INTRODUCTION

Zenobius tells us that Alexandrians of his day would call an arrogant man "Kelmis in iron" (4.80). Behind the proverb lay a well-known myth of three brothers, Akmon, Damnameneus, and Kelmis, known collectively as Idaian Daktyloi, or "Fingers of Mount Ida." They were familiar figures in the ancient world: Hesiod dedicated a work to them; they appeared in comic choruses on the Attic stage; their inventions were celebrated in chronologies, *heuremata*, and the rationalizing accounts of Hellenistic historians.[1] They were magicians, musicians, and inventors of iron, famous for their dance, and for the creation of magical spells called Ephesian letters, which Androkydes claimed revealed the cosmic order of planets and seasons (Clement of Alexandria *Stromateis* 1.45.2). Daktyloi sprang from the ground at Zeus' birth to protect him from his father's cannibalism (Stesimbrotos *FGH* 107 fr. 12a). Powerfully fertile, their dance summoned fruit from the trees, crops from the ground, and springs from a rocky hillside; Herakles the Daktyl attended on Demeter at Mykalessos, and women wore amulets in recognition of his magical power.[2] With his brothers, he was a master of medicines, poisons, spells, and mysteries.

Behind "Kelmis in iron" is a myth of metamorphosis. The three Daktyloi encountered the mother goddess of Phrygia, deep inside Mount Ida. Kelmis offended her somehow; as punishment, his brothers locked him into a subterranean prison. An earthquake followed, and he metamorphized into the material that most reflected his difficult, unbending personality.[3] All three brothers reflect metallurgical ideas: Akmon means "anvil," Damnameneus "Hammerer," and Kelmis becomes iron itself.[4] A more sexual and violent version of the story appears in Clement of Alexandria's diatribe against the mysteries. The rites unfold against the anger of the mother, whose sexual violation must be violently avenged; fratricide plays a central role, and the murdered brother is buried

at the foot of Mount Olympus. His burial is followed by generation, wild celery springing from his blood as pomegranates do from Dionysos' (*Protrepticus* 2.14–16). The brothers are Korybantes, or Kabeiroi, whom other authors equate to Daktyloi.[5]

The Daktyloi thus access a semantic range that connects iron making to magic, autochthony, music and dance, cosmological order, and terrestrial fecundity. They bring these associations into the ritual contexts of mysteries and magic, and represent the divine type known as daimones, a term ranging in meaning from the deified dead to demoted former gods.[6] This rich semantic range is nearly invisible due to the fragmentation of the sources and their scattering over a broad historical period. The difficulty is regrettable, as these creatures suggest metaphoric uses of metallurgy that exceed what is visible in Hephaistos, Kyklopes, or other mythic crafters. From the perspective of an anthropology of technology, however, this breadth and richness is exactly what is expected. Economically vital materials are naturally the object of metaphorical elaboration, and the more productive a material is, the more naturally elaborated its position in the semantic web of symbol, myth, and ritual. The complex and lacunous quality of the Greek data has obscured the extent to which the daimones provided this for the Greek world; so too have the styles of investigation, which fitted models inspired by nationalism, psychoanalysis, evolutionism, and primitivism onto the fragmentary data, seeing in the daimones the cultural model of technological advance appropriate for the scholar's own day.

Comparison of the daimones with sub-Saharan African rituals casts significant light on the extent to which metallurgy was, in Lévi-Strauss' words, "good to think" in the ancient Greek world, and the daimones good to think about it with. Both Greek and African groups treat metallurgy with mythic seriousness, and employ tantalizingly analogous metaphors, including parturition, ancestors, terrestrial fertility, and functional application in the world of magic and medicine. The numerous parallels in their semantic ranges are exemplified by the Ader Hausa in Niger.[7] The Hausa attribute iron working skills to the Asna, an autochthonous people who lived in caves and holes in the ground long ago. The Asna's smithing clan trace their descent to a woman named Lola who fell from the sky, holding a hammer in her right hand and a ladle full of food in her left. Lola was able to handle hot iron without being burned, and when she became angry she would take the red-hot iron away from the forges. The clan is composed of smiths, who know the magic and the practice of iron making, and griots, singers of exceptional power. Men born of smithing fathers are the masters of metallurgical techniques, honored for their ability to make the agricultural implements needed to cultivate the land. Men born of women of the smithing clan become griots, who exercise social control and magical force through their skill in songs.

The smelting rituals combine the practical actions of metallurgy with cosmology, medicines, magic, song, and the imagery of the parturient female. Smelts begin at the time of the full moon and are complete before the next one appears. The smelting master oversees all the physical and ritual aspects of the operation. He directs the preparation of fuel, ore, and equipment; he lays out the smelting camp in alignment with the points of the compass and the village hierarchy; he prepares the medicines for the smelts, items gathered from the wild that he alone understands. He applies these to each furnace in a circular movement from west to south, and east to north, repeating his actions three times as a reflection of the Hausa number for masculinity. He punctuates his actions with gyrating movements that will make the ore fuse as blood and semen do, swirling together in a woman's womb. The furnace is washed and adorned as a bride, positioned on space marked out as a nuptial house, and fertilized and protected by the smelter, whose words emphasize the equation of iron smelting to human sexuality. He is careful to propitiate a genie of the bush who, if not properly appeased, will take the life of a member of his family.

As the smelter performs his ritual, the griots accompany him with songs of praise and sexuality. They play on musical instruments made by the smiths, and may be accompanied by dances of their women, who are of the smithing clan. The griots exercise social and supernatural control over procreation: Women from outside their clan may lose a pregnancy or their menses if they touch his instruments; villagers who indulge in sexual misbehavior may hear their escapades announced in the griot's songs. In the smelting camp, it is their songs that help the furnace conceive; as the slag starts to run, the griots hail it as the rupture of water and the start of labor. The slag is considered placenta, and will be buried beneath the furnace just as human placentas are buried beneath the floor of their family's houses. After the final smelt of the season, the young men of the village rush to the furnace and smash it violently to pieces, as the smelter begs them to desist.

The Daktyloi and the Hausa both combine iron making with conceptions of autochthonous tribes and individuals skilled in music, medicine, magic, and dance. The woman as mother figures in both traditions, as does an act of violence against her. Rituals are characterized by carefully guarded information, magic and mysteries for the daimones, and the master smith's ritual knowledge of medicine. Hausa smiths are also associated with protection of the newborn, the delivery of judgement, and assistance to kings that characterize Daktyloi. Analogous semantic ranges inform iron making traditions in other sub-Saharan groups.[8] Taken together, these yield a sophisticated array of parallels to the Greek daimones who make metal. Both systems assign a central role to a parturient mother and to the king, either Zeus on whom the daimones attend, or the chief. Narratives and

behavior suggest a crime in need of atonement, and a life sacrificed for the production of iron. The tools of the African smith are personified, as the names of the Daktyloi personify the smith's labor.[9] Ritual performances ensure the cooperation of ancestors, of nature spirits, and of the dead, all in an atmosphere of intense secrecy. Greek daimones and African smiths both figure in the rites of passage for young men, the Kouretes as divine patrons, the smiths as circumcisers.[10] The African smith can prophesy, reading the patterns in the flow of slag; the Daktyloi and Kouretes had mantic powers, dispensed to men through oracles and sacred caves.[11] Dance is the heart of both ritual performances. The Greek dances derive from a common narrative of attendance on the infant Zeus, and offer a range of ritual powers including purification, divine possession, terrestrial fecundity, and apotropaic protection. African dances similarly arise from the image of the female in birth. The dancers harness the transformative metaphor of the mother's gestation and transfer it to a variety of tasks, turning young men into adults, princes into kings, or moving the living into the world of the dead.[12] Their performances may be accompanied by songs that magically ensure the formation of the iron, and so the growth of the fields, the strength of the king, and the well-being of the town.

These parallels inspired anthropologists and classicists of an earlier era to suggest that the Greek and African symbolic systems were essentially comparable, reflecting analogous stages in the mastery of technological knowledge, and the integration of its specialists into the social fabric.[13] These proposals were based not on the sophistication of the systems, or even the full extent of parallels, but on the evolutionary paradigm that dominated the European academy from the late nineteenth century on. These paradigms interpreted technological rituals as a signal of primitivism, an appeal to divine aid by workers who did not fully comprehend the art they practiced. African cultures were the living museum of early man, and their cultures a demonstration of how European men had lived long ago in their own pretechnological time. Early Iron Age Greece – the putative origin of the myths of the Daktyloi and their cousins – was inherently comparable to traditional Africa, viewed as the long-elaborated childhood of the human race.

A more fruitful approach to the comparanda can be made now, with the advances of the last fifty years in ethnography and social anthropology. Previous emphases on the primitive have been abandoned, and evolutionary models and broad comparisons replaced with closely focused, local analyses.[14] Studies of technology and ritual have yielded a sociotechnical systems approach that replaces the model of magic as ignorance with an integrated model for process and symbolism.[15] Technologies are recognized as the result of social choice, and reflect cosmology and social organization as well as economic, political, and ecological history. Studies of African smelting have revealed in particular the tremendous

variation in rituals from one context to another, so that even apparently parallel symbols support substantially different social structures.

The metallurgy of the daimones has not benefited from these theoretical advances. Interpretations by classicists rely upon models proposed as early as the nineteenth century. These have used a variety of hypotheses to account for the daimones; they were almost invariably informed by evolutionary perspectives, and sought a single sociological explanation for the daimones' association with craft. The daimones were considered the faded remnant of smithing guilds, apotropaic appeals to the gods of the smelt, a reflection of the suspicion with which a new technology was received, or subordinate, regional personifications of Hephaistos' power.[16] These models assume a priori the centrality of the daimones' metallurgy to their social function, although no evidence suggests that these daimones were the smith's own gods, or received special honors in a forge or atelier. They also fail to consider the other conceptions and functions with which the daimones were associated, which constitute the bulk of the evidence. The evolutionary hypothesis renders these irrelevant, the historical detritus that collected in the centuries that separated primordial smiths from Classical and Hellenistic literary sources.

The investigation of the daimones stands to gain much from the application of the sociotechnical model, and a more critical use of ethnographic comparanda. The sociotechnological model suggests that the daimones' numerous functions beyond their craft are not the accidents of history, but the semantic realm into which the daimones place metallurgy. African comparanda offer both principles of investigation, and apparently parallel themes, to structure a new study. In the era of evolutionary anthropology, parallel symbols and structures constituted proof of universal human evolution. Current ethnography is more concerned, however, to understand material in its indigenous context. Comparanda are valuable less for their affirmation of the investigator's models than for the distinctions between the two systems they reveal. These differences offer the investigator four advantages. First, they help reify the unexamined importation of cultural assumptions from the investigator's own milieu.[17] Studies of technology are particularly prone to these, as the conditions required for metallurgical production, such as abundant fuel, high temperatures, and work that is both skilled and physically demanding, are universally analogous. A second advantage derives from the differences among the African examples themselves. Smelting rituals vary greatly across the continent; analogous symbols are used to very different social purposes, even between neighboring groups. This cultural specificity cautions against seeking a single meaning in the daimones' relationship to metallurgy; it also invites the investigator to seek, not only the typologies that are the traditional goal of mythological investigation, but to establish the use to which the daimones may be put in a given circumstance,

genre, or historical moment. The ancient author thus becomes an informant, a very specific voice making selections from the semantic range that the daimones provide. His choices from the mythological menu reflect his audience, genre, mood, and historical moment. Anthropologies of technology have emphasized the nondeterministic nature of technological advance; equally nondeterministic is the use any author made of the metallurgical daimones, who could be creatures of praise or tokens of insult.

This focus on the individual piece of data, and sensitivity to distinctions, also offers a third advantage: it moves the investigation away from the cumbersome search for survivals that has characterized scholarly analyses of the daimones. Many scholars have taken literally the identification of the daimones as the first inventors of metallurgy, and so positioned the intellectual package they represent in the earliest stages of cognition about the metallurgical act. They have assumed the daimones are the mythologized expression of non-complex cultures, with broadly similar technological characteristics. This obscures the sophistication of the daimones as a tool for articulating the role of metallurgy in society. Narratives of invention reflect the time of their own composition, and serve the needs of often complex, urban, international cultures. The daimones, as will be seen, provide for ancient writers a primitive analogous to the anthropologically constructed primitive of the modern era. This is a more intellectually sophisticated package than a faultily preserved historical memory, invoked when its cultural usefulness was long past.

Finally, the focus on distinctions as well as similarities represents a chance to test rather than assume the hypotheses that have been the starting point for previous investigations. Was metallurgy "good to think," and were the daimones good to think about it with? The African systems under consideration occur at the point of smelting; their relationship to metal is unquestionable. Greek myths come from fragments of literature and a few visual depictions, and the bulk of the evidence is not obviously relevant to metallurgy. Comparison between the data suggests that the daimones were not, as has been assumed, the gods of smiths, or metallurgy their primary function. The approaches through which the African materials have been studied, however, suggest avenues of investigation for Greek material that reveal more of the uniquely Greek articulation of metallurgy that the daimones provide. Analysis of the modalities through which the Greek daimones enter ritual – in song, dance, and magic – and through the literary genres of epic and epinician praise, reflect a more nuanced relationship between the daimones and metal than previously apprehended.

This book is organized into three sections: an introduction to the data and scholarship on Greek and African material, an analysis of gender and parturition in metallurgical metaphors, and the political force of metallurgical ritual and myth.

In each section I have adopted a methodology for comparison that stems more from anthropology than from Classics. I do not assume familiarity with either the human cultures studied, or the academic cultures that study them, on the part of my readers. I begin each section with an initial overview of the broadest kind, granting a structural, ahistorical, syncretic view of the semantic range of the data in question. This is followed by analysis of the nature of the evidence and the scholarship that created this syncretic vision, and finally by close analysis of individual examples. I take this approach so that the reality of the evidence and the arguments may be as clear as possible. The data are partial, uneven, and contradictory, and the perspectives of scholarship have so shaped previous presentations, smoothing the data to fit the models, that the distinction between the material and its interpretation has often become obscured. Separating the synthesis from the original sources helps restore the odd edges of the ancient fragments. These are precisely what a sociotechnical systems approach needs, in order to work at fitting the data back into its ancient context more than into the models of the modern academy.

The daimones are complicated mythological entities, fragmentarily preserved and categorically indistinct; absent from the literary and iconographic canon, they have remained at the edges of Classical studies. The difficulty of the data is compensated by the opportunity the daimones represent to investigate a unique mythological response to the historical and social force of metallurgy, and its relationship to medicine, magic, political power, and poetic performance. African comparanda offer benefits, in both data and approach, for the daimones' investigation. Their variety cautions against overgeneralization; their clear articulation of themes apprehended fragmentarily in the daimones reveals the extent to which the Greek data do not fulfill the psychological, sociological, or structural models that have been proposed in the past. The comparanda overturn more than they support the hypothesis of a simple relationship between gods who made metal, and men who worshipped them. In doing so they reveal the far more subtle discussion about metallurgy that the daimones do provide – distinct from both Hephaistos, and their African counterparts.

I DATA AND METHODOLOGIES

The daimones and the smelters share numerous superficial similarities. These are parallels of theme and narrative, assemblage and juxtaposition, as though smelting attracted not only an analogous array of ideas, but arranged them in syntactically similar ways. Thus young men, sometimes metallurgists, gather in a show of arms and emerging manhood to dance protectively around the sacred mother and her imperiled child in a Cretan cave. The child will ensure the land's fertility, and the town's well-being. In the composite image of the African smelt, young men celebrate their sexual potency around a furnace that is the metonymic bride, wife, and mother. Her child is the iron bloom, who needs ritual protection against the spells of rival smelters. If brought to successful birth, this bloom will be made into hoes to till the land, ensuring agricultural success and political stability. These are the parallels that encourage comparative projects, and their identification and cataloging was the goal of such studies, and proof of shared meaning, in the Frazerian anthropological tradition.

Less encouraging, and far less explored, are the parallel epistemological challenges of the Greek and African materials on which this study is based. Both data are partially preserved at best, through fragmented texts or imperfect memory; the extant materials, moreover, defy canon or reason. Primary sources may contradict each other, and do not consistently reflect regional distinctions, chronological development, gradual syncretization or diffusion from a common source. The parallels are too many to ignore, the distinctions too various to explain with a single social or historical model. Strabo in the first century, and Lobeck in the nineteenth, noted the impossibility of imposing order on the daimones. Strabo finally asserted kinship by focusing on their commonalities, and ignoring the myths that demonstrated their distinctions (10.3.7); Lobeck concluded that there is an art, and a science, to knowing nothing (1829:1110). In African studies, Cline

noted already in 1937 that the reports of iron smelting rituals came from problematic sources – Christian missionaries who viewed them with disdain, or local administrators for whom iron production was an unwelcome sign of indigenous competence. Few of these had any knowledge of metallurgical science, and none of them knew material from regions outside their own. Cline was the first to bring these faulty resources into a single volume: The compilation revealed both the abundance of variation and the inadequacy of a single model to account for the range.

The challenge of this study is to bring critical approaches, developed from the study of living cultures, to bear on an ancient Mediterranean phenomenon. This requires an introduction to the primary data, in all its contingency and contradictions, an acknowledgment of the cultural forms through which the data come, and the function these forms serve. It stipulates as well a consideration of the full semantic range of the phenomenon in its subject culture, and not only those points that inspire comparison through their apparent parallels. An overview of intellectual and cultural context is the necessary background for the close analysis of individual cases, which I provide in the following chapters. It is also the only way to address the inherent problem of a study that crosses academic as well as cultural divides. Classical materials are texts and images; African smelts are known from fieldwork, reconstructions, and archaeological investigation. These are the cultural forms through which modern Western investigators construct the daimones and the rituals. Awareness of them cautions against a purely structural approach, encourages consideration of indigenous contexts and functions, and suggests that the goal of investigation is a more nuanced set of questions rather than a new answer.

I begin with an overview of the Greek data, providing an introduction to each of the five daimones. The survey reveals the permeability of the daimonic types, the variability of their relationship to metallurgy, and the wealth of other thematic, ritual, and iconographic associations, including jealousy, magic, and deformity. These serve various purposes, responding to the literary genres, authorial intent, and artistic conventions in which they functioned. Investigations of African smelting rely on a very different range of materials. Texts include the reports of colonial administrators, missionaries, and ethnographers: these include native genres of smelting songs, the traditions of the griot singers, and myths about the first iron makers. To these may be added interviews with smelters themselves, who could recall the techniques and rituals of fifty or sixty years ago, and advised fieldworkers in the reconstruction of traditional smelts. Early ethnographic films document smelts as early as 1927; archaeological investigations of smelting sites have yielded evidence suggesting continuity in technological as well as ritual practices. Reconstructed smelts have provided insights into the combination of ritual

and technological skills. These reflect the function of the rituals as a response to procedural failures, and suggest high levels of technological control.

With the African cultural material, I offer as well an overview of the data for the arrival of iron technology to Africa. Parallels between Greek and African cultural systems have often inspired models of diffusion as an explanation. There are strong limitations to that model for metallurgy in particular, and I address the issue in part because of the debates within the Classical world since Bernal's work, *Black Athena*. Bernal sought to derive Greek culture – science, medicine, arts, and technology – from African antecedents. The contributions of these cultures were obscured, he argues, by anti-Semitic scholarship that insisted on Greece, and not Africa, as the cradle of Western civilization. Models of diffusion are not inherently improbable, particularly for the ancient Mediterranean trade in metals. In the case of Greek and African iron technology, and the mythic and ritual responses to it, they are deeply unlikely. Arguments for a historical derivation would focus on the most tenuous of data, at the expense of the bulk of evidence, and would ignore the more profound insights that come from studying these complicated mythological and ritual types in the cultural contexts in which they functioned.