Ras Budran and the Old Kingdom trade in Red Sea shells and other exotica

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Despite its primary function as a fortified Red Sea anchorage facilitating late Old Kingdom turquoise expeditions to Wadis Maghara and Kharig in southwest Sinai, the fort at Ras Budran contains evidence for gathering other materials for potential export to Egypt and perhaps the Levant. For example, the site has yielded thirty-seven types of Red Sea shells (n = 5,041 shells), 1,622 plates from at least 203 chitons (a Red Sea mollusc with eight plates), 257+ pieces of white coral, several sea urchins of two types (329+ spines and body fragments), ten cuttle-fish fragments (i.e., molluscs of genus Sepia) and nine fish bones, most of which came from the interior occupation surface enclosed by the fort’s circular stone wall (see table 1 and, Figs 1–42). Although many of these marine products may represent items already present within the interface of the sand surface underlying the occupation debris within the fort, the 2008 investigations revealed that the interior occupation layer currently being excavated overlies an undulating shallow sand layer that separates it from a lower occupation level. Until further excavations determine both the extent of, and the stratigraphic relationship between, this earlier occupation layer and the fort’s encircling foundation trench, it remains uncertain whether all the materials from the upper occupation layer represent materials introduced purposefully to the fort’s interior by the structure’s occupants. At this point it seems quite likely, however, that many of the marine materials found in the fort’s uppermost layer, prior to the late Old Kingdom abandonment and dismantling of this structure (i.e., during camp site levels 1–4), actually represent more meaningful items, whether for local consumption (e.g., Red Sea chitons; some bivalves; fish), occasional tools (e.g., some shells) or other goals, including diverse exotica for export to the Nile valley and elsewhere. Hence, this study provides a preliminary assessment of the marine products from Ras Budran, including their potential significance as a local supplementary sustenance and utensils and as more exotic exports to Egypt and the Levant.

Red Sea imports in the Nile valley

The Nile valley has yielded diverse imports from the Red Sea beginning in the Predynastic through Early Dynastic periods, including shells, sea urchins, coral and other materials. For more details on this late Old Kingdom fort, see Mumford (2005; idem 2006). This study represents a preliminary assessment of the Red Sea shells and other materials at Ras Budran that the project registrar (Frances Cahill), this writer and others have already begun to catalogue and identify. Naturally, further work at Ras Budran and elsewhere, including ongoing and more detailed analysis, may alter the preliminary conclusions presented here.

The search for Red Sea shells and other materials from Nile valley and Delta sites is continuing. The current study provides only a small sampling of a much broader corpus of Red Sea materials, which include unpublished items and many publications with insufficiently identified ‘shells’ from potentially diverse origins: i.e.,

http://www.britishmuseum.org/research/online_journals/bmsaes/issue_18/mumford.aspx
Several examples of *Oliva bulbosa* shells (*Olividae* family) occur in late Predynastic to Early Dynastic graves at Naqada (tomb 1567) and Koptos (Petrie 1897, 31; 1914, 28 shell 121, pl. 15: 121a–b); this shell type is common in the southern Red Sea, but is rare elsewhere (see Rusmore-Villaume 2008, 112–13). Two *Turbo opercula* shells (*Turbinidae* family) appear in late Predynastic to Early Dynastic contexts at Koptos (Petrie 1897, 31; Rusmore-Villaume 2008, 24). Grave 31 at Faras and graves from elsewhere in Nubia have yielded cowrie shells dating to the Early Dynastic period (Spencer 1980, 77 no. 557, pl. 59). Regarding sea urchins, 1,319 spines and 66 teeth came from a Naqada III context in feature 1 at the elite cemetery in Locality HK6 at Hierakonpolis (Van Neer, Linseele and Friedman 2004, 80). Bard has also reported sea urchins from some Predynastic graves at Naqada (Bard 1994, 89, table 12, group 1). Coral represents a slightly less common import, but Bard has observed Red Sea coral (*Tubipora musica*) amongst the grave goods from Predynastic burials at Naqada and in Cemetery 1400–1500 at Armant (Bard 1994, 61, table 6, group 5; 89, table 12, group 2).

The importation of Red Sea shells, however, continues to be fairly popular throughout the Old Kingdom and later. From the advent of the Old Kingdom, a Dynasty 3 grave (N503) at Naga-ed-Der has yielded seven Red Sea shell amulets, which have been identified as *Nerita marina* (sensu Engelmann 1840) (*Neritidae* family). Another Dynasty 3 grave (N524) from this site contained numerous small ‘spiral shells’ with a narrow spiral, which probably also represent Red Sea imports. Reinsner noted a large bivalve from N627 (Reinsner 1932, 157, B4890 and C9509), but this could easily be a Nile mollusc rather than a Red Sea species. Some Dynasties 4–6 graves at Mostagedda have produced a wider variety of shell species and imitations of these types in various materials, including *Nassa* (*Nassariidae*), *Conus* (*Conidae*), *Nerita* (*Neritidae*), *cowries* (*Cypraeidae* including juveniles and sub-adult *Cypraea*), *Columbella* (*Columbellidae*) and *Trochus* (*Trochidae*) species. A few other shell species are noted from this cemetery, but may reflect the Nile, the Red Sea and the Mediterranean. Of note, the earliest pearls in Egypt appear in a necklace of Queen Ahhotep at the advent of Dynasty 18, but are otherwise not attested until the Ptolemaic period (Lucas and Harris [1962] 1989, 401–2). However, recent investigations at As-Sabiyah, near Kuwait City in the Persian Gulf, have revealed the importance of the pearl trade, which dates back to the Neolithic and Bronze ages in the Near East (Lawler 2012, 46, 48–49).

1 *Nassa* shells appear in three Dynasty 4 graves (312; 2638; 2839), two Dynasty 5 graves (514; 3529) and eleven Dynasty 6 graves (631; 690; 722; 5105; 10,002; 10,007; 10,008; 10,010; 10,024; 10,030) (Brunton 1937, 107, pl. 49; Rusmore-Villaume 2008, 96 *Nassariidae*).

2 *Conus* shells occur in one or two Dynasty 4 graves (grave 2624/2625), a Dynasty 5 grave (3529) and three Dynasty 6 graves (509; 785; 1944) (Brunton 1937, 107, pl. 49). Brunton notes that an elderly female in grave 2624 had a *Conus* species shell (Brunton 1937, 95; Rusmore-Villaume 2008, 124–30 *Conidae*).

3 *Nerita* shells were found in one or two Dynasty 4 graves (2638; 2647?), a Dynasty 5 grave (3529) and a Dynasty 6 grave (785) (Brunton 1937, 107, pl. 49). Another elderly woman in grave 2825 had a *Nerita* species shell and other beads (Brunton 1937, 96, not in register on pl. 49?; Rusmore-Villaume 2008, 30 *Neritidae*).

4 Cowrie shells (*Cypraea, Cypraeidae*) came from one Dynasty 5 grave (3529) and three Dynasty 6 graves (530; 10,002; 11,753) (Brunton 1937, 107, pl. 49; Rusmore-Villaume 2008, 62 *Cypraeidae*, 66, juvenile and sub-adult *Cypraea*).

5 *Columbella* shells lay in a Dynasty 4 grave (2638) and one Dynasty 5 grave (3529) (Brunton 1937, 107, pl. 49; Rusmore-Villaume 2008, 102 *Columbellidae*).

6 *Trochus* shells lay in one Dynasty 4 grave (2660) and are reported from a Dynasty 5 grave (Brunton 1937, 107, pl. 49 Dyn. 5, not in register?; Rusmore-Villaume 2008, 22 *Trochidae*).
Nile valley molluscs or possibly Mediterranean species. For example, the Petunculus shells reported from Mostagedda seem to originate from the Mediterranean and reveal a clear ancient Egyptian interest in obtaining exotic shells from various marine environments. Of the aforementioned shell types, Andrews has pointed out that sliced Nassa shells are particularly popular during the Old Kingdom and into the First Intermediate Period (Andrews 1990, 65). In addition, the aforementioned Red Sea shell dispersal in Egypt suggests that a slight increase in Red Sea shell imports may have occurred during the mid- to late Old Kingdom.

Although actual Red Sea shells appear to be a desired commodity in the Old Kingdom and later, their relative rarity, exotic nature, possible status signifiers and presumed amuletic properties may have influenced their imitation in semi-precious and precious materials, including blue- or green-glazed faience, carnelian, feldspar and gold. For instance, a Dynasty 3 grave (N503) at Naga-ed-Der yielded an imitation of Nerita marina in carnelian, while another tomb (N530) had ten of these shells made in gold (Reisner 1932, 157 C4812). The Old Kingdom cemetery at Qau has also yielded imitations of shells from the more popular shell categories, namely cowries (Cypraeidae family), Ancillaria (possibly from Turbinellidae), Conus (Conidae), Nerita (Neritidae) and Pectin (Pectinidae).

Of the thirty-seven or so shells, species and families attested from the late Old Kingdom fort at Ras Budran, ten shell types (i.e., Figs 3, 5, 7, 12, 14, 19, 22, 23, 26 and 29) coincide with the preceding sample of Old Kingdom shells and imitation shells noted from Old Kingdom graves in the Nile valley. The real shells and their parallels from Ras Budran include Nerita and Nerita marina(?) species (2,483 specimens of type 3: Nerita sanguinolenta), trochidae (208 of type 5: Trocchus erithreus; thirteen of type 26: Clanculus pharaonius; one type 12: either a Tectus dentatus, or a Tectus virgatus; and one type 22: Tectus dentatus), Conus (twenty-six occurrences of type 7: Conus textile neovicarius), Cypraeidae (i.e., cowries) (nineteen of type 14: Erosaria turdus) and Nassa species (four examples of type 19: Nassarius obvelatus[?]) (see table 1); the imitation shell types and their real parallels at Ras Budran consist of Pecten bivalves (Pectinidae) (seven samples of type 23: Pecten erythraeensis) and Ancillaria gastropods, possibly from Turbinellidae(?) (three

9 For example, Brunton mentions a string of Purpura shells and beads in a Dynasty 4, adult burial (grave 2638) at Mostagedda and reports more examples from a Dynasty 5 grave (Brunton 1937, 95, 107, pl. 49 Dyn. 5 not in register?). He adds that some Cardium shells lay in a Dynasty 4 burial (grave 2647?) and reports others in a Dynasty 5 grave (Brunton 1937, 107, pl. 49 Dyn. 5 not in register?). However, this writer has yet to find either of these shell species in a Red Sea corpus; they may reflect shells from another area, such as the Petunculus species or possibly alternate names for Red Sea species.

10 Petunculus shells lay in a Dynasty 4 grave (2647?) and a Dynasty 5 grave (1412) (Brunton 1937, 107, pl. 49).

11 Brunton observed that imitation cowries have several types arranged according to their perforation style and are normally manufactured from blue glazed faience (Brunton 1928, 12, 15, amulet class 55, pl. 98).

12 A Dynasty 6 grave (3143) at Qau produced an imitation shell in green faience/glaze; Brunton suggested that this amulet might imitate an Ancillaria shell (Brunton 1928, 12, 15, amulet class 56, type f, pl. 98).

13 Although Old Kingdom imitations of this shell probably occur, this writer has located a late Dynasty 11/12 grave (400) at Qau with a copy of a Conus shell in carnelian (Brunton 1928, 12, amulet class 56, type g, pl. 98).

14 A Dynasty 5 grave (1145) at Qau has yielded a feldspar example of a Nerita shell pendant (Brunton 1928, 12, 15, amulet class 56, type e3, pl. 98).

15 Two Dynasty 6 graves (4904; 5535) at Qau produced examples of a Pecten shell, which Brunton noted is most commonly copied in carnelian (Brunton 1928, 12, 15, amulet class 56, type d, pl. 98).
of type 29: Ancilla lineolata[?]; see table 1). Furthermore, the Nile valley has also yielded shell species from pharaonic contexts in general that also parallel nine additional shell types and families attested at Ras Budran, including the Caridae,\(^{16}\) Cerithidae,\(^{17}\) Dentaliidae,\(^{18}\) Muricidae\(^{19}\) and Strombidae\(^{20}\) families (see table 1, shell types 1, 4, 7, 9, 13, 15, 17, 27, and [?]). Hence, the coincidence between at least nineteen of the shell types, species and families found at Ras Budran and the imports and copies found in the Nile valley suggest that the personnel stationed at the late Old Kingdom fort and anchorage in South Sinai played a more active role in collecting and transporting Red Sea shells to Egypt (see Figs 43–46). In addition, other Old Kingdom expeditions that camped at different sites along the Red Sea coast, including Ayn Soukhna, Wadi al-Jarf and Mersa Gawasis (see below), probably played a similar role in this trade.

Old Kingdom routes between the Nile valley and Red Sea

The presence in the Nile valley of various Red Sea shell types that are currently found in specific through broader areas of the Red Sea (Rusmore-Villaume 2008; see table 1) suggests that either the ancient Egyptians exploited several areas of the Red Sea coast or that some of these modern distributions have changed since antiquity. Regarding Old Kingdom activity areas near or along the Red Sea, several Old Kingdom sites have been found more recently. For example, Old Kingdom activity in the Eastern Desert and routes to the Red Sea are fairly well-attested between the royal residence at Memphis and Ayn Soukhna and via two routes farther south, between the Qena Bend and Gebel Zeit and from Koptos to Mersa Gawasis.

At the northern end of the Gulf of Suez, the coastal site of Ayn Soukhna contains a copper mine, smelting area, workshop and other activity areas that have recently yielded Old Kingdom pottery (Defernez 2004, 59) and several seal impressions bearing the names of

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16 Petrie ([1914] 1972, 27 pl. 14 necklace 111a–b?); this shell type is said to be similar to Cerastoderma glauca of the Cardiidae family, which occurs in brackish water at Suez and Lake Qaroun in the Faiyum and in the Gulf of Suez (Rusmore-Villaume 2008, 226). Other shell types from this general family appear at Ras Budran (eleven of type 13: Tridacna maxima; see table 1).

17 Randall-MacIver and Mace 1902, 49; Rusmore-Villaume 2008, 34–42; Brunton and Caton-Thompson (1928, 38) reported a Cerithium caeruleum shell from a Badarian grave (5364). Many similar shells from this family appear at Ras Budran (150 of type 4: Cerithium caeruleum; twenty-six of type 7: Cerithium adansonii; see table 1).

18 Lucas and Harris ([1962] 1989, 40) mention the occurrence of ‘Dentalium’ in the Nile valley, which may represent the common dentalium clavus, versus a rare dentalium reeaei found mainly in the Hurghada-Safaga area, namely between Gebel Zeit and Wadi Gawasis (see Rusmore-Villaume 2008, 156). Several examples of this gastropod shell type appear at Ras Budran (probably dentalium clavus; see table 1).

19 Petrie ([1914] 1972, 28 no. 117, pl. 15:117) mentioned the appearance of a Murex ternispina shell in Egypt, while Falkner (1981, 89, 141–42 cat. 937) noted a Chioeresus rosanus shell in a Late Period to Ptolemaic context at Saqqara (see also Rusmore-Villaume 2008, 88, 94). Ras Budran has yielded many similar examples from this family (fourteen of type 15: Murex forskhlebii; fifteen of type 9: Chioeresus erythraeus [?]; see table 1).

20 Randall-MacIver and Mace (1902, 49) report examples of Strombus fasciatus from Egypt; similar shell types occur at Ras Budran (thirty-nine examples of types 1 and 27: Tricornis tricornis juvenile and dwarf; an example of type 17: Conomurex fasciatus); see Rusmore-Villaume (2008, 52, 58).
Khafre, Niuserre and Djedkare (Dynasties 4–5).\(^{21}\) In addition, a deposit of Middle Kingdom ship timbers at this site has produced some older pieces that may have been recycled from Dynasty 6 (c. 2200 BC),\(^ {22}\) thereby suggesting a potential direct link between the late Old Kingdom anchorage and fort at Ras Budran, which lay 110km to the southeast across the Gulf of Suez. In the Middle and New Kingdoms, several inscriptions from Ayn Soukhna reveal that turquoise and copper mining expeditions sometimes utilised Ayn Soukhna as a way-station en route to Wadi Maghara and Serabit el-Khadim in South Sinai (Abd el-Razig et al. 2002). The June 2011 excavations by IFAO at Wadi al-Jarf on the east coast of the Red Sea, immediately opposite Ras Budran in Southwest Sinai, have revealed a substantial Old Kingdom anchorage dating mainly from Dynasty 4 to early Dynasty 5. Preliminary investigations have uncovered submerged anchor stones enclosed within a 190 by 120m L-shaped stone quay, nearby camp sites, a ‘visual landmark,’ a pottery kiln and rock-cut galleries with potsherds from many storage jars, fragmentary wooden boxes, ropes and cedar and acacia fittings from one or more dismantled ships (Tallet and Marouard 2012: 40–43). Wadi al-Jarf is closely linked with the Old Kingdom turquoise mining anchorage at Ras Budran, which is 50 km to the east across the Red Sea and has yielded many identical examples of marl storage jars, and may also have served as an alternate departure point for Punt.

It is likely that some Red Sea shell species found outside the Gulf of Suez originated from other Old Kingdom activity areas to the south. Most of the southern Old Kingdom routes to the Red Sea and its vicinity apparently departed from Koptos and the region of the Qena Bend. For example, Old Kingdom copper and gold mining is attested to the north of Wadi Abu Had located only 17km west of the Red Sea and Gebel Zeit (Bomann 1993, 41). Hence, some Old Kingdom mining expeditions to this region may either have extended their trip by less than one day’s journey to obtain Red Sea resources such as shells, or perhaps simply traded with indigenous coastal Bedouin populations.

Otherwise, the two main east-west Old Kingdom, and later, routes to the Red Sea consist of the Wadi Hamama and Wadi Hammamat. The former route has minimal evidence for Old Kingdom activity, such as graffiti left by two officials, one of whom dates to the reign of Sahure;\(^ {23}\) this Dynasty 5 ruler is historically credited with having sent a small fleet to Punt,\(^ {24}\) which probably lay near, or in, Eritrea and the Eastern Sudan (Kitchen 2004, 30 postscript; idem 2005, 12, map 3). Near Wadi Hamama, an adjacent valley called Wādī ‘Atolla produced

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\(^{21}\) Abd el-Raziq et al. 2006, 4; Abd el-Raziq, Castel and Tallet 2007, 68; Abd el-Raziq et al. 2007, 48; see also Mumford (2005, 24; idem 2006, 56). Of note, these Old Kingdom rulers’ names are excluded in the 2002 publication of inscriptions from Ayn Soukhna (Abd el-Razig et al. 2002, 35, 125 index of royal names). A recent publication makes some reference to the Old Kingdom materials and texts from this site (Abd el-Raziq, Castel and Tallet 2011).

\(^{22}\) Abd el-Raziq et al. 2007, 49. Despite the early C14 dating (c. 2200 BC), an assessment of the context and materials place the ship a couple of centuries later in the early Middle Kingdom. The C14 only dates the timber’s age.

\(^{23}\) Porter and Moss ([1952] 1975, 338) mention a scribe called Hetep and an interpreter named Nika-‘ankh; their assignment of this graffito to Sahure’s reign is not discussed by Peden (2001, 7–10) or Baker (2008, 344–45).

\(^{24}\) For more recent evidence regarding the ships sent to Punt by Sahure, including scenes of the ships carrying monkeys and tjesem-dogs, bringing an ‘nd-tree, and Sahure rewarding the expedition’s sailors, see El-Awady (2009, 135–86, pls 1–7).
an Old Kingdom rock inscription that had subsequently been obscured by a later Ramesside graffito (Porter and Moss [1952] 1975, 338). In contrast, the most popular Old Kingdom way to the Red Sea lay between Qift and Quseir along the Wadi Hammamat and has yielded much evidence of Old Kingdom activity, including quarrying and mining greywacke and gold (Shaw 1994, 110, table 1), and traces of expeditions passing through this region en route to the Red Sea. For instance, Porter and Moss noted officials placing a graffito at Bir Menih during the reign of Khafre (Dynasty 4) and other Dynasty 4 rock texts from Wadi Fawakhir with the names of kings Khufu, Djedefre and Khafre, and contemporary princes Hordedef (Djedefhor) and Baufre (Porter and Moss [1952] 1975, 327; Baker 2008, 68, 80). Peden has added, however, that the Dynasty 6 cartouches of kings Pepy I and Merenre I represent some of the earliest well-dated texts from this region. The main gold-bearing region around Wadi Fawakhir features several texts dating to the reign of Pepy I (Porter and Moss [1952] 1975, 329), while many other texts date more broadly to Dynasties 5–6 (Porter and Moss [1952] 1975, 330, 332).

The Wadi Hamama and Wadi Hammamat led to separate points along the Red Sea coast that lay 78km apart between Safaga and Quseir. Some late Old Kingdom activity is also emerging from the excavations at Mersa Gawasis (pharaonic Saww), which is located beside the Red Sea, about 55km north of Quseir at the eastern end of the Wadi Hammamat and 23km to the south of Safaga. Bard and Fattovich have uncovered some late Old Kingdom potsherds from a work area and a nearby artificially cut gallery and storage chamber (Cave 1). The late Old Kingdom levels in Cave 1 produced various artefacts, including Egyptian-style pottery that was manufactured locally (Manzo and Perlingieri 2007, 107), a non-Egyptian style shell bead (Arpin et al. 2007, 72) and four cedar planks and other wooden fragments suggesting the presence of at least one Old Kingdom ship (Arpin et al. 2007, 71). This anchorage also facilitated maritime expeditions to Punt (Bard and Fattovich 2007, 238; Bard et al. 2007, 29), but probably lay too far south of Ras Budran to have served as a departure point for turquoise expeditions. On the other hand, maritime expeditions from Ayn Soukhna to Ras Budran could easily have sailed south to Mersa Gawasis to complete a mission with varied mining, quarrying and exotic shell-collecting objectives.

Another Old Kingdom area of exploitation in the Eastern Desert lies farther south. For example, several late Old Kingdom graffiti are attested in the Wadis Mueilha, Dunqâsh and

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25 Ancient Egyptian expeditions to Punt are well-attested travelling through the Wadi Hammamat to the Red Sea during Dynasty 6 and probably occurred earlier (see Peden 2001, 7–9, 7 note 18; Porter and Moss [1952] 1975, 327, 330) report graffiti dating to Old Kingdom officials in general at Bir Menih and the occurrence of the titles of Merenre I at Wadi Fawakhir.

26 Arpin et al. (2007, 51 southern slope, 72 western slope, Cave 1, fig. 6); Manzo and Perlingieri (2007, 119, a few Nile B1–2 jar sherds, 122 Nile B1, B1–2 and C potsherds from bowls and jars, 125); Bard and Fattovich (2007, 243) also note some late Old Kingdom potsherds from WG 19.

27 Four grinding stones are noted by Carannante et al. (2007, 197, 200, table 15, WG 28, Cave 1), while Manzo and Perlingieri (2007, 132–33, table 4) mention seven Nubian potsherds, mostly from cooking pots, from this stratum.

28 Bard and Fattovich (2007, 241–43) ascribe this phase to Dynasty 6 (c. 2345–2181 BC), but note that the pottery forms might allow a dating as early as King Sahure (in Dynasty 5) and later into the early First Intermediate Period.
Barramiya, which lie along the Edfu-Mersa Alam transit route. These texts date to the reign of Pepy II, but are probably associated with mining and quarrying work rather than any expeditions travelling to the Red Sea, which lay more than 100km to the east (i.e., a four- to five-day journey). It is possible, however, that this area, or ones much farther to the south (e.g., Wadi el-‘Allaqi), may have catered to a Nubian C-Group interest in the Red Sea trade.

Applications of Red Sea products

The ancient Egyptians identified shells in general as inr n r, or inr n spt mw, namely ‘stone of the water’s edge/shore’ (Andrews 1990, 65). Red Sea shells were frequently used for jewellery, amulets, containers and other purposes in Egypt during the late Neolithic and Predynastic, with a visible decrease in quantities during the pharaonic through Ptolemaic and Roman periods. In contrast, artificially shaped mother-of-pearl shells remained popular as pendants in Nubia until recent times (Aldred 1971, 147). Pharaonic jewellers applied smaller shells as beads, pendants and amulets most often on necklaces, but also used them for anklets, bracelets and other strung ornamentation, which would be worn by both children and male and female adults (Brunton 1937, 52). Red Sea shells are also sometimes portrayed in art and sculpture, while larger shells, particularly bivalves, made useful containers for holding cosmetics and pigments, but often incorporated Nile molluscs. In some cases, Red Sea shells and sea urchins appear as votive offerings in mining shrines, such as a New Kingdom copper mining shrine at Timna in the southern Negev (Reese 1988, 260–65). Reese suggests that some Red Sea shells from shrines to Hathor, a goddess of love and music, may have had fertility associations (e.g., cowries representing female genitalia), while other shells, especially large bivalves, may have formed musical instruments (e.g., clappers), offering dishes and perhaps incense bowls (Reese 1988, 264–65). Both the popularity of, and symbolic importance assigned to, various Red Sea shells are also attested by their imitation in bone, faience, carnelian, feldspar, sard, porphyry, silver, electrum and gold during the pharaonic period. Of note, the Nile valley and Delta populations also had access to and utilised the shells from Nile molluscs for similar, albeit often more mundane, applications.

Other marine products attracted the attention of ancient Egyptian expeditions to the Red

29 Porter and Moss ([1952] 1975, 327, 424 pl. iv map) report Old Kingdom graffiti at Bir Menih, including a cartouche of Pepy II (see Peden 2001, 9 section iv, note 25, 350 map 2; Sidebotham, Hense, and Nouwens 2008, 68).

30 Shells become increasingly imitated in various materials, especially after Dynasty 18 (Aldred 1971, 125, 146).

31 The Protodynastic colossal statue of Min of Koptos bears some sculpted Red Sea shells (see Kemp 2006, 130, fig. 45), both emphasising the importance of Koptos as a departure point to the Red Sea and its link with Red Sea products, including shells.

32 Petrie ([1914] 1972, 27–28 shell nos 107–9 and 111–13). Shell no. 112, a pearl-bearing Melagrina margaritifera shell, is deemed particularly popular for imitation in precious materials, including examples in electrum and other materials holding the names of Senwosret I, Amenemhet III and Sekenenre (i.e., Dynasties 12 and 18).

33 Other shell amulets and necklaces published by Petrie originate from the Nile and Mediterranean regions (Petrie 1897, 31; Petrie [1914] 1972, 27–28 nos 113–14, and 118, Choptera bulimoides [Nile], Pectunculus violacescens [Mediterranean], Helix desertorum [Egypt]).
Sea and may have been sought from the indigenous Eastern Desert and Red Sea Bedouin populations. For example, Red Sea coral, including pink organ coral, appears in the Nile valley during the Predynastic period, and in pharaonic through Ptolemaic-Roman contexts at Hierakonpolis, Armant, Deir el-Bahri, Tell el-Maskhuta, Timna, Quseir al-Qadim and elsewhere (e.g., Hajar bin Humeid in south Arabia).  

Such natural pieces of coral often appear to have served as exotica, including being considered as appropriate votive offerings in shrines and presumably had some sort of amuletic function.

Regarding marine fish, although Darby, Ghalioungui and Grivetti have asserted that there is no evidence for Egypt exploiting the Red Sea for food during the pharaonic period, by Dynasty 18 Egypt was definitely knowledgeable about some of the distinctive marine life that inhabited the Red Sea: scorpion fish, swordfish, sea turtles, squids, octopuses and lobsters. However, concerning the consumption of Red Sea fish outside Egypt, the presence of nine fish bones at the late Old Kingdom anchorage at Ras Budran may represent Red Sea species. At this stage in the investigations they remain unidentified, while their low quantities suggest only a minor dietary supplement for the fort’s occupants. On the other hand, sea urchin fragments and spines are attested in some Predynastic Nile valley contexts, such as at Hierakonpolis and Naqada, in Middle Kingdom Egyptian mining camps at Wadi Maghara in South Sinai, as a votive offering in a Ramesside mining shrine at Timna and from later contexts at Petra (Reese 1988, 260, 264). Their presence at inland sites might possibly represent sustenance or even a utensil, but much more likely reflect exotica, including an

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34 Bard (1994, 61 table 6, group 5) notes moderate amounts of coral (*Tubipora musica*) in graves at Armant; Van Neer, Linseele and Friedman (2004, 80 feature 1) noted two types of Red Sea coral in feature 1 in HK6 at Hierakonpolis. For other sites, see Reese (1988, 260, 265 note 1).

35 For example, Brunton (1937, 52) notes pink organ coral in graves 3553 and 3555 at Mostagedda; see also Reese (1988, 260, 265 note 1), who reports twenty corals from the late New Kingdom Hathor shrine at Timna.

36 Darby, Ghalioungui and Grivetti (1977, vol. 1, 398, 412–19) have asserted that the Nile valley has produced minimal to no evidence for the ancient Egyptians consuming marine fish, turtles, squids, octopus, molluscs or crustaceans from the Red Sea during the Predynastic to pharaonic periods. Van Neer et al. (2004, 137, fig. 3, 108–9 tables 1–2) have noted twelve species of Red Sea fish being exported to the Nile valley during the early Roman–Coptic periods, and later: *Carcharhinidae* (requiem sharks), *Muraenidae* (moray eels), *Serranidae* (groupers), *Carangidae* (trevallies and jacks), *Lutjanidae* (snappers), *Lethrinidae* (emperors), *Sparidae* (seabreams), *Labridae* (wrasses), *Scaridae* (parrotfish), *Acanthuridae* (surgeonfish), *Balistidae* (triggerfish) and *Mugilidae* (mullets).

37 The Dynasty 18 Red Sea expedition of Queen Hatshepsut apparently recorded and later portrayed fairly accurate renditions of such marine life as a scorpion fish, a swordfish, a sea turtle, a squid, an octopus and a lobster (Darby, Ghalioungui and Grivetti 1977 vol. 1, 398, 412–13, 416, and 419–20, figs 8.2 and 8.4; Houlihan 1996, 197–98, figs 134–35). For the difficulty in identifying some of the species portrayed in Hatshepsut’s temple, see Danelius and Steinitz (1967).

38 Van Neer, Linseele and Friedman (2004, 80 feature 1).

39 Bard (1994, 89 table 12, group 1) notes some sea urchins amongst the Predynastic grave goods at Naqada.

40 Petrie (1906, 52) noted echini spines (i.e., sea urchins) and several types of food shells in the Middle Kingdom stone huts on the west side of the wadi dividing the eastern hilltop camp from the turquoise mines at Maghareh.

41 Reese (1988, 260, 264 pl. 152: 6) noted the remains from one sea urchin, *Phyllacanthus imperialis*, at Timna; Reese mentions other finds at Petra (Reese 1988, 264; personal communication).
amuletic purpose. Of note, the ancient Egyptians apparently did sometimes retrieve Red Sea turtles to apply portions from their shells for use in jewellery and other artefacts during the Predynastic and later periods. The bulk of the evidence, however, indicates that they mostly exploited freshwater Nile turtles (Trionyx triunguis) for such purposes.

Red Sea trade with the Levant

Further investigations into Old Kingdom interactions with the Red Sea and Sinai have also shown the export of some Red Sea shells and sinaitic turquoise to the Levant. For instance, the Early Bronze Age IIIA occupation at Tel Yarmuth in southwest Palestine (which is contemporary with the early Old Kingdom) yielded a piece of raw turquoise from South Sinai. Farther to the east in the Jordan valley, Bab edh-Dhra has produced some Red Sea Dentalium clavus(?), spider conch or scorpion shell (lambis truncate sebae [conches]), Nerita crassilabrum (Neritidae; i.e., ‘slipper winkles’) and mother-of-pearl pieces from Early Bronze Age III contexts (contemporary with Dynasties 3–5/6). Since Egypt is well-attested for collecting and using such shells in jewellery and amulets in the Old Kingdom and throughout much of the pharaonic period, it seems quite likely that Egypt played an active role in exporting at least some of these items to the Levant during the Old Kingdom, albeit only as part of a secondary, small-scale trade (Sowada 2009, 126, 203, fig. 19). On the other hand, the physical evidence for Egyptian trade with Palestine (i.e., the southern Levant) declines visibly during most of the Old Kingdom and First Intermediate Period (Early Bronze Age III–IV), which may suggest that the Red Sea shells and other materials reached this region via indigenous exchange networks between the southern Levant and Sinai.

http://www.britishmuseum.org/research/online_journals/bmsaes/issue_18/mumford.aspx
peninsula. Sowada has recently demonstrated, however, that a bit more continuity in commerce and influence occurs between Egypt and southern Palestine during the Old Kingdom (Early Bronze Age IIIA–B and early IV): the possible export of antique Naqada IIIB–C1 siltstone palettes to EB II–III, III, and III–IV contexts at Tel Halif (Lahav), Beth Yerah, Tel Yarmuth, Bab edh-Dhra, Numeira and Megiddo (possibly local heirlooms?); an Old Kingdom feldspar bead at Tel Halif (Lahav) during EB III; an Early Dynastic and Old Kingdom ivory knife handle and ivory/bone comb in EB IIIB deposits at Ai; several Early Dynastic and Old Kingdom stone vessels at Tel Erani, Ai, Tel Yarmuth and Bab edh-Dhra; the presence of Dynasty 6 Meydum bowls at sites in North Sinai; a late Old Kingdom pottery vessel at Bab edh-Dhra; possible Egyptian influence in the shapes of locally made cultic pottery vessels at Ai; the adoption of the Egyptian cubit in the EB IIIB Palace B at Tel Yarmuth (temp. Dynasty 5); and late Old Kingdom textual-pictorial sources revealing the retrieval of captives and other persons from the Levant in general. Hence, in light of such enhanced indicators for interactions between Egypt and the southern Levant during the Old Kingdom, and in conjunction with emerging evidence for Old Kingdom interest in obtaining Red Sea exotica at Ras Budran and elsewhere, it seems more likely that Egypt did include some Red Sea exotica amongst its exports to the Levant.

Conclusion

Although the Red Sea trade in shells, sea urchins and coral formed a secondary focus for ancient Egyptian expeditions to, or trade with, the Red Sea, it still represented a fairly significant aspect of Old Kingdom commerce and society. For instance, both the presence of various species of Red Sea shells within the late Old Kingdom fort at Ras Budran, and the popularity of many duplicate shell types in the Nile valley as well as in the Levant, argue for a definite ancient Egyptian desire to collect and transport such materials to Egypt, and in some cases possibly farther afield to the Levant. Red Sea shells appear as simple, albeit exotic, perforated beads strung on bracelets and necklaces; they served as special amulets and pendants; they may have functioned as musical instruments, fertility amulets, offering dishes and incense bowls; they are imitated in precious and semi-precious materials, functioning as amulets and status markers. For instance, the sculpted portrayal of Red Sea shells on a Protodynastic colossal statue of Min at Koptos emphasises both the importance of such marine products and the link between Koptos as a major departure point and its deity, patron for expeditions travelling to the Red Sea. On the other hand, some shells simply provide supplementary sustenance, while a few bivalves are commonly used as containers and simple tools. In addition, the continuity in the importation of Red Sea shells to Egypt and Nubia during the Predynastic through Ptolemaic and Roman periods, their growing imitation as amulets and their presence in occupation, mortuary and cultic contexts demonstrate that these exotic items played a significant role in all social strata, various contexts and multiple periods of ancient Egyptian society. Much more research is needed, however, regarding these aspects of the Red Sea trade

Sowada (2009, 123–24, 248–55); of note, the stone vessels at Ai may reflect Early Dynastic to Dynasty 3 heirlooms from Early Bronze Age II/IIIA in an Early Bronze Age IIIB cultic deposit (i.e., late Old Kingdom).
and the varying significance and applications of Red Sea shells and other materials in Egypt and Nubia, while the presence of such imported and re-dispersed materials is also helpful in reconstructing Egypt’s direct and indirect interactions with the Red Sea and Levantine polities and peoples.

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Figs 1–42 photograph credits: All photographs taken by the project photographer, Patrick Carstens.

Frontispiece: Ras Budran, general view (author’s photograph).

Bibliography


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Table 1: Tell Ras Budran shell types and other materials (see Figs 1–42).

<table>
<thead>
<tr>
<th>Species</th>
<th>Family:</th>
<th>Class:</th>
<th>Distribution in Red Sea:</th>
<th>Ref: Rasmussen-Villaume 2008: page(s).</th>
<th>Site shell type</th>
<th>Total at Ras Budran</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cerithium caeruleum</td>
<td>Cerithidae</td>
<td>Gastropod</td>
<td>Common</td>
<td>Pg. 34, photo</td>
<td></td>
<td>150+</td>
</tr>
<tr>
<td>Cerithium adansonii</td>
<td>Cerithidae</td>
<td>Gastropod</td>
<td>Common in G.S.+</td>
<td>Pg. 34, photo</td>
<td></td>
<td>7</td>
</tr>
<tr>
<td>Littorina textiva nesiotica</td>
<td>Littorinidae</td>
<td>Gastropod</td>
<td>Not in Gulf Suez (rare?)</td>
<td>Pg. 130, photo</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Erosaria turdus (Lark Cowrie)</td>
<td>Cypraeidae</td>
<td>Gastropod</td>
<td>Common in G.S.+</td>
<td>Pg. 64, photo</td>
<td></td>
<td>14</td>
</tr>
<tr>
<td>Fusinus versicolor</td>
<td>Fasciolidae</td>
<td>Gastropod</td>
<td>Endemic</td>
<td>Pg. 108, photo</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Cymbium forskoehlii</td>
<td>Muricidae</td>
<td>Gastropod</td>
<td>Mod. Common in G.S.+</td>
<td>Pg. 84, photo</td>
<td></td>
<td>15</td>
</tr>
<tr>
<td>Conus textile neovicarius</td>
<td>Conidae</td>
<td>Gastropod</td>
<td>Common in G.S.</td>
<td>Pg. 130, photo</td>
<td></td>
<td>9</td>
</tr>
<tr>
<td>Calcarina rota</td>
<td>Naticidae</td>
<td>Gastropod</td>
<td>Common</td>
<td>Pg. 10, photo</td>
<td></td>
<td>21A 80</td>
</tr>
<tr>
<td>Nassarius obesulus(R)</td>
<td>Nassariidae</td>
<td>Gastropod</td>
<td>Common in south</td>
<td>Pg. 106, photo</td>
<td></td>
<td>19</td>
</tr>
<tr>
<td>Plicatilis pseudophanti</td>
<td>Naticidae</td>
<td>Gastropod</td>
<td>Rare (Ras Sudr)</td>
<td>Pg. 74, photo</td>
<td></td>
<td>28</td>
</tr>
<tr>
<td>Nerita anguilliformis</td>
<td>Neritidae</td>
<td>Gastropod</td>
<td>Endemic</td>
<td>Pg. 30, photo</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Phasianella solida(R)</td>
<td>Phasianellidae</td>
<td>Gastropod</td>
<td>Locally common</td>
<td>Pg. 28, photo</td>
<td></td>
<td>16</td>
</tr>
<tr>
<td>Cymbium aquatile(R)</td>
<td>Muricidae</td>
<td>Gastropod</td>
<td>Rare in Gulf Suez</td>
<td>Pg. 78, photo</td>
<td></td>
<td>32</td>
</tr>
<tr>
<td>Travanus trovurus juvenile</td>
<td>Strombidae</td>
<td>Gastropod</td>
<td>Endemic</td>
<td>Pg. 38, photo</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Travanus trovurus dwarf</td>
<td>Strombidae</td>
<td>Gastropod</td>
<td>Common</td>
<td>Pg. 58, photo</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Travanus trovurus(R)</td>
<td>Strombidae</td>
<td>Gastropod</td>
<td>Common</td>
<td>Pg. 58, photo</td>
<td></td>
<td>17</td>
</tr>
<tr>
<td>Mitula pomum (Grinning Tun Shell)</td>
<td>Tonnidae</td>
<td>Gastropod</td>
<td>Straths of Gubal to Wadi Lahmi</td>
<td>Pg. 80, photo</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Trochus dentatus(R)</td>
<td>Trochidae</td>
<td>Gastropod</td>
<td>Mod. Common</td>
<td>Pg. 20, photo</td>
<td></td>
<td>22</td>
</tr>
<tr>
<td>Trochus dentatus(R) worn</td>
<td>Trochidae</td>
<td>Gastropod</td>
<td>Rare in Gulf Suez</td>
<td>Pg. 20, photo</td>
<td></td>
<td>12</td>
</tr>
<tr>
<td>Trochus erithreus</td>
<td>Trochidae</td>
<td>Gastropod</td>
<td>All regions</td>
<td>Pg. 22, photo</td>
<td></td>
<td>5</td>
</tr>
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</table>

Note: extremely dangerous
Table 1 cont.: Tell Ras Budran shell types and other materials (see Figs 1–42).

<table>
<thead>
<tr>
<th>Clanculus pharaonis (Strawberry Top Shell)</th>
<th>Trochidae</th>
<th>Gastropod</th>
<th>Mod. Common</th>
<th>Pg. 16, photo</th>
<th>26</th>
<th>13</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ancilla lineolata (?)</td>
<td>Turbinidae</td>
<td>Gastropod</td>
<td>Mod. Common</td>
<td>Pg. 112, photo</td>
<td>29</td>
<td>3</td>
</tr>
<tr>
<td>Turbo radiates</td>
<td>Turbinidae</td>
<td>Gastropod</td>
<td>Common</td>
<td>Pg. 26, photo</td>
<td>34</td>
<td>4</td>
</tr>
<tr>
<td>Dendraster (Neo) clavus</td>
<td>Dendraster</td>
<td>Gastropod</td>
<td>Common in Hurghada</td>
<td>Pg. 156, photo</td>
<td>(?)</td>
<td>Some</td>
</tr>
<tr>
<td>Epitonion subquadratum (?)</td>
<td>Epitonion</td>
<td>Gastropod</td>
<td>Common in G.S.</td>
<td>Pg. 16, photo</td>
<td>26</td>
<td>13</td>
</tr>
<tr>
<td>Barbodiana gallica (Leaky Ark shell)</td>
<td>Anomalidae</td>
<td>Bivalve</td>
<td>Rare in Gulf Suez</td>
<td>Pg. 164, photo</td>
<td>6</td>
<td>30+</td>
</tr>
<tr>
<td>Tridacna maxima (Giant dam shell)</td>
<td>Cardiidae</td>
<td>Bivalve</td>
<td>Rare in Gulf Suez</td>
<td>Pg. 232, photo</td>
<td>13</td>
<td>11</td>
</tr>
<tr>
<td>Pseudolobus variabilis</td>
<td>Chamidae</td>
<td>Bivalve</td>
<td>Very common</td>
<td>Pg. 208, photo</td>
<td>10</td>
<td>24+</td>
</tr>
<tr>
<td>Chroma linnei (?)</td>
<td>Chromidae</td>
<td>Bivalve</td>
<td>Common in G.S.</td>
<td>Pg. 209, photo</td>
<td>57</td>
<td>-</td>
</tr>
<tr>
<td>Chroma pacifica</td>
<td>Chromidae</td>
<td>Bivalve</td>
<td>Common in G.S.</td>
<td>Pg. 208, photo</td>
<td>37</td>
<td>-</td>
</tr>
<tr>
<td>Diodon quadricapatus</td>
<td>Fissurella</td>
<td>Bivalve</td>
<td>Common in G.S.</td>
<td>Pg. 12, photo</td>
<td>21B</td>
<td>above</td>
</tr>
<tr>
<td>Geopyrum tridacnae</td>
<td>Geopyrum</td>
<td>Bivalve</td>
<td>Less common</td>
<td>Pg. 168, photo</td>
<td>30</td>
<td>1</td>
</tr>
<tr>
<td>Brephidium pharaonis (?)</td>
<td>Mytilidae</td>
<td>Bivalve</td>
<td>Common in G.S.</td>
<td>Pg. 170, photo</td>
<td>11</td>
<td>3/5+</td>
</tr>
<tr>
<td>Brephidium parvulum (?)</td>
<td>Brephidium</td>
<td>Bivalve</td>
<td>Common in G.S.</td>
<td>Pg. 170, photo</td>
<td>11</td>
<td>3/5+</td>
</tr>
<tr>
<td>Pecten erythraeensis</td>
<td>Pectinidae</td>
<td>Bivalve</td>
<td>Common in G.S.</td>
<td>Pg. 198, photo</td>
<td>25</td>
<td>/</td>
</tr>
<tr>
<td>Pinctada maxima</td>
<td>Pinctidae</td>
<td>Bivalve</td>
<td>Abundant in G.S.</td>
<td>Pg. 190, photo</td>
<td>24(a)</td>
<td>21</td>
</tr>
<tr>
<td>Diodonta sp. 2 (?)</td>
<td>Unioideidae</td>
<td>Bivalve</td>
<td>Mod. common</td>
<td>Pg. 220, photo</td>
<td>8</td>
<td>1,068+</td>
</tr>
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<td>Identification in progress</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>31</td>
<td>(?)</td>
</tr>
<tr>
<td>Identification in progress</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>33</td>
<td>1</td>
</tr>
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<td>Fish bones (unidentified)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>9</td>
<td>-</td>
</tr>
<tr>
<td>Cartilaginous fish bones</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>111</td>
<td>1</td>
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<tr>
<td>203+ Chitons (i.e., 8 plates per chiton)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1622+</td>
<td></td>
</tr>
<tr>
<td>Two types of sea urchins</td>
<td>Diadema setosum (?)</td>
<td>Echinidae</td>
<td>-</td>
<td>-</td>
<td>329+</td>
<td></td>
</tr>
<tr>
<td>Pieces of white coral</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>257+</td>
<td></td>
</tr>
<tr>
<td>Chambardia rubens arundina (Aspatharia rubens caillaudi)</td>
<td>Naiad mollusc</td>
<td>Bivalve</td>
<td>Import to Red Sea</td>
<td>-</td>
<td>20</td>
<td>1 (?)</td>
</tr>
<tr>
<td><strong>Total:</strong></td>
<td><strong>517</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Fig. 1: Shell type 1 *Tricornis tricornis* juvenile.

Fig. 2: Shell type 2 *Fusinus verrucosus*.
Fig. 3: Shell type 3 *Nerita sanguinolenta*.

Fig. 4: Shell type 4 *Cerithium caeruleum*.
Fig. 5: Shell type 5 *Trochus erithreus.*

Fig. 6: Shell type 6 *Barbatia foliata.*
Fig. 7: Shell type 7 *Cerithium adansonii*.

Fig. 8: Shell type 8 *Diplodonta* sp. 2(?).
Fig. 9: Shell type 9 *Chicoreus erythraeus* (?).

Fig. 10: Shell type 10 *Chama limula* (?).
Fig. 11: Shell type 11 *Brachidontes pharaonis* (?) worn.

Fig. 12: Shell type 12 *Tectus dentatus* (?) worn.
Fig. 13: Shell type 13 *Tridacna maxima*.

Fig. 14: Shell type 14 *Eosaria turdus*. 
Fig. 15: Shell type 15 *Murex forskoeblii*.

Fig. 16: Shell type 16 *Phasianella solida*.
Fig. 17: Shell type 17 *Conomurex fasciatus.*

Fig. 18: Shell type 18 *Pseudochama corbieri.*
Fig. 19: Shell type 19 *Nassarius obvelatus*(?).

Fig. 20: Shell type 21(A) *Cellana rota.*
Fig. 21: Shell type 22 *Tectus dentatus*.

Fig. 22: Shell type 23 *Pectin erythraeensis*. 
Fig. 23: Shell type 24(A) *Plicatula plicata*.

Fig. 24: Shell type 24(B)/25 *Cymatium aquatile*.
Fig. 25: Shell type 26 *Clanculus pharaonius*.

Fig. 26: Shell type 27 *Tricornis tricornis* dwarf.
Fig. 27: Shell type 28 *Polinices pseulephanti*.

Fig. 28: Shell type 29 *Ancilla lineolata* (?)
Fig. 29: Shell type 30 *Glycymeris livida*.

Fig. 30: Shell type 32/24(B) *Cymatium aquatile*.
Fig. 31: Shell type 34 *Turbo radiates*.

Fig. 32: Shell type 35 *Conus textile nevicarius*.
Fig. 33: Shell type 36 *Malea pomum*.

Fig. 34: *Dentalium reevei* (?).
Fig. 35: White coral pieces.

Fig. 36: Cuttle-fish pieces.
Fig. 37: Chiton plates.

Fig. 38: Sea urchin (echini) spines.
Fig. 39: Fish bone fragments.

Fig. 40: Detail of upper left fish bone (cm).
Fig. 41: Fish bone(?) fragment.

Fig. 42: Detail of fish bone(?) (from fig. 41).
Fig. 43: Detail map of Ras Budran in Markha Plain, South Sinai (adapted by Gregory Mumford).

Fig. 44: Plan of fort at Ras Budran, Markha Plain, South Sinai (drawn by Gregory Mumford).
Fig. 45: Reconstruction of fort at Ras Budran, Markha Plain, Sinai (by Oxanna Rechetnikova).

Fig. 46: Reconstruction of fort at Ras Budran, Markha Plain, Sinai (by Gregory Mumford).

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