New material of *Seggeurius amourensis* (Paenungulata, Hyracoidea) including a partial skull with intact basicranium.

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APPENDIX S1. List of species used, datamatrix, and list of characters for the phylogenetic analysis. **Abbreviations: BMNH,** British Museum of Natural History, London; **MHN–aix,** the Museum d'Histoire Naturelle d'Aix–en–Provence, France; **MNHN,** Muséum national d'Histoire naturelle, Paris; **NMB,** Naturhistorisches Museum Basel; **SMF**, Senckenberg Research Institute and Natural History Museum, Frankfurt; **SMNS**, Staatliches Museum fur Naturkunde, Stuttgart; **UM2**, Université de Montpellier 2; **V**, variable character; **ZMB**, Museum für Naturkunde in Berlin.

Coded Taxon	Species	Basicranium	Bony Labyrinth	Petrosal	Literature used or specimen number
Marsupialia					
	Didelphis sp.	X	X	X	UM2 N–320; UM2 N–321 Ekdale, 2013
	Mimoperadectes houdei	X	X	X	Horovitz et al., 2009
	Herpetotherium fugax	X	X	X	Sánchez–Villagra et al., 2007
Zalambdalestes	*Zalambdalestes lechei*	X	X	X	Wible et al., 2004; Ekdale and Rowe, 2011
Hyracoidea					
	Seggeurius amourensis	X	X	X	K210

APPENDIX S1. Continued

Embrithopoda	*Arsinoitherium zitteli*	X	X	X	Andrews, 1906; Court, 1990, 1992b
Proboscidea					
	Phosphatherium escuilliei	X		X	Gheerbrant et al., 2005
	Numidotherium koholense	X	X	X	Benoit et al., 2013c
	Moeritherium lyonsi	X			Andrews, 1906
	Moeritherium trigodon	X	X	X	Tassy, 1981; Court, 1992a, 1994
Sirenia					
	Prorastomus sirenoides	X	X	X	Savage et al., 1994; Benoit et al., 2013a
	Sp. indet.		X	X	Benoit et al., 2013a

APPENDIX S1. Continued.

Tubulidentata					
	Orycteropus afer	X	X	X	Wible, 2012; MNHN 1951–435; MHN–aix VE–2012–22–2,1; SMF 35350; SMF 92228; SMF 15605
	Amphiorycteropus depereti	X	X		NMB Rss55
	Amphiorycteropus gaudryi	X	X	X	BMNH 5690
Bibymalagasia					
	Plesiorycteropus germainpetterae	X	X	X	MacPhee, 1994; MNHN–MAD327
	Plesiorycteropus madagascariensis	X	X	X	MacPhee, 1994; MNHN–MAD328
Macroscelidea					
	Rhynchocyon cirnei	X	X	X	Benoit et al., 2013e

APPENDIX S1. Continued.

	Chambius kasserinensis		X	X	Benoit et al., 2013d
Tenrecoidea					
	Cf. *Erythrozootes chamerpes*	X			Butler, 1969
	Tenrec ecaudatus	X	X	X	UM2 N–439; UM2 N–80; ZMB Tenrec1880a; ZMB Tenrec4A; UMZC Tenrec6
	Potamogale velox	X	X	X	MNHN 1898–1576; MNHN 1947–866; MNHN 1947–864
Xenarthra					
	Dasypus novemcinctus		X		Billet et al., 2012a ; Ekdale, 2013
	Kuntinaru boliviensis	X			Billet et al., 2012b
	Hapalops elongatus	X			Gaudin, 1995

APPENDIX S1. Continued.

	Sp. indet.			X	Babot et al., 2012
Leptictis	*Leptictis dakotensis*	X	X	X	Novacek, 1986
Eulipotyphla					
	Pholidocercus hassiacus	X			MacPhee et al., 1988
	Macrocranion nitens			X	MacPhee et al., 1988
	Erinaceus europaeus		X		UM2 N–483; UM2 N–395
Cetartiodactyla					
	Diacodexis ilicis		X	X	Orliac et al., 2012b
	Diacodexis sp.	X		X	Coombs et Coombs, 1982
	Homacodon vagans	X		X	Coombs et Coombs, 1982; Orliac et al., 2012b

APPENDIX S1. Continued.

Perissodactyla					
	Heptodon posticus	X			Cifelli, 1982
	Hyracotherium angustidens	X			Kitts, 1956
	Equus caballus		X		Hyrtl 1845; Gray 1907, 1908
Glires					
	Rhombomylus sp.	X	X	X	Meng et al., 2003
	Paramys copei	X			Wahlert, 2000
Archonta					
	Ignacius graybullianus	X		X	Silcox, 2003; Silcox et al., 2009b
	Carpolestes simpsoni	X	X	X	Bloch and Silcox, 2006; Silcox et al., 2009a
Notoungulata					
	Notostylops aspectans	X			Patterson, 1932

APPENDIX S1. Continued.

	Sp. indet.		X	X	Billet and Muizion, 2013
Hyopsodus					
	Hyopsodus lepidus		X	X	Orliac et al., 2012a; Benoit et al., 2013d
	Hyopsodus sp.	X		X	Gazin, 1968; Cifelli, 1982
Meniscotherium	*Meniscotherium chamense*	X		X	Gazin, 1965; Cifelli, 1982; Williamson et Lucas, 1992
Phenacodus	*Phenacodus primaevus*	X		X	Cifelli, 1982;
Pleuraspidotherium	*Pleuraspidotherium aumonieri*	X	X	X	Russell, 1964; Ladevèze et al., 2010
Arctocyon	*Arctocyon primaevus*	X	X	X	Russell, 1964; Russell and Sigogneau, 1965
Ocepeia	*Ocepeia daouiensis*	X	X	X	Gherbrant et al., 2014

APPENDIX S1. Continued.

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                      10          20        30          40
Marsupialia     0110100101 101001110- 100V000-10 10-0111010 1
Seggeurius      10111-1100 0101?00110 0000010-01 0-10001011 0
Embrithopoda    00110-0010 0?01?0?10- 0000001100 0-01010100 0
Proboscidea     0V0-V-11V0 V10110000- 000000110V 0-01V01V10 1
Sirenia         100-1-1110 0100?0?10- 0010011100 V010VV0V10 V
Tubulidentata   0011000100 11V0000010 1100000-01 10-V0010V0 1
Bibymalagasia   010-011V00 0?10?00011 0100V00-00 10-0VV10VV 0
Macroscelidea   00100V0101 1011100011 101110101- 10-01V101V 1
Tenrecoidea     110-110101 1011000011 1010000-1- 10-01V1011 0
Zalambdalestes 010-110101 1010011111 110000101- 10-0001010 1
Xenarthra       -111011100 001000110- 010000101- 10-0111011 0
Hyopsodus       110-101100 1000?00010 1000000-1- 11-0111010 1
Meniscotherium 0110101100 0110?00010 001000101? 10-??????? ?
Phenacodus      0110101100 1100101170 000000101- 10-0?????? ?
Pleuraspidoth   010-V01101 1100?00011 000010101- 10-0?110?? ?
Arctocyon       010-100100 1000?0?110 1??000??1- 10-0?????? 1
Leptictis       0111010101 1010000011 100100101- 10-0111??? ?
Eulipotyphla    0111111101 1010000011 100110101- 10-0101010 0
Artiodactyla    0110110V00 1011?00010 100100101- 11-0011010 1
Perissodactyla 01101?1100 11000?110- V1V0000-?? 1V-?01101V V
Glires          -10-V10100 000010VVVV ??0000101- 1V-0111?10 1
Archonta        010-01110? 101110VVV? 111110101- 10-0001010 1
Notoungulata    011110011? 00?0101111 1010001001 10-0011010 1
Ocepeia         010-010100 1100?00010 1000011100 11-01110?1 0
```

Characters

1. Shape of the postglenoid process:

0. legthen mediolaterally

1. short medialoaterally, tuber-shaped

2. Postglenoid foramen:

0. absent

1. present

APPENDIX S1. Continued.

3. Epitympanic sinus of the squamosal:

0. absent

1. present

4. Size of the epitympanic sinus of the squamosal:

0. small

1. large and deep pit

5. Paroccipital process:

0. small or absent

1. present, developed

6. Petrosal paroccipital process:

0. absent, exoccipital paroccipital process

1. present, petrosal contribution to the paroccipital process

7. Morphology of the basioccipital in ventral view:

0. flat

1. Medial ridge present

8. Middle and posterior lacerate foramina:

0. fused

1. separated by the petro-basioccipital suture

9. Position of the external auditory meatus:

0. notches the ventral margin of the squamosal

1. located deep into the squamosal

10. Carotid foramen:

0. absent, fused with the middle lacerate foramen

1. present, individualized

11. Stylomastoid foramen:

0. notches the caudal margin of the petrosal

1. discrete foramen within the petrosal (foramen stylomastoideum primitivum)

12. Position of the stylomastoid foramen:

0. below the toothrow

1. above the toothrow

13. Entoglenoid process (squamosal contribution to the bulla):

0. absent

1. present

14. Basisphenoid basin (basisphenoid contribution to the bulla):

0. absent

1. present

APPENDIX S1. Continued.

15. Ossification of the bulla:

0. not ossified

1. ossified

16. Prootic sinus:

0. absent

1. present

17. Course of the internal carotid artery (Wible, 1986):

0. intrabullar

1. extrabullar (or perbullar)

18. Position of the internal carotid artery with respect to the promontorium:

0. lateral (transpromontorial sulcus present)

1. medial (transpromontorial sulcus absent)

19. Satapedial sulcus or any other clues of the presence of the stapedial artery (e.g. stapedial foramen within the tegmen tympani):

0. absent

1. present

20. Ramus inferius of the stapedial artery:

0. absent

1. present

APPENDIX S1. Continued.

21. Mastoid foramen:

0. absent

1. present

22. Percranial foramen (MacPhee, 1994):

0. absent

1. present

23. Shape of the pars cochlearis:

0. Long and conical, tapered rostrally

1. Rounded, globular

24. Rostral tympanic process of the petrosal:

0. small or absent

1. present

25. Caudal tympanic process of the petrosal:

0. small or absent, fossula cochleae large

1. large, covers the fenestra cochleae caudally, at least partially

26. Bulging of the septum metacochleare:

0. absent

1. present

27. Tegmen tympani:

0. small or absent

1. large

28. Morphology of the tegmen tympani:

0. usual

1. tegmen process

29. Fossa subarcuata:

0. shallow or absent

1. deep

30. Petromastoid canal:

0. absent

1. present

31. Mastoid exposure:

0. absent

1. present

32. Position of the mastoid exposure when present:

0. caudal

1. lateral

33. Shape of the mastoid apophysis (if not exposed):

0. small or absent
1. squared and massive

34. Crista falciformis:

0. thick, easy to see in the internal auditory meatus
1. thin, located deep into the internal auditory meatus

35. Cochlear canal morphology:

0. flattened (aspect ratio <0.6)
1. conical (aspect ratio >0.6)

36. Number of cochlear spiral turns:

0. less than two
1. two or more

37. Lamina secundaria:

0. absent
1. present

38. Fenestra cochleae and perylimphatic foramen:

0. separated
1. fused

APPENDIX S1. Continued.

39. Average semicircular canal angles:

0. acute, mean of SC angles is is less or equal to 80°
1. right, mean of SC angles above 80°

40. Ventral expansion of the posterior canal:

0. absent, the ampular limb of the posterior canal is at the same level than the posterior limb of the lateral canal
1. present, the ampular limb of the posterior canal goes ventral to the level of the posterior limb of the lateral canal

41. Secondary common crus:

0. absent
1. present

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APPENDIX S1. Continued.

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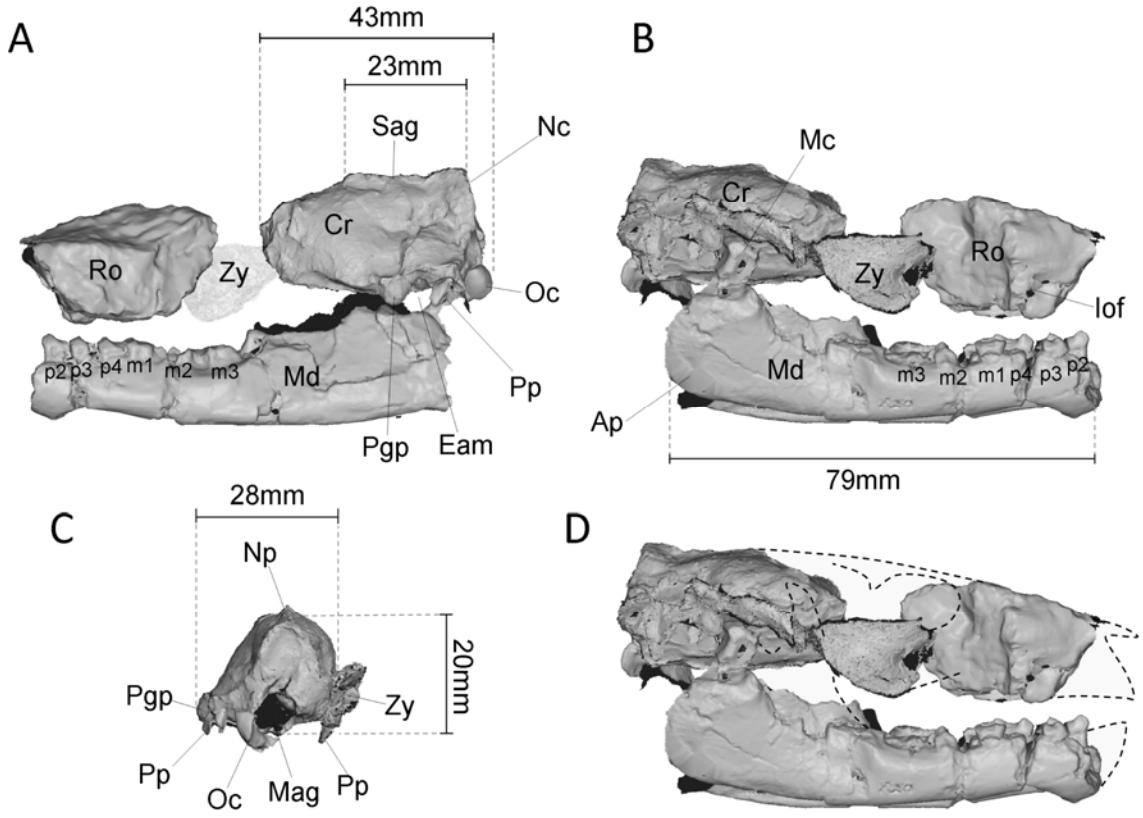
FIGURE S2. Digital reconstruction of the skull of *Seggeurius amourensis* UOK210 (see also Supplementary data 4S). **A**, left lateral view (right zygomatic arch in transparency); **B**, right lateral view; **C**, occipital view; **D**, left lateral view with the missing part redrawn in dotted lines. **Abbreviations**: **Ap**, angular process; **Cr**, cranium; **Eam**, external auditory meatus; **Iof**, infraorbital foramen; **Mag**, foramen magnum; **Mc**, mandiblar condyle; **Md**, mandible; **Nc**, nuchal crest; **Np**, nuchal process; **Oc**, occipital condyle; **Pgp**, postglenoid process; **Pp**, paroccipital process; **Ro**, rostrum; **Sag**, sagittal crest; **Zy**, zygomatic arch.



VIDEO S3. Video of the digital reconstruction of the skull of *Seggeurius amourensis* UOK210.

FIGURE S4. Two CT sections in the mandibles of *Seggeurius amourensis* UOK210 and a CT reconstruction of the left mandible of the same specimen that show the cavities for nutritive tissues beneath the mandibular canal, and its relationship with the mesial depression of the mandible. The mandible is in transparent to highlight cavities underneath the mesial depression of the mandible. **Abbreviations**: **Dors**, dorsal direction.

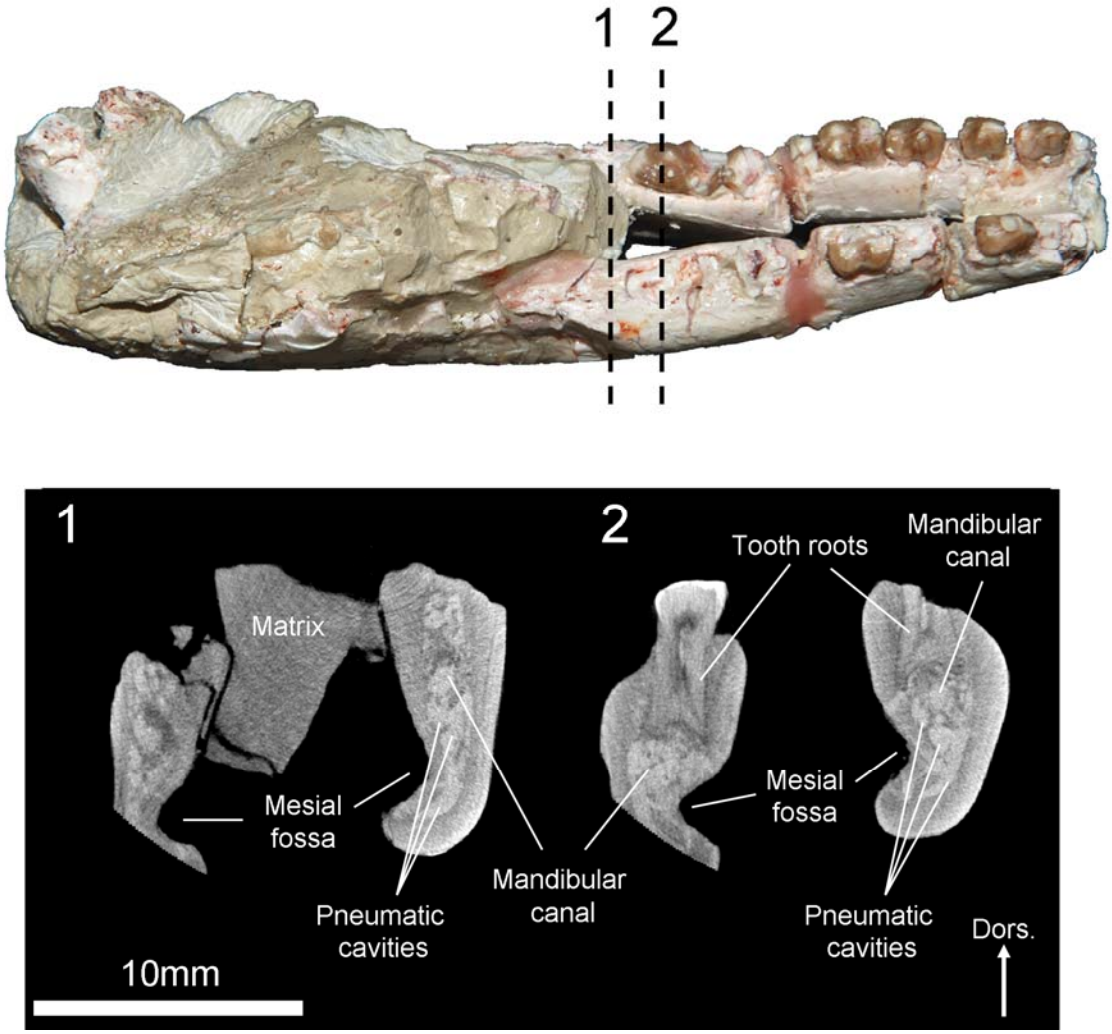


FIGURE S4. (continued)

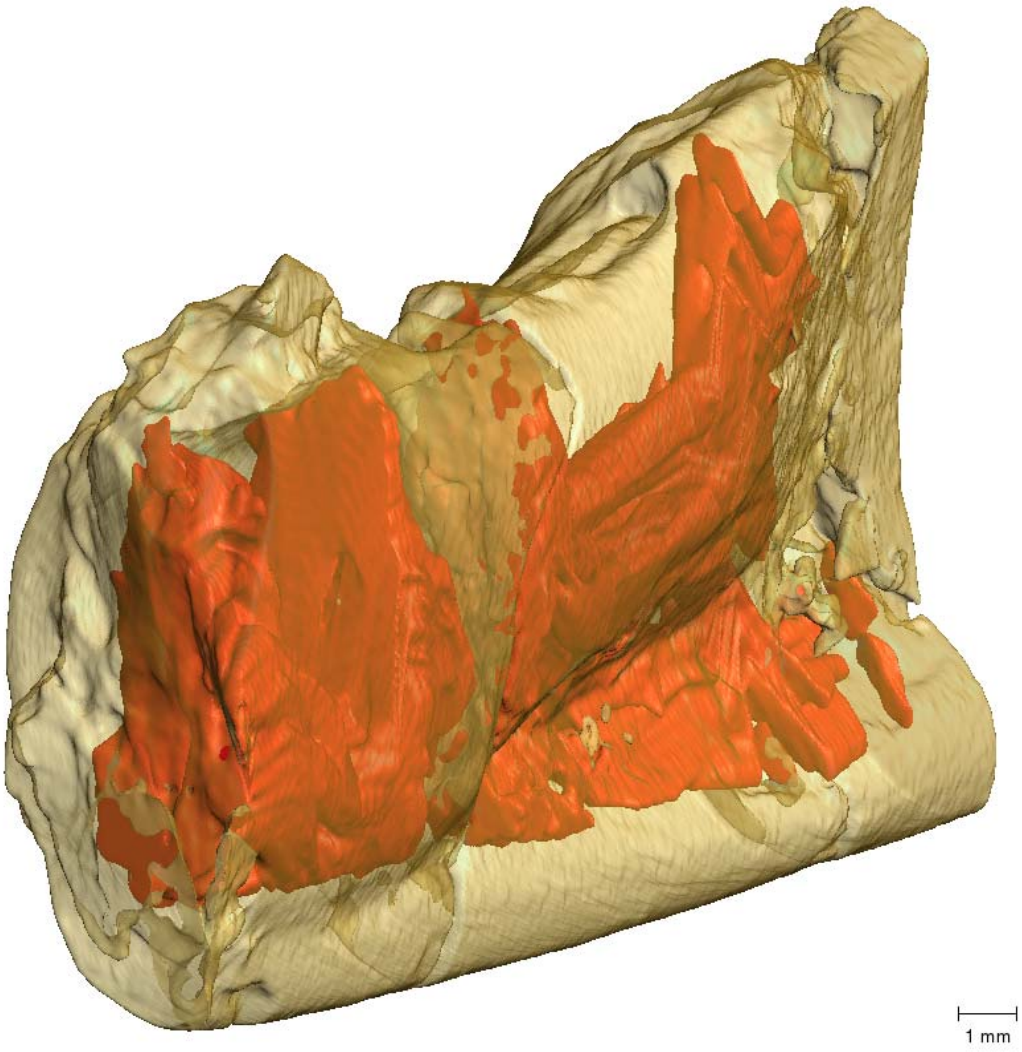


FIGURE S5. CT slices in the skull of *Seggeurius amourensis* K210. The position of each slice is indicated on the skull by dotted lines (not to scale). **Abbreviations**: **Bas**, basisphenoid; **Bb**, basisphenoid bulla; **Bo**, basioccipital; **Cca**, cranial cavity; **Eps**, epitympanic sinus; **Lab**, bony labyrinth; **Par**, parietal; **Pet**, petrosal; **Pgp**, postglenoid process; **Pmc**, petromastoid canal; **Saf**, subarcuata fossa; **Sag**, sagittal crest; **Sq**, squamosal (note the slenderness of the squamosal and the bulging du to the large mastoid apophysis below).