erected. In the valley that slopes to the north toward Abusir, excavations led by Walter B. Emery between 1964 and 1971 and later by Geoffrey T. Martin and Harry S. Smith have revealed temples and associated catacombs containing thousands of mummies of baboons, falcons, and ibises. Nothing remains of the temple of Bastet, but the conversion of New Kingdom rock-cut tombs in the escarpment of the Bubasteion into catacombs for cat-mummies similarly attests to the vigor of that cult during the Late period.

[*See also* Pyramid.]

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SARCOPHAGI. *See* Coffins, Sarcophagi, and Cartonnages.

SATIRE. *See* Humor and Satire.

SCARABS. The ancient Egyptian model for the sacred scarab is a dung beetle *Scarabaeus sacer,* which functions within the ecosystem of North Africa and Egypt by disposing of the dung of large herbivores. The scarab utilizes dung both as a source of nourishment for itself and its young as well as for their protection. In the wild, the scarab can be observed crafting dung balls into two distinctive shapes with mechanical precision by using its legs and mouth parts. The first of these, termed a brood ball, is a pear-shaped pellet of sheep dung into which the female lays her eggs. As the larvae develop they feed on the fecal matter of the nest. Meanwhile, the female continuosly attends the brood ball by removing molds and fungi until the larvae emerge from their incubation as adults. The second ball, of cattle dung, is a perfectly shaped sphere used for food. The scarab rolls this nourishment with its hind legs across the landscape and into an underground chamber, which is reached via a vertical shaft and horizontal passage! It was the dung beetle's association with the food ball that prompted the ancient Egyptians to develop several visual conceits, but those conceits, while based on nature, were artificial constructs often ignoring or fundamentally altering entomological reality.

Foremost among those conceits was the ancient Egyptian creation of a mythological beetle which propelled the sun disc across the heavens by using its forelegs, not its hind legs. By associating the sun, via the model of the food ball, with the sacred scarab, the Egyptians suggested that the beetle was spontaneously generated from it, ignoring the reality of the brood ball. The dung beetle's elaborate underground tunnel system into which the food ball was maneuvered served as another model for the Egyptians. It was reminiscent of their developing concept of the architectural plans of tombs from the Old Kingdom. Nature, thus modified, provided the ancient Egyptians with a powerful visual image for the diurnal course of the sun which, as one of their most dynamic cosmic cycles, could be readily applied to myths involving creation, and by extension, resurrection. In fact, the ancient Egyptian word for the "scarab" is *ḫpr,* from a verbal root connoting concepts such as "to be created" and "to come into being," and as the noun meaning "form" or "manifestation." The scarab was, therefore, considered to be the embodiment of the creator god who was self-engendered.

The gradual merging of the characteristics of the creator and sun gods led in the Old Kingdom to the development of Khepri, the god of the rising sun often depicted in the form of a male with an entire beetle set onto his shoulders to serve as a head. That image was in contrast to the depictions of other composite deities, which relied on the combination of an animal head on a human body. Because he represented the emergence of the sun from the darkness of night, Khepri was depicted in funerary scenes from the *Book of That Which Is in the Underworld* as a symbol of the resurrection of the deceased into the hereafter.

The earliest appearance of the scarab in the ancient Egyptian cultural record dates to the prehistoric period of

the fourth millennium BCE, when pottery vases containing dung beetles were intentionally interred within tombs. It was not until some two thousand years later, during the sixth dynasty of the Old Kingdom, that crafted scarabs first appeared in ancient Egypt. After the inception of that form, hundreds of thousands of scarabs were manufactured over the course of Egypt's long history in almost every known material, from glazed steatite and faience to glass and semiprecious stones of jasper, carnelian, and lapis lazuli. The oval space formed by the underside of the scarab provided the ancient Egyptians with a convenient surface on which inscriptions and designs could be displayed. These designs vary but may be conveniently grouped into geometric designs, hieroglyphic signs, and figures of both humans and animals.

Geometric designs are generally confined in time to the Middle Kingdom and Second Intermediate Period and can be divided into four general categories: spiral scrolls, concentric circles, coiled cord patterns, and cross patterns. Scarabs bearing mottos in hieroglyphs are attested in different periods, their messages often containing prophylactic formulas or expressions of good fortune. These appear to be introduced during the course of the eighteenth dynasty and continue in use until the Late period. Among the sentiments expressed are "lots of good luck" and "may your name endure and may you be blessed with children." Names of divinities are also found in such mottos for the same purposes. Here one reads, "may the god Khonsu be my protection," "stable is the city which the god Amun loves," and "the god Amun-Re is the strength of the individual." These same functions are inherent in designs representing animals and human figures, both human and divine. Consequently, the types of scarabs might be employed simultaneously as amulets for the dead as well as for the living, each group requiring talismans drawn from a common repertory of motifs and mottos.

Scarabs might also have served officials as seals, a practice which gained wider currency from the time of the First Intermediate Period, although it is only from the twelfth dynasty of the Middle Kingdom that signet rings in the form of scarabs are first attested. Those continued in use into the Second Intermediate Period, and they provide historians with important historical documents. For example, more than sixty of the two thousand known examples inscribed with the names and titles of officials have been found in the Palestine region. The data contained in such texts enables scholars to explore the interconnections between Egypt and the Levant during the Bronze Age. The presence of such Egyptian scarabs may have been the impetus for the local production of Egyptianizing scarabs in the Levant, the existence of which is confirmed by the archaeological excavation of unfinished examples in Canaanite sites.

The earliest scarabs of the sixth dynasty were summarily crafted and probably served as amulets because of their blank undersides. Scarabs inscribed with the names of kings of the Old Kingdom known to have ruled before the sixth dynasty are now regarded as posthumous creations, intended to protect their owners from harm because of the omnipotence of the pharaoh. A similar function was fulfilled by numerous other scarabs of all periods that simply contained royal epithets, such as "The King of Upper and Lower Egypt," "The Lord of the Two Lands," "The Good God," and the like.

One of the most common types of amulets is termed a *heart scarab,* usually inscribed with a version of Spell 30B of the *Book of Going Forth by Day* (*Book of the Dead*). Heart scarabs were primarily made of green stone, anciently termed *nmḥf* and tentatively identified as green jasper (a quartz), although the majority of that classification appear to be crafted of any number of similarly colored stones, including feldspar, serpentine, and basalt. The earliest examples date from the eighteenth dynasty and replace the head of the scarab with that of a human. Although the spell cited above specifies that the heart scarab replaces the deceased's heart, in practice the heart scarabs appear to have been placed at random anywhere on or within the mummy's torso. Their purpose was to insure that the heart, regarded as the seat of intellect and conscience, would not bear false witness against the deceased in the hall of judgment, as the opening lines "Oh my heart, oh my mother . . . stand not up against me as a witness," reveal. Heart scarabs were also incorporated into the design of a pectoral, a chest ornament of rectangular shape that imitated the façade of an ancient Egyptian temple.

Another classification of scarabs is the *commemorative.* Those created during the reign of Amenhotpe III of the eighteenth dynasty are justifiably the most famous because of the number of themes into which they can be divided. More than sixty examples bearing ten lines of hieroglyphs mentioning the pharaoh and Tiye, his queen, are termed the *marriage scarabs,* although the precise occasion for their issuance has not been determined. Some six others commemorated his marriage to Gilukhepa, a princess of the Mitanni, whereas a dozen others celebrated the creation of a pleasure lake, the Birket Habu in Western Thebes, constructed in honor of Queen Tiye. Amenhotpe III was an avid hunter who issued two additional series of commemorative scarabs, to recount his bagging of 96 wild bulls and 102 lions, respectively. Each group of those scarabs revealed differences in both their manufacture and text, suggesting that they were made in different workshops and were awarded to favored courtiers at home and abroad, to glorify the monarch. His son and successor Amenhotpe IV, called Akhenaten, also is-

sued a series of commemorative scarabs early in his reign, of which less than half a dozen examples have survived. Those were of glazed steatite (soapstone), modeled on the scarabs issued by his father, and they seem to commemorate a jubilee.

Related to the scarabs are a classification termed *scaraboids,* which, while retaining the oval bottom of the surface for either inscriptions and/or designs, replaced the body of the scarab proper with that of another animal—cats, ducks, frogs, hedgehogs, rams' heads, and the like—designed to conform to the general configuration of that insect.

The image of the sacred scarab transcended the borders of ancient Egypt and imitations were created far and wide around the Mediterranean in the first millennium BCE by such diverse cultures as the Greeks, Etruscans, and Phoenicians. The popularity of the scarab has not diminished. In the wake of Napoleon's epoch-making campaign to Egypt in 1799, the scarab became a motif incorporated into European jewelry, particularly in the Victorian era, and it is still encountered as a popular fashion accessory to this day.

The ancient Egyptians' fascination with the beetle did not end with the *Scarabaeus sacer,* because other beetles were found within the record of their material culture. For example, the elaterid beetle (*Agrypnus notodonta*) may have served as the model for images on two reliefs from the first dynasty, as well as for pendants of a necklace from the fourth dynasty. It has been suggested that the symbol of the goddess Neith is a design incorporating two head-to-head elaterids, flanked by their respective abdomens.

Buprestids are beetles, perhaps to be identified as *Steraspis squamosa,* of outstanding visual appeal because of their color. An examination of one of the canes from the tomb of Tutankhamun revealed that crushed buprestid elytra (anterior wings) were employed as a pigment. Furthermore, buprestid femurs (legs) were strung together as elements of an ancient Egyptian necklace. Crafted amulets in the form of buprestids are also known, and those were made of a variety of materials, including gold. Perhaps the most remarkable example of the buprestid as a motif in ancient Egyptian art appears crawling up one of the posts of the bed canopy of Queen Hetepheres of the fourth dynasty. The insect was, however, also functional, because its body served to conceal a dowel within the canopy construction.

The larva of the buprestid beetle bore into the tamarisk (a desert shrub or tree), to pupate under the bark until the adult emerged from the small hole. That characteristic may have been regarded, anciently, as a regenerative cycle, linking the buprestid to the cycle of Osiris, god of the dead.

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SCEPTERS. *See* Insignias.

SCIENCE. There is no generic word for "science" in the language of ancient Egypt. *Rḫ* ("to know") comes closest and had a wide range of meanings. For simplicity's sake, this article focuses on our modern concept of "science," with its many disciplines. The ancient Egyptians would not have used the same categories, and probably no such categories existed. Science was the domain of the god Thoth.

Artifacts, tomb paintings, inscriptions, and papyri inform on the Egyptians' knowledge of science. Our study of their hand-crafted objects, tools, and buildings offers insight about their techniques and, indirectly, suggests the knowledge required to develop such techniques. There is, however, no proof about the degree of knowledge reflected in those artifacts. Images of craftsmen at work, for example, have illustrated manufacturing processes and some applied techniques; these illustrations are often accompanied by short explanatory texts and sometimes contain specific terminology. The greatest significance is given, however, to those Egyptian texts that are regarded as "scientific" literature in the broadest sense. Since the preserved material is only a small percentage of the original, our holdings are incomplete and our knowledge of Egyptian science somewhat sketchy.

Scientific Disciplines. The following sciences are documented for ancient Egypt:

- Anatomy (for art)
- Astronomy and astrology (the two disciplines being inseparably linked in ancient Egypt)
- Biology and veterinary medicine
- Chemistry
- Geography
- Geology