

In Nature's Workshop.

BY GRANT ALLEN.

I.—SEXTONS AND SCAVENGERS.



Na certain sense, all animated nature is but a single vast co-operative society. I am no foolish optimist: I will admit, indeed, that the members of the society so composed often display to one another the most unfriendly and unfraternal spirit. The hawks, for instance, show a distinct want of true brotherly love towards the larks or the tom-tits: and the mice and lizards find the owls and the cats by no means clubbable. The co-operative society is hardly what one could call a happy family. Still, in spite of the fact insisted upon by the poet that "Nature is one with rapine—a harm no preacher can heal," it is none the less true that a certain rough balance, an accommodation or adjustment of part to part, occurs in every department of animal and vegetable life. When we come to think, it could hardly be otherwise. Things can only exist if they contain in themselves the conditions necessary to existence. An unadapted animal or plant perishes instantly. Spiders could not live in an island which contained no flies; kingfishers necessarily presuppose fish; and silkworms imply the presence of mulberry leaves. You cannot have vultures wild in a country where there are no dead animals lying about loose; nor can you keep bees except where there are honey-bearing flowers. Dutch clover depends for its very existence upon a few insects which fertilize it and set its seeds. The draining of the fens killed out a dozen species of English plants and animals; the inclosure of the prairies deprived the buffaloes of their chance of pasture. In this sense, all nature hangs together as it were; each species fills some place in the great mosaic which cannot be altered without considerable disturbance of adjacent pieces. Destroy the rabbits in a given area, and you have nothing left for the weasels to feed upon.

Sometimes, too, apparently unimportant or unnoticed creatures perform in the aggregate some valuable work for the rest of the plant and animal community, which little suspects its real indebtedness to them. Darwin showed long ago that the humble and de-

spised earthworm was really answerable for the greater part of that rich layer of vegetable mould or soil which covers the bare rocks; it deposits the material in which all our plants root and from which they derive a large element of their sustenance. Kill out the earthworms over the whole of our earth, and you would reduce a vast proportion of it to the condition of a desert. For the worms pull down green leaves into their neat little burrows; and the refuse of these leaves, continually renewed from season to season by the industrious small workmen, forms by far the greater share of that dark layer of vegetable mould which is the chief source of the fertility in plains and lowlands. Sandy upland spots, where worms are few, form little or no soil, and will only support a poor moorland growth of gorse and heather. You must have plenty of worms if you want to grow corn or turnips.

But there are other unconsidered creatures besides these, creatures which perform for us functions almost as useful and important as those of the earthworms; and I propose to devote a few pages here to one such group, the sanitary commissioners of the insect world, as I will venture to call them—the vast body of minor sextons and six-legged scavengers. Has it ever struck you that as you walk abroad through the rich green meadows and pastures of England, you almost never come across a dead and decaying animal? I do not mean large animals like horses and donkeys: those do sometimes occur unburied, giving us bold and unpleasant advertisement of their near presence. But just consider that the fields through which you stroll are a perfect warren of moles and shrews and field-mice and water-voles and frogs and lizards and rabbits and weasels, to say nothing of smaller fry; and then think how seldom on your morning rounds in the country you come across a single dead bird or rat or adder, a departed toad, or a late lamented leveret. The ground about you teems with life: but where are its cemeteries? Squirrels and dormice are dying in every copse: but what becomes of their bodies? Who ever saw a dead bat? Who knows the tomb of the deceased hedgehogs?

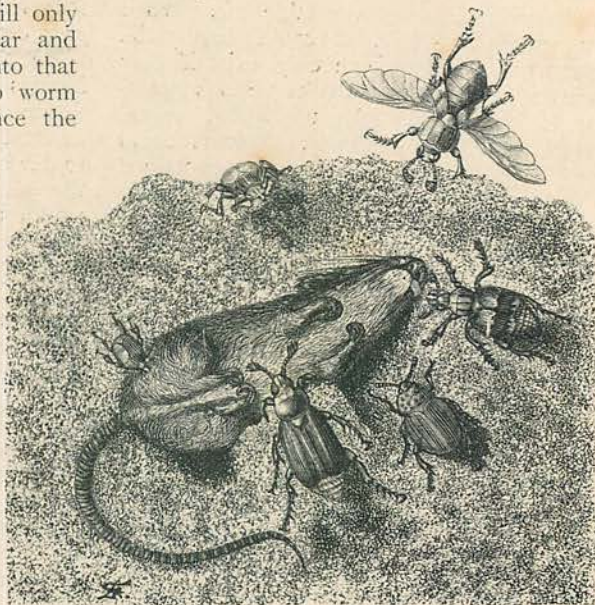
Of course a great many of the smaller animals die a violent death, and find their living grave in the maw of their devourers—one must admit that explanation as covering a very large number of cases. Thirty field-mice have been disinterred from the stomach of a single buzzard when it was shot in the act of digesting after a good dinner; and owls and snakes are answerable for the fate of no small proportion of our minuter wild animals. In other countries, too, vultures and jackals devour most of the carrion as it lies; while even in England we have a few dead-meat-eaters, such as the carrion-crow, the rat, and the shrike. But for the most part our rural English public scavengers are smaller and less conspicuous creatures. Foremost among them in number and utility we may reckon the various kinds of burying beetle.

If you *do* find the body of a mouse or shrew lying unburied in England, it occurs almost always on a path or high-road. Now this fact is in itself significant; for the high-road is practically a man-made desert, so hardened and steam-rollered, so pounded and wheel-ridden, that no plant can grow on it; so exposed that small animals will only scurry across it for dear life in fear and trembling; and so difficult to dig into that no burrowing creature can hope to worm his toilsome way through it. Hence the animals that die on the road are almost never buried; while those that die in the field or copse are either eaten at once by larger beasts, or else decently interred within a few hours by the sexton beetles and other established scavengers. Indeed, a common superstition exists among country folk that one of the small long-nosed, insect-eating animals known as shrews cannot so much as cross a road without being killed instantly. A human track is supposed to be fatal to them. The superstition has arisen in this way: shrews die of cold and hunger in great numbers at the approach of winter. A certain proportion of them perish thus in the open fields; these, however, are immediately buried by the proper authorities, the sexton beetles. But a few happen to die as they are crossing a road or path; these lie where they fell, because the sextons cannot there pierce the hard ground, and seldom even dare venture

on the road to carry them off to softer spots for burial. The rustic sees dead shrews in the road, and none on the open ground: so he hastily concludes in his easy-going way that to cross a human path is sudden death to shrews, who are always supposed for other reasons to be witch-like and uncanny animals. If the road leads to a church, a fatal stroke is specially certain: for the shrews, like all witch-creatures, hate Christianity.

I need hardly say, however, that the burying beetles do not perform their strange funereal office out of pure benevolence, without hope of reward. Like human sextons and undertakers, they adopt their lugubrious calling for the sake of gain: they expect to be paid for their sanitary services. The payment is taken in two forms: one, immediate, as food for themselves: the other, deferred, as board and lodging for their children.

Our illustration No. 1 introduces us to a typical miscellaneous group of these insect scavengers, occupied in appropriating a very fine and desirable carcass on which they



1.—GROUPS OF MISCELLANEOUS SEXTON BEETLES, DISCOVERING A DEAD FIELD-MOUSE.

have just lighted. A field-mouse, vanquished by fate in the struggle for existence, has lately "turned up his toes" in the most literal sense, and lies unburied, like Archytas, on the loose sand of a bare patch in a meadow. All carrion-eating creatures are

remarkable for their powerful sense of smell : and the sexton beetles, like the vultures and condors, are no exception to the rule. They sniff their prey from afar : for where the carcass is, there shall the carrion beetles be gathered together. All are eager to take their share of the feast, and still more to lay their eggs in the dead body. Some of them may crawl up from the immediate neighbourhood : others, summoned from afar, come flying on their gauze-like wings from considerable distances. They are, as a rule, nocturnal creatures, and they come out on their burying expeditions by night alone.

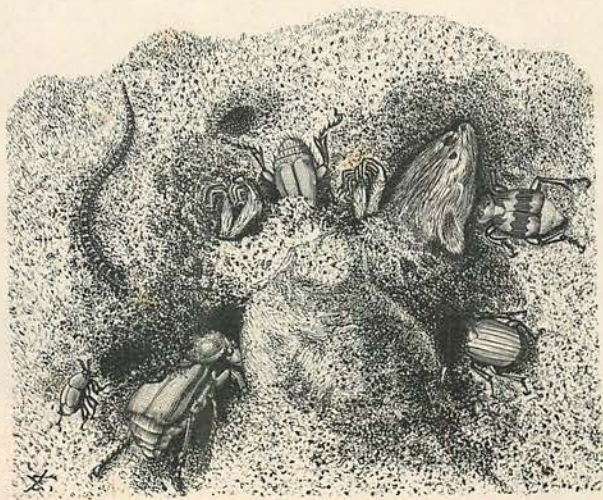
The insect just alighting from his flight, in the upper part of the illustration, is *the* burying beetle *par excellence* among our British kinds ; he rejoices (we are always supposed to rejoice foolishly in our personal designations) in the dignified title of *Necrophorus vespillo*. In stature he measures

about an inch long, and he is a handsome beast, with two bright orange bands on his hard wing-covers. The illustration shows these wing-covers raised, as is the habit of beetles when they fly, while the thin but powerful wings beneath them are expanded as true pinions. When the insect alights, he folds

the wings up carefully and replaces them under the hard protective wing-covers : he is then securely armour-plated from head to foot, and need fear no foe, save birds which swallow him whole—a very tough morsel—and hedgehogs which crunch him in their strong jaws before eating him. However, he is well prepared for all such enemies, for he can exude when attacked a very nasty fluid with a disgusting smell : and this mode of defence, which resembles that of the skunk and the polecat, usually protects him from obtrusive inquirers. He must be handled with caution, as the perfume he diffuses spoils woollen clothes and clings to the fingers after two or three washings.

As a rule, when a carcass appears, a pair of burying beetles of the same species—a husband and wife—fly up to the scene of operations together and take possession of the prey ; though in the illustration Mr. Enock has represented several kinds engaged at once in staking out claims, which indeed happens often enough in nature. But if you count the number on any one dead bird or animal, you will almost always find they are even in number—in other words, so many pairs, male and female. No. 2 shows us the next act in the funeral drama. The male beetles, after satisfying their own immediate hunger, proceed to bury the carcass in a very cunning and laborious manner. You would wonder how so small a creature could produce so great a result : the fact is, the beetles attain their end by continuous under-cutting. The female hides herself in the body : the male buries her alive and the dead creature

with her. He first drags the mouse, frog, or bird to a suitable spot where the soil is soft enough to admit of excavation ; and sometimes three or four males have to combine for this purpose. They then proceed to dig with their heads, which are tools specialized for the purpose, and provided with strong and



2.—THE SEXTONS AT WORK : BURYING THE BODY.

powerful muscles. The antennæ have also assumed for this object a short club-shaped type, very suitable for a navy's mattock. The little engineers begin by excavating a furrow all round the body, and then a second inside that again, throwing the earth out of each into the previous one ; and so on till the carcass begins to sink into the hollow. They then dig and tunnel beneath it, carrying out loads of earth, one after another, till bit by bit the carcass collapses into the hole, first in front, then behind, and has reached a level considerably below the surface. Then they throw in the earth they have excavated, and cover up the body with the females inside it ; after which, I regret to say, they

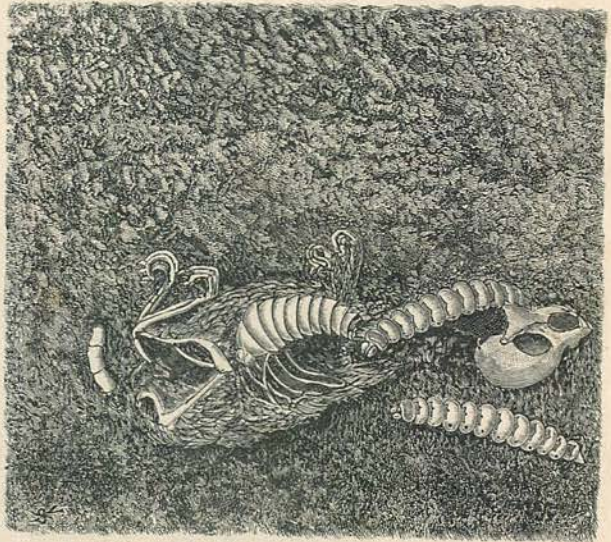
proceed to hold a very cannibalistic funeral service above it. The funeral service consists in eating as much of the body as they desire for their own purposes: when they have satisfied their appetite, they begin to think of the interests of posterity. The mother beetle proceeds to lay her tale of eggs in the decently-buried body, for every animal knows by instinct the precise place in which to deposit its young and the precise food which happens to suit them.

After the eggs are laid, the two parent beetles crawl out of the hole and cover it carefully up so as to conceal the hiding-place. So far as they themselves are concerned, their only object in all this is to procure food for themselves and their infant young. But the wider effects of such scavenger insects go very far. For we now know that there is no disinfectant so good as the top layer of the soil, which is not really mere dead earth (as most people imagine), but a mingled mass of ramifying life—a little foundation of clay and sand intermixed with endless minute organisms, both animal and vegetable—fungi, bacteria, mites, weevils, and all sorts of petty creatures, which eat up and destroy harmlessly all dead matter subjected to their influence. The earth is thus a most admirable deodorizer and purifier: and burial in its top layers, the body being freely exposed to the rapid action of the devouring microbes, is a most sanitary mode of disposing of refuse.

Thus the part that is played in the East by vultures and jackals, or by the wild dogs of Constantinople, is far more effectually and unobtrusively played in our fields and meadows by the many kinds of burying beetles and other insect scavengers. If we remember how great a nuisance a single dead rat becomes in a house, we can faintly picture to ourselves the debt we owe to these excellent and unnoticed little sanitary commissioners. Without them, our fields would not smell so fresh, nor would our flowers bloom so bright; for we must remember that by burying the dead beasts they are not only preventing disease but also manuring the pastures in the best possible fashion. The bones of small animals decay rapidly and make excellent material for the growth of vegetation. The beetles as a rule hunt by night

only, and find their prey, as vultures do, by the sense of smell. When they first find it, the male hovers above it like an eagle, circling round and round, so as to point it out to his mate; the female flies straight to it, and buries herself without delay in the rich banquet.

But what becomes at last of the buried bodies? No. 3 will show you. The female beetle lays in each body about as many eggs as she thinks it will support. In a very short time the eggs hatch out, and the grubs begin to devour the abundant feast provided for them. The two grubs to the right in the illustration are the young of



3.—THE GRUBS UNDERGROUND: FEEDING UPON THE BODY.

our friend the orange-banded burying beetle: the one to the left is a larva of an allied form known by the poetical name of *Silpha*. They set to work at once on the remains of the mouse, and thoroughly strip the bones of every fibre of flesh. As soon as the skeleton is bare, they consider it time to leave off feeding, and pass on to the second stage of their existence—the pupa, or mummy-case.

As larvæ, the young burying beetles look like worms, and have six short legs. No. 4 shows them in the intermediate stage, when they have retired into a clay cell, or cocoon, and are undergoing their transformation into the perfect insect. We are here supposed to have removed the soil on one side so as to give a view into the concreted earthen chambers where the pupæ are changing into full-grown beetles. You can see the much

longer legs of the adult insect beginning to develop, while the head assumes slowly its later form. The grubs remain in the cocoon through the winter, and emerge in spring as winged beetles, when they fly away with their brilliant wing-cases raised, in search of congenial mates and more dead field-mice. The best places to look for all these beetles are the "keeper's trees," on which game-keepers hang up the jays and weasels they shoot, to encourage the others. If you tap one such dead weasel you will generally find it is simply swarming with insect life.

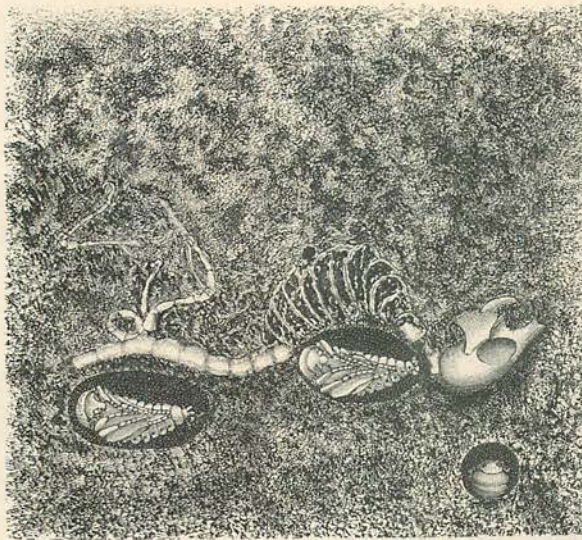
Yet, strange to say, even the insect undertakers themselves are not without their ideas of beauty and their musical perceptions. The

forms where our human eyes would be more inclined to look for the presence of these higher endowments.

I may add that if the beetles left the bodies in which they laid their eggs to lie above ground, the bodies would dry up, and the eggs would run much greater risks. By burying the dead animal, they provide their young with food and shelter together, and so display considerable intelligence.

Another very distinct group of insects which act as scavengers in a different way in hotter climates than ours are the famous scarabs or sacred beetles, worshipped almost like gods by the ancient Egyptians. English people know the scarabs best, I think, in the

neighbourhood of Naples, or on the Lido at Venice—that great bank of sand and shingle which separates the lagoons from the open Adriatic. When wearied with sight-seeing at St. Mark's and the Doge's Palace, we have, most of us, taken the little steamer that runs across to the baths on the Lido, and spent a pleasant hour or two in picking up shells and dried sea-horses on the firm belt of beach that stretches away to Malamocco. A little inland, the beach gives way to dry sand-hills, blown about by the wind, and over-grown by patches of blue-green maram-grass and other sandy seaside weeds. If you lie down on one of these sand-hills, choosing a spot not quite so dirty as its neighbours, you will soon be amused by seeing a curious little comedy going on perpetually around you in every direction. A number of odd-



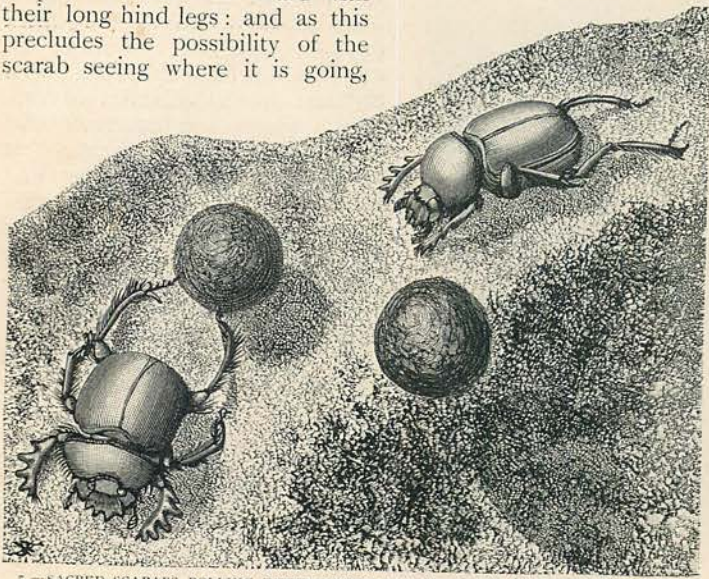
4.—NO MORE LEFT! THE GRUBS IN THEIR COCOONS TURNING INTO BEETLES.

orange bands of our commonest English kind have been developed as attractions for their admiring mates; and the male beetles have also a musical instrument of their own in the shape of a peculiar rasp-like ring on the body, which they can rub against the wing-cases, and so produce a much-appreciated chirping. Such instrumental music is always employed, like the song of birds, as a charm to heighten the attractiveness of the suitor: and male burying beetles may be heard on the evenings of sunny days competing with one another in musical contests. Indeed, it often happens that animals which seem to us disgusting or unclean display among themselves much æsthetic taste, and are gifted with more sense of beauty or love of music than many other

looking beetles, with long hind legs and very quaint heads, are occupied with ceaseless industry in rolling a lot of dark, round balls almost as big as themselves along the slopes of the sand-hills. In many places, the whole ground is alive with the tugging and pushing little beasts: indeed, when you come to look close you will find that every half acre of sand on the Venetian shore or the lower edge of the Egyptian desert is a perfect city of these busy wee creatures. Earth is honey-combed with their holes, towards which innumerable beetles are continually rolling their mysterious balls at every possible angle.

Now, what are the balls composed of? There comes the oddest part of the whole odd proceeding. The plain truth of it is that the sacred beetles are assistant scavengers

—imperfect Southern and Oriental substitutes for a main drainage system. The balls consist of dung, dirt, and refuse, and the beetles collect them on the open, dry them hard in the sun, roll them to the mouths of their burrows, and then live on them till the ball has all been eaten. It is the funniest thing in the world to watch them. They tumble about in the loose sand and stumble over little eminences in the most comical fashion. No. 5 shows a pair of scarabs engaged in this habitual and quaint amusement. They have each collected a round mass of manure, and rolled and dried it nicely into shape; they are now engaged in trundling their booty off at their leisure to a place of safety. But they are obliged to push the balls backward with their long hind legs: and as this precludes the possibility of the scarab seeing where it is going,



5.—SACRED SCARABS ROLLING THEIR FOOD-BALLS BACKWARD (THE INSECT TO THE RIGHT HAS LOST HIS DINNER).

each beetle pauses every now and again and turns round, like a man sculling in a boat alone, to look what is ahead of him. Sometimes in doing so he loses his ball, a misfortune which has just happened to the beetle on the right in No. 5. The precious pellet goes bounding off down hill as fast as gravitation will take it. In this case, the disappointed little workman faces round and darts after it at full speed, going forward now instead of backward, and trying to head the ball as it rolls down the uncertain slope of the sand-hills. If he succeeds, he puts himself in front of the ball as it falls, catches it with his hind legs, and begins once more laboriously to push it backward up hill again, towards the mouth of his hole.

But as the pellets roll quickly, and the beetles are by no means rapid runners, he seldom succeeds in recovering his own property, unless the ball happens to catch for a moment on some projecting little hillock of sand, or be checked on its downward course by a weed, a stick, or a dead shell or starfish.

On the other hand, the scarabs, I fear I must admit, are terrible thieves; and if one scarab has lost his own ball, and sees some companion's pellet come rolling down hill towards him, he will often give up the pursuit of his lost property, and quietly and barefacedly appropriate his neighbour's. I have seen great fights take place at times over a disputed ball; though sometimes the combatants agree amicably to

roll it along in common, and probably share it when they have reached their hole. Sometimes, again, three or four will unite to roll a ball: and then, when one loses it, the others combine to hold it up or catch it. I have spent hours together both in Egypt and on the Mediterranean or the Adriatic in watching the queer antics of these comic little commissioners of drainage: and I never tire of observing their odd and unexpected combinations of interest. I have sometimes known the real owner abandon a ball in despair, from the unevenness of the ground, and then seen

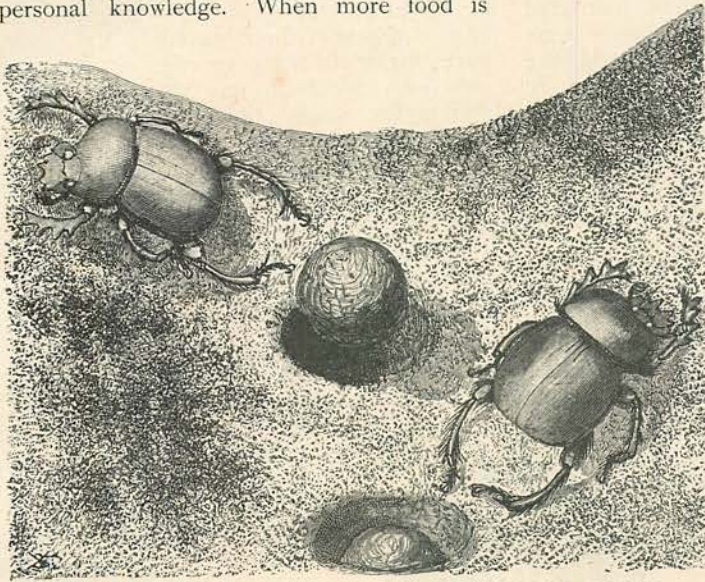
a couple of outsiders come up and succeed in doing what the true owner had been unable to accomplish.

In No. 6 you see two such scarabs whose toil has at last been crowned by success, and who are delivering their balls with joy into the holes in the sand which form their residences. As far as I can make out, a pair of beetles, male and female, seem usually to share a hole in common, and to roll balls of food to it either alone or in concert. I cannot say I have ever seen much co-operation except between such partners. Once a ball is secured and safely landed—for here, as elsewhere, there's many a slip 'twixt the cup and the lip—the happy couple proceed to eat it up, and apparently do not emerge

again from their burrow till the supply is exhausted. Patient naturalists say that one ball has been known to last a scarab as long as a fortnight, but this I do not vouch for of personal knowledge. When more food is

one of the most marked features in their monstrous religion. Hence grew a strange and widespread superstition. A race which

deified the hawk, the cat, the ibis, and the jackal was not likely to overlook the marvellous proceedings of the pious and dutiful scarab. So the very early Egyptians, we may conjecture, began by thinking there must be something divine in the nature of an insect which worked so ceaselessly on behalf of its young, and rolled such big round balls behind it up such relatively large hillocks. Watching a little closer, as time went on, the Egyptian discovered, no doubt, that sacred beetles did not proceed directly from sacred beetles, like lambs from ewes, but grew, as it were, out of the dirt and corruption



6.—PRIMITIVE GOLF—END OF A ROUND: THE SCARABS HOLING THEIR BALLS.

wanted, the couple emerge once more on the open sand and begin to collect fresh dung and refuse, which they roll into a new food-ball and then dry and harden.

Till very lately, it was universally believed that the female scarab laid an egg in some of the balls, and that the young grubs hatched within such food-stocks and began at once to devour them. This belief has recently been contradicted with great emphasis by a good French observer, who opened many balls and found no eggs; but I cannot accept his conclusion. I opened numbers of balls myself near Venice this year, and saw in several one or two eggs, while in one case (unearthed from a hole) I discovered a half-grown larva. I venture therefore in this matter to believe my own eyes as against those of even the most celebrated and authoritative entomologists.

In Egypt, it has been universally believed from all antiquity—and I think quite rightly—that after the scarab has laid an egg in the ball, the parents unite in rolling it to a place of safety, above the level of the annual inundation due to the rise of the Nile. At any rate, scarabs abound in Egypt. At a very early date, it would seem, the curious action of these beetles attracted the attention of the ancient Egyptians, whose worship of animals was

of the mysterious pellets. A modern observer would, of course, at once suspect that the scarab laid an egg inside the ball, and would promptly proceed to pull one open and look for it. But that cold scientific method was not likely to commend itself to the mystic and deeply religious Egyptian mind. The priests by the Nile jumped rather to the conclusion that the scarab collected dirt in order to make a future scarab out of clay, and that from this dirt the young beetle grew, self-existent, self-developed, self-created. Considering the absence of scientific knowledge and comparative groups of scientific facts at the time, such a conclusion was by no means unnatural.

Once started on so strange a set of ideas, the Egyptians proceeded to evolve a worship of the scarab which grew ever and developed, as they thought the scarab itself did, practically out of nothing. The immortality of the soul and the resurrection of the body were the central ideas of Egyptian religion; the thinkers of Thebes and Memphis instantly perceived a fanciful analogy between the scarab rising from its bed of dirt and the mummy reviving when the expected day of resurrection should at last arrive. As a consequence of this analogy, the scarab was made sacred: it was revered during its life and

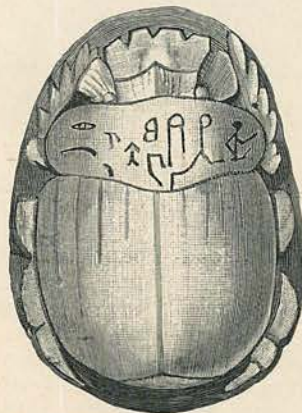
often preserved after its death, like the mummied cats and hawks and sacred Apis bulls which formed such special objects of veneration to the devout of Egypt. All sorts of mystic relations were also discovered before long in the scarab: its "toes" were counted as thirty, and held to symbolize the days of the month: it was said to be male only, without a female, and so to typify the creative power and the paternal or masculine principle in nature. Sun-worship, as we know, formed a large part of the later (though not of the most primitive) Egyptian religion: and the ball rolled by the scarab was therefore supposed to personify Ra, the great sun-god. In one way or another, the sanctity and the mystic implications of the scarab grew and grew, age after age, until at last scarab-worship became one of the chief practical elements in the religion of Egypt. There was a scarab-headed god, and scarab hieroglyphs appear on the face of all the monuments.

It is as a charm or amulet, however, that the ancient Egyptian imitation scarab is best known. From a very early period in the history of the Nile valley it became usual for luck's sake to bury some of these sacred beetles with the mummy, perhaps alive (in which case most of them would no doubt creep out again) and perhaps also dead. A few real scarabs have thus been found here and there in tombs. But for the most part, just as the Egyptians buried little porcelain images to accompany the mummy, so they buried porcelain or stone scarabs; and these were rather closely imitated from the living insect, but made still more sacred by being enamelled or engraved with the holy name of some king or god. Scarabs of this kind, inscribed with sacred words, and regarded as talismans, form some of the commonest objects disinterred in all the Egyptian excavations: one of them, from a specimen in the British Museum, is illustrated in No. 7. Comparison with the live beetles in the other engravings will show how well the Egyptians copied nature in this instance.

These beautiful and often costly Egyptian scarabs have been made the subject of very exhaustive study by various writers, more

particularly by Mr. Loftie and Mr. Flinders Petrie. The Egyptians did not coin money, so that scarabs bearing the names of kings came to have somewhat the same importance for Egyptian history as coins have for the history of later civilized nations. Mr. Loftie traces the origin of the inscribed scarabs to a very early epoch in the Egyptian annals. "From the earliest times until the end of the native monarchy," he says, "certain usages continued unchanged. Among them was the inscription of names and texts on scarabs. The beetle which rolls before it"—he ought rather to have said behind it—"a ball of mud in which its egg is concealed was, at some period so remote that we cannot even approximately date it, seized upon as the embodiment of the idea of futurity. . . . The scarab, burying his egg, became the symbol of the resurrection, of the

happy time to come, of a re-creation of all things; and with every corpse scarabs were buried, and scarabs were sewed upon the shroud, and strung into a network to cover the body, and suspended round the neck, and clasped in the dead hands. As many as three thousand scarabs have been found in one tomb, and the number in existence in museums and private collections is past count." Some of these imitation beetles are of blue pottery, enamelled outside; but others are of lapis-lazuli, jade, carnelian, and many other precious



7.—AN EGYPTIAN SACRED SCARAB, IN THE BRITISH MUSEUM.

stones. Sacred in themselves by their very form, that of the revered insect god, they are rendered still more sacred by their mystic inscriptions, which consist of appropriate religious phrases in hieroglyphic writing.

From Egypt, the belief in the luck and value of engraved scarabs as charms or amulets passed on to the Greeks, and also to the Etruscans. Many Greek scarabs have been found; and in the old Etruscan tombs such lucky beasts are comparatively common. They are mostly made more or less in imitation of the Egyptian originals. Oddly enough, even the early Christians themselves did not at once get over the belief in the sanctity and talismanic character of the sacred beetle, for the Rev. W. J. Loftie has pointed out examples of late

scarabs engraved with undoubted Christian symbols—not only crosses but even crucifixes. In our own days, a slight revival of the antique superstition has once more taken place, and some ladies of my acquaintance wear specimens of the old sacred beetles as charms in brooches or suspended on their watch-chains.

Though such numbers of true ancient scarabs have been unearthed in Egypt, still the supply of the genuine article does not quite keep pace with the increasing demands of the modern tourist: and there is now a flourishing manufactory of sham antiques at Luxor, where hundreds of false scarabs with nice imitation hieroglyphic inscriptions are neatly turned out for the market every season.

About sixty different kinds of live scarabs are known to inhabit the Mediterranean district in Europe, Asia, or Africa: and four of these kinds can be easily distinguished as being individually represented in the old Egyptian gems. We have no true scarab of this class living in Britain: but there are other scavenger beetles which take their place, the best known being the common dor-beetle. One of the same family, but with a quaintly horned head, exists in vast numbers on the Surrey hills where I have pitched my tent. This English dung-beetle burrows in the soft sandstone, and throws up neat little heaps of clean sand at the mouth of its hole, like miniature mole-hills. Still, our English scavenger beetles—known to science as *Geotrupes*—are not nearly so clever or so interesting as the southern type, for the female in our sort merely grubs a straight tunnel in the ground, and lays her egg in a loose mass of dung, which she drags to the bottom in a shapeless condition. This beetle utters a plaintive buzzing cry when it is chasing its mate—a sort of “last appeal” which seems calculated to soften the heart of the hardest lady beetle. It is as cunning in its way as most others of its race, for if you catch it in your hand, it at once draws in its legs to its side and “shams dead.” All the English and foreign scavenger beetles perform a useful task by following up animals and clearing away their refuse; indeed, a special kind of beetle lays itself out as scavenger for each species of large animal, one kind being attached to the cow, one to the donkey, one to the camel, and

so on through a long list of patrons and satellites.

You will thus see that in this wider sense all creation moves together like a vast joint-stock co-operative society, each kind working consciously for its own good alone, but each also in a certain deeper and unconscious way contributing to the general well-being of all, by its exercise of some special function. Nevertheless, the function is always performed by each plant or animal itself for its own purposes; it only incidentally serves to benefit the others. Thus the burying beetles and the scavenger beetles work first of all and ostensibly for their own food and the food of their offspring: it is merely as an incidental result, undesigned by themselves, that they assist in purifying the air and the soil for all other species. Or, to put it still more simply, while these industrious little creatures are working individually for their own ends, they are also in the wider scheme of nature working unconsciously and almost unwillingly in the service of others. Nature bribes each kind, as it were, by some personal advantage to perform good work for the benefit of the totality.

The good work performed by the scavengers may be thus summed up. If dead bodies and the refuse of food were left about everywhere freely on the open, germs of disease and putrefaction would fly about much more commonly than even at present. But a large number of scavenger animals, scavenger birds, and scavenger insects—hyenas, vultures, burying beetles, and so forth—act as public servants to prevent this calamity. Again, the earth needs the bodies and the refuse as fertilizers: and many of the scavengers carry down such materials into the first layer of the soil, where they become of enormous use in promoting the freer growth of vegetation. Thus, long before men learnt to bury their dead or to manure their fields, nature had invented both these processes, and registered them, so to speak, in the instincts and habits of a special class of insect sextons and sanitary inspectors. It is always so in life. There is hardly a human trade or a human activity which does not find its counterpart somewhere in animal or vegetable life: and it will be my object, in future numbers of these papers, to set before you in other directions some such natural anticipations or foreshadowings of man's inventions.