

A LOWER MIOCENE MAMMALIAN FAUNA FROM SIWA, EGYPT

by W. R. HAMILTON

ABSTRACT. A small collection of fossil vertebrates from the Siwa area of Egypt is described. This fauna includes five mammalian genera—a creodont, a cetacean—*Schizodelphis aff. sulcatus*, a proboscidean—*Gomphotherium angustidens*, a rhinoceros—*Brachypotherium snowi*, and an anthracothere—*Brachyodus africanus*; fish and reptiles are also present. This fauna is important as it agrees with the mammalian faunas of Moghara, Egypt, and Gebel Zelten, Libya, which are both early Miocene in age.

IN 1920 the British Museum (Natural History) purchased from Lady Moon a small collection of fossil vertebrates which had been collected near Siwa Oasis (29° 13' N. 25° 40' E.), Egypt. More accurate geographical details are not available but the nearest known fossil mammal localities to Siwa which could have yielded a similar fauna are Moghara (30° 15' N. 28° 56' E.) and Wadi Faregh (30° 15' N. 30° 22' E.) in Egypt, and Gebel Zelten (28° 30' N. 20° E.) in Libya. In each case the distances involved are great; it therefore seems likely that a previously undescribed fossil mammal site is located at Siwa. The rediscovery of this small fauna is important as it lies approximately mid-way between Moghara and Gebel Zelten and these two sites are the subject of much study at present as a result of their large and important mammalian faunas. It is likely that Moghara and Gebel Zelten were part of the same faunal unit during early Miocene times and the presence of this small fauna between them provides additional support for this theory. The vertebrate fauna is small consisting of a reptile—*Tomistoma dowsoni* Fourtau, a fish—*Pristis* sp., and five mammalian genera, three of which are represented by teeth.

DESCRIPTIONS

Creodonta indet.

Plate 28, fig. 2

An axis vertebra (M. 11970) is carnivore-like with a strong odontoid process and posteriorly sloping lateral faces of the anterior centrum face. The centrum, which is depressed anteriorly, is much longer than in *Apterodon macrognathus* from the Fayum (Andrews 1906, p. 228). The neural spine is strong and its distal edge is parallel to the centrum whereas in *Apterodon* the neural spine rises steeply and projects behind the rest of the vertebra. The vertebra is large, having a maximum height of 72 mm and length of 127 mm; its size suggests an animal rather larger than a lion. Fourtau (1920) described an isolated upper premolar from Moghara which he identified as '*Hyaena* sp. indet.'. This was redescribed by von Koenigswald (1947) as *Hyaenaelurus fourtaui* which becomes *Hyainailouros fourtaui* as a result of Simpson's (1945) correction of the generic name. *H. fourtaui* is larger than a lion but far smaller than the large creodont from Gebel Zelten (Savage pers. comm.).

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Carnivores of comparable age and size from Africa are *Afrocyon burrolleti* and *Afrocyon* sp. from Gebel Zelten (Savage 1967) and *Pterodon* from East Africa (Savage 1965). The axis from Siwa cannot be identified with any of the African carnivores but its size suggests *H. fourtaui* rather than *A. burrolleti*.

Cetacea

SCHIZODELPHIS Gervais

Schizodelphis aff. sulcatus Gervais

Plate 28, fig. 1

A mandibular fragment (M. 11971) comprising the posterior part of the symphyseal region compares in size with a specimen described by Fourtau (1920) from Moghara. This was named *Cyrtodelphis aff. sulcatus* by Fourtau but the generic name *Schizodelphis* has precedence (Pia 1937) and should therefore be applied. The fragment (M. 11971) is less complete than Fourtau's, consisting of the posterior edge of the symphysis and the left and right rows of alveoli separated by a shallow antero-posterior channel. The specimen has a maximum length of 110 mm and carries ten alveoli on each side in a distance of 90 mm. The ventral surface has a sharp median groove and shallow, paired lateral channels.

Schizodelphis aff. sulcatus was first described from North Africa by Stromer (1907) on the basis of a mandibular fragment from Wadi Faregh. The specimen described by Fourtau (1920) is similar to that of Stromer but specific identification was not made. The cross-sections of the Wadi Faregh specimen are similar to those of the Siwa specimen and those from the three areas agree in size and regularity of the alveoli and in over-all size (Table 1).

TABLE 1. A mandibular fragment of *Schizodelphis aff. sulcatus*

| | Siwa M. 11971 | Wadi Faregh (from Stromer 1907) | Moghara (from Fourtau 1920) |
|---|------------------|------------------------------------|--------------------------------|
| Width across posterior end of symphysis | 45 mm | 48 mm | 52 mm |
| Depth at posterior end of symphysis | 16 mm | 18 mm | — |
| No. of alveoli in 100 mm | 12 | 11 | 10 |

Proboscidea

Gomphotherium angustidens (Cuvier)

Plate 28, fig. 3

A right M_3 (M. 11964) agrees with *Gomphotherium*; the tooth lacks the lingual and antero-lingual regions and exhibits medium wear. Fourtau (1920) described upper molars of an adult and lower molars of a juvenile gomphothere which he identified as *Mastodon (Gomphotherium) angustidens* var. *libyca*. These specimens were discussed by Osborn (1936) who questioned the identity with *G. angustidens*, mainly on a size basis. Further revision of the Moghara material has not been attempted. Fourtau also described a new species of gomphothere from Moghara which he named *Mastodon (Gomphotherium) spenceri* and which was distinguished from *G. angustidens* by features of the mandible and the greater development of

the talonid in M_2 . This species was identified as *Rhynchotherium spenceri* by Osborn (1936) but he indicated some uncertainty in this identification. An isolated M_3 and mandibular fragment from Moghara (M. 14075) is very similar to the *G. angustidens* from Europe and East Africa and also to the Siwa specimen which is therefore identified with this species.

TABLE 2. The M_3 of *Gomphotherium angustidens* (M. 11964)

| | Siwa (M. 11964) | Moghara (M. 14075) |
|-------------------------|--------------------|-----------------------|
| Length | 120 mm | 142 mm |
| Width of posterior lobe | 60 mm (approx.) | 65 mm |
| Length of talonid | 30 mm | 42 mm |

Rhinocerotidae

Brachypotherium snowi Fourtau

Plate 28, fig. 4

North African Miocene rhinoceroses are known from Moghara and Gebel Zelten with two genera, *Brachypotherium* and *Aceratherium*, described from each site. A rhinocerotid M^3 from Siwa (M. 11966) differs greatly in size and anatomy from the only known upper third molars of *Aceratherium* from North Africa (Hamilton 1973) but agrees closely with the M^3 of *B. snowi* (Fourtau 1920, p. 38, fig. 26). *B. heinzeli* from the Congo (Hooijer 1963) and East Africa (Andrews 1914) is of similar size but differs in features of the metaloph, and cingula from M. 11966 and in these features the Siwa specimen agrees with *B. snowi* from Moghara. *B. snowi* is also known from Gebel Zelten but unfortunately this site has not yielded any third upper molars.

TABLE 3. The M^3 of *Brachypotherium snowi* (M. 11966)

| | Moghara | Siwa | B. heinzeli | Aceratherium (Zelten) |
|--------------------------|---------|-------|-------------|--------------------------|
| Length of lingual region | 61 mm | 57 mm | 56 mm | 46 mm |

Anthracotheriidae

Brachyodus africanus Andrews

Plate 28, fig. 5

Of the three anthracotheres known from Moghara, published information on two—*B. africanus* and *B. moneyi*—deals with the lower dentitions only and *Masritherium* is known mainly from lower dentitions. The three forms represent three size groups as demonstrated by the lengths of the lower cheek tooth rows (Table 4).

TABLE 4. Anthracothere dentitions (from Fourtau 1920)

| | <i>Brachyodus moneyi</i> | <i>B. africanus</i> | <i>Masritherium depereti</i> |
|---------------|--------------------------|---------------------|------------------------------|
| M^1 - M^3 | 59 | 112 | 127 |
| | 59 | 114 | 140 |

A right maxilla with P¹-M³ from Moghara (M. 15020) is from an animal larger than *B. moneyi* and smaller than *Masritherium* and is identified with *B. africanus* although it is smaller than lower dentitions identified with this species. The right maxillary fragment (M. 11967) from Siwa is larger than M. 15020 but the M¹-M³ length agrees closely with the corresponding length in *B. africanus* and is smaller than that length in *Masritherium*. Specimens M. 11967 and M. 15020 also agree in several anatomical features in which they contrast with *Masritherium*. As a result of these similarities the Siwa anthracothere (M. 11967, Pl. 28, fig. 5) is identified with *B. africanus*. The teeth are similar in size to those of *B. aequatorialis* from East Africa (Table 5) but are distinguished from this species by features of the second and third upper premolars.

TABLE 5. The upper dentition of *Brachyodus africanus* (in mm)

| | <i>M. 15020</i> (Moghara) | <i>M. 11967</i> (Siwa) | <i>Masritherium</i> (from Fourtau 1920) | <i>B. aequatorialis</i> (from MacInnes 1951) |
|--------------------------------|------------------------------|---------------------------|--|---|
| P ¹ length | 14 | — | 18 | 17 |
| width | 12 | — | 19 | 17 |
| P ² length | 17 | — | — | 22 |
| width | 14 | — | — | 22 |
| P ³ length | 17 | — | — | 23 |
| width | 17 | — | — | 24 |
| P ⁴ length | 16 | 22 | 27 | 21 |
| width | 19 | 28 | 31 | 26 |
| M ¹ length | 23 | 24 | 30 | 31 |
| width | 28 | 34 | 44 | — |
| M ² length | 32 | 34 | 34 | 32 |
| width | 37 | 45 | 46 | 36 |
| M ³ length | 36 | 43 | 53 | 35 |
| width | 40 | 48 | 54 | 38 |
| P ⁴ -P ¹ | 65 | — | 100 | 83 |
| M ³ -M ¹ | 89 | 102 | — | 92 |

Mammalia indet.

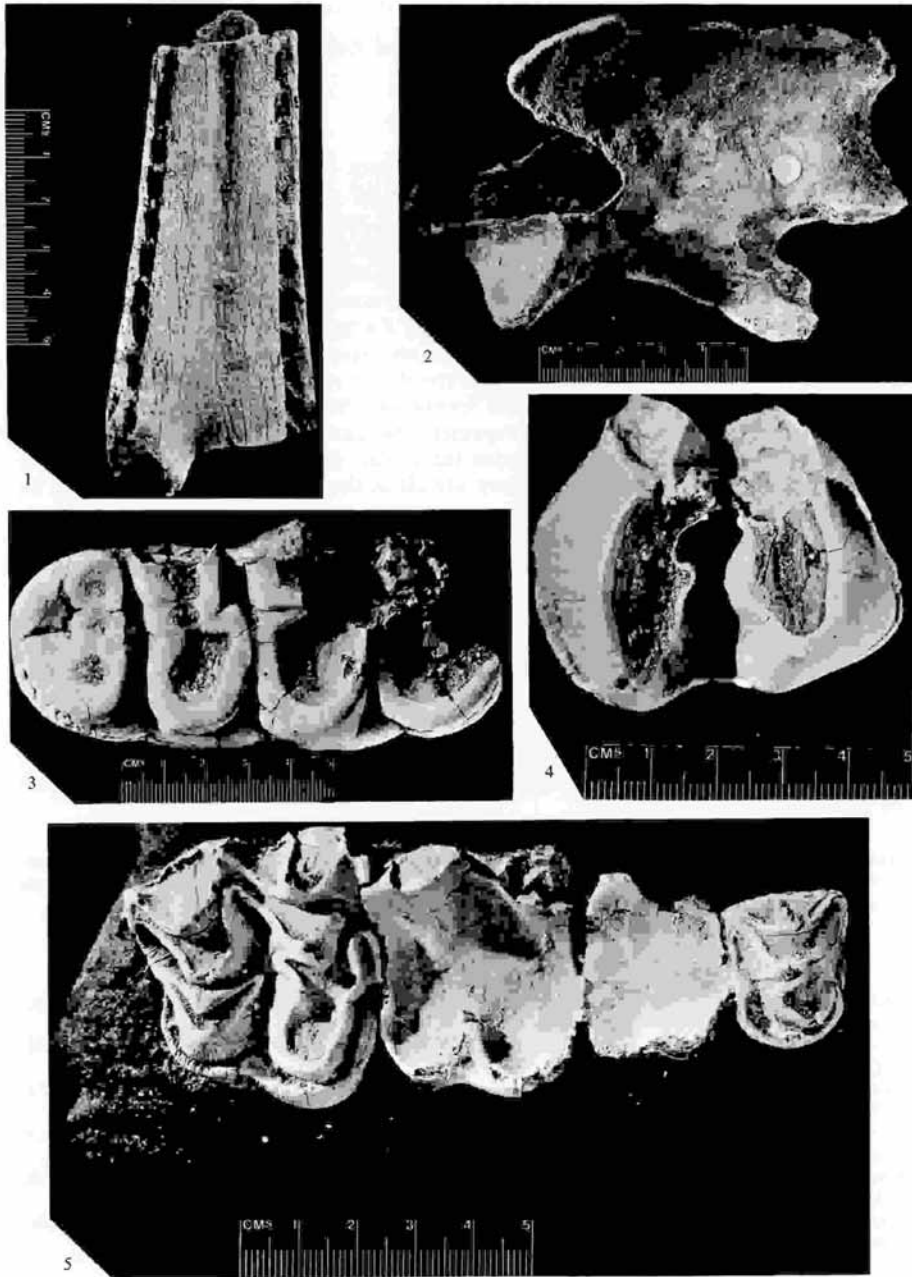
A caudal vertebra (M. 11969) and a sacrum (M. 11968) are also mammalian but cannot be identified with any group. Both specimens are large and probably in the size range of *Brachyodus africanus* or *Brachypotherium snowi*.

Other vertebrates

Part of the rostrum of a large *Pristis* sp. and two skull fragments identified with *Tomistoma dowsoni* are also known from Siwa. *T. dowsoni* was described from

EXPLANATION OF PLATE 28

- Fig. 1. *Schizodelphis aff. sulcatus* Gervais M. 11971, mandibular fragment.
 Fig. 2. *Creodontia* indet. M. 11970, axis vertebra, left lateral aspect.
 Fig. 3. *Gomphotherium angustidens* (Cuvier) M. 11964, right M₃, occlusal aspect.
 Fig. 4. *Brachypotherium snowi* Fourtau M. 11966, right M³, occlusal aspect.
 Fig. 5. *Brachyodus africanus* Andrews M. 11967, right maxilla with cheek teeth P⁴ to M³, occlusal aspect.



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Moghara by Fourtau and *Tomistoma* from Gebel Zelten may also belong with this species.

DISCUSSION

The Siwa fauna agrees with the large faunas from Zelten and Moghara and the smaller fauna from Wadi Faregh. *Schizodelphis aff. sulcatus* and *Brachypotherium snowi* are characteristic of the North African sites and the latter is otherwise known only from Zelten and Moghara. *Brachyodus africanus* and *Gomphotherium angustidens* are known from Miocene sites in North and East Africa but the latter is of little use in dating. Their mammalian faunas suggest the contemporary nature of the sediments at Zelten, Moghara, Siwa, and Wadi Faregh. The Moghara Formation occurs throughout north-western Egypt and an exposure at Siwa is mentioned by Said (1962); it is therefore likely that the vertebrate remains of Moghara and Siwa were derived from rocks of the same formation. Selley (1969) suggests that the Moghara Formation of Egypt may represent the eastern extremity of the Marada Formation (Desio 1935) which includes the Zelten deposits; if this is so then the localities of Zelten, Moghara, and Siwa are all in the same formation and may be expected to agree closely in age.

The presence in the Siwa fauna of a cetacean suggests deposition in marine conditions but Savage (1967) states: 'Localities which contain sirenians and cetaceans are probably not far from the coast.' The presence of cetacean, fish, and aquatic reptile remains in association with those of terrestrial vertebrates suggests near-shore deposition and the Siwa remains are not water-worn. The existence of large, northward-flowing rivers at Zelten (Selley 1969) and Moghara (Said 1962) has been suggested and another large river may have existed in the Siwa area.

The age of the Siwa fauna depends upon the age of the Zelten and Moghara faunas, these have been consistently identified as early Miocene (Desio 1935; Arambourg 1961, 1963; Savage 1967) and Savage (in Selley 1969) refined this to early Burdigalian or late Aquitanian.

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W. R. HAMILTON

Department of Palaeontology
British Museum (Nat. Hist.)
London SW7 5BD

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