. Kaiser (ed.) *Die Diamantenwüste Südwest-Afrikas*. Reimer, Berlin, **2**, 107-153.
- Van Couvering, J.A. and Hamilton, W.R. 1983. Lower Miocene mammals from South West Africa. *Nat. Geogr. Soc. Res. Rept*, **1983**, 697-703.
- Van Couvering, J.A.H. and Van Couvering, J.A. 1976. Early Miocene mammal fossils from East Africa. In: G. Isaac and E. McCown (eds) *Human Origins: Louis Leakey and the East African Evidence*, pp. 155-207, W.A. Benjamin Inc. Menlo Park.
- Ward, J., Corbett, I., Pickford, M. and Senut, B. 1993. Terrestrial gastropods in the southern Namib: evidence for winter rainfall in the Miocene? *SASQUA Abstr.*, **1993**, 24.
- Wenz, W. 1926. Tertiäre Binnenmollusken. In: E. Kaiser (ed.) *Die Diamantenwüste Südwest-Afrikas*, **2**, 154-159, table 39, Berlin, Reimer.
- Whitworth, T. 1954. The Miocene hyracoids of East Africa. *Br. Mus. Nat. Hist. London, Foss. Mamm. Afr.*, **7**, 1-58.
- Wilkinson, A.F. 1976. The lower Miocene Suidae of Africa. *Foss. Vertebr. Afr.*, **4**, 173-282.
- Wood, A.E. 1958. The African Oligocene Rodentia. *Bull. Peabody Mus. Nat. Hist. New Haven*, **28**, 23-105.